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1999년도
제 18차 대한신경과학회
추계학술대회 초록집

□ 일시 : 1999년 10월 28~29일
□ 장소 : 서울교육문화회관
□ 주최 : 대한신경과학회 학술위원회
□ 주관 : 대한신경과학회

대한신경과학회

대한신경과학회지 제17권 제2호 [189~332] 1999년 3월

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장소 : 서울교육문화회관

회　　장 : 이 대 희 교수

이 사 장 : 최 일 생 교수

부이사장 : 김 범 생 교수

학술이사 : 이 병 철 교수

간행이사 : 김 주 한 교수

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총무이사 : 김 승 민 교수

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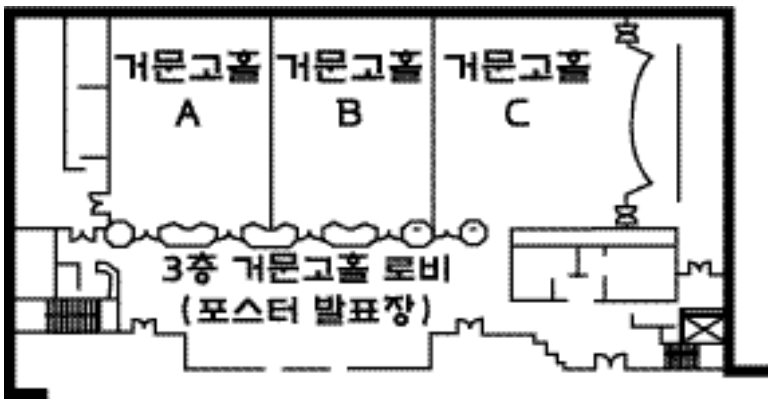
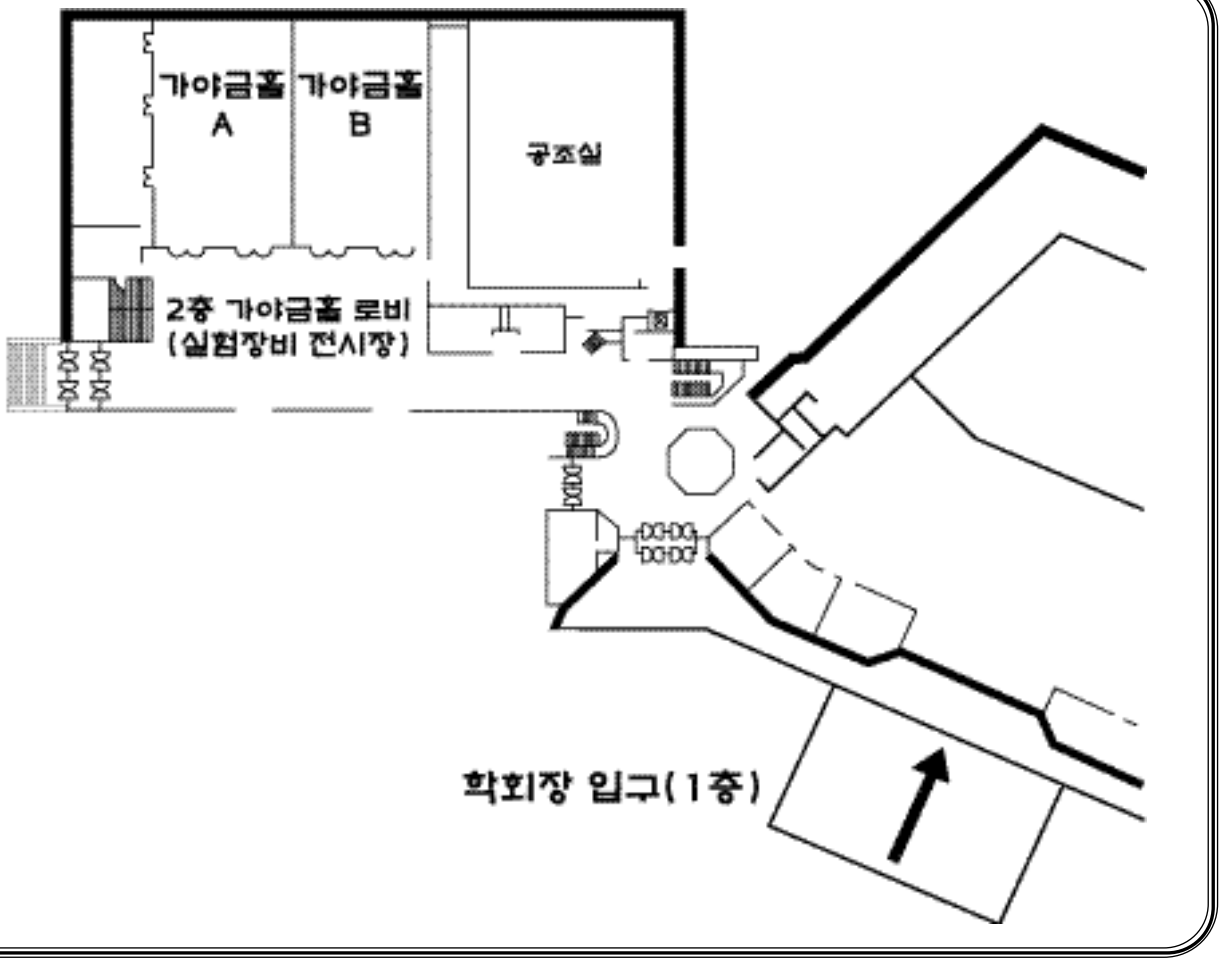
섐 학술발표장소 안내도 섐





추계학술대회 일정표

10월 28일 ~ 29일
서울교육문화회관

제1 일 (10월 28일)

PM 1:30 - PM 2:15	개회식 초청강의	가야금	「한글바로쓰기」 임재훈 교수 (삼성서울병원 진단방사선과)
PM 2:15 ~ PM 3:15	구연 I	가야금거문고A B	
PM 3:15 ~ PM 3:30	Coffee Break		
PM 3:30 ~ PM 4:30	구연 II	가야금거문고A B	
PM 4:30 ~ PM 6:30	Poster I	거문고C	
PM 6:30	Dinner Party	가야금	
PM 7:30 ~ PM 9:00	After Dinner Session	거문고A	간행위원회 주관

제2 일 (10월 29일)

AM 8:00 ~ AM 9:00	구연III	가야금 거문고A B	
AM 9:00 ~ AM 10:00	구연IV	가야금 거문고A B	
AM 10:00 ~ AM 10:15	Coffee Break		
AM 10:15 ~ AM 11:15	구연 V	가야금 거문고A B	
AM 11:15 ~ PM 12:15	특강	가야금	Recent Advances in Alzheimer's Disease Research 김승업교수 (아주의대 뇌질환연구센타)
PM 12:15 ~ PM 1:30	점심	가야금	
PM 1:30 ~ PM 3:30	Poster II	거문고C	
PM 3:30 ~ PM 3:45	Coffee Break		
PM 3:45 ~ PM 4:45	구연VI	가야금 거문고A B	
PM 4:45 ~ PM 5:45	구연VII	가야금 거문고A B	
PM 6:00	폐회식		
PM 7:30 ~ PM 9:00	After Dinner Session	거문고A	치매연구회주관

학술대회 연제발표

1999년 10월 28일

Scientific Session Ⅰ (PM 2:15 ~ PM 3:15)

가야금	거문고A	거문고B
Cerebrovascular Disease Ⅰ 노재규교수 신현길교수	Muscle & Nerve Disease Ⅰ 이광우교수 김승민교수	Epilepsy Ⅰ 이병인교수 김주한교수

Scientific Session Ⅱ (PM 3:30 ~ PM 4:30)

가야금	거문고A	거문고B
Cerebrovascular Disease Ⅱ 김종성교수 조기현교수	Muscle & Nerve Disease Ⅱ 선우일남교수 권기한교수	Epilepsy Ⅱ 홍승봉교수 김장성교수

Poster Session Ⅰ (PM 4:30 - PM 6:30)

P 01 - P 15	정 대 수 교수
P 16 - P 30	유 경 무 교수
P 31 - P 45	나 정 호 교수
P 46 - P 60	허 지 회 교수
P 61 - P 75	서 만 욱 교수
P 76 - P 90	어 경 윤 교수
P 91 - P 105	나 덕 렬 교수
P 106 - P 114	이 상 건 교수

1999년 10월 29일

Scientific Session Ⅲ (AM 8:00 ~ AM 9:00)

가야금	거문고A	거문고B
Movement Disorder Ⅰ 이명종교수 이명식교수	Cerebrovascular Disease Ⅲ 고재영교수 임병훈교수	Neurophysiology Ⅰ 이상복교수 하정상교수

Scientific Session **IV**(AM 9:00 ~ AM 10:00)

가야금	거문고A	거문고B
Movement Disorder **II** 최일생교수 전범석교수	Cerebrovascular Disease **IV** 이광호교수 윤병우교수	Neurophysiology **II** 서정규교수 김승현교수

Scientific Session **V** (AM10:15 - AM 11:15)

가야금	거문고A	거문고B
Movement Disorder **III** 김재우교수 하충건교수	Cerebrovascular Disease **V** 김영현교수 정진상교수	Neurophysiology **III** 박규현교수 정근호교수

Scientific Session **VI**(PM 3:45 ~ PM 4:45)

가야금	거문고A	거문고B
Cerebrovascular Disease **VI** 김명호교수 이병철교수	Headache & Others 정경천교수 최경규교수	Epilepsy **III** 박영춘교수 이상암교수

Scientific Session **VII**(PM 4:45 - PM 5:45)

가야금	거문고A	거문고B
Systemic Disease 박성호교수 이광수교수	Behavioral Neurology Dementia 김범생교수 한설희교수	Epilepsy **IV** 이상도교수 허균교수

Poster Session **II** (PM 1:30 ~ PM 3:30)

P 01 - P 15	손 영 호 교수
P 16 - P 30	정 원 영 교수
P 31 - P 45	이 동 국 교수
P 46 - P 60	김 광 국 교수
P 61 - P 75	허 경 교수
P 76 - P 90	권 오 상 교수
P 91 - P 105	김 두 응 교수
P 106 - P 113	김 재 문 교수

钝钝钝钝 특 강 钝钝钝钝

한글바로쓰기 : 임 재훈 교수

삼성서울병원 진단방사선과

10월 28일 1 : 30 p.m. ~ 2 : 15 p.m. (좌장 : 이대희 교수)

钝钝钝钝 초청 강의 钝钝钝钝

Recent advances in Altzheimer's Disease Research

김승업 교수

아주의대 뇌질환 연구센타

10월 29일 11 : 15 a.m. ~ 12 : 15 p.m. (좌장 : 이상복 교수)

「 한글바로쓰기 」

삼성서울병원 진단방사선과

임 재 훈 교수

(좌장 : **이 대 희** 교수)

10월 28일 1 : 30 p.m. ~ 2 : 15 p.m.

특 강

대한신경과학회 추계학술대회 i ~ iii, 1999 ISSN 1225-7044

한글 논문 바로 쓰기

성균관대학교 의과대학 삼성서울병원 진단방사선과

임 재 훈

Ⅰ. 머리말

논문의 목적이 연구한 바를 글로 표현하여 남에게 발표하는 것이라면 그 논문이 독자에게 읽혀져야 본래의 목적을 달성할 수 있을 것이다. 정보의 홍수 속에 살고 있는 독자들의 주의를 끌지 못하는 논문은 읽혀지지 않고 그대로 사장될 것이며 그러한 논문을 쓰는 것은 저자나 독자의 시간과 경제적인 낭비일 뿐이다. 논문 중에는 연구업적이 훌륭함에도 불구하고 원고작성이 서툴어 인기가 없는 논문이 되고 결국 읽혀지지 않고 있음은 안타까운 일이다. 나는 이 글에서 연구결과를 정확하고 조리있게 정리하고 표현하여 주장하는 바를 논리정연하게 서술하는 한글 논문 쓰기 요령에 대하여 써 봤다.

좋은 글의 요건에는 1) 내용이 충실할 것, 2) 독창적일 것, 3) 정성이 담겨 있을 것, 4) 명료할 것, 5) 표현이 경제적일 것, 6) 말하는 바가 일관될 것, 7) 구성이 치밀할 것 등이 있다. 글에 따라서는 어떤 점이 더 중요할 수 있다. 사사로운 편지에는 정성이 내용의 충실성보다 더 중요하고, 시나 소설 같은 문예문에는 독창성이 중요하며, 학회지에 게재되는 논문의 글은 정확하고 명료함이 더 중요하다. 학회지에 실리는 논문을 읽으며 필자가 느낀 점으로 문장과 글이 쓸데없이 길고, 서툰 표현, 일본말의 잔재, 필요없는 한자어 같은 것이 많다. 명료한 글이 되려면 논리가 있어야 하고 글도 쉽고 간결하여 누구나 알기 쉽게 써야 한다. 좋은 내용의 연구가 문장표현이 서툴고 논리와 어법이 맞지 않고 쓸데없이 장황하게 글을 늘어놓아 길고 애매하여 무슨 내용인지 몰라 결국 읽히지 않는 경우가 얼마나 많은가?

Ⅱ. 논문을 쓰기 전에

경험있는 저자는 논문을 쓰기 전에 2가지 사항-논문의 목적과 그 논문을 읽는 독자에 대하여 많은 시간을 할애한다. 논문을 쓰는 목적이 무엇인가? 왜 논문을 쓰는가? 많은 저자들이 이것을 깊이 생각하지 않고 단순히 논문을 써 내야 된다는 의무감에서, 또는 어떤 자격을 갖추기 위하여 논문을 쓰기 때문에 남이 이루어 놓은 연구나 성적을 모방하거나 적당히 바꾸어 놓은 경우가 적지 않다. 논문은 아무리 적은 것이라도 새로운 사실을 발표할 수 있는 것이라야 한다.

또한 논문을 읽는 독자는 누구인가, 저자는 독자에 대하여 얼마나 알고 있는가를 신중히 생각하여야 한다. 대중잡지에 과학적인 용어로 전문적인 내용을 발표한다든지, 반대로 누구나 다 잘 알고 있는 사실을 전문잡지에 장황하게 늘어 놓는다든지, 또는 대한신경과학회지에 내과나 외과 내용에 대하여만 발표한다면 독자는 곧 흥미를 잃게 되어 논문은 전혀 읽혀지지 않는다. 독자가 무엇을 얼마나 알고 있는가, 무엇을 원하고 있는가, 관심이 무엇인가 등을 고려하여 독자의 흥미를 끌 수 있는 논문을 작성하여야 한다.

Ⅲ. 문장과 단락의 기능과 글의 전개

글은 기·승·전·결의 사대기능을 가진 단락 (paragraph) 으로 나눌 수 있고 단락은 다시 기·승·전·결의 기능을 가진 문장 (sentences) 으로 나눌 수 있다. 기 (introducers) 는 그 단락 또는 글 전체의 주제를 제시하며, 승 (developers) 은 제기한 주제를 설명하는 여러가지 자세한 면을 기술하며, 전 (modulators) 은 여러 강의를 결론으로 이끌기 위한 전환을, 결 (terminators) 은 위에서 논의한 주제를 논리적으로 정리하여 결론을 맺는 기능이다. 논문도 기승전결에 해당하는 서론, 연구방법 및 결과, 고찰과 결론으로 나누어지지 않는가. 모든 단락이나 글이 사요소를 갖는 것은 아니나 잘 쓰여진 단락이나 글의 대부분은 이러한 사대기능의 문장과 단락으로 구성된다 (이 단락은 기·승·전·결의 대문장으로 구성됨).

단락의 전개는 어떤 사상을 독자가 이해하기 쉽게 서술한다. 전개방식은 구체적 사항이나 예의 나열, 비교나 대조, 정의와 분류, 시간과 공간에 따른 상황전개, 원인과 결과 등을 중심으로 전개할 수 있다. 어떤 틀에 꼭 매일 필요는 없으나 문장과 단락을 기능별로 혹은 사상별로 나누어 글에 담긴 내용을 명쾌하게 파악할 수 있도록 해야 한다.

문장은 가능한 한 짧게 쓰는 것이 좋은데 짧은 글이 독자에게 쉽게 뜻을 전할 수 있기 때문이다. 긴 글을 쓰는 경우에는 숙련이 필요하고 구문상 잘못이 생기기 쉽고 전체의 뜻을 파악하기 어렵게 된다. 이 때는 논리적 순서로 적당한 연결어 (와, 그리고, 그러나 등) 로 묶어 글의 맥락 (coherence) 에 주의해야 혼란이 생기거나 뜻이 애매해지는 것을 막을 수 있다. 또한 한 개의 글속에 담긴 사상은 오직 한 개이어야 한다. 여러 사항이 포함되어 있는 경우에도 그 사항들이 모두 중심사상을 나타내는데 이용되어 전체의 사상이 통일되어 독자에게 유기체로서의 인상을 줄 필요가 있다. 과학논문의 전개는 수식어를 적게 쓰고 간결하게 하여 독자가 주장하고 싶은 한가지 사상을 직설적으로 표현해야 읽기 쉽다.

글은 논리정연해야 독자들로부터 좋은 평을 받을 수 있다. 문장이나 단락의 기능을 무시하고 뒤죽박죽 쓰거나 문장마다 새로 시작하여 무엇이 문장이고 무엇이 단락인지 알 수 없는 경우가 많다. 각 기능을 갖는 문장이 모여 단락이 되고 단락이 모여 하나의 글이 되는 것을 잊지 말아야 한다 (이 글은 기·승·전·결에 해당하는 단락들로 구성됨).

IV. 글의 경제

논문 중에는 문장이 필요없이 길고 문법에 맞지 않는 수동형의 글이 많다. 글은 필요한 단어를 필요한 만큼만 써서 짧게 써야 뜻이 정확하고 명료하다. 불필요한 단어나 문장을 길게 늘어 놓으면 글 뜻이 모호하게 된다. 다음 두 글을 비교하여 보자.

"나는 내가 이러한 종류의 글을 쓰고 있는 동안에 이 글을 읽는 학회회원들이 이 글을 읽고 난 다음, 글의 경제성에 대하여 심각히 생각하여 앞으로는 논문을 쓰는데 간단명료하게 경제적으로 글을 써서 학회지가 훨씬 얇아지게 되고 그만큼 학회지 발행비용이 절약되어 학회의 예산도 절감하고 저자가 게재료도 많이 내지 않게 되어 학회의 재정이나 저자의 주머니 사정도 나아질 것이라는 것은 은연중 생각하고 있는 것이다."

"나는 이 글을 쓰면서 학회회원들이 이 글을 읽은 후에는 논문의 글을 경제적으로 간단명료하게 쓰게 되어, 학회지가 얇아지고 그만큼 발행비용이 절약되어 학회와 저자의 재정적 부담이 줄어들 것이라고 생각한다."

첫 글보다 다음 글이 훨씬 간결하고 뜻이 명료하다.

"학회지에 게재되어지고 이는 논문이나 판독보고서에 쓰여지고 있는 글 중 비경제적으로 기술되어지고 있는 글의 문제점은 문법에 맞지 않는 수동형이 쓸데없이 많이 쓰여지고 있다는 것이다. 우리말은 수동형이 그리 발달되어지지 않은 언어이지만 실제 논문이나 판독보고서에 사용되어지고 있는 대부분의 글이 수동으로 끝이 맺어지고 있다. 따라서 글이 쓸데없이 길어지게 되고 뜻이 모호해지고 있다. 이것은 아마도 영어문법 교육의 탓이 아닌가 싶어진다."

이 글에서는 쓸데없이 수동형을 많이 이용하였다. 다음과 같이 쓰는 것이 훨씬 짧고 이해하기 쉽다.

"학회지 논문이나 판독보고서의 글에는 문법에 맞지 않는 수동형의 글이 많다. 우리말은 수동형이 그리 발달되지 않은 언어이나 실제 대부분의 글이 수동으로 끝을 맺는다. 따라서 쓸데없이 길고 뜻이 모호하다. 아마 영어문법 교육의 탓이 아닌가 싶다."

우리가 의식하지 못하고 말하고 쓰는 글에는 너무나 많은 수동형을 발견할 수 있다. "간이 커져 있다."보다는 "간이 크다"가 더 낫고, "암의 소견이 보이지 않고 있다."보다는 "암의 소견이 없다"가 더 좋다. "종괴가 관찰되어지고 있다"는 "종괴가 보인다"로, "종괴를 보여주고 있다"는 "종괴가 있다"로 쓸 수 있다.

또 "...되다"만으로도 수동이 되는데, 한번 더 수동태로 만들어 "...로 되어지다"로 (중복수동) 으로 쓰는 수도 많다. 다른 예로서 "생각되어지고 있다", "관찰되어진다", "종괴가 보여지고 있다" 등은 "생각된다", "관찰된다", 그리고 "종괴가 보인다"로 고치면 훨씬 짧고 뜻도 명백하다.

엎친데 덮친격으로 진행형과 완료형의 문장도 너무 많다. "보고되고 있다", "보고되어지고 있다", "보고되어져 왔다" 등.

파스칼은 친구에게 보낸 긴 편지에서 "시간이 없어서 편지가 길어졌네"라고 썼다 한다. 시간을 많이 들여 생각하고 다듬어서 글을 짧게 써 보자.

V. 논문의 문장표현

학회지에 실리는 논문에는 어색하거나 필요없는 표현, 쓸데없거나 잘못된 글, 또는 표현이 적절치 않아 뜻을 알 수 없는 글도 있다. 무분별한 외국어, 외국어와 우리말의 섞어 쓰기, 상스러운 낱말과 글, 잘못된 용어와 표현이 전문학술지에 그대로 쓰인다. 학회지에 실리는 논문 중에 흔히 보는 잘못된 문장표현을 나누어 열거하였고, 좋은 표현이라고 생각한 것을 옆에 써 보았다. 학술용어는 학회나 의학협회에서 따로 일을 하므로 빼었으며 따라서 학술용어가 아닌 문장표현만을 다루었다. 필자가 이 방면의 전문가도 아니고 능통하지도 않으므로 제시하는 표현이 반드시 좋다거나, 옳다고도 할 수 없으므로 그러한 잘못된 표현은 독자들이 지적하여 더 좋은 것으로 다듬는 일이 필요하다. 다만 잘못된 표현이 있다는 것을 알고 이런 방면에 관심을 갖게 하는 것이 이 글을 쓰는 목적이다.

1. 비과학적 표현을 쓰지 말자.

조영되고 있는 것 같다. · · · · · 조영된다.
관찰되고 있는 것 같다. · · · · · 관찰된다. 보인다.

2. 필요없는 수동태 문장은 피하자.

생각되어지고 있다. · · · · · 생각된다.
관찰되어지고 있다. · · · · · 관찰된다.
보여주었다. · · · · · 보였다.
-㎝로 측정되었다. · · · · · -㎝이었다.
종괴가 발견되었다. · · · · · 종괴가 있었다.

3. 쓸데없는 현학적 표현을 쓰지 말자.

방법론 · · · · · 방법
통계학적으로 · · · · · 통계적으로
수술적 치료 · · · · · 수술
방사선학적 소견 · · · · · 방사선 소견

4. 쓸데없이 긴 문장을 짧게 줄이자.

상당히 낮은 음영을 보이고 · · · · · 음영이 상당히 낮고
결과를 나타냄을 알 수 있다 · · · · · 결과를 나타낸다
경험 축적이 요구된다 · · · · · 경험이 필요하다
암은 없는 것으로 알고 있다 · · · · · 암은 없다
보고하는 바이다 · · · · · 보고한다
CT는 높은 해상력을 갖고 있어 · · · · · CT는 해상력이 높아

5. 일본식 표현

1) · · · · · 에 있어서
논문을 쓰는데 있어서 → 논문을 쓰는데
그에게 있어서 논문은 목숨과 같다 → 그에게 논문은 · · · · ·

회사경영에 있어서의 → 회사경영에
2) ·····의, 와의, 과의, 에의 (으) 로의, 에서의
나의 살던 고향은 꽃피는 산골 → 내가 살던 고향은 꽃피는 산골
논문의 최대의 장점은 → 논문의 최대장점은
우리의 말과 글 → 우리 말과 글
서울까지의 거리는 → 서울까지 거리는
대통령과의 만남 → 대통령과 만남
남한과의 교류를 통하여 → 남한과 교류를 통해서
국민회의와의 무조건 통합 → 국민회의와 무조건 통합
가을로의 초대 → 가을로 초대
일본말 공해로부터의 해방 → 일본말 공해로부터 해방
보다 빨리, 보다 높이, 보다 힘차게 → 더 빨리, 더 높이, 더 힘차게

6. 영어영향을 없애자

1) 수동형
2) 영어의 완료시제 -"없었다"
보고되었었다 → 보고되었다
보고되어져 왔다 → 보고되었다
관심을 모았었다 → 관심을 모았다
진작 시작했었더라면 → 진작 시작했더라면
(참여했었다 → 참여한 경험이 있다고 할 때는 옳은 표현)
3) 영어말
레크리에이션 → 오락
오리엔테이션 → 예비교육
이미지 → 심상
장르 → 갈래
매스미디어 → 대중매체
가이드 → 안내
4) 특성을 갖는다 (have a characteristics) → 특성이 있다
한 잔의 커피 (a cup of coffee) → 커피 한 잔

7. 되도록이면 한자말 사용을 줄이자

1) 혹은 → 또는
증가할 → 늘어날
이외에도 → 이밖에도
유발시키다 → 일으키다
우월하다 → 낫다
열등하다 → 못하다
촉지된다 → 만져진다
카테타를 대동맥에 위치시킨다 → 놓는다, 넣는다, 삽입한다
시행하다 → 하다
2) 특히 뜻도 잘 안 통하는 한자말은 쉬운 한글로 쓰자
일측성 불현신 → 한쪽 콩팥(신장)이 안 보임
배액하다 → 뽑다
세절하여 → 잘게 잘라
3) 비 (鼻), 구 (口), 악 (顎) → 코, 입, 턱
4) "유아를 앙와위 (仰臥位)로 눕히고 검측 (儉側) 고관절은 90。굴곡, 슬관절은 완전 굴곡시킨 다음 술자의 중지(中指)는 대전자상에, 무지는 대퇴내측에 ....."
"젖먹이 아이를 반듯하게 눕히고 검사하는 쪽 엉치 관절은 90。굽히고, 무릎 관절은 완전히 굽인 다음 검사하는 사람의 가운데 손가락은 큰 대퇴돌기에 엄지 손가락은 넙적다리 안쪽에."

VI. 술어(학술용어)의 사용

1. 적절한 번역어가 없는 의학용어, 고유명사, 약품명, 단위 등은 원어를 그대로 사용한다. 한글용어가 있으나 의미전달이 명확치 않은 경우에는 그 용어가 최초로 등장할 때 한글용어 (번역어) 다음에 괄호속에 원어로 표기하고 그 이후로는 한글용어만 사용한다. 영문 약어는 최소로 사용하며 최초 사용때 원어를 풀어서 표기한 후 괄호안에 약어를 쓴다. CT, MR 같이 이미 그 자체로 용어가 된 경우는 그대로 약어를 쓴다.

2. 한자로 구성된 용어는 띄어쓰지 않고 붙여 쓴다. 다만 합성어로 된 긴 용어만 중간에 띄어 쓴다. 술어도 한글로 써야 하지만 특히 술어아닌 것도 영어로 쓰는 것은 옳지 않다.

3. Routinly하는 procedure를 skip하지 말자 → 늘하는 절차를 건너뛰지 말자

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「Recent Advances in Altzheimer's Disease Research」

아주의대 뇌질환 연구센타

김 승 업 교수

(좌장 : 이 상 복 교수)

10월 29일 11 : 15 a.m. ~ 12 : 15 p.m.

초 청 강 의

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알츠하이머병 연구의 최근 동향

아주대학교 의과대학 뇌질환연구센터 의과학연구소 소장

김 승 업

빠른 경제적 성장을 이룬 우리나라의 경우 노인인구의 증가로 인해 고령화사회로 급격히 이행해가고 있으나 이에 대한 복지대책이 매우 미흡한 실정이다. 가장 문제가 되는 것이 알츠하이머병으로 대표되는 노인성치매이다. 현재 알츠하이머병으로 인한 사회적, 경제적 부담은 매우 크며 매해 증가하는 추세를 보이고 있다.

알츠하이머성 치매 (Alzheimer disease, AD) 는 유전자 변이에의하여 발병하는 가족성 알츠하이머병 (familial AD, FAD) 과 그 원인이 아직 파악되지 않은 산발성 알츠하이머병 (sporadic AD, SAD) 으로 나눌 수 있다. FAD의 경우는 전체 AD환자의 5~10%이고 나머지는 SAD 환자이다. FAD의 원인 유전자로는 염색체 14번에 위치한 프리시니린 1 (PS1) 유전자, 염색체 21번에 위치한 아밀로이드 전구단백질 (APP) 유전자, 염색체 1번에 위치한 프리시니린 2 (PS2) 유전자가 있다. 이들 세 유전인자 중 하나에라도 돌연변이가 생겼을 경우 AD로 진전을 하게 되는데, PS1의 돌연변이에의한 FAD 환자가 가장 많이 보고되어져 있는 상태이다. 이러한 FAD의 특징은 SAD에 비하여 그 발병시기가 이른 것으로 40세에서 60세 사이에 발병하게 되며 아직까지 보고되어진 가장 빠른 발병연령은 28세이다.

노령의 65세 이상에서 많이 나타나는 SAD의 경우는 그 정확한 원인이 알려져 있지 않으며 전체 AD 환자의 대부분을 차지하고 있으므로 그 원인을 찾는 것이 무엇 보다 중요하다. AD연구자들은 아직 원인 유전인자를 찾아내지 못하였으나 SAD환자의 많은 부분이 유전적 소인에 의하여 발병할 것이라 생각하고 있다. SAD와 관련이 되었다고 알려진 위험인자로는 염색체 19번에 위치한 아포단백질 (apoprotein E, ApoE) 와 염색체 12번에 위치한 알파 2-매크로글로블린 (α2-macroglobulin, a2M) 이 있다. 이러한 유전인자들에서 돌연변이가 일어났다 하여 AD로 진전하는 것이 아니라 AD에 걸릴 확률이 높아진다고 하여 위험인자 (risk factor) 라고 한다. 아포E의 경우 ε2, ε3, ε4 중 ε4가 이상이 있으면 AD에 걸릴 확률이 높아짐을 알 수 있다. 흥미롭게도 FAD나 SAD의 경우 모두 베타아밀로이드라는 독성 단백질의 과다침착이 AD 환자의 뇌에서 공통으로 나타나므로 이러한 베타아밀로이드가 AD를 발병시키는 주요 원인물질중의 하나라고 생각되어지고 있다.

노인성치매의 특징은 만성적이라는 것이다. 따라서 노인성치매 환자들을 수용하고 보호하는 차원의 수동적인 대책으로는 점점 증가하는 비용을 도저히 감당할 수 없을 것이다. 지금까지 FDA의 승인을 얻은 알츠하이머성 노인성 치매 치료제는 아세틸콜린의 분해를 막는 아세틸콜린에스테레이즈 (acetyl cholinesterase) 억제제인 테크린과 아리셉트/엑셀론이 있으며 항산화제로서 치매 치료효과가 있다고 보고되어진 비타민 E가 임상실험중에 있다. 최근에 유력한 치료제 후보로서 AD발병의 원인물질이라고 생각되는 베타아밀로이드의 생성을 막는 감마 시크리테이즈 저해제가 개발중에 있으나 그 효과는 아직 검증되어지지 않은 상태이다.

Scientific Session Ⅰ (2:15 p.m. ~ 3:15 p.m.)

가 야 금

1	Comparison of Risk Factors between Lacunar Infarction and Intracerebral Hemorrhage	계명의대 이 장 준
2	The Predictive Value of Triphasic Perfusion CT for the Development of Severe Brain Edema in Acute Ischemic Stroke	삼성의료원 이 수 주
3	Post-stroke depression and emotional incontinence: correlation with lesion location	서울중앙병원 김 종 성
4	Yonsei Stroke Registry: Analysis of 1,000 Cases	연세의대 이 병 인
5	Seasonal variation of monthly admissions and mortality in stroke	한양의대 정 상 준

거 문 고 A

1	Sural/Ulnar Amplitude Ratio as a Useful Indicator of Mild Polyneuropathy	삼성의료원 문 희 수
2	Clinical characteristics of the patient with mononeuropathy multiplex	서울의대 박 경 석
3	Tomaculous neuropathy with and without chromosome 17p11.2-p12 deletions	연세의대 김 승 민
4	Clinical patterns and electrophysiologic study in Guillain-Barre syndrome	한림의대 백 기 훈
5	Conduction Block in Neuropathy with Diabetes Mellitus	한림의대 권 석 범

거 문 고 B

1	The Effect of Public Educational Campaign on Changing Negative Attitudes Toward Epilepsy	전남의대 김 명 규
2	A Comparison of Midazolam & Thiopental sodium in Refractory Status Epilepticus (RSE)	충남의대 방 선 웅
3	Visual System Dysfunction In Epileptic Patients With Vigabatrin Treatment	한림의대 김 성 민
4	Drug eruptions associated with conventional antiepileptic drugs	한양의대 정 부
5	Analysis of Status Epilepticus by Time to Respond Treatment	연세의대 김 서 현

Scientific Session Ⅱ (3:30 p.m. ~ 4:30 p.m.)

가 야 금

1	Progressive Lacunar Infarction	경상의대 최 낙 천
2	Usefulness of Triphasic Perfusion CT for Intravenous Thrombolysis with Tissue Plasminogen Activator in Acute Ischemic Stroke	삼성의료원 이 광 호
3	Presentation Time to Hospital and Recognition of Stroke in Patients with Ischemic Stroke Effect of Public Education	연세의대 허 지 회
4	Comparison of Diffusion Weighted MRI & Tc99m-ECD SPECT with subsequent clinical score in acute ischemic stroke	전남의대 황 인 용
5	Basilar Artery Dolichoectasia in pontine infarction	충남의대 김 제

거 문 고 A

1	Axonal Stimulation Single Fiber Electromyography Findings in Myasthenia Gravis	부산의대 김 대 성
2	Comparison of median nerve conduction study between symptomatic and asymptomatic carpal tunnel syndrome with diabetes mellitus	분당제생병원 권 순 희
3	Changes in Cortical Excitability and Conductivity of Amyotrophic Lateral Sclerosis	삼성의료원 김 병 준
4	Organophosphate Cholinesterase inhibitor, Diisopropylfluorophosphate Induces Acetylcholinesterase-mediated Nicotinic Receptor Facilitation	서울의대 성 정 준
5	Strategy for repetitive nerve stimulation test in myasthenia gravis and myasthenic syndrome	연세의대 서 범 천

거 문 고 B

1	Effects of Tailored Anterior Temporal Lobectomy on Intelligence and Memory Function	계명의대 김 진 석
2	Radial Surface Rendering of Brain MRI in Localizing Epileptic Focus	삼성의료원 태 우 석
3	The Clinical features, EEG findings and Surgical outcome of Extratemporal lobe epilepsy ; Experience in Asan Medical Center	서울중앙병원 강 중 구
4	Sphenoidal Electrode for Localization of Temporal Lobe Seizure Focus	서울중앙병원 곽 규 환
5	Supplementary Sensorimotor Area Seizures : Video-EEG Monitoring and Surgical Outcome Experience in Asan Medical Center	서울중앙병원 김 지 현

Poster Session Ⅰ (4:30 p.m. ~ 6:30 p.m.)

거 문 고 C

01	Simple digital EEG system utilizing analog EEG machine	대전선병원 정 기 영
02	Independent component analysis for EOG artifact removal in EEG	인하의대 심 용 수
03	The Changes of Cerebral Hemodynamic Properties in the patients with Hyperthyroidism	충남의대 송 희 정
04	Motor Evoked Potentials in Motor Neuron Disease	서울의대 최 원 준
05	Clinical and electrophysiological features in motor neuron disease	서울의대 조 중 양
06	Single Focal Cerebral Lesions with Shortened Silent Period	중앙의대 박 태 환
07	Two cases of Anorexia nervosa with peripheral neuropathy	서울의대 김 한 준
08	Characterisitc Electrophysiological Findings at Cervico-thoracic Spinal Cord Infarct	서울중앙병원 김 광 국
09	NCV of Median Proper Palmar Digital Nerve Recorded by Bar Electrode	대구가톨릭의료원 곽 규 호
10	Visual working memory revealed by repetitive transcranial magnetic stimulation	서울의대 송 은 철
11	Ophthalmoplegic Migraine with Reversible Enhancement of the Intraparenchymal Abducens Nerve on MRI	경희의대 이 형 길
12	Symmetry of Normal Nerve Conduction Studies	충북의대 이 상 수
13	Normalization of middle cerebral artery velocities using TCD after aneurysmal clipping in aneurysmal SAH - Preliminary study -	원주기독병원 이 지 용
14	Transcranial Doppler Diagnosis of Chronic Middle Cerebral Artery Occlusion	서울의대 이 정 주
15	Radiation-induced Moyamoya Disease	한림의대 배 종 석
16	Diffusion-Weighted MRI in Wallerian Degeneration	서울의대 김 남 희

17	Correlation between Hemocrit and Cerebral Blood Flow Velocity Measured by Transcranial Doppler in Iron Deficiency Anemia	서울의대 고 상 배
18	Moyamoya disease presenting with limb shaking transient ischemic attack	서울의대 송 영 목
19	A Case of Pure Primary Medullary Hemorrhage	한국보훈병원 하 현 욱
20	Acetazolamide-TCD in Unilateral Internal Carotid Artery Disease focus on the blood flow velocity change in the non-lesional hemisphere	서울의대 김 동 억 서울의대 윤 병 우
21	Evolving Fashion of Delayed infarction Following Mild Focal Brain Ischemia in Rats	
22	Patterns of Transcranial Doppler Ultrasound in Vertebrobasilar Intracranial Steno-occlusion: Significance of Bidirectional or Reversed Flow	서울의대 박 경 일
23	Risk factors of Leukoaraiosis in Patients with Lacunar Infarction	계명의대 강 봉 구
24	Complications of cerebral angiography in ischemic stroke	연세의대 이 경 열
25	Characteristics of Patent Foramen Ovale Associated with ischemic stroke	계명의대 최 승 호
26	Protein C and Ischemic Stroke.	계명의대 최 종 환
27	White matter hyperintensities on MRI in diabetic patients with acute stroke	이화의대 유 현 정
28	Acute Cerebral Infarction in Congestive Heart Failure	계명의대 김 광 덕
29	Precipitating Events and Risk factors of Hemodynamic Stroke	계명의대 권 오 대
30	“Effect of glucose/oxygen deprivation on synapsin 1, syntaxin and SNAP-25 in rat hippocampal slices”	이화의대 박 은 미
31	Comparison of the hemodynamic risk factors between border zone infarction and lacunar infarction	전남의대 최 성 민
32	Intracerebral hemorrhage after evacuation of chronic subdural hematoma	한림의대 손 종 희
33	Unusual Pattern of Steal Phenomenon due to Isolated Bracheocephalic Trunk Stenosis	한림의대 이 일 형
34	Malignancy induced cerebral infarcts -A Case Report-	경북의대 박 희 천
35	A case of vertical gaze palsy associated with a unilateral infarct in the midbrain on MR imaging	국립의료원 박 희 정
36	Effects of 7-Nitroindazole on Delayed Neuronal Damage of Hippocampus in Transient Global Ischemia Model of Gerbil	이화의대 조 은 경
37	Secondary vascular events after primary intracerebral hemorrhage	가톨릭의대 정 태 익
38	Dysphagia and Aspiration following unilateral hemispheric stroke	한양의대 박 춘 강
39	Coexistence of acute ischemic stroke and peripheral vascular disease : A Preliminary Report	경희의대 성 강 주
40	Hypertrophic Olivary Degeneration after Cerebellar or Brain Stem Hemorrhage	대구가톨릭의료원 서 상 일
41	**중대뇌동맥영역의 뇌경색 환자에서의 장기예후에 영향을 미치는 요인과 사망원인**	조선의대 정 원 영
42	A case of dural arteriovenous malformation treated by combined transvascular embolization and surgical ligation	가천의대 강 영 혜
43	Moyamoya disease and hemiplegic migraine: A case report	경희의대 오 재 욱
44	The acute phase response and the volume of stroke; retrospective study	가천의대 윤 창 본
45	Clinical and radiologic features of symptomatic small deep cerebral infarcts	경희의대 신 원 철
46	A Case of Acute Ischemic Stroke after Sildenafil Use	경희의대 노 용 우
47	Clinical analysis of chronic subdural hematoma	가톨릭의대 박 정 욱
48	Atherothrombotic Cerebellar Infarction: Vascular Lesion-Magnetic Resonance Imaging Correlation of 31 Cases	경북의대 민 왕 기
49	A Case of Thrombotic Thrombocytopenic Purpura(TTP) associated with Ticlopidine	아주의대 배 명 철
50	Clinical significance of diffusion weighted MR images in ischemic stroke	인제의대 김 진 태
51	Hypertensive Encephalopathy Associated with Occlusion of Visceral Arteries	순천향의대 조 동 신
52	Endogenous Plasminogen Activator Expression after Focal Cerebral Ischemia in Rats	순천향의대 이 보 람
53	Is It Transhemispheric Diaschisis?	가톨릭의대 이 정 욱

54	“MELAS : Clinical Correlations with MRI, MR Spectroscopy, and Acetazolamide Challenge SPECT”	순천향의대 정재훈
55	A Case of Deep Cerebral Venous Thrombosis Associated with Advanced Gastric Cancer	충남의대 이경목
56	Cerebrovascular Autoregulation and White Matter Lesion	가톨릭의대 이지연
57	The Clinical Features of Ischemic Stroke in Cancer Patients	연세의대 정연경
58	Predictive Factors Related to an Early Mortality in Acute Ischemic Stroke	연세의대 남효석
59	Acute Bilateral Cerebellar Infarcts in the Territory of Posterior Inferior Cerebellar Artery	서울의대 강동화
60	Central hypoventilation syndrome : Clinico-radiologic correlation	가톨릭의대 고석범
61	What factors will predict the recurrence of Ischemic stroke ?	한림의대 김현석
62	Diffusion MRI in Patients with Transient Ischemic Attacks	인제의대 정현정
63	Lobar Localization by Semiology and EEG in Localization - Related Epilepsy Patients with Normal MRI	아주의대 김장욱
64	A case of anterior cervical cord infarction associated with vertebral artery occlusion	동국의대 김욱년
65	Recurrent transient ischemia due to vertebral artery stenosis mimicking classical migraine	서울중앙병원 정종필
66	Dysphagia Following Pontine Stroke	삼성의료원 김향희
67	Clinical and Pathphysiological Characteristics of Transient Ischemic Attacks in Korean Patients	서울중앙병원 방 현
68	Effect of Duration of Ischemia and Body Temperature on Expression of Bcl-2 and Bax in Gerbil Global Ischemia	보라매병원 이용석
69	Apolipoprotein E Polymorphism in Korean Patient with ischemic stroke	고려의대 박문호
70	A Case of Proximal MCA Occlusion with Thrombocytosis of Uncertain Cause	중앙의대 오형근
71	Branch Atheromatous Disease : Alternative Stroke Subtype	인하의대 강사윤
72	Availability of Diffusion-weighted Magnetic Resonance Imaging in Patients with Transient Ischemic Attacks	삼성의료원 오경미
73	A Case of Sneddon’s syndrome	동아의대 최성호
74	The probability of mean flow velocities of TCD in the stenoocclusive disease of major cerebral arteries	서울중앙병원 류지연
75	Anterior Cerebral Artery Territory Infarction: Clinicoradiological Study	서울중앙병원 강석윤
76	The relationship between clinical presentation and angiographic characteristics in adult moyamoya disease patients	한림의대 박종호
77	Claude Syndrome caused by Paramedian Midbrain Infarction A Case	동강병원 강재영
78	Biswanger ’s disease associated with Alzheimer’s pathology (An Autopsy case)	을지의대 주성민
79	Isolated Cortical Venous Thrombosis without dural sinus involvement	고려의대 서우근
80	Prolonged exposure to EGF induces neuronal death in cortical culture	서울중앙병원 차유경
81	Middle Cerebral Artery Dissection as an Uncommon Cause of Ischemic Stroke in Middle Cerebral Artery Territory	중문의대 구본대
82	Elevation of Hepatic Enzymes during heparinization in Acute Stroke	고신의대 지광택
83	Changes of Magnetic Motor Evoked Potentials in Hemiparesis due to Cerebral lnfarction	고신의대 이주호
84	A Case of Transient Ischemic Attack associated with Scrub Typhus	원주기독병원 권준범
85	Mediation of BDNF-induced oxidative neuronal necrosis by the TrK-B signaling	서울중앙병원 김현정
86	Vertebrobasilar Insufficiency due to Cervical Spondylosis	중문의대 이종호
87	Two Cases of Concomitant Cerebral Infarction during Management of Intracerebral Hemorrhage: How to Manage the Cerebral Infarction?	경상의대 이연효
88	Clinical manifestation of spinal cord infarction	영동세브란스병원 양진우
89	Diagnosis and Monitoring of Acute Middle Cerebral Artery Occlusion with Transcranial Doppler Ultrasonography	삼성의료원 윤수진
90	Insulin-induced Oxidative Neuronal Injury in Cortical Culture	서울중앙병원 노경민

91	The Effects Of Demographic And Health Characteristics On Cognitive Function Among Rural Community Populations In Korea	서남대 남광병원 손 의 주
92	Clinical characteristics of patients admitted Yongin Hyoja Geriatric Hospital WITHDRAWAL	용인효자병원 곽 용 태
93	Unilateral Autotopagnosia due to Corpus Callosal Infarction : A New Disconnection Syndrome	이화의대 오 지 영
94	Effect of induced visual motion on line bisection performance in normal subjects	삼성의료원 손 영 철
95	Stroop Test : Its Localization and Correlation	서울의대 안 성 신
96	Two Cases of Primary Progressive Aphasia	조선의대 류 종 현
97	Hormone Replacement Therapy in Korean Women with Alzheimer's Disease	삼성의료원 윤 병 구
98	A case of antiphospholipid antibody syndrome (APAS)	영동세브란스병원 김 현 숙
99	A Case of Graphemic Buffer Agraphia in Sporadic OPCA	서울의대 김 광 기
100	A case of apraxic agraphia due to left parietal lobe infarction	충북의대 박 계 연
101	Comparison of Two Screening Tests in Dementia: The Mini-Mental State Examination (MMSE) and the Revised Hasegawa's Dementia Scale (HDS-R)	삼성의료원 강 연 욱
102	Systemic lupus erythematosus leukoencephalopathy	한림의대 김 대 훈
103	Hippocampal Neurodegeneration without Motor Deficits after Concussive-like Brain Injury in Apolipoprotein E-deficient Mice	충북의대 한 설 희
104	The Expression of Tcell A Receptor in Human Melanocytes as a Model System for the Study of Pathogenesis in Alzheimer Disease	순천향의대 조 상 걸
105	A Case of Primary Sj gren's Syndrome Mimicking Multiple Sclerosis	동아의대 김 종 국
106	"Effects of Lesion Site, Hippocampal Sclerosis, and Intelligence on Verbal and Visual Memory Performance"	삼성의료원 이 정 희
107	A Pilot Study on Relationship between Haptoglobin and Posttraumatic Epilepsy	순천향의대 송 안 욱
108	Epidemiologic study of unprovoked first seizure in Kang-Nam St. Mary's Hospital	가톨릭의대 김 혜 식
109	Effect of Intelligence on the Relationship Between Memory and Hippocampal Sclerosis	삼성의료원 류 경 희
110	A Case of Aphasic Status with Brain SPECT demonstrating Focal Hyperperfusion	삼성의료원 김 한 영
111	Newly-developed psychosis following temporal lobectomy: 2 cases	서울중앙병원 임 수 빈
112	**쥐에서 단발성 경련이 중첩성 경련에 미치는 영향**	가톨릭의대 김 지 훈
113	The value of multi-modality image registration in neocortical epilepsy surgery	삼성의료원 이 지 영
114	A Case of Non-convulsive Status Epilepticus Characterized by Ictal Hemiplegia	순천향의대 정 명 근

Scientific Session III(8:00 a.m. ~ 9:00 a.m.)

가 야 금

1	Clinical Analysis of Progression in Parkinson's disease	가톨릭의대 류 선 영
2	Amantadine as treatment for levodopa induced dyskinesia in Parkinson's disease	동아의대 정 재 익
3	123I-IPT SPECT in Parkinson's Disease and Multiple Systemic Atrophy	서울중앙병원 배 영 희
4	Clinico-anatomical parameters of thalamic infarction causing dyskinesias	영동세브란스병원 김 용 덕
5	Status of Korean patients with Parkinson's disease before diagnosis	영동세브란스병원 최 선 아

거 문 고 A

1	Serum Levels of Chemokines in Patients with Acute Ischemic Sroke and with Carotid Atherosclerosis	동아의대 차 재 관
2	Neuroprotective Effect of Riluzole and Nilvadipine in Transient Focal Cerebral Ischemia of Rat	서울의대 구 자 성
3	4G/5G Polymorphism in the Promoter Region of the PAI-1 Gene and Alu-repeat I/D Polymorphism in the t-PA Gene in Ischemic Stroke	순천향의대 방 차 옥
4	Hypothermia Decreases Apoptosis in Neurons following Global Ischemia	이화의대 김 용 재
5	Cytokines and Acute ischemic stroke	인제의대 김 응 규

거 문 고 B

1	Habituation of VEP in Normal Subjects and Migraineurs	서울의대 이 경 민
2	Scalp EEG Seizure Onset Pattern in Temporal Lobe Epilepsy	서울중앙병원 이 상 암
3	Transcranial Doppler Characteristics of Lacunar Infarction Comparison with Stroke-free Hypertensive Patients and Healthy People	연세의대 손 영 호
4	A study of Lyapunov Index and Fractal Dimension analysis in variable age groups by digital EEG	이화의대 주 은 연
5	Independent Component Analysis(ICA) of Eyeball Movements	인하의대 이 일 근

Scientific Session IV(9:00 a.m. ~ 10:00 a.m.)

가 야 금

1	Subthalamic Nucleus Lesion protects Dopaminergic Nigral Neuron	가톨릭의대 김 영 인
2	Comparision study of the Clonidine Stimulation Test and the External Anal Sphincter Electromyography in Idiopathic Parkinson's Disease and Multiple System Atrophy	삼성의료원 이 은 아
3	"Clinical Significance of Hyperintense Pallidum on MRI in Patients with Chronic Liver Disease (Acquired Hepatocerebral Degeneration)"	연세의대 김 지 현
4	Temporal bone MRI study in hemifacial spasm	영동세브란스병원 김 선 곤
5	Abnormal N30 component of the somatosensory evoked potentials in patients with asymmetric Parkinsonian symptoms	한림의대 마 효 일

거 문 고 A

1	Measurement of Regional Cerebral Flow in Normal Rabbits Using Echo-planar Perfusion-sensitive Magnetic Resonance Imaging	부산삼선병원 나 상 옥
2	Acute Multiple Infarcts on Diffusion-Weighted MRI	서울의대 노 재 규
3	Diffusion MRI in Transient ischemic attacks	영동세브란스병원 김 원 주
4	Analysis of Cortical Cerebral Blood Flow Patterns in Subcortical Infarction using Perfusion MR Imaging	전남의대 이 승 한
5	Noninvasive Quantitative Assessment of Cerebral Blood Flow(CBF) using 99mTc-ECD SPECT with adjunctive Radionuclide Angiography in Ischemic Stroke	한양의대 임 준 성

거 문 고 B

1	Sympathetic Skin Reflex and Cardiovagal Autonomic function in Essential Hyperhidrosis	고려의대 최 용 민
2	Cutaneous silent period findings and neurophysiolgic value in peripheral neuropathy	영동세브란스병원 김 우 경
3	Can the Imagination of Movement Increase the Excitability of the Corticospinal System ?	원주기독병원 양 현 덕
4	Initial motor unit recruitment in stroke patients with spastic hemiparesis	한림의대 이 상 무
5	Significance of Vestibular Evoked Myogenic Potentials in evaluating vestibular function	한양의대 박 기 형

Scientific Session V (10:15 a.m. ~ 11:15 a.m.)

가 야 금

1	Characteristics of Hemichorea : clinico-radiologic localization and pathophysiology	가톨릭의대 이 규 환
2	Evaluation of Tremor : A development of computerized tool using three-axial accelerometer	단국의대 이 근 호
3	The Efficacy and Safety of Ropinirole as an Adjunct to Levodopa in Parkinson's Disease	서울중앙병원 이 명 종
4	Abnormal saccadic latency improves after levodopa treatment in Parkinson's disease	영동세브란스병원 류 철 형
5	Release reflexes in Parkinson's disease	전북의대 서 만 욱

거 문 고 A

1	Hemodynamic Parameters in Crossed Cerebellar Diaschisis in Hemispheric Infarct : Assessment with Dynamic Susceptibility Contrast MR imaging	가톨릭의대 곽 태 호
2	The Response of the Basilar Artery to Photo-stimulation Measured by Transcranial Doppler	경희의대 변 상 진
3	Methyenetetrahydrofolate reductase(MTHFR) Polymorphism in Korean with Stroke	고려의대 이 승 환
4	Is Hypolipidemia Associated with Multifocal Signal Loss Lesions on Gradient-echo MRI?	서울의대 이 승 훈
5	Hyperinsulinemia associated with cerebral macroangiopathy in first-ever stroke patients	한림의대 김 진 혁

거 문 고 B

1	"Clinical Patterns, Laboratory Tests, and Neuroimaging of Multiple Sclerosis in Korea - Experience in Samsung Medical Center -"	삼성의료원 김용범
2	Comparison of multiple sclerosis and recurrent myelitis	연세의대 한상원
3	"Cycloheximide, ZVAD-FMK, or Trolox attenuates 5-fluorouracil-induced oligodendrocyte death in murine cortical culture."	전남의대 조기현
4	Changes in brain complexity during valproate treatment in patients with partial epilepsy	충남의대 김재문
5	Transcranial Magnetic Stimulation-Evoked Inhibition of Voluntary Muscle Activity(Silent Period)	한림의대 배재천

Scientific Session VI(3:45 p.m. ~ 4:45 p.m.)

가 야 금

1	Cerebral hemodynamics during head-up tilt in the patients with carotid stenosis : Assessment with Transcranial Doppler Sonography	가톨릭의대 한 시 령
2	Prognosis of the patients with acute cerebral infarction associated with internal carotid artery occlusion	서울중앙병원 권 순 억
3	Interobserver agreement on the diagnosis of subtypes of acute ischemic stroke in the TOAST classification	연세의대 오 원 석
4	Magnetic Resonance Angiographic Findings in Patients with Isolated Vertigo	을지의대 김 병 건
5	The Mortality Rate and Prognostic Factors of Patients with Large Hemispheric Infarction	한림의대 나 해 리

거 문 고 A

1	Isolation of GDNF-inducible genes in vivo	고려의대 박 건 우
2	Airway CT during Sleep Apnea and Multi-level Airway Pressure Monitoring during Sleep in Obstructive Sleep Apnea Syndrome	삼성의료원 정 승 철
3	Classification Issues of Migrainous Headache That Does Not Meet the HIS Criteria	삼성의료원 이 혜 승
4	Clinical correlation of TCD abnormalities in migraineurs	을지의대 홍 삼 남
5	Clinical and electro-oculographic analysis of saccadic intrusions in the patients with various neurologic diseases	한양의대 고 성 호

거 문 고 B

1	Role of the subthalamo-nigral input in the control of pilocarpine induced seizures in the rat	가톨릭의대 최 재 영
2	A genetic mouse model of limbic seizures with the phospholipase Cb1 knock-out	가톨릭의대 박 성 민
3	Preserved Responsiveness in Unilateral Temporal Lobe Epilepsy: Can it be a Lateralizing Sign?	삼성의료원 손 영 민
4	Spectral and Non-linear Analysis of EEG in Variable Mental States of Normal Person	이화의대 채 승 희
5	lInduction of immediate early gene encoded protein in the rat hippocampus after Penicillin-induced partial seizures	충남의대 김 선 국

Scientific Session VII(4:45 p.m. ~ 6:00 p.m.)

가 야 금

1	Localization of phospholipase D on the human chromosome and developing rat brain	분당제생병원 노 숙 영
2	Clinical Significance of MRI Findings in Central Nervous System Lupus	서울의대 이 경 복
3	ALS Immunoglobulins and Cerebrospinal Fluid Reduced Voltage-gated Calcium Current in PC12 Cell Line	서울의대 김 성 훈
4	Comparison of the Efficacy of Amphotericin B and Fluconazole in the Treatment Cryptococcal Meningitis	연세의대 김 규 식
5	Neurologic manifestations and characteristics of CNS involvements in Systemic Lupus Erythematosus	한양의대 김 현 영

거 문 고 A

1	Change of Cognitive Function after Posteroventral Pallidotomy for the Treatment of Parkinson's Disease	가톨릭의대 양 동 원
2	Practical method for measuring vertical eye movement	삼성의료원 함 동 석
3	Gradient echo MR imaging in Vascular Dementia Associated with Small Vessel Disease	삼성의료원 나 덕 렬
4	Parietal Dysfunctions associated with Sporadic Cerebellar Cortical Atrophy: A Crossed Parieto-Cerebellar Diaschisis ?"	서울의대 주 건
5	Functional Magnetic Resonance Imaging during Pantomiming Gestures	인하의대 최 성 혜

거 문 고 B

1	Seizure Localization and Ictal Perfusion Patterns of Subtracted SPECT in Partial Epilepsy	삼성의료원 이 향 운
2	Neocortical Epilepsy with non-lesional cases on MRI : Presurgical evaluation and Surgical outcome	서울의대 홍 근 식
3	Significane of Chronic Epilepsy in Primary Brain Tumors	연세의대 김 옥 준
4	Is febrile convulsion a preferential association with temporal lobe epilepsy or hippocampal sclerosis on MRI?	인제의대 김 성 은
5	The Clinical Features of Posthypoxic Multifocal myoclous	한림의대 최 휘 철

Poster Session II (1:30 p.m. ~ 3:30 p.m.)

거 문 고 C

01	Systemic Lupus Erythematosus presenting as Pseudotumor Cerebri Syndrome	조선의대 황 승 용
02	Evolution of Clinical Features in Huntington's Disease: A 6 Year Follow-up Observation	연세의대 주 민 경
03	MERRF with features of Leigh's syndrome : a case of mitochondrial 8344 MERRF mutation	연세의대 임 종 근
04	H-1 MR Spectroscopy findings in Wilson's disease ;the evidence of direct neurotoxicity as another pathophysiological mechanism	연세의대 조 정 희

05 Clinical and electroencephalographic characteristics of high dose Kainic-acid induced Status epilepticus — 충남의대 이 용 만

06 A Case of Brachial Plexitis after Varicellar Zoster Infection — 충남의대 손 은 희

07 Orbital Pseudotumor Presenting with Unusual Isolated Inferior Rectus Muscle Palsy — 순천향의대 남 상 원

08 Vertebrobasilar infarcts in patients with previous isolated vertigo — 계명의대 김 근 호

09 A case of Fahr 's disease presenting with hemiparkinsonism and complex partial seizure — 국립의료원 한 동 균

10 Relationship of Pachymeningeal Enhancement on Brain MRI and CSF leakage on Radioisotope Cisternography in Patients with Orthostatic Headache : Is loss of CSF volume caused by CSF hyperabsorption or decreased production? — 아주의대 오 윤 민

11 Rhinocerebral Mucormycosis ; Cases and Review — 조선의대 안 성 환

12 A Case of Myasthenia Gravis(MG) Showing Markedly Abnormal Incremental Respsonse at the Tetanic Nerve Stimulation — 영남의대 하 정 상

13 Associated autoimmune diseases in myasthenia gravis — 충남의대 오 상 근

14 A Case of Herpes Zoster Infection in the Trigeminal Nerve Mandibular Branch — 가천의대 김 명 권

15 Clinical Characteristics of Posttraumatic Epilepsy — 가톨릭의대 권 혜 영

16 Amyotrophic lateral sclerosis combined with Hashimoto's thyroiditis: A case report — 가천의대 강 성 수

17 Magnetoencephalographic Analysis of Epileptic Foci in Patients with Seizure Disorder — 가천의대 박 현 미

18 A Case of respiratory failure after recovery of cholinergic crisis in organophophate poisoning : The intermediate syndrome — 국립의료원 정 원 희

19 Isolated rest tremor is a Parkinson disease — 서울의대 전 범 석

20 The risk factors related to the mortality of generalized convulsive status epilepticus — 계명의대 장 상 섭

21 Mainly upper extremity form of CIDP — 한림의대 황 성 희

22 Mutation analysis of the gene for copper-zinc superoxide dismutase in a patient with familial amyotrophic lateral sclerosis — 서울의대 김 만 호

23 A case of atypical Cogan's syndrome — 서울의대 박 종 무

24 Acute Pandysautonomic Neuropathy — 서울의대 전 종 은

25 Migrational Disturbances of Neocortex in Medial Temporal Lobe — 서울의대 홍 윤 호

26 Dopamine transporter imaging as a differential diagnostic tool in parkinsonian patients with history of manganese exposure — 서울의대 김 종 민

27 Acute bacterial meningitis in children and adults : causative organism, clinical characteristics, prognosis — 연세의대 박 동 철

28 A case of "Parkin" disease in a Korean female — 서울의대 Y.Mizuno 전 범 석

29 A case of first onset SPSE in old age presenting as pure sensory aura continua of limbic origin — 연세의대 임 성 룡

30 Central nervous system involvement in idiopathic hypereosinophilic syndrome — 서울의대 안 태 범

31 Does electromagnetic wave enhance the naloxone-induced seizure? — 단국의대 김 재 수

32 Diffusion-weighted MR imaging in a patient with Hypoxic brain damage — 인제의대 김 은 기

33 CIDP in a patient with diabetes mellitus and chronic renal failure — 한림의대 권 기 한

34 Dopa-Responsive dystonia : Two Case of Familial and Sporadic Dopa-Responsive Dystonia — 원광의대 박 현 영

35 Mitochondrial Neurogastrointestinal Encephalomyopathy (MNGIE) : A Case Report — 경북의대 박 경 건

36 Ocular Tilt Reaction according to Lesions of Graviceptive Pathway from Otoliths to Interstitial Nucleus of Cajal — 대구가톨릭의료원 김 태 일

37 The Clinical Usefulness of Ictal SPECT in Temporal Lobe Epilepsy The Lateralization of Seizure Focus and Correlation with EEG — 서울의대 이 상 건

38 A case of spinocerebellar ataxia type 6 — 충북의대 신 동 익

39 Aphasic status epilepticus: Two cases — 대전선병원 남 선 우

40 Stroke in Hematologic malignancy and Bone marrow failure disorder — 가톨릭의대 김 중 석

41 Myasthenia Gravis after allogeneic Bone Marrow Transplantation — 가톨릭의대 심 동 석
42 A Case of Fukuyama Congenital Muscular Dystrophy — 이화의대 김 정 은
43 Chronic Inflammatory Demyelinating Polyradiculoneuropathy in a 13-year-old Girl with Pes Cavus Deformity — 부산의대 김 남 제
44 Juvenile Type Acid Maltase Deficiency in Brothers — 부산의대 안 규 환
45 Multifocal Conduction Block in Vasculitic Neuropathy — 부산의대 박 경 필
46 Diagnostic Sensitivity of Several Muscles in Repetitive Nerve Stimulation Test for Myasthenia Gravis — 영남의대 박 승 권
47 Two Cases of The Symptomatic Dystonia Complicated by Tuberculous Meningitis — 조선의대 강 상 진
48 A case of brain abscess associated with Vibrio vulnificus — 대전성모병원 이 상 봉
49 Central Pontine Myelinolysis Associated With Hypoglycemia — 충북의대 이 태 연
50 A Case of Parkinsonism in Alcohol Withdrawal — 전북의대 양 윤 중
51 A Case of Postconcussional Cerebellar Ataxia — 전북의대 고 광 석
52 Two Cases of Numb Cheek Syndrome — 전북의대 오 병 철
53 A Case of Acute Cerebral Infarction Developed After Wasp sting Anaphylaxis — 전북의대 김 지 성
54 Reversible focal signal abnormalities on MRI after prolonged partial seizures associated with hyperglycemia: two cases of subcortical hypointensity on the T2WI — 한림의대 남 경 식
55 Recurrent Coma due to Thyrotoxic encephalopathy. — 동국의대 박 소 강
56 Chorea-Ballismus with Hyperglycemia in Diabetes Mellitus — 중문의대 김 상 범
57 Inclusion body myositis : atypical clinical presentations — 가톨릭의대 박 진 국
58 Post-Irradiation Multiple Cranial Nerve Palsies — 한림의대 엄 근 용
59 Rapid progression of cerebral hemiatrophy after epilepsia partialis continua — 한양의대 노 학 재
60 A case of probable adult onset Leigh syndrome with characteristic clinical and MRI findings — 한양의대 이 상 목
61 A case of cerebral metastatic synovial sarcoma initially misdiagnosed with arteriovenous malformation(AVM) — 한양의대 윤 웅 용
62 Clinico-topographical characteristics and recovery pattern of partial oculomotor nerve palsies in midbrain lesion — 한양의대 고 진 석
63 A case of Eclampsia with irreversible neurological deficits — 한양의대 박 운 규
64 A Case of POEMS Syndrome — 이화의대 김 지 현
65 Subacute combined degeneration in patient with gastrointestinal surgery — 한국보훈병원 한 정 호
66 Decremental motor responses to repetitive nerve stimulation in ALS : Three case report — 원광의대 박 성 욱
67 Clinical, EEG Characteristics and Prognostic Factors of Neuronal Migration Disorder with Epilepsy — 연세의대 정 용
68 Experience With Gabapentin for Neuropathic Pain — 가톨릭의대 최 유 진
69 The Pilot study of Effectiveness of Mexiletine in Focal Dystonia — 가톨릭의대 최 영 빈
70 Hypnic headache is probably a REM sleep disorder. — 경희의대 이 준 원
71 Two cases of partial oculomotor nerve palsy in midbrain infarction — 경희의대 이 학 영
72 The Acute Effect of Tobacco Smoking on Cerebral Blood Flow — 순천향의대 박 정 호
73 A Case of Posttraumatic Pressure Suppressible Myoclonus — 순천향의대 배 성 준
74 A Study for Association between Migraine and Mensturation — 순천향의대 제 종 석
75 Periodic Paralysis as the First Manifestation of Hyperthyroidism — 원광의대 조 광 호
76 Significance of Superficial Radial Nerve in the Diagnosis of Mild Diabetic Polyneuropathy — 한림의대 고 임 석
77 Neuropsychological changes after temporal lobectomy; 1-year follow-up — 서울중앙병원 이 순 금
78 Rhino-orbito-cerebral Mucormycosis Complicated with Intracranial Hemorrhage — 한림의대 신 준 현
79 Reversable Upper Motor Neuron Findings in Patients with Hyperthyroidism — 한림의대 유 경 호
80 A case of Cerebral Infarction associated with Essential thrombocytosis — 고려의대 박 범 식
81 Asterixis due to Phenytoin in Left Thalamic Infarction. — 고신의대 박 영 혁

82	Brain Mapping of Memory Encoding and Retrieval in Patients with Medial Temporal Lobe Epilepsy by Using Activation Positron Emission Tomography(PET)	보라매병원 남 현 우
83	A Case of Isaac's Syndrome associated with Lung Cancer	경상의대 홍 준 기
84	The Clinical Factors affecting Nerve Conduction Studies(NCS) in Patients with DM	전남의대 김 병 채
85	Myasthenia Gravis associated with Other Autoimmune Disease	서울중앙병원 최 은 정
86	Case Report of Unusual Synkinetic Facial Movement :Marin-Amat syndrome varient ?	지방공사 강남병원 조 용 진
87	A Case of Behcet's Disease Presenting With Recurrent Transient Global Amnesia and Perimesencephalic Subarachnoid Hemorrhage	삼성의료원 안 재 영
88	Ipsilateral ventricular dilatation associated with carotid stenosis	삼성의료원 홍 석 찬
89	Single Photon Emission Computed Tomography Imaging in Transient Global Amnesia	삼성의료원 정 필 욱
90	A case of perineuritis	동아의대 천 상 명
91	Reflex Sympathetic Dystrophy: mimicking Central Cord Syndrome	경상의대 박 기 종
92	A Case of Myasthenia Gravis with Alopecia Universalis and Vitiligo	고려의대 유 성 욱
93	A Case of Simultaneous Multiple Cranial Neuropathies in Diabetes Mellitus	경상의대 곽 준 혁
94	Two Cases of Acellular Cryptococcal Meningitis in AIDS Patients	부평성모자애병원 정 성 우
95	A case of hemichorea-hemiballism associated with hyperglycemia	고신의대 장 용 석
96	Diagnostic Value of Interictal and Ictal Epileptiform Discharges on Scalp EEG in Partial Epilepsy Patients with Good Surgical Outcome	삼성의료원 서 대 원
97	Two Cases of Paroxysmal Sympathetic Storms	계명의대 이 현 아
98	Neurological Complication after Surgery of Aortic Aneurysm	부천세종병원 조 수 진
99	Clinical Characteristics of Drug-induced Parkinsonism	인곡자애병원 고 성 범
100	Isolated musculocutaneous nerve palsy	인제의대 정 정 욱
101	Diffuse signal changes in corpus callosum after decompression with hydrocephalus	한림의대 유 상 효
102	The Evaluation of the Width of Pars Compacta in Parkinson's Disease on T2 Weighted Image of MRI and Its Clinical Correlations (Preliminary Study)	고려의대 최 재 철
103	Do N37 and P37 Potentials have Different Generators in Somatosensory Evoked Potential ? - Analysis using gating mechanism -	동아의대 박 영 석
104	Thoracic Myelopathy Secondary to Ossification of The Posterior Longitudinal Ligament	한림의대 이 병 주
105	A Case of Painful Legs and Moving Toes Syndrome	삼성의료원 박 광 열
106	Dysphagia in Neurogenic Population	삼성의료원 권 미 선
107	Isolated facial nerve palsy as the initial manifestation of relapse in the T-cell acute lymphoblastic leukemia	전남의대 박 만 석
108	Decompression sickness presenting as blindness responsive to hyperbaric oxygen therapy	지방공사 강남병원 김 주 동
109	Safety of Selegiline in the Treatment of Parkinson's Disease : Focus on Orthostatic Hypotension	서울중앙병원 강 지 훈
110	Antioxidants attenuate cisplatin-induced apoptosis by decrease p53 level but not Fas in mouse hybrid neurons	아주의대 박 선 아
111	Positive ELISA test to Clonorchis sinensis in CSF - Is it true CNS Clonorchiasis ? -	전남의대 조 연 희
112	MR imaging in Amyotrophic Lateral Sclerosis	서울중앙병원 김 종 철
113	A Case of Osteomalacic Myopathy	동아의대 김 상 수

가 야 금

Cerebrovascular Disease I

좌장 : 노 재 규 교수
신 현 길 교수

1

Comparison of Risk Factors between Lacunar Infarction and Intracerebral Hemorrhage

Jang-Joon Lee, M.D., Jeong-Geun Lim, M.D., Sang-Doe Yi, M.D., Young-Choon Park, M.D.

Department of Neurology, Keimyung University School of Medicine

Background and Objectives : Cerebral small vessel lisease is the most important cause oflacunar infarction ınd intracerebral hemorrhage(ICH). It is generally postuated, in its early stages, the vascularlesion engenders /essel wall fragility and ICH. But if rupture dose not ɔccur, segmental vessel occlusion evolves, producing acunar infarction. It may be a common aging phenomeıon that is exacerbated by hypertension and diabetes nellitus. This study was performed to evaluate risk facors of lacunar infarction and ICH. **Methods** : We 'eviewed retrospectively the medical records of 2364 ɔatients with stroke who were admitted Keimyung Jniversity Dongsan Hospital between January 1995 hrough December 1998. Thepatients with lacunarinfarcion were 254 and with ICH were 436. The major risk 'actors including age, sex, hypertension and diabetes nellitus, and the several minor risk factors were analyzed n these patients. **Results** : Younger age($p<0.01$), female ;ex($p<0.01$),and hypertension without treatment($p<0.01$) were more frequent in ICH. Cigarettesmoking($p<0.01$), ıigher level of total lipid($p<0.01$), triglyceride($p<0.05$) ınd hematocrit($p<0.05$), and lower level ofHDL($p<0.01$) were more frequent in lacunar infarction. The frequency ɔf hypertension or diabetes mellitus was not different ɔetween these two groups. **Conclusion** : These results ;uggested that younger age, female sex, hypertension vithout treatment may increase the possibility of develɔpment of ICH.

2

The Predictive Value of Triphasic Perfusion CT for the Development of Severe Brain Edema in Acute Ischemic Stroke

Soo-Joo Lee, M.D., Kwang-Ho Lee, M.D., Yong-Bum Kim, M.D., Chin-Sang Chung, M.D.

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Background : Cerebral blood flow measurement and NIH stroke scale score(NIHSSS) within 6 hours of stroke onset may be used for predicting fatal brain edema in acute ischemic stroke. Triphasic perfusion CT(TPCT) can provide the information of collateral blood flow and perfusion deficit(PD) in the ischemic areas as reliably as conventional angiography in patients with acute ischemic stroke. **Objective** : To determine whether the extent of PD on TPCT within 6 hours of stroke onset could predict the subsequent development of severe brain edema. **Methods** : We reviewed 14 patients with acute middle cerebral artery(MCA) stroke, who had a minimum baseline NIHSSS of 20 in left hemispheric lesions or a minimum baseline NIHSSS of 15 in right hemispheric lesion within 6 hours after symptom onset. TPCT was performed with power injector-controlled, intravenous administration of contrast media. Sequential scans of early, middle, and late phase were performed. The whole procedure took 5 minutes. Depending on the collateral flow, PD was graded as severe perfusion deficit(SPD) or moderate perfusion deficit(MPD). To assess the severity of hemisheric brain edema, horizontal displacement of pineal gland and septum pellucidum was measured on follow-up CT and/or MR between 2 to 7 days after symptom onset. The significant midline shift(SMS) was defined as more than 5 mm contralateral shift both pineal gland and septum pellucidum. **Results** : SMS on follow-up CT and/or MR seen only in 7 of all 14 patients. The mean NIHSSS of 7 patients with SMS was not higher than that of the remaining stroke without SMS(left MCA stroke, 20.2 vs. 20.6; right MCA stroke, 15.5 vs. 16.5) All six patients with more than 67% of presumed MCA territory on initial TPCT showed SMS. SMS was not seen in 6 patients with SPD less than 50%. Of the remaining 2 patient with SPD around 50% of presumed MCA territory, only one showed SMS. SMS was not seen in three patients with SPD less than 50 % on initial TPCT although final infarct extended to nearly whole

MCA territory(>67% of presumed MCA territory) on follow-up images. **Conclusion** : Within 6 hours of MCA stroke onset, TPCT may be used to predict the subsequent development of severe edema and to warrant more aggressive medical or neurosurgical intervention.

3

Post-stroke Depression and Emotional Incontinence: Correlation with Lesion Location

Jong S. Kim, M.D.

Department of Neurology, University of Ulsan, Asan Medical Center

Background : The role of the location of stroke on post-stroke depression(DP) and emotional incontinence(EI) remains controversial. **Methods** : We studied 148 patients with unilateral stroke at 2-4 months after the stroke regarding the presence of DP(using DSM-IV and Beck Depression Inventory) and EI. Lesions were localized by CT/MRI. **Results** : 27 patients(18%) had DP and 50(34%) had EI. DP and EI were not related to the nature, laterality or the size of the lesion. The frequency of EI, but not of DP, was higher in women and in ischemic(vs. hemorrhagic) stroke($p< 0.05$). Although both DP and EI were related to motor dysfunction and location (anterior vs. posterior cortex) of the lesion, the latter was a stronger determinant for DP($p<0.05$). The prevalence of DP/EI in each locations was: 75%/100 % in ACA territory, 50 %/none in temporal lobe, 30%/40 % in frontal-MCA territory, 13 %/none in occipital, 19%/45 % in lenticulocapsular, 11%/16 % in thalamic, none/33% in midbrain, 16%/53% in pontine base, 36%/55% in medullar and none/22% in cerebellar, respectively. None with parietal or dorsal pontine lesions had DP/EI. EI was more closely related to lenticulocapsular strokes than was DP($p<0.01$). **Conclusion** : PSD and PSEI are strongly influenced by the lesion location, probably associated with the chemical neuroanatomy related to the frontal/temporal lobe-basal ganglia-brainstem circuitry. EI is more closely related to lenticulocapsular strokes than is DP.

4

Yonsei Stroke Registry: Analysis of 1,000 Cases

Byung In Lee, M.D., Hyo Suk Nam, M.D., Ji Hoe Heo, M.D., and Yonsei Stroke Team

Deparment of Neurology, College of Medicine, Yonsei University

Background and Objectives : Stroke registry and data bank system is an essential tool for hospital based stroke researches. Yonsei stroke registry and data-bank(YSRDB) is a prospective computerized data-bank system, established on October 1, 1994. The general clinical characteristics of patients admitted with acute ischemic stroke were investigated by using YSRDB. **Methods** : All patients enrolled to YSRDB were admitted to the neurology ward with acute stroke within 1 week of onset. Stroke team reviewed all available data at the time of patient's discharge to confirm the diagnosis of acute stroke and to draw the etiological classification according to the TOAST classification system. A total of 1,000 consecutive patients with ischemic stroke were registered at the end of March 1999. Results: The mean age was 61.7(11.6 years old and 8.1% of patients were under 45 years old. 62% was male and 78% had clinically first-ever stroke. Only CT scan was done in 33.6% and the remaining 66.4% had MRI. Cerebral angiography was conducted in 53.9% with conventional DSA in 34.9% and MR-angiography in 20.2%. Echocardiography(mainly TEE) was conducted in 35.8%. Large artery atherosclerosis(ATH) was responsible for the stroke in 16.5%, cardiac embolism(CE) in 18.3%, lacunar infarction(LI) in 21.5%, other determined(OD) in 3.1%, and undetermined causes(UD) in 40.6%. Among UD, two or more causes comprised 5.8%, negative results in 25.4%, and incomplete work-up was 25.5%. Among various risk factors, hypertension was present in 64.3%, smoking in 26.9%, DM in 26.9%, hypercholesterolemia in 24.1%, high hematocrit in 21.8%, previous history of cardiac disease in 25.3%, and TIA in 4.7%. Among 816 patients who have shown acute lesion in CT or MRI, 91% had a single vascular territorial lesion, 7.5% had multiple territorial lesion, and 1.5% had borderzone infartion. Among patients with a single vascular territorial lesion, 61% had lesion in the carotid artery territory and 39% in the vertebrobasilar territory. During hospitalization, 8.3% had progressive deterioration, 18.8% had either fluctuation or stable courses, and 72.9% showed gradual improvement. Hospital

nortality was 5.6%. **Conclusion** : Compared to the results of other stroke registries, the incidence of ATH was lower and UD was higher in YSRDB, which might be related to he lack of carotid-duplex study. Among topographical analysis the involvement of vertebrobasilar territory was 39.0%, which was higher than previous reports. The introduction of MRI might be responsible for the difference by detecting small lesions in the posterior circulation territory.

5

Seasonal Variation of Monthly Admissions and Mortality in Stroke

Sang Joon Jung, M.D., Boo Chung, M.D., Woon Gyu Park, M.D., Hee Tae Kim, M.D., Myung Ho Kim, M.D.

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Background & Objectives : Seasonal variation in the occurrence and mortality from stroke has been recognized throughout much of this century, and has been studied extensively in many different countries, but conclusions were unclear. Several studies suggest a circannual rhythm for stroke, with a peak onset and mortality in the winter. We studied to identify the seasonal variation of monthly admissions and mortality in stroke. **Methods** : From 1989 to 1998, 2526 first stroke populations were enrolled including ischemic and hemorrhagic stroke. Fatal events were defined as those in which the patient died within 28 days after the beginning of symptoms. We analyzed the seasonal variation of monthly admissions and mortality in stroke. **Results** : The monthly admissions and fatality rate of stroke showed significant seasonal variation. Monthly admissions for stroke was highest in December and lowest in August. Also, the fatality rate was highest in November(4.1%) and lowest in July(2.4%). Major causes of death were herniation, sepsis due to pneumonia, urinary tract infection, sore, and cardiovascular disease including congestive heart failure and myocardial infarction. Our analysis showed the presence of a statistically significant rhythm with a peak in the coldest months. **Conclusion** : There is a significantly greater mortality of stroke during winter in our hospital. This is very important for a better understanding and control of the underlying factors of stroke in terms of prevention.

거 문 고 A

Muscle & Nerve Disease I

좌장 : 이 광 우 교수
김 승 민 교수

1

Sural/Ulnar Amplitude Ratio as a Useful Indicator of Mild Polyneuropathy

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Backgrounds : In length-dependent axonal polyneuropathy, the longest axons are affected first and gradually the process of degeneration extends proximally, involving the feet and lower legs before the nerves of the arms become affected. **Objectives** : We suggest that a sural/ulnar amplitude ratio(SUAR) might be a more sensitive indicator of mild polyneuropathy than sural amplitude alone. **Methods** : We analyzed sural amplitude and SUAR from 133 diabetic patients and age-matched control subjects. The diabetic patients could be classified into three groups.(1) have not any evidence of polyneuropathy clinically or electrophysiologically.(2) have polyneuropathy clinically but electrophysiologic testing revealed normal response.(3) have polyneuropathy clinically and electrophysiologically. **Results** : Mean sural amplitude was 19.5 uV, 12.6uV, 4.9uV in subgroup 1, 2, 3 and 17.96 uV in healthy persons. Mean SUARs were 0.97, 0.81, 0.62 in subgroup 1, 2, 3 and 1.22 in normal control group. Our results showed sural amplitude and SUAR had a statistical significance between four subgroups. **Conclusions** : We conclude that the SUAR is also a useful electrodiagnostic indicator of early stage of mild axonal polyneuropathy.

2

Clinical Characteristics of the Patient with "Mononeuropathy Multiplex"

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Background & Objectives : The term "mononeuropathy multiplex" means simultaneous or sequential involvement of individual noncontiguous nerve trunks, either partially or completely, evolving over days to years. The aim of this study is to delineate the causes, clinical features, and detailed electrophysiological findings in the patients with mononeuropathy multiplex. **Methods** : We analyzed the medical records of 21 patients with mononeuropathy multiplex confirmed on electrophysiological studies in Seoul National University Hospital between 1989 to 1999. **Results** : Ten patients are male; eleven are female. The mean age is 47.3 years(range, 16 to 71) with a peak incidence in the sixth decades. The causes include systemic vasculitis(10 patients), diabetes mellitus(4), leprosy(4), and Guillain-Barre syndrome(1). Ulnar and median nerves are the most commonly involved(19 patients). In descending order of frequency, peroneal, tibial, radial, and sural nerves are also involved. Bilateral involvement occurs most commonly in ulnar nerve. The symptoms and signs of mononeuropathy multiplex are the initial manifestations in 11 patients(52 %), which is more frequent in vasculitis group(70 %). In this group, polyarteritis nodosa, Churg-Strauss syndrome, and rheumatoid arthritis are included. Electrophysiological studies ascertain that the prominent pathological process is axonal degeneration(80 %), and the location of the nerve lesion is not necessarily related to potential sites of entrapment. **Conclusions** : Mononeuropathy multiplex is a syndrome with diverse causes, the most common of which is systemic vasculitis. It is the presenting features frequently, the early identification is important for the correct etiological diagnosis and therapeutic implication.

3

Tomaculous Neuropathy with and without Chromosome 17p11.2-p12 Deletions

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Background & Objectives : Toumaculous neuropathy is the sausagelike focal swellings of nerve fibers caused by redundant loops of myelin which are characteristics for hereditary neuropathy with liability to pressure palsies (HNPP). A 1.5-Mb deletion in chromosome 17p11.2-p12 is present in the majority but not all cases of toumaculous neuropathy. The aim of the present study is to evaluate the clinical, electrophysiological and morphological aspects of tomaculous neuropathy patients associated with and without chromosome 17p11.2-p12 deletion. **Methods**

To detect the presence of deletion, the DNA of the patients was analyzed with pVAW409R3(D17S122). We have 9 patients in 6 families of HNPP with 1.5-Mb deletions in chromosome 17p11.2, and 3 patients in 3 families of toumaculous neuropathy without deletions. So, we reviewed the clinical and electrophysiological features of theses 12 patients. **Results** : Nerve conduction studies demonstrated diffuse mild to moderate slowing of nerve conduction velocities especially worse over the common entrapment sites in 12 patients regardless of the deletion. Long duration of compound muscle action potentials without conduction block or dispersion is also characteristic findings in all patients. **Conclusions** : We report the clinical, electrophysiological and morphological aspects of tomaculous neuropathy with and without chromosome 17p11.2-p12 deletion. There are not any different findings between the patients with and without deletion.

4

Clinical Patterns and Electrophysiologic Study in Guillain-Barre Syndrome

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Background & Objectives : To find the clinical patterns and electrophysiological finidings of patients with Guillain-Barre syndrome(GBS). **Methods** : Total 56 patients who fulfilled the diagnostic criteria of GBS were included. **Results** : About half of them had an antecedent event. One-quarters of the patients had URI symptoms and sings. In 17.7% patients one or more cranial nerves were involved, most often leading to EOM limitation or facial palsy. In 15% patients ventilator was needed. The mean progressive phase lasted 10.7 days, the plateau 7.9days. In progressive phase, 38% of patients could not walk with assistance(Grade D, A; 7.6%, B; 7.6, C; 23%, E; 23%). Eleven patients(20%) described severe pain with some elevation of creatine phosphokinase(CPK) during the course of their illness. The common pain sites were back(2), generalized(2), leg(2), neck(1), pelvic(1), thigh(1), ocular(1), shoulder(1). Most common clinical variant was pure motor variant(57%), which was followed by sensorimotor(25%), Miller-Fisher variant (7.1%), pharyngo-cervico-brachial variant(5.3%), ataxic variants(3.5%), pure sensory variant(1.7%). The electrophysiological studies were performed in 80% of patients. The mean interval between electrophysiological study and onset of symptoms was 13 days. The percentage of patients with electrophysiological evidence of demyelination was 75%. **Conclusions** : We could find that GBS showed various clinical manifestations. Some patients with GBS complained of elevation of serm CPK. In addition, not all patients did show demyelination evidence in electrophysiological study.

5

Conduction Block in Neuropathy with Diabetes Mellitus

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Background & Objectives : Diabetic neuropathy is a common complication of diabetes mellitus and one of the most common neuropathies worldwide. The pathogenesis of diabetic neuropathy is unknown, but it is generally ascribed to a complex interaction sequelae of chronic hyperglycemia. Although pathologic studies show both segmental demyelination and axonal loss, the relative importance of segmental demyelination is debated. Conduction block(CB) is a physiologic hallmark of segmental demyelination. If segmental demyelination were a main pathology of neuropathy with diabetes, CB should be common. So we undertook this study to determine the prevalence of CB in diabetic patients. **Methods** : Fifty-two consecutive diabetic patients(M=30, F=22, mean age=57.3(10.9 years) referred to Neurology EMG laboratory underwent routine nerve conduction studies(NCS) including median, ulnar, peroneal, and posterior tibial nerves. Conduction block was defined by two methods. One was > 20% drop in peak-to-peak amplitude and < 15% change in negative-peak duration between proximal and distal stimulation sites. The other was > 50% drop in the amplitude and area. Clinical findings, electrophysiological data, and effectiveness of anti-immune therapy for some patients with CB were reviewed. **Results** : A total 326 nerves were studied. The criteria for 20% and 50% CB were met in 35 nerves in 19 patients and 7 nerves in 6 patients, respectively(prevalence=10.7%, 2.1%, respec-

ively). Some patients with CB were treated with IVIG or steroid and had a good response. **Conclusion** : CB in neuropathy with diabetes is not a common finding. The rarity of CB in neuropathy with diabetes suggests that segmental demyelination is not a prominent part of the underlying pathology. CB and good responsiveness to anti-immune therapy in neuropathy with diabetes also suggest alternative or additional causes for neuropathy, such as chronic inflammatory demyelinating polyneuropathy.

거 문 고 B

Epilepsy I

좌장 : 이 병 인 교수
김 주 한 교수

1

The Effect of Public Educational Campaign on Changing Negative Attitudes Toward Epilepsy

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Background & Objectives : Although social discrimination against people with epilepsy is a common phenomenon all over the world, it is probably more serious in Korea than in Western countries as we have documented previously. There is some evidence that negative attitudes toward epilepsy can change with proper public educational campaign. **Methods** : Recently, we have performed a second survey after conducting a planned educational program in the same rural area, where the first survey to get baseline data of public attitudes toward epilepsy had been done in 1995. All 717 respondents were divided into two groups according to whether they had participated in the educational program or not. The results of the second survey were compared to those of the first survey in order to assess the effect of the campaign. **Results** : In the educated group, most of the negative attitudes toward epilepsy were changed more positively, especially in the aspect of attitudes toward epileptics. However, the misbeliefs of epilepsy such as 'epilepsy can not be treated' and 'epilepsy is a genetic or a psychotic illness' were not changed despite the emphases on those aspects in the campaign. **Conclusion** : We concluded that although the public educational campaign was quite effective in changing negative attitudes toward epilepsy, the deep rooted prejudice against epilepsy in our society was hardly changed by the episodic educational campaign. Therefore, a thorough, long-lasting well-planned public educational program on epilepsy is needed to root out the prejudice against epilepsy in Korea.

2

A Comparison of Midazolam & Thiopental Sodium in Refractory Status Epilepticus(RSE)

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Background & Objectives : Midazolam(MDZ) is a newly introduced therapeutic agent in the treatment of status epilepticus(SE). We compared the effectiveness & adverse effects of MDZ and thiopental sodium(TS) for the refractory SE. **Method** : Thirteen SE of 12 patients were included. We managed all the SE by standard protocol & treated with MDZ and/or TS, alternatively after the conventional anti-SE treatment failed. If a SE was not controlled with MDZ, TS was added and the next patient received MDZ again but MDZ was not added on TS. Age, sex, etiology and duration of SE were not considered in choosing drugs. Five out of 9 SE received MDZ initially resolved SE, and 4 SE needed additional TS. Initially, 4 out of 13 patients was administered TS. **Result** : Among 5 patients improved by MDZ, no one experienced significant hypotension, but 3 had respiratory suppression and needed artificial ventilator. Among the 4 patients treated with TS after standard treatment, refractory SE was successfully treated in two. Complications were as follows; hypotension in two, pneumonia/unknown infection in three, and respiratory suppression in three. All patients with respiratory suppression kept artificial ventilator & none of them could weaning the ventilator. Among four patients treated with TS after MDZ, SE were controlled in two, and hypotension was developed in three, pneumonia in two, and respiratory suppression in all. **Conclusion** : MDZ was not better than TS in SE control, but has less adverse effects. Patients with TS alone or TS after MDZ had similar adverse effect and outcome. We propose using MDZ before TS might be better in treatment of refractory SE than TS alone.

3

Visual System Dysfunction In Epileptic Patients with Vigabatrin(Sabril®) Treatment

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Background & Purpose : It has been reported that vigabatrin(VGB) may induce visual field constriction in some epileptic patients. However, the exact incidence or prevalence of visual dysfunction in epileptic patients with VGB treatment is not well known, so we tried to investigate the cross sectional prevalence of abnormal visual function. **Method** : 32 epileptic patients(male; 19, female; 13) with VGB treatment as an add-on therapy were enrolled as test group. The mean number of concomitant anticonvulsant drugs was 1.4(carbamazepine; 20(62.5%), phenobarbital; 9(28.1%), valproate; 6(18.8%), phenytoin; 6(18.8%) etc). The mean age was 35.5 years, the mean duration of disease, total anticonvulsant medication, VGB medication and VGB dosage was 204.8 months, 155.0 months, 29.3(4-63) months and 1430(500-2000) mg respectively. The mean seizure frequency a month was as follows: none; 5(15.6%), less than 1; 21(65.6%), 1~less than 5; 5(15.6%), over 5; 1(3.1%). Fundus examination, visual evoked potential(VEP), electroretinogram(ERG), Humphrey visual field perimetry were performed. **Result** None of the patients showed abnormal findings on fundus examination and VEP(n=18). ERG was performed in 28 patients. 9(32.1%)patients of them showed photoreceptor dysfunction, mainly cone cell dysfunction. 6(15.6%) of 32 patients showed visual field defect. Only one(3.1%) patient complained of peripheral visual field dimness, but the remainder was asymptomatic. **Conclusion** : Visual system dysfunctions in epileptic patients with VGB treatment are not as uncommon as we expected, so regular ophthalmologic examinations are warranted for detecting unwanted visual system dysfunctions.

4

Drug Eruptions Associated with Conventional Antiepileptic Drugs

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Background & Objectives : Drug eruption is a well known complication of antiepileptic drug(AED) treatment. However, its subtype & incidence have not been well studied in Korea. We have studied drug eruptions associated with commonly used AEDs, phenytoin(PHT), phenobarbital(PB), carbamazepine(CBZ), and valproic acid(VPA). **Methods** : We retrospectively studied 108 cases of drug eruptions associated with AEDs collected in a neurological unit from 1990 to 1999. These cases were classified by maculopapular drug eruption, exfoliative dermatitis, Stevens-Johnson syndrome(SJS), and toxic epidermal necrosis(TEN). **Results** : The AEDs implicated were CBZ(n=58); PHT(n=38); PB(n=12); VPA(n=0). There were 97 cases of maculopapular eruption(89.8%), 5 of exfoliative dermatitis(4.6%), 4 of SJS(3.7%), and 2 of TEN(1.9%). Twelve cases were occurred in the first week after the initiation of therapy(11.1%), 50 in the second week(46.3%), 29 in the third week(26.9%), 9 in the fourth week(8.3%) and 8 cases were after the first month(mean interval=13.7 days). Among 4 SJS patients, 3 were due to CBZ and 1 due to PHT. Two TEN cases occurred from PB. Many cases of drug eruptions also exhibited fever and elevated liver enzyme. SJS and TEN cases showed lymphadenopathies and visceral involvement. One case of TEN showed agranulocytosis, hematuria, and albuminuria. There was no evidence that drug eruptions were related to the plasma concentration. Most of drug eruptions were recovered without complications by the interruption of causative AEDs. **Conclusion** : Although most of drug eruptions are benign and self-limited when use of the AEDs is discontinued, several cases are characterized by significant morbidity and mortality. Prompt recognition of drug eruption and early intervention are necessary to prevent the serious consequences. Physicians should be aware of drug eruption associated AEDs, especially in the first month of the therapy.

5

Analysis of Status Epilepticus by Time to Respond Treatment

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Background & Objectives : Status epilepticus(SE) is a neurologic emergency requiring a prompt treatment. Many clinical variables may affect the responses to treatment or the prognosis of SE. We conducted retrospective analysis to find the relationships between the time interval of responsiveness to drug treatment and many clinical variables in patients presented with SE. **Method** : We reviewed medical records of 143 patients 15 years old or over, who were admitted to Yonsei hospital from 1994 to 1998. We divided the patients as early response group(ER: drug response(1hr) and late response group(LR:>1hr). The definition of drug response was the improvement of mental state and no further seizure attaks. We compared two groups by initial patient's state, possible cause of SE, past history of epilepsy, initial laboratory findings, seizure type, anticonvulsive therapy, state at discharge, and medical complication. **Results** : Of 147 patients, 65 were ER and 78 were LR. 81.5% of ER patients directly came to the emergency room without any intermediate care at other hospitals. In ER, presence of past epileptic history(75.4%) and abnormality in GOT/GPT(89.2%) and BUN/Cr(93.8%) were higher than LR. In ER, most common etiology was antiepileptic drug withdrawl(49.2%), whereas CNS infection in LR(24.4%). 96.9% of ER responded first-line therapy, and 47.4% of LR needed second or third-line therapy. 69.2% of ER were neurologically full-recovered state at discharge, and 89.2% were not medically complicated on admission. **Conclusion** : Among various factors, possible cause of SE, past history of epilepsy, abnormalities of GOT/GPT and BUN/Cr, anticonvulsive therapy, state at discharge, and medical complication were significantly different between two groups($p<0.0001$).

가 야 금

Cerebrovascular Disease II

좌장 : 김 종 성 교수
조 기 현 교수

1

Progressive Lacunar Infarction

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Background & Objectives : Some patients with lacunar nfarction have progression of their neurologic deficits. 3ut there are few reports about the progression of motor leficits in lacunar infarction. The aim of this study was to nvestigate the clinical characteristics in lacuanr stroke patients with progressive motor deficits. **Methods** : We evaluated 37 patients with first-ever stroke due to lacunar nfarction within 24 hours after stroke onset. All patients performed MRI and MR angiography. We compared clinical characteristics progressive lacunar infarction with stable lacunar infarction. **Results** : Of 37 patients, 9(24%) had progression of initial motor deficits within 1 or 2 days after admission. There were no significant differences between the two groups regarding the severity of motor leficits, mean blood pressure, glucose levels, and hematocrit levels on admission. The mean blood pressure at 1 day(119.00±11.48 vs 108.61±12.17 mmHg, p<0.05) and 2 days(121.44±11.96 vs 110.82±12.37 mmHg, p<0.05) after admission were higher in patients with progressive lacunar nfarction than in those without progression. Size of the nfarct was larger(17.89±3.52 vs 11.61±4.17 mm, p<0.05) and motor deficits at discharge were worse(5.11±1.45 vs 1.54±1.88, p<0.05) in patients with progressive lacunar nfarction than in those without progression. **Conclusion** : Mean blood pressure at 1 day and 2 days after admission may predict progression of motor deficits.

2

Usefulness of Triphasic Perfusion CT for Intravenous Thrombolysis with Tissue Plasminogen Activator in Acute Ischemic Stroke

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Background : Intravenous(i.v.) thrombolysis for acute ischemic stroke has been investigated in several clinical trials without enough information of collateral flow and perfusion deficit in the ischemic areas. The therapeutic time window may vary from patient to patient depending on these informations. Triphasic perfusion CT(TPCT) can provide this information as reliably as conventional angiography. **Objective** : To assess the safety and efficacy of thrombolysis within 7 hours of stroke onset according to the extent of perfusion deficit on TPCT. **Methods** : The precontrast CT(PCT) was taken and then TPCT was performed after power injector-controlled i.v. administration of contrast media in patients with acute middle cerebral artery(MCA) stroke. Sequential scans of early, middle, and late phases were obtained. The whole procedure took 5 minutes. Depending on collateral blood flow, perfusion deficit was graded as severe perfusion deficit (SPD) or moderate perfusion deficit(MPD). Twenty-one patients with small extent of SPD(33% or less of the presumed MCA territory) were treated with 0.9 mg/kg of i.v. recombinant tissue plasminogen activator within 7 hours. **Results** : Mean time lapse to thrombolysis was 4.2 hours(1.5-7.0). The initial NIH stroke scale(NIHSS) score was 11.0(5-20). The initial NIHSS scores were well correlated with the total extent of SPD and MPD. Twelve patients(57.1%) improved by 4 or more points from baseline NIHSS score within a day. The patients with MPD 50% or more of the MCA territory had a higher chance of early improvement than those with MPD less than 50%(4/4 vs. 8/17). No fatal hemorrhage developed. Only one patient(4.8%) had symptomatic small basal ganglia hemorrhage after thrombolysis. **Conclusion** : Thrombolysis may be safely done within 7 hours in patients with small SPD on TPCT. The large extent of MPD on TPCT may predict early improvement after thrombolysis.

3

Presentation Time to Hospital and Recognition of Stroke in Patients with Ischemic Stroke Effect of Public Education

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Background & Objectives : Recent advances in stroke therapies require patients to be treated very early after symptom onset. Multi-directional efforts including public education may reduce the presentation time of patients to hospital. However, there has been little information about the presentation time to hospital, recognition of stroke symptoms, and awareness of stroke in patients with ischemic stroke, which may be important to perform public education or campaign. **Methods** : Prospective and standardized interviews were performed before and after the public education in 155 patients with acute ischemic stroke who were admitted to the Severance hospital. The educational program included local newspaper articles, distribution of pamphlets, and lectures to 119 emergency care teams. Delay in presentation time, factors associated with delay, and stroke recognition and awareness were assessed in them [75 pre-education(group 1) and 80 post-education(group 2)]. **Results** : 52% of group 1 and 52.5% of group 2 arrived at the hospital within 24 hours. Those who arrived within 3 hours were only 21.3 % and 15 %, respectively. A direct visit to the hospital and a worsening or fluctuating clinical course were associated with a shorter presentation time. About half of patients or responders(42.7 % of group 1 and 55.7% of group 2) recognized patient's symptoms as a stroke before a diagnosis was made by a doctor. Most of them knew that a stroke should be treated urgently. However these stroke recognition and awareness were not associated with an early arrival, which suggests that their knowledge was not concrete. The public education using local newspaper articles and pamphlets towards the local residents for the limited period did not affect on the shortening of the presentation time. **Conclusions** : Many of stroke patients did not arrive within the therapeutic time window. Our findings suggest that extensive and multi-directional campaign should be performed to reduce the presentation time. Our findings also suggest that educational aims should include the need for rapid treatment of stroke and therapeutic time window as well as stroke recognition.

4

Comparison of Diffusion Weighted MRI & Tc99m-ECD SPECT with Subsequent Clinical Score in Acute Ischemic Stroke

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Background and Purpose : Diffusion Weighted magnetic resonance imaging(DWI) and single-photon emission computed tomography(SPECT) can demonstrate ischemic brain injury within the first several hours after onset of stroke. We aimed to compare the quantitative data of DWI and SPECT in the earliest phases of stroke with neurologic severity and outcome. Subjects and **Methods** : Nineteen patients with acute middle cerebral artery infarction underwent DWI and SPECT within 12 hours of symptom onset(mean, 9.6 hours). In SPECT, we defined abnormality as defect region(perfusion(30%) and ischemic region (perfusion difference(10% compared to contralateral normal hemisphere). The initial DWI and SPECT lesion volume ratios(lesion volume/hemispheric volume) were analysized with subsequent neurologic deficits as determined by National Institutes of Health Stroke Scale (NIHSS) score and Barthel index(BI). **Results** : There was high correlation between clinical scores within 7 days and lesion volumes determined by DWI(1day; p=0.001, 3days; p=0.005, 7days; p=0.044) and SPECT(1day; p=0.004, 3days; p=0.008, 7days;p=0.038) respectively. The correlation was more significant in DWI than SPECT in acute stage. In 15 patients with cortical lesions, the group with favorable outcome showed larger difference between the volume of defect in SPECT and the volume of abnormality in DWI than the group with unfavorable outcome($p<0.01$). **Conclusions** : DWI and SPECT were highly correlated with severity of neurologic deficit in acute ischemic stroke. Moreover the comparison between DWI and SPECT may provide more important information about subacute clinical outcome.

5

Basilar Artery Dolichoectasia in Pontine Infarction

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Background and Objective : Vertebrobasilar dolichoectasia(DE) has been suggested as a precipitating factor in basilar artery(BA) territory infarction. Recently, it has been reported that the branch atheromatous disease (BAD) of the pons is more frequent than lacune in pontine infarction. This study was undertaken to evaluate the type of infarction, significance of basilar artery DE in pontine infarction. **Methods** : MRA, MRI and clinical data of 59 pontine infarction patients were reviewed to analyze the type of infarction and prognosis. The length and diameter of BA on the MRI and MRA were measured using a size-measuring software(Boundary, KAIST). Basilar artery obstruction, causing severe clinical deterioration in a few hours, was excluded. **Results** : Infarction type was mainly BAD of the pons(88.1%), and pontine lacune was only observed in 11.9% on MRI brain stem thin section and sagittal image. DE of the BA(39%) was the most frequent morphological change. Stenotic(16.9%), narrow lumened (11.9%), hypoplastic(10.2%), and not-visualized(3.4%) BA was observed in decreasing frequency. No abnormal finding was observed in 18.6% of patients. Most of the patients(71.2%) improved from their initial deficits. Progression of initial deficit was observed less frequently in DE than stenosis or luminal narrowing. **Conclusion** : These findings show that the most pontine infarction are BAD involving the pontine base and DE change is the most frequent type of morphological changes of the BA in pontine infarction.

거 문 고 A

Muscle & Nerve Disease II

좌장 : 선우일남 교수
권 기 한 교수

1

Axonal Stimulation Single Fiber Electromyography Findings in Myasthenia Gravis

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Background : Axonal stimulation single fiber electromyography(S-SFEMG) is a relatively new electrophysiologic technique and have several advantages over conventional voluntarily activated single fiber electromyography(V-SFEMG). **Objectives** : This study was performed in patients with myasthenia gravis(MG) in order to analyze their neuromuscular transmission defect and thus to verify the usefulness of the S-SFEMG technique. **Methods** : In 27 patients with newly diagnosed Tensilon(+) MG, S-SFEMG was performed on extensor digitorum communis muscle. The repetitive nerve stimulation test(RNST) on orbicularis oculi, trapezius, flexor carpi ulnaris and abductor digiti quinti muscles was also performed at the same time. Then, the statistical analysis was performed between 2 groups of ocular(O-MG) and generalyzed MG(G-MG). **Results** : The S-SFEMG was abnormal in 88.9%, while RNST was abnormal in 77.8% of the patients tested. The normal S-SFEMG result was observed exclusively among O-MG patients. The mean MCD value(32.6 in O-MG, 75.8 in G-MG), % of fibers with blocking(3.6% in O-MG, 36.9% in G-MG) and % of fibers with abnormal jitter(20.8% in O-MG, 78.5% in G-MG) was more increased in patients with G-MG than those with O-MG, and this difference was statistically significant(unpaired T-test, $P < 0.01$) in all 3 variables. Conclusions: The S-SFEMG is a highly sensitive and useful diagnostic tool in MG. Although it demands more delicate and strict technical consideration than V-SFEMG, it is less time-consuming and applicable even to uncooperable patients. Our study also shows S-SFEMG results satisfactorily reflects the clinical severity of MG.

2

Comparison of Median Nerve Conduction Study between Symptomatic and Asymptomatic Carpal Tunnel Syndrome with Diabetes Mellitus.

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Background & Objectives : Carpal tunnel syndrome (CTS) was fivefold more common in diabetic group than in non-diabetic group. Characteristically, there were greater frequency of asymptomatic CTS with diabeties. But asymptomatic CTS was poorly understood. We tried to find the nature of asymptomatic CTS with diabetes by doing conventional nerve conduction studies. **Methods** : We included 114 patients with diabetes who diagnosed by abnormal on median nerve but other tested nerves were normal on conventinal nerve conduction study ; 1) Absolute prolongation of motor terminal latency(>3.9ms) or 2) Absolute prolongation of sensory peak latency(>3.0msec) or 3) Absolute slow sensory nerve conduction velocity(< 39.3m/s). Then we divided 114 patients into symptomatic who had numbness, paresthesia or pain on any of the lateral four digits of the involved hand and positive findings in tinel or phalen or flick test and asymptomatic group. We compared median nerve conduction studies between symptomatic and asymptomatic groups. **Results** : Symptomatic CTS were 32 cases and duration of diabetes was 9.5years. Asymptomatic CTS were 82 cases and duration of diabetes was 6.5years. Age and sex were matched between two groups. Median motor terminal latency(4.9ms) and median nerve sensory peak latency of finger to wrist segment(3.7ms) in symptomatic group were statistically significant prolonged ($P<0.05$). Difference of median and ulnar nerve motor latency and difference of median and ulanr sensroy peak latency on symptomatic group were also statistically significant($P<0.05$). **Conclusion** : This results showed that in diabetes, carpal tunnel syndrome symptoms and signs maybe associated with severity of median nerve abnormality. We suggested that asymptomatic carpal tunnel syndrome with diabetes was early stage of overt carpal tunnel syndrome.

3

Changes in Cortical Excitability and Conductivity of Amyotrophic Lateral Sclerosis

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Background & Objectives : Amyotrophic lateral sclerosis(ALS) is a well-defined disorder of spinal motor neurons. The cortical motor neuronal changes in this disease show complex neurophysiologic pictures and are not easily accessible. We focused on the excitability and conductivity changes in cortical motor neurons as measured by magnetic motor evoked potential(MEP). **Methods** : MEP to magnetic transcranial stimulation were recorded for abductor pollicis brevis muscles(APB) in 25 patients, 14 men and 11 women, with ALS. Mean age was 53.4±10.0 years, and mean disease duration was 14.9±12.6 years. Eleven patients with definite upper motor neuron(UMN) signs, and 5 patients of progressive bulbar palsy were included. Four serial magnetic stimulation was applied in order to get the parameters; excitability threshold(TH), central conduction time(CCT), and silent period(SP). Data were analyzed according to the clinical findings. **Results** : TH was higher in ALS patients(mean 62.6±17.5%) than normal control(mean 49.6±3.7%, $p<0.01$). MEP amplitudes were generally reduced in the patients(2.8±3.4mV; control 6.4±3.1mV: $p<0.05$). Resting CCT was significantly prolonged in patient group(17.0±6.5ms) compared with control(7.4±0.8ms, $p<0.01$). SP duration was remarkably shorter in ALS patients(81.9±31.1ms) than control(145.7±21.2ms, $p<0.01$). Duration of the disease did not seemed to be correlated well with TH, CCT or SP. Patients with definite UMN signs showed the tendency to higher threshold, lower amplitude, longer CCT, and shorter SP than the other patients without statistical significance. SP was significantly shorter in patients with UMN signs than patients classified as progressive bulbar palsy($p<0.05$). **Conclusion** : Our study suggest decreased cortical excitability and conductivity in ALS patients and that there may be abnormalities of motor cortical inhibitory mechanisms which are detected with the measurement of the SP. These distinctive features of MEP in ALS could be a useful supplements for diagnosing this disease.

4

Organophosphate Cholinesterase Inhibitor, Diisopropylfluorophosphate Induces Acetylcholinesterase-mediated Nicotinic Receptor Facilitation

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Background & Objectives : Cholinesterase inhibitors(ChEIs) which have been widely clinically used are known to have diverse actions on the neuromuscular synaptic transmissions, suggesting that inhibition of cholines-terase(ChE) might not be their only mode of action. They interact with the nicotinic acetylcholine receptor(nAChR) macromolecule as a weak agonist, and as a modulator inducing desensitization and blockade at high concentration. In the previous study, we reported that carbamate ChEIs, Pyridostigmine and Physostigmine could facilitate ionic influx through nAChRs, when precluded the ACh-hydrolyzing effect of AChE by applying carbachol as an agonist. The facilitation of nAChR function was supposed to be achieved by AChE-mediated nAChR modulation and possibly by up-regulation of nAChRs. **Methods** : In this study, we analyzed the effect of irreversible organophosphate ChEI, diisopropylfluorophosphate(DFP) on the function of muscular nAChRs in TE671 cells, quantifying carbachol-induced intracellular $^{22}Na^{+}$ influx through nAChRs, using radioassay. **Results** : Preincubation of cells with 1mM DFP at 37**℃** for 10 min as well as simultaneous application of carbachol and DFP decrease the carbachol-induced influx. However, preincubation of cells with 10 μM DFP potentiated the influx. **Conclusion** : Thus, it is supposed that organophosphate ChEI as well as the carbamate ChEIs facilitates nAChR function at low concentration, whereas it inhibits nAChR at high concentration. The novel function of ChEIs is indicated to necessitate cellular metabolism, and be possibly mediated by AChE. The inhibition of DFP on nAChR function at high concentration is attributable to its remained curare-like action and direct cellular toxicity.

5

Strategy for Repetitive Nerve Stimulation Test in Myasthenia Gravis and Myasthenic Syndrome

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Background & Objectives : Repetitive nerve stimulation(RNS) test is a useful tool in the evaluation of neuromuscular transmission disorder. In our laboratory, we use Oh's method, which tests 5 kinds of muscles(FCU, ADQ, orbicularis oculi; nasalis and trapezius) and 3 kinds of low rate stimulation(LRS). For FCU and ADQ, we perform another study with high rate stimulation(HRS). This method has the advantage of high sensitivity, but its disadvantages are time consuming and delivers painful stimuli to patients. **Methods** : To re-establish the stage of RNS to overcome this problem and to make a simple and useful test, we analyzed RNS data from 369 patients, retrospectively. **Results** : The number of patients with MG was 357. The sensitivity of RNS(LRS) was 69.7% in MG. The sensitivity was greater with generalized symptom(86.4%) than with only ocular symptom(40.3%). The sensitivity was higher with 3pps and 5pps than with 2pps, while the exclusion of 2pps didn't affect the sensitivity. We found only 3cases with post-tetanic exhaustion(PTE) in MG patients with negative results on LRS. The number of myasthenic syndrome was 12. There was a difference in the distribution of resting CMAP, post-exercise CMAP between MG and myasthenic syndrome. In most cases of myasthenic syndrome, the resting CMAP of ADQ and FCU was below 4.0mV and post-exercise CMAP of ADQ and FCU was above 50%. **Conclusion** : LRS may be done only with 3 and 5 pps, and that HRS of the ulnar nerve was helpful only if there was a suspicion of myasthenic syndrome or a borderline decremental response in LRS. As well, HRS was needed if resting CMAP of ADQ or FCU was below 4.0mV, or if post-exercise CMAP had increased over 50%.

거 문 고 B

Epilepsy II

좌장 : 홍 승 봉 교수
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1

Effects of Tailored Anterior Temporal Lobectomy on Intelligence and Memory Function in Patients with Mesial Temporal Lobe Epilepsy

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Background & Objectives : Dysfunction of left dominant temporal lobe is associated with memory impairment for verbal material. Right non dominant temporal lobe seems important for learning and memory of material that is difficult to verbalize. Considerable debates exist concerning effects of epilepsy surgery on cognition. To evaluate effects of tailored anterior temporal lobectomy with amygdalohippocampectomy(ATLAH) on intelligence and memory, we compared cognitive function pre- and postoperatively in patients with right and left mesial temporal lobe epilepsy(MTLE). **Methods** : Forty patients(male: 25, female : 15) who had unilateral temporal lobe surgery from 1993 to 1997 and had been seizure-free at least two years postoperatively were included. Mean age of surgery was 27.1 and periods of mean follow-up were 47 months. All patients underwent tailored ATLAH, and the extent of surgery was tailored by intraoperative eletrocorticographic findings and functional mapping of eloquent cortex. The change of cognitive function was assessed pre- and postoperatively with Korean Wechsler Adult Intelligence Scale and Rey Memory Test. We also assessed correlation between extent of hippocampal resection and cognitive changes. **Results** : In right and left temporal lobectomy group(N=40), there was statistically significant improvement in performance IQ(PIQ, P=0) and full scale IQ(FIQ, P=0.02), and improvement in verbal IQ(VIQ), complex figure tests(CFT), and auditory verbal learning tests(AVLT) without statistical significance. In right temporal lobectomy group(N=18), improvement in VIQ, PIQ, and FIQ without statistical significance, but significant improvement in delayed recall of AVLT. In left temporal lobectomy group(N=22), improvement in VIQ, PIQ, FIQ, CFT, and AVLT without statistical significance. There was no significant postoperative changes in cognitive tests according to the extent of hippocampal resection. **Conclusion** : Patients who were seizure free after tailored ATLAH had significant improvement in performance IQ and full scale IQ. The results suggest that ablation of seizure attack, reduction of antiepileptic drugs and tailored temporal lobe resection may contribute to the improvement.

2

Radial Surface Rendering of Brain MRI in Localizing Epileptic Focus

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Background & Objectives : The sensitivity of brain MRI is not high in localizing epileptic focus of neocortical epilepsy. The minor sulcal and cortical abnormalities, which might produce epilepsy, cannot be detected by the conventional visual inspection of 2 dimensional cross-sectional MRI images. To improve the sensitivity of MRI, we performed 3-dimensional(3-D) reconstruction and radial surface rendering of brain MRI in the patients with neocortical epilepsy and normal control. **Methods** : Ten normal controls, 14 neocortical TLE and 14 extra-TLE patients were included. All subjects had SPGR 1.6 mm thickness MRI of whole brain and epilepsy surgery after presurgical evaluation. 3-D reconstruction and radial surface rendering of brain MRI were carried out using Analyze software(version 7.5, Biomedical Image Resource, Mayo Foundation, Rochester, Minn.). The 2-D brain MRI images(T1, T2, FLAIR and SPGR) were interpreted by a neuroradiologist and radial surface rendering images were inspected visually in comparison with those of normal controls by a neurologist without clinical and EEG information. **Results** : The conventional 2-D brain MRI analysis(CMA) found brain abnormalities in 6 of 14 neocortical TLE(42.9%). Radial surface rendering(RSR) revealed cortical abnormalities in 11 of 14 neocortical TLE(78.6%). The CMA recognized focal abnormalities in 3 of 14 extra-TLE(21.4%). The RSR found epileptic lesions in 11 of 14 extra-TLE(78.6%). RSR could find all brain lesions detected by CMA. RSR revealed epileptic cortical lesion in 13 of 19 patients(68.4%) who were interpreted as normal by CMA. The common abnormal findings of RSR images were focal enlargement or atrophy of gyri and regional distortion of gyral patterns. **Conclusions** : 3-D reconstruction and radial surface rendering greatly impro-

ved the sensitivity of brain MRI in localizing epileptic focus of neocortical epilepsy.

3

The Clinical Features, EEG Findings and Surgical Outcome of Extratemporal Lobe Epilepsy; Experience in Asan Medical Center

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Background & Objectives : To evaluate the clinical features, EEG findings and surgical outcome of extratemporal lobe epilepsy. **Methods** : We retrospectively analysed the clinical history, preoperative diagnostic evaluation such as MRI and interictal & ictal EEG, pathologic findings and surgical outcome in 28 patients with medically refractory extratemporal epilepsy, who underwent epilepsy surgery at Asan Medical Center between Aug. 1995 and Dec. 1998. **Results** : Nineteen patients were male and 9 female(mean age : 30±6.8). Frontal lobe epilepsy was in 22 patients, parietal lobe epilepsy in 4 and occipital lobe epilepsy in 2. MRI findings were abnormal in 20 patients(encephalomacia in 8 ; tumor in 5 ; focal high signal in 4 ; vascular malformation in 2 ; polymicrogyria in 1) and 8 were normal. EEG findings were less lateralized or localized in frontal lobe epilepsy, especially of medial frontal or orbitofrontal origin. Surgical outcome with minimal 8 months follow-up was as following ; seizure-free in 18(67.9%), rare disabling seizure in 3(10.7%), worthwhile improvement in 1(3.6%), no worthwhile improvement in 4(14.2%) and follow-up loss in 1 patient. Of 8 patients with normal MRI finding, 5(62.5%) were completely seizure free. **Conclusion** : We conclude that surgical treatment often can be successful in medically intractable extratemporal lobe epilepsy.

4

Sphenoidal Electrode for Localization of Temporal Lobe Seizure Focus

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Background & Objective : Usefulness of sphenoidal electrodes for detecting mesial temporal seizure foci remains controversial. Our aim is to determine whether sphenoidal electrodes are superior to surface electrodes for EEG localization in patients with mesial temporal lobe epilepsy(TLE). **Method** : We retrospectively reviewed ictal EEGs recorded simultaneously with standard International 10-20 System, subtemporal(F9/10, T9/10, P9/10), and sphenoidal electrodes in 65 consecutive patients who underwent temporal lobectomy. Ictal EEGs were reviewed in a blinded fashion in both longitudinal bipolar and referential montages. Seizure onset was classified according to Ebersole's classification. Pathologic substrate was divided into mesial temporal sclerosis(MTS) and the others(Non-MTS). **Results** : 1) Of the 356 seizures in total 65 patients, 31 seizures in 11 patients were localized exclusively to sphenoidal electrode at least 3 seconds before involvement of subtemporal electrodes and the 22 seizures in 5 patients who showed the lateralized onset pattern were localized predominantly to sphenoidal electrode. 2) Twelve patients(27%) of 45 MTS and 4(20%) of 20 Non-MTS had isolated or localized sphenoidal onset, which is not correlated with pathological substrate. 3) Isolated or localized sphenoidal onset was not significantly related to surgical outcome, and seizure onset pattern. **Conclusion** : Although sphenoidal electrodes are superior to surface electrodes in some patients with TLE, isolated or localized sphenoidal seizure onset may not be specific for mesial temporal seizure foci.

5

Supplementary Sensorimotor Area Seizures : Video-EEG Monitoring and Surgical Outcome Experience in Asan Medical Center

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Backgrounds & Objectives : The supplementary sensorimotor area(SSMA) is a region located within medial superior surface of premotor area of frontal lobe and has a clinically distinct seizure semiology. Noninvasive lateralization or localization of SSMA seizure is difficult, often necessitating intracranial EEG monitorings before epilepsy surgery. To analyze electroclinical features of SSMA seizure and surgical outcome, we have reviewed semiology by video recordings, EEG patterns, and patients' interview. **Methods** : We retrospectively reviewed medical records and video-EEG monitoring data and interviewed them to evaluate postoperative outcome. Thirteen patients with characteristic semiology of SSMA seizure underwent prolonged video-EEG recordings and 7 of them had subdural grid implantation with cortical resection. Other presurgical work-ups included brain MRI, interictal and ictal SPECTs, and functional brain mapping by cortical stimulation. **Results** : Nine patients were male and the others female(age of evaluation 16-52 years, age of onset 6-39 years). All patients had clinically apparent SSMA seizures. By surface monitorings, lateralization of seizure focus could be documented in 7 patients(54%) and localization in 8(62%). With intracranial recordings, epileptogenic focus was localized to SSMA in 6 and parietal area in 1. Neuronal migration anomaly was found in 4, tumor in 1, encephalomalacia in 1, and non-diagnostic abnormality in 1. Postoperatively, 5 of the 7 patients were completely seizure-free with a mean 15-month follow-up. One patient had significantly improved seizure control. One patient had persistent nondisabling simple partial seizure. None of them had permanent complications. **Conclusions** : Seizures arising from the SSMA area are clinically distinct. The diagnosis should be verified with video-EEG recording and intracranial recording is inevitable for epilepsy surgery. Successful cortical resection can be performed after meticulous subdural recording and functional mapping without any critical complications.

거 문 고 C

좌장 : 정 대 수 교수
유 경 무 교수
나 정 호 교수
허 지 회 교수
서 만 욱 교수
어 경 윤 교수
나 덕 렬 교수
이 상 건 교수

1

Simple Digital EEG System Utilizing Analog EEG Machine

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Backgrounds & Objectives : The rapid development and popularity of digital EEG(DEEG) is due to its convenience, accuracy and applicability for quantitative analysis. These advantages of DEEG rendered physician preferring it to conventional analog EEG(AEEG). This study was conducted to assess the advantage of DEEG system utilizing AEEG(DAEEG). For this purpose a DAEEG system was developed and applied to rats. **Methods** : Status epilepticus-induced and control rats were used for collecting the EEG data. After four epidural electrodes were inserted and connected to 8-channel analog EEG(Nihon-Kohden, Japan), continous EEG monitoring via monitor was done from two rats simultaneously. EEG signals(HFF 70 Hz, time constant 0.3, notch filter off) through analog amplifier and filters were digitized at digital signal processor(DSP) and stored in Windows-based pentium PC. Digital data were sampled at the rate of 200 Hz and 12 bit of resolution. Acquisition software was able to carry out 'real-time view, sensitivity control and event marking' during continuous EEG monitoring. Review system consisted of off-line review, saving and printing out interesting segment and annotation function. **Results** : This DAEEG system could utilize most major functions of DEEG sufficiently while making a use of an AEEG. It was easy to monitor continuously and control sensitivity during ictal period. Marking the event such as documenting clinical events was less favorable than AEEG. Reviewing data was reliable, though speed was low. Storage and management of data was handy and economic. **Conclusion** : Simple DEEG system utilizing AEEG can be set-up at a laboratory level. It may be possible to apply in clinical purposes.

2

Independent Component Analysis for EOG Artifact Removal in EEG

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Background & Objective : Eyeball movement is one of the main artifacts in EEG. A new approach to the removal of these artifacts is presented using the technique of independent component analysis(ICA). This technique is a signal-processing algorithm to separate independent sources from unknown mixed signals. Through this approach, it is possible to isolate eyeball movement activity in EEG recordings. This study was performed to show that ICA is a useful method for selective separation of EEG components and makes little data deformity. **Method** : 12 sets of 10 sec digital EEG data including eye opening and closure were obtained using international 10-20 system scalp electrodes. ICA with 18 tracings of double banana bipolar montage was performed. Among obtained 18 independent components, two components, which were thought to be eyeball movements were removed. Other 16 components were reconstructed into regional bipolar montage. Power spectral analysis of EEGs before and after ICA was done and compares statistically. Total 12 pairs of data were compared by visual inspection and relative power comparison. **Results** : Waveforms of each pair look alike by visual inspection. Means of relative power before and after ICA were 29.16 % Vs 28.27 %, 12.12 % Vs 12.41 %, 10.55 % Vs 10.52 %, and 19.33 % Vs 18. 33 % for alpha, beta, theta, and delta, respectively. These values were statistically significant before and after ICA. **Conclusion** : We found little data deformity after ICA and it possible to isolate pure eyeball movement in EEG recordings. In addition to separation of eyeball movement, many other components of EEG could be selectively separated using ICA.

3

The Changes of Cerebral Hemodynamic Properties in the Patients with Hyperthyroidism

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Background : The effect of hyperthyroidism on the cerebral circulation has not been well studied, although hyperthyroidism has been known as an endocrine disorder that affects the cardiovascular hemodynamics. To identify the changes of cerebral circulation in the patients with hyperthyrodism, we evaluated the cerebral hemodynamic characteristics in the patients with hyperthyroidism. **Methods** : We performed TCD in 27 patients with hyperthyroidism(M:F=6:21) and 31 healthy controls(M:F=9:22). TCD parameters, mean blood flow velocity(MFV), pulsatility(PI) and resistance(RI) indices were obtained from the right middle cerebral artery. Pulse rates, systolic and diastolic pressure were measured during the TCD evaluation simultaneously. The vascular resistance of cerebral vessels was evaluated by the ratio of the mean arterial blood pressures to MFV(MABP/MFV ratio). MABP/MFV ratio and TCD parameters were compared between the patients and the controls to evaluate the effect of hyperthyroidism on the cerebral hemodynamics. **Results** : The values of MABP were not different significantly between two groups, whereas, the MFV of the patients with hyperthyroidism was higher(84.0 vs. 67.8 cm/sec, $p<0.05$). The MABP/MFV ratio was decreased in the patients(1.09 vs. 1.35, $p<0.05$). The PI(0.79 vs. 0.70, $p<0.05$) and RI(0.51 vs. 0.47, $p<0.05$) were higher in the patients. The patients showed higher pulse rate compared to the controls(92.2 vs. 68.3 beats/min, $p<0.05$), **Conclusions** : These findings suggest that the increased cerebral MFV in hyperthyroidism might be a result of decreased cerebral vascular resistance of small-sized cerebral vessels in thyrotoxic state.

4

Motor Evoked Potentials in Motor Neuron Disease

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Background & Objectives : Motor evoked potentials (MEPs) to magnetic trans-cranial stimulation were performed to evaluate upper motor neuron involvement(UMN) and it's relationship to lower motor neuron(LMN) involvement in motor neuron disease patients. **Method** : MEPs were obtained in the 17 consecutive patients with motor neuron disease. These patients were divided into three group based on clinical evidence of UMN and LMN involvement, bulbar symptom; amyotrophic lateral sclerosis(ALS), progressive muscular atrophy(PMA), progressive bulbar palsy(PBP). MEPs were recorded on four extremities using recording electrode placed in APB and AH muscles. Abnormal MEPs were defined by delayed central motor conduction time or absent waveform from cortical stimulation. **Results** : MEPs were abnormal in 64%(11/17) of patients; 100%(7/7) in ALS, 64%(4/7) in PMA, 0%(0/3) in PBP, respectively. In 68 total recording muscles, 34 had evidence of LMN involvement. In ALS group, 75%(12/16) of muscles with evidence of LMN involvement had abnormal MEPs and 8%(1/12) without LMN signs had MEPs abnormalities. In PMA group, MEPs abnormalities were found in 44%(8/18) of muscles with LMN signs and 0%(0/10) without. In PBP, none(0/12) of muscles without LMN signs showed MEPs abnormalities. Overall, 64%(20/34) of muscles with LMN involvement showed abnormal responses and only 3%(1/34) without LMN signs showed abnormal responses. **Conclusion** : MEPs results are well correlated with UMN signs in ALS and UMN involvement in MEPs usually related to LMN involvement in motor neuron disease.

5

Clinical and Electrophysiological Features in Motor Neuron Disease

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Background & Objectives : Motor neuron disease (MND) is a group of neurodegenerative disorders characterized by death of upper motor neurons(UMN) and lower motor neurons(LMN). Clinical and electrophysiological features in MND are not a uniform pattern. Therefore, we assessed clinical and electrophysiological characteristics of 65 cases of MND. **Methods** : We analyzed the clinical and electrophysiological data of patients who visited outpatient clinic or were admitted to Seoul National University Hospital from January, 1998 to July, 1999. The patients were diagnosed as definite, probable, possible amyotrophic lateral sclerosis(ALS), based on the E1 Escorial diagnostic criteria and other categories(progressive muscular atrophy(PMA), primary lateral sclerosis (PLS), progressive bulbar palsy(PBP)). We divided the patients into two groups according to the type of onset (spinal onset and bulbar onset MND) and nerve conduction study(NCS) data in patients with ALS were evaluated. **Results** : In the 65 patients(M:F=51:17, age: 51.9(12.8 years), the number of definite ALS was 24, probable ALS was 7, possible ALS was 7, and other categories(PMA: 22, PLS:0, PBP:5) were 27 patients. Thirty-eight patients with ALS were analyzed by NCS, and prolongation of terminal latency was observed in 30.0% of the nerves studied, slowing of motor conduction velocity in 7.2%, lowering of CMAP amplitude in 26.3%, and lowering of CNAP amplitude in 1.6%. On view of the affected area of onset, they consisted of 49 spinal and 16 bulbar onset MND. Onset age of bulbar onset MND was elder than spinal onset MND(bulbar : spinal = 57.4(19 : 47.9(14.4, $p<0.05$). Interval between onset and diagnosis of spinal onset MND was longer than that of bulbar onset MND(spinal : bulbar = 31.2(40.3 months : 9.4(6.5 months, $p<0.05$). **Conclusion** : ALS was the most common type in motor neuron disease and NCS abnormalities in patients with ALS were not uncommon. Our study suggested the possibility that ALS was not a disease with uniform clinical features, but subgroup with different clinical characteristics could exist.

6

Single Focal Cerebral Lesions with Shortened Silent Period

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Background & Objectives : Cortical silent period(SP) reflects cortical inhibition of central motor pathway, but its changes in various cerebral lesions have not been understood well. In most previous report, studied with unilateral cerebral lesions, prolonged cortical SP recorded with transcranial magnetic stimulation(TMS) on affected side compared with SP on contralateral hemisphere has been observed. In some studies, there have been reported unilateral cerebral lesions with shortened SP, so we tried to analyse its significance. **Methods** : We studied cortical SP of first dorsal interossei muscles evoked by TMS on both sides in 13 patients who had single focal cerebral lesions(lacunar infarct or small hemorrhage) at thalmus (n=7), cortex(n=3), basal ganglia(n=3), proven by MRI scan. To evaluate thalamocortical pathway in thalamus, we divided thalamic lesions into two groups : ventrolateral and dorsomedial lesions. Interside difference of SP at each lesion was compared with that of normal control group. **Results** : Shortened SP was observed in 3 ventrolateral thalamic, 3 motor cortical lesions and 1 caudate nucleus head lesion. Four dorsolateral thalamic and 2 putamen lesions showed prolonged SP. Interside difference of both shortened and prolonged group was 85.8± 47.6 msec. and 99.3±49.7 msec. respectively(normal control, 7.3±5.9msec.). **Conclusion** : These results suggest that intrathalamic location of thalamocortical pathway of cortical inhibition induced by TMS could be separated functionally and evaluation of SP is helpful for further understanding of central motor circuitry.

7

Two Cases of Anorexia Nervosa with Peripheral Neuropathy

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Background & Significance : Anorexia nervosa(AN) is a psychiatric disorder characterized by disturbance of body image, fear of gaining weight, severe weight loss and in female, amenorrhea. Compared with normal persons, patients with AN have subjective neuropathic symptoms more frequently. But electrophysiological abnormalities have rarely been reported. **Case** : (Case 1) A 23-year-old woman was presented with left foot drop and numbness in left hand and distal lower extremity. She rarely ate regular meals for years and always ate cookies or snacks. She lost 9kg from 42kg to 33kg during the last 8 months. Amenorrhea and sinus tachycardia were detected. The levels of LH, FSH, E2,Vitamin B_{12} and folate were decreased. The diagnosis of AN was made by a psychiatrist. Electrophysiologic test showed left ulnar neuropathy at elbow, left sciatic neuropathy at thigh level and diffuse sensorimotor polyneuropathy.(Case 2) A 40-year old woman was presented with numbness and weakness in both distal lower extremity. She rarely ate regular meals and usually ate cookies irregularly. She had amenorrhea for 3 years. On laboratory test, anemia and hypoalbuminemia were detected. The levels of LH and E2 were reduced. Dual-energy X-ray absorptiometry(DEXA) revealed osteoporosis. The diagnosis of AN was confirmed by a psychiatrist. Electrophysiological test revealed diffuse sensorimotor polyneuropathy. **Conclusion** : Although patients with AN complain neuropathic symptom more frequently than normal subjects, there were only a few reports with electrophysiological abnormalities. We experienced two cases of AN with peripheral neuropathy, and report them with electrophysiological findings.

8

Characterisitc Electrophysiological Findings at Cervico-thoracic Spinal Cord Infarct

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Background & Object : The Diagnosis of the cervical cord infarct could be made with clinical manifestation and precise neurologic examination. The cervical magnetic resonance imaging(MRI) study will make a confirmative diagnosis without electrophysiological study. In a forty-four year-old man of diffuse cervico-thoracic infarct(C5 to T1), probably caused by dissection of vertebral artery, electrophysiological study was done for the better comprehension of flaccid hands weakness and paraplegia. **Methods** : Nerve conduction study, electromyogram and magnetic stimulation test of motor cortex was done. **Result** : no compound motor action potentials(CMAPs) of abductor pollicis brevis(APB), adductor digiti quinti(ADQ), and extensor digitorum brevis muscls were not seen. The late-responses(F-waves at stimulation of bilateral peroneal and posterior tibial nerves and H-reflex) were not evoked. Small amount of denervation potentials were detected in APB and ADQ muscles. No potentials were seen at tibialis anterior and APB muscles at magnetic stimulation of motor cortex. **Conclusion** : The diffuse anterior horn cell lesion of C7-T1 spinal cord may cause the flaccid weakness of hands predominantly, but corticospinal tract lesion of cervico-thoracic spinal cord make paraplegia by conduction block to anterior horn cells of lumbo-sacral spinal cord possibly. No potentials of F-wave and H-reflex of lower extremity, inspite of cervical cord infarct suggested that the suprasegmental region of descending tract above lumbar spinal cord must be needed for the production of late-response reflex.

9

NCV of Median Proper Palmar Digital Nerve Recorded by Bar Electrode

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Background & Significance : There has been few electrophysiologic studies in median proper palmar digital nerve(PPDN). Bar electrode may be a useful tool to evaluate the distal peripheral nerves. **Objectives** : To evaluate nerve conduction velocities(NCVs) of median PPDNs in normal controls and carpal tunnel syndrome(CTS) patients by bar electrode. **Methods** : We checked NCVs of median PPDNs of thumb, index and middle fingers in normal controls(70 hands) and CTS patients(95 hands) by bar electrode. The mean NCVs of both groups were compared to find the correlation between them. **Results** : The mean NCVs of each median PPDN in control group were 38.7±4.2(D1), 32.0±4.6(D2), 34.2±4.4(D3) m/sec, and in CTS group were 35.3±8.9(D1), 20.2±5.2(D2), 20.2±5.1(D3) m/sec orderly. There were significant differences between mean NCVs of 3 fingers in control group($p=0.0001$), but not between left and right fingers($p>0.05$). The differences between mean NCVs of control and CTS were significant in all 3 fingers($p=0.0014$, 0.0000, 0.0000). **Conclusion** : Bar electrode is a useful tool to evaluate the median PPDNs in normal controls and CTS patients.

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Visual Working Memory Revealed by Repetitive Transcranial Magnetic Stimulation

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Background & Objectives : We evaluated whether repetitive transcranial magnetic stimulation(rTMS) may be utilized for the hemispheric lateralization and anatomical localization of the object-related visual working memory system. **Methods** : In eight normal volunteers, we tested visual working memory with synchronous rTMS delivery. rTMS was applied over 9 different positions on each side of the scalp according to the International 10-10 System: frontal(F3/F4, F5/F6, F7/F8), frontotemporal(FT7/FT8), temporal(T7/T8), temporoparietal(TP7/TP8), and parietal(P3/P4) areas. Synchronous with the delivery of rTMS for 5 seconds a desktop computer presented serial four non-semantic figures for 1 second respectively. After a 2 second delay, a probe-recognition figure was presented for 2 seconds and subjects had to decide whether it matched any of the previously presented items. At each position, ten sessions were performed and the number of incorrect responses was recorded. **Results** : rTMS over the right hemisphere significantly increased the disturbance of visual working memory compared with the left($p<0.05$). rTMS over the right inferior frontal(F8), inferior temporal(T8), and middle parietal(P4) areas significantly increased the disturbance of visual working memory compared with the control($p<0.05$). **Conclusions** : rTMS would be a useful method for evaluation of visual working memory and it was lateralized to the right hemisphere and localized in the right inferior frontal, inferior temporal, middle-parietal areas.

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Ophthalmoplegic Migraine with Reversible Enhancement of the Intraparenchymal Abducens Nerve on MRI

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Background and Significance : Ophthalmoplegic migraine is a rare disorder characterized by repeated attacks of headache associated with paresis of ocular cranial nerve(s), without demonstrable intracranial lesion. There are some rare reports that the cisternal segment of the oculomotor nerve was enhanced in acute phase, followed by resolution of enhancement over several weeks in contrast-enhanced MRIs. Meanwhile, the patient with ophthalmoplegic migraine associated with abducens nerve palsy was rarely reported. We report one patient who opthalmoplegic migraine with abducens nerve palsy and serial MRI findings. **Case** : A 42 years old woman with history of migraine presented with sudden horizontal diplopia. She had suffered

from migraine without aura, 3-4 times a year, for recent 10 years. On the day(noon) of her symptom onset, the patient had unilateral pounding headache associated with nausea for several hours, which was somewhat relieved after medcation but continued up to the next morning. She denied any significant past medical history except for migraine. About 9 PM on the first day, she suddenly felt double vision, which was relived by closing either eye. This was the second time for her to have diplopia during migraine attack. Immediately after disappearance of diplopia she underwent a brain MRI(1.5 Tesla) with Gd-enhancement which demonstrated enhancement in the ntraparenchymal portion of the right abducens nerve. Her diplopia responded well to 60mg of oral prednisolone, which was started on the third day. On the next day, she didn't complain of double vision at all. On the two months, we performed a follow-up Gd-enhancement MRI with thin-sections of the brian stem. The follow-up MRI after two months showed disappearance of enhancement in the intraparenchymal portion of the right abducens nerve. **Comment** : This is the first report of reversible intraparenchymal enhancement of intraparenchymal ocular motor nerve in phthalmoplegic migraine. The pathophysiological implication of this finding in ophthalmoplegic migraine will be discussed.

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Symmetry of Normal Nerve Conduction Studies

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Background : It is often assumed that nerve conduction measurements in normal subjects are symmetric. However, the normal limits of symmetry have not been studied completely. **Objectives** : To determine the side-to-side symmetry of commonly tested nerves. **Methods** : Bilateral studies from normal registered electromyographic laboratory reports were selected. For each right-left nerve pair, the ratio(left/right) and difference(left-right) were calculated. **Results** : Side-to-side variations of the amplitudes are much wider than those of terminal and F-wave latencies, motor and sensory conduction velocities. Statistically significant differences were observed in the terminal latencies of peroneal and tibial nerves, conduction velocities of proximal median sensory and ulnar motor nerves, amplitudes of proximal and distal peroneal nerves, proximal median motor nerve and distal ulnar sensory nerve($p<0.05$). However, the magnitudes of the average differences were very small and were not clinically meaningful except for the ulnar sensory nerve. **Conclusions** : When making side-to-side comparisons of nerve conduction measurements, only the amplitude of ulnar sensory nerve had significant deviations from symmetry.

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Normalization of Middle Cerebral Artery Velocities using TCD after Aneurysmal Clipping in Aneurysmal SAH - Preliminary study -

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Background and Objectives : With the development of TCD(transcranial Doppler), serial evaluation of intracerebral basal arteries velocities can be performed noninvasively. To obtain factors that promote normalization of MCA(middle cerebral artery) velocities after aneurysmal clipping may be a important to identify in order to optimized management of SAH(subarachnoid hemorrhage). **Methods** : We studies serial MCA velocities using TCD in 15 patients who underwent aneurysm clipping to analyze which factors promoted normalization from March to August, 1999. The serial TCD examinations started within the first 72 hours after aneurysmal clipping and were carried out every two to three days. MCA mean velocities were considered normalized if either sides were less than 120 cm/second. Age, sex, operatiom timing, number of aneurysm, initial blood pressure, hemoglobin, blood sugar, clinical conditions, amount of subarachnoid blood on CT were analyzed. **Results** : Cases of SAH with intraventricular or intracerebral hemorrhage on initial CT scan showed a slower normalization. Other parameters listed above did not effect normalization time. **Conclusion** : Initial CT findings appear to be a significant factor in predicting normalization of MCA velocities after aneurysmal clipping in aneurysmal SAH.

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Transcranial Doppler Diagnosis of Chronic Middle Cerebral Artery Occlusion

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Background & Objectives : Transcranial Doppler(TCD) findings in chronic middle cerebral artery(MCA) occlusion are diverse due to collateral circulation. However, the studies focused on this issue are scarce. This study aimed to determine TCD patterns in chronic MCA occlusion and to estimate the accuracy of TCD in the evaluation of collateral circulation. **Methods** : We reviewed 12 patients(11 men and 1 women, age=57.9(12.6 years) with chronic atherosclerotic MCA occlusion confirmed by the review of transfemoral cerebral angiogram(TFCA) during past 2.5 years in Seoul National University Hospital. The patients with embolic MCA occlusion, moyamoya disease, vasculitis or ipsilateral internal carotid disease(>50% stenosis) were excluded. Flow velocities(FV) of anterior, middle and posterior cerebral arteries(ACA, MCA, PCA) on TCD were analysed. Basal collateral and leptomeningeal collateral circulation through ACA or PCA were evaluated with TFCA. We correlated TCD findings with MR angiogram(MRA) and TFCA. **Results** : MRA was regarded as occlusion in all cases. Basal and ACA leptomeningeal collaterals were found in all cases, and PCA leptomeningeal collateral in six patients on TFCA. We found three TCD patterns: 1) normal MCA FV with increased ACA or PCA FV(n=4); 2) normal M1 FV with loss of M2 signal and increased ACA or PCA FV(n=4); and 3) increased M1 FV with distal dampening and increased ACA or PCA FV(n=4). TCD accuracy for the diagnosis of leptomeningeal collateral circulation was 83.3%(10/12) for ACA and 50%(3/6) for PCA. **Conclusions** : Basal collateral network may be mistaken for the MCA Doppler signal. TCD is very useful in the evaluation of leptomeningeal collaterals in chronic MCA occlusion. TCD and MRA are complementary tools for the diagnosis of MCA occlusion and estimation of collateral circulation.

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Radiation-induced Moyamoya Disease

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Background : A large conducting arteries are affected by ionizing radiation only uncommonly. Although radiation injury is often involved in the differential diagnosis of ischemia, symptomatic arterial narrowing from radiation is unusual. The resistance of large arteries to radiation is probably due to their ample lumen and capacity for moderate amounts of wall thickness without flow reduction. We present a rare case of acute stroke with moyamoya phenomena induced by radiation therapy and discuss the possible mechanisms. **Case** : A 40 years old male patient was admitted with right hemiparesis. He recently suffered from three times of transient motor weakness, lasting for several minutes, on the right side. Diagnosed as pituitary macroadenoma in 5 years ago, he had taken radiation therapy after surgery. On T2 MRI, multiple hyperintensity lesions, suggesting ischemic lesions, were noted in striatocapsular area, corona radiata and occipitoparietal cortex of right hemisphere. Any atherogenic/thrombogenic risk factors or cardioembolic sources were not found. On cerebral angiography, total occlusion at the proximal portion of right MCA, abnormal vascular moyamoya netswork and cortical leptomeningeal collaterals were observed, however, these findings were not shown on the previous brain imaging study performed at the time of surgery. **Comment** : Although the mechanisms of radiation induced vascular change are still unknown, radiation may cause endothelial damages and accelerate atherosclerotic changes or myointimal proliferation. The damage to vasa vasorum by radiation has been also proposed. Regardless of benefits of radiaion therapy, the fatal side effect to cerebral vessels should not be ignored. In order to avoid this effect, careful estimation of the radiation, if not absolutely indicated, should be required and cerebral angiographic follow-up during and after radiation therapy is indicated, particularly when the patient develops transient cerebral ischemic symptoms.

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Diffusion-Weighted MRI in Wallerian Degeneration

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Background : Wallerian degeneration(WD) refers to anterograde degeneration of axons and their accompanying myelin sheath. Several authors have addressed the temporal changes of MR signal intensities of WD, but diffusion-weighted MRI(DWI) abnormality of WD has not been previously reported. **Objective** : To report the patients with DWI high signal intensities on the area of WD and discuss the underlying mechanism. **Methods** : We reviewed four patients(four men, age=64.8(6.2) with high signal intensities on T2-weighted image(T2WI) and DWI on the area of WD in the pyramidal tract of brainstem following a large cortical infarct. The interval from stroke onset to MRI study was 12 days in two patients, 16 days in one, and six months in one. Apparent diffusion coefficient(ADC) was calculated based on Stejskal-Tanner equation in three patients(two patients in subacute stage, and one in chronic stage). **Results** : High signal intensities of DWI are more conspicuous than those of T2WI. The ADC on the area of WD was normal or elevated(mean=1.21(0.21×10^{-5} cm²/s, ranging from 0.89 to 1.67×10^{-5} cm²/s) compared to contralateral homologous area(mean=1.10(0.20×10^{-5} cm²/s, ranging from 0.80 to 1.49×10^{-5} cm²/s). The ADC maps showed no obvious abnormalities. **Conclusions** : DWI high signal in WD did not arise from decreased diffusion coefficient. The mechanism of hyperintensities on DWI is presumed to be related to T2 shine-through effect. We suggest that DWI can be a useful tool to detect the early stage of WD.

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Correlation between Hemocrit and Cerebral Blood Flow Velocity Measured by Transcranial Doppler in Iron Deficiency Anemia

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Background & Objectives : It is well known that cerebral blood flow is affected by blood viscosity and one of the major determinant of it is hematocrit. Though several investigators reported the negative correlation between hematocrit and cerebral blood flow, most of the studies were done in healthy volunteers or patients with sickle cell anemia. We investigated the quantitative correlation between hematocrit and cerebral blood flow velocity measured by transcranial doppler(TCD) in patients with iron deficiency anemia(IDA). **Methods** : Patients with IDA were recruited consecutively from April 1998 to May 1999. Maximal peak systolic(PSV) and mean blood flow velocity(MV) along the left middle cerebral artery(MCA) and basilar artery(BA) were measured by TCD. First TCD was done at initial recruitment and follow-up was done at more than 4 weeks later. The correlation between hematocrit and flow velocity was studied by simple regression analysis with the percent change of follow-up value on the initial value. **Results** : Twenty two patients(2 men and 20 women; mean age, 41.2±12.6 years) were recruited. The hematocrits(mean±SD) were 25.8±4.1%(initial) and 37.9±4.0%(follow-up). At first TCD, the maximal flow velocities(mean±SD, cm/sec) were 134.3±25.5(PSV) and 89.1±13.5(MV) along the MCA, and 89.1±16.5(PSV) and 59.6±11.3(MV) along the VA. At follow-up TCD, each value was decreased to 105.22±2.0(PSV of MCA), 69.1±14.3(MV of MCA), 71.2±20.2(PSV of VA), and 47.0±14.7(MV of VA). The correlation coefficients between hematocrit and flow velocity were -0.55(PSV, $p<0.01$) and -0.58(MV, $p<0.01$) for MCA, while those for BA were -0.37(PSV, $p<0.05$) and -0.41(MV, $p<0.05$). The regression equations for MCA were [% change of PSV]=9.36-0.24×[% cahnge of Hct] and [% change of MV]=6.79-0.31×[% change of Hct]. **Conclusions** : The

ıematocrit correlated more with flow of MCA than of BA. If one use the regression equations, presumed cere-ɔral blood flow velocity at a certain hematocrit can be cal-culated in patients with IDA.

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Moyamoya Disease Presenting with Limb Shaking Transient Ischemic Attack

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Background & Significance : Moyamoya disease usual-y presents as seizure and focal neurologic deficits such as ıcute motor and sensory deficits, speech disturbance by ɛerebral ischemia or hemorrhage. Its initial symptoms ɤarely include limb-shaking. **Case** : We experienced a forty ƒour-year-old man with Moyamoya disease who showed shaking involuntary movement of the left upper and lower ɪimbs. These symptom could be triggered by exercise or ɲyperventilation. CT detected ischemic lesion in the right ƒrontal area. In TFCA both MCAs and left ACA are ɔccluded, and fine basal collateral vessels are observed. SPECT demonstrated low perfusion and reduced vascular ɤeservoir in the right frontoparietal area. EEG showed no ɛpileptic discharge but only bifrontal slow waves. **Conclusion** : Low perfusion in the borderzone between MCA and ACA territory may be the pathogenesis of these limb shaking. Moyamoya disease may be considered in the differential diagnosis of transient limb shaking.

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A Case of Pure Primary Medullary Hemorrhage

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Backgroud & Significance : Pure primary medullary ɦemorrhage is rare, generally accompany ipsilateral hypo-ɡlossal nerve palsy & contralateral hemiparesis due to ɲedially & ventrally extending. These two features distinguish most examples of medullary hemorrhage from the classical presentation of Wallenberg's lateral medullary syndrome, due to infarction rather than hemorrhage. **Case** : A 53 years old man was admitted with sudden onset Lt. side weakness & vertigo. On neurologic examination, mentality was alert and orientated. Rt. Pupil was dilatated. light reflex, EOM was intact. Tongue was deviated to Rt. side. Horner syndrome of Rt. side, spontaneous horizontal jerking nystagmus to Lt. side were present. He had also dysarthria, mild dysphagia. Motor power of Lt. extremity was grade IV, Pain & temperatue sense of Lt. trunk, extremity & Rt. face were decreased. Babinski sign was not elicited. Hypertension, diabetes mellitus were absent. Routine laboratory findings, chest-PA, EKG, brain-CT, VEP, BAEP, MNSEP, EEG were normal findings. Brain MRI revealed focal swollen Rt. medulla with high signal intensity on T1WI & low mixed signal intensity on T2WI. 4-vessel TFCA showed no vascular abnormality. 2 month later, dysarthria, mild dysphagia, Lt. side weakness were still remained. **Comment** : We report a case of pure primary medullary hemorrhage, which may be clinically distinguished from Wallenberg's lateral medullary syndrom due to infarction.

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Acetazolamide-TCD in Unilateral Internal Carotid Artery Disease - Focus on the Blood Flow Velocity Change in the non-Lesional Hemisphere -

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Background : Acetazolamide(Diamox) causes cerebral arteriolar dilatation followed by increase of blood flow. The use of transcranial Doppler-acetazolamide(Diamox TCD) test in the internal carotid artery(ICA) steno-occlusion has been focused on the blood flow velocity(FV) change in the middle cerebral artery(MCA) and cerebrovascular reserve capacity in the lesional side. **Objective** : To evaluate Diamox TCD pattern in the MCA contralateral(non-lesional side) to the site of ICA steno-occlusion. **Methods** : Sixteen patients(14 males and 2 females, age=62(8) with unilateral ICA significant stenosis(n=8) or occlusion(n=8) confirmed by transfemoral cerebral angiog-

raphy(n=14) or MRA(n=2) were included. We divided the patients into two categories according to the degree of the anterior communicating artery(A-com) collateral development: Group I comprised 8 patients with good A-com collateral; and group II comprised the other 8 patients without A-com collateral. Ten hemispheres in 5 volunteers(3 males and 2 females, age=54(15) whose TCD(n=5) and/or MRI/A(n=3) were normal served as a control group. Diamox TCD test was performed as a two-point measurement of the MCA blood flow velocity before and 5 to 25 minutes after drug injection. The response of MCA mean FV to Diamox in the non-lesional side in Group I was compared with that of Group II and controls. We used Mann-Whitney U-test for statistical analysis. **Results** : The mean maximal increase of MCA mean FV in the non-lesional side was significantly higher in Group I(64(17%, from 77.8(32.2 to 126(49.9 cm/sec) than in Group II(37(22%, from 67.1(28.3 to 92.5(42.0 cm/sec) and control group (37(12%, from 52.8(13.0 to 72.6(20.1 cm/sec)(p<0.05). **Conclusions** : We report that the MCA contralateral to the ICA steno-occlusion shows hyper-normal Diamox response, if A-com collateral development is good.

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Evolving Fashion of Delayed Infarction Following Mild Focal Brain Ischemia in Rats

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Background & Objectives : In global ischemia models, the development of delayed neuronal death has been well-described in many reports. Regarding focal ischemia models, however, there have been rare reports. The aim of this study is to investigate whether the corresponding results in transient middle cerebral artery(MCA) occlusion models might be produced. **Methods** : Adult male Sprague-Dawley rats underwent transient left MCA occlusion with a 3-0 nylon monofilament for 20 minutes in mild ischemia group. In severe ischemia group, 2-hour occlusion of MCA was induced. During operation, mean arterial blood pressure, blood glucose, body temperature, and ABGA were monitored. Evolution of brain infarction was studied at 24 hours, 72 hours, and 7 days after MCA occlusion on triphenyl tetrazolium chloride(TTC)-stained coronal sections. Volume of infarction measured by image analyzer was analyzed statistically with Mann-Whitney U-test. **Results** : There were no significant differences in mean arterial blood pressure, blood glucose, body temperature, and ABGA between the two groups. The severe ischemia group showed that various reperfusion time did not affect the volume of infarction(43.0±8.9 ㎣ in 24-hour reperfusion; 38.1±2.8 ㎣ in 72 hour; 41.3±2.8 ㎣ in 7 days). Volume of infarction, which developed after 24-hour reperfusion, was significantly smaller than that of others($p<0.05$). But, infarcted volumes after 72-hour occlusion(32.5±9.8 ㎣) and after 7-day occlusion(43.3±8.6 ㎣) were as large as that in severe ischemia group. Delyed infarction evolved mainly to cortical areas from the initial striatal lesion. **Conclusion** : The results of this study showed that delayed neuronal death in mild focal ischemia might develop as in global ischemia. Future studies focused on the pathophysiologic mechanism of delayed infarction in focal ischemia would be necessary.

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Patterns of Transcranial Doppler Ultrasound in Vertebrobasilar Intracranial Steno-occlusion: Significance of Bidirectional or Reversed Flow

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Background & Objectives : Vertebrobasilar intracranial steno-occlusion(VBISO) raise a high risk of brainstem ischemia. The assessment of VBISO by transcranial Doppler ultrasound(TCD) remains difficult with low sensitivity, using the current velocity criteria of steno-occlusion. In this study, we aimed to analyze TCD patterns of the patients with VBISO and correlate them with collateral circulation. **Methods** : 33 consecutive patients with abnormal TCD, MRA or cerebral angiographic findings in vertebrobasilar artery(VBA) during past 6 months were included in this study. **Results** : We could differentiate five TCD patterns: 1) mean flow velocity(MFV) lower than the upper normal limit with angiographical VBISO(AVBISO)(n=3) consisting of severe VBISO and false positive cases in MRA, 2) increased MFV with AVBISO(n=10), 3) increased MFV with normal angiogram(n=5) consisting of cases with inc-

eased VBA blood flow compensated for anterior circulation stenosis, and cases of normal vessel status with high MFV, 4) bidirectional flow(BDF) with AVBISO(n=12), and 5) reversed flow(RF) with AVBISO(n=3). BDF or RF with AVBISO in BA were significantly correlated with the existence of P-com collateral(P<0.001). BDF or RF was not detected in the cases with normal angiogram. **Conclusion** : BDF or RF of BA mean the existence of P-com with high probability. As an explanation, RF with AVBISO of BA indicates the VBA occlusion with compensated flow through P-com from anterior circulation, and with AVBISO of VA, compensated flow through the intact opposite VA. BDF with AVBISO indicates vertebrobasilar stenosis where low blood pressure evoked backwash from distal site to stenosis site in case of the existence of P-com or intact opposite VA. Thus, BDF or RF themselves indicate the AVBISO and raise the sensitivity of TCD in the detection of AVBISO.

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Risk Factors of Leukoaraiosis in Patients with Lacunar Infarction

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Background & Objectives : The leukoaraiosis(LA) was defined as bilateral and nearly symmetrical hypodense areas of the periventricular white matter and centrum semiovale on brain CT. LA may be associated with small vessel disease rather than with large vessel disease because of the frequent association between LA and lacunes or deep intracerebral hemorrhage. This study was performed to evaluate the risk factors which affect on the presence of LA in patients with lacunar infarction. **Methods** : We reviewed medical records including brain CT or MRI in 129 patients with lacunar infarction who wereadmitted Keimyung University Dongsan Hospital between January 1997 through December 1998. Risk factors were sex, age, hypertension, diabetes mellitus, heart disease, cigarette smoking, alcohol drinking, serum lipid and blood pressure on admission. **Results** : Patients having both lacune and LA were 81 and having only lacune were 48. LA was postively associated with older age(OR:1.08, CI:1.05-1.12),hypertension(OR:4.65, CI:1.55-13.91) and heart disease(OR:2.36, CI:1.121-4.99), total lipid(OR:1.01, CI: 1.00-1.02). LA was negatively asscociated with HDL(OR: 0.94, CI:0.90-0.98). Diabetes mellitus, cigarette smoking and alcohol drinking were not associated with LA. Mean systolic and diastolic blood pressure were also not associated with LA. **Conclusions** : These results suggested that older age, presence of hypertension, presence of heart disease, higher level of total lipid increase the possibility of development of leukoaraiosis.

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Complications of Cerebral Angiography in Ischemic Stroke

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Background and Objectives : Conventional cerebral angiography, which is a prerequisite for carotid endarterectomy and angioplasty, carry some risk while it may provide the best visualization of cerebral vasculature. We attempted to examine the incidence of complications associated with cerebral angiography in ischemic stroke patients. **Methods** : We retrospectively reviewed medical records of patients with ischemic stroke or TIA who had digital subtraction cerebral angiography. 419 procedures were performed between October 1994 and August 1999. Systemic, local and neurologic complications were evaluated. The neurologic complication was defined as any new focal neurologic deficit or progression of the preexisting neurologic deficit during or within the following 24 hours of angiography. **Results** : There were 5 systemic(1.2%), 17 local(4.1%), and 10 neurologic(2.4%) complications. The neurologic complications were reversible within 7 days in 6(1.4%) and were persistent after 7 days in 4(1.0%). Six out of 10 patients with neurologic complications had previous stroke or TIA. Angiographic studies revealed stenosis or obstruction of relevant arteries in 7 of them. There were no deaths. **Conclusion** : Cerebral angiography in ischemic stroke patient was associated with 1.4% reversible and 1.0% persistent neurologic complications. The history of previous stroke or TIA and the presence of severe stenosis or occlusion of the symptomatic artery may carry high risk of neurologic complications.

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Characteristics of Patent Foramen Ovale Associated with ischemic stroke

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Background and Objectives : Paradoxical embolism through a patent foramen ovale(PFO) has been found to be responsible for a few cases of stroke. The prevalence of PFO in general population is high, with estimated proportions of 22% to 38%. We assessed the role of a PFO in patients with ischemic stroke. **Methods** : 102 consecutive patients with ischemic stroke underwent brain MRI or CT, angiography and transesophageal contrast echocardiography. These patients were classified according to TOAST classification with blind for presence of PFO. **Results** : A PFO was found in 17(16.7%) patients(14 men and 3 women). Ischemic stroke patients with PFO were significantly younger than the ischemic stroke patients without PFO(49.6±12.9 years, 50.7±12.3 years respectively). The stroke subtypes of 17 patients with PFO were as follows ; 1(5.9%) with large-artery atherosclerosis, 5(29.4%) with small-vessel occlusion, 11(64.7%) with stroke of undetermined etiology(5(29.4%); two or more causes identified, 6(35.5%); negative evaluation). 11 of 17 patients with PFO had a middle cerebral artery(MCA) territory infarct(6; superficial MCA territory, 4; deep perforating MCA territory, 1; total MCA territory) and others had a posterior circulation territory infarct(4; cerebellum, 2; brainstem). **Conclusion** : Ischemic stroke patients with PFO show younger onset and more of brain imaging features indicating embolic infarcts than ischemic stroke patients without PFO.

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Protein C and Ischemic Stroke

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Background & Objectives : Several studies have suggested that the individuals with protein C deficieny are at increased risk for thromboembolism and venous thrombosis. It has been also assumed that lower serum concentration of protein C could be a risk factor of ischemic stroke. **Methods** : We studied 101 patients with acute ischemic stroke who were hospitalized between March. 1998 and July. 1999. Controls were age and sex matched 73. serum concentrations of protein C were measured both initially in all acute stage of stroke and follow-up in patients with initial lower protein C concentration. functional activities of protein C were not measured. **Results** : Protein C concentrations were significantly low in 7 of 101 ischemic stroke. Four of them had well known acquired causes of protein C deficiency(such as, anticoagulants therapy, liver disease, autoimmune disease) three had no obvious cause, who showed normal concentration of protein C, 2 months later. In the control group, 14 of 73 showed low concentration of Protein C. **Conclusions** : Protein C deficiency is not only rare in ischemic stroke but also may not be a risk factor.

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White Matter Hyperintensities on MRI in Diabetic Patients with Acute Stroke

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Background and Objectives : On MRI the frequency of white matter hyperintensities(WMHI) increases with advancing age and have been related to various risk factors such as arterial hypertension, cardiac disorders, diabetes, and cigarette smoking. This study is aimed to define the factors related with WMHI in diabetic patients. **Methods** : Diabetic patients who admitted to department of neurology

lue to acute stroke with performed MRI were included. Among them, patients who had hypertension and cardiac lisease were excluded. Their age, sex, duration of diabetes, liabetic complication such as neuropathy, retinopathy or iephropathy, Hb A1C at admission were investigated. Breteler Scale(grade 0, 1, 2) was used for visual rating scales of WMHI on T2WI. Statistical analyses were carried by logistic regression analysis. **Results** : All 51 patients were recruited. Their mean age was 64.10(10.01 years. Male: female was 23: 28. Mean interval between taking MRI and Hb A1C was 2.9(5.4 day. Mean Hb A1C was 9.8(2.7%. In analyzing, only significant variable to WMHI was Hb A1C(p=0.0147), but Hb A1C about severity of WMHI was not significant. **Conclusion** : It was found that degree of hyperintensity tended to be proportional to severity of DM. We recommend that followed MRI in patients with well controlled sugar level after stroke will be required.

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Acute Cerebral Infarction in Congestive Heart Failure

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Background and Objectives : The management of congestive heart failure(CHF) can contribute to development of cerebral ischemia. The aim of this study is to reveal the relation between mortality and the grade of CHF and risk of antihypertensive therapy for CHF patients. **Methods** : We have studied retrospectively the patients hospitalized to our hospital for cerebral infarction during 1997 to 1998 years and having the history of CHF. Sixty seven patients taken echocardiogram were selected. We divided these 67 patients into two groups, group A and B. The group A was composed of 24 patients with clinical symptoms of CHF on admission and have one or more of following; 1) less than 45% of ejection fraction, 2) greater than 0.55 of cardiothoracic ratio, 3) greater than 2.7cm/㎡ of left ventricular internal diastolic dimension by M-mode echocardiogram. The other 43 patients were included in the group B. **Results** : The frequency of large artery atherosclerosis was 36%(4/11) in group A and 45%(9/20) in group B. 7(10.5%) patients died during hospitalization(2 in group A, 5 in group B). The mean BP of them on hospital was 112.3mmHg. Seventeen(70.8%) patients in group A and 21(48.8%) patients in group B were on the antihypertensive medication, respectively. The mean BP on hospital was 99.6mmHg in group A and 108.3mmHg in group B. **Conclusion** : management of CHF with high risk of ischemic stroke is controversial especially on BP control. The early death rate may not be related with grade of CHF or BP on admission but further study is needed.

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Precipitating Events and Risk factors of Hemodynamic Stroke

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Background and Objectives : Hemodynamic stroke is a recognized but poorly described entity.The aim of this study was to define the precipitating events and risk factors of hemodynamic stroke. **Methods** : We reviewed 1,833 cases of acute ischemic stroke who were admitted Dongsan Medical Center between 1994 and 1998. Twenty four(1.3%) patients were compatible with hemodynamic stroke according to Christopher's description. **Results** : All the patients who had hemodynamic stroke had watershed zone infarction on CT or MRI. Seventeen(70.8%) patients took a slowly progressive mode of onset. The precipitating events of hemodynamic stroke were activity(9 [37.5%]), dehydration(6 [25%]), and massive bleeding(2 [8.3%]). The stroke occured at resting state in the other 7(29.2%) patients. Antihypertensive medications were being taken(8 [33.3%]). Carotid artery stenosis exists in 6. Neurological deficits progressed in 12(50%) despite of intravenous hydration, medications of antiplatelets or anticoagulation. Compared with the other types of ischemic stroke, the patients with hemodynamic stroke had significantly higher frequency of diabetes mellitus, valvular heart disease, congestive heart failure($p<0.05$). **Conclusion** : Recognition of the clinical and imaging features of hemodynamic stroke can lead early identification and management of underlying cardiac and carotid diseases. prevention of iatrogenic hypotension may reduce the risk of further events.

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Effect of Glucose/Oxygen Deprivation on Synapsin 1, Syntaxin and SNAP-25 in Rat Hippocampal Slices

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Background & Objectives : It has been well documented that a massive release of not only glutamate but also other neurotransmitters may modulate the final responses of nerve cells to the ischemic neuronal injury. But there is no information regarding whether the release of monoamines is directly associated with synaptic vesicular proteins under ischemic conditions. In this study, it was investigated whether synaptosomal proteins are involved in the release of 5-hydroxytryptamine(HT) in ischemia. And the effect of NMDA receptor on ischemia-induced release of 5-HT and synaptosomal proteins were also investigated. **Methods** : Rat hippocampal slices were divided four groups according to control, glucose/oxygen deprivation(GOD, glucose-free medium aerated with 95% N_2/5% CO_2), control with APV(NMDA receptor antagonist), and GOD with APV. Radioactivities of [^{3}H]5-HT every 10 min through 120 min were counted from medium of rat hippocampal slices in each group. GOD was induced for 20 min at 5th 10-min period. APV was administrated simultaneously with GOD for 20 min. Synapsin 1, syntaxin and SNAP-25 from homogenates of hippocampal slices in each group were analyzed using western blot. **Results** : GOD for 20 min enhanced release of [^{3}H]5-HT, which was in part blocked by the NMDA receptor antagonist, APV. The augmented expression of synapsin 1 during GOD for 20 min, which was also in part prevented by APV. But the expression of syntaxin and SNAP-25 was not altered during GOD. **Conclusion** : These results suggest that ischemic insult induces release of neurotransmitters associated with synapsin 1, synaptic vesicular protein, via activation of NMDA receptor in part.

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Comparison of the Hemodynamic Risk Factors between Border Zone Infarction and Lacunar Infarction

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Background & Objectives : Infarction of border zone areas, the junction between territories of supply of major cerebral arteries, is generally attributed to hemodynamic mechanisms which are dependent in hypotension, cardiac lesions, or severe carotid stenosis or occlusion. The purpose of this study was to evaluate more significant attributable factors resulting in border zone infarction compared with lacunar infarction. **Methods** : We studied the hemodynamic risk factor profiles in a series of 45 consecutive patients with border zone infarction, and 82 patients with lacunar infarction, registered at Chonnam University Hispital stroke registry from January 1997 to July 1999. We evaluated ejection fraction, systolic and distolic blood pressure on arrival, hypertension, the history of hypertension treatment, and the existence of ipsilateral carotid stenosis or occlusion as risk factors. **Results** : Among the factors, the existence of ipsilateral carotid stenosis or occlusion($p<0.001$), low systolic BP on arrival($p=0.014$) and the history of hypertension treatment($p=0.047$) were more attributable to border zone infarction than lacunar infarction. There was no significant difference in ejection fraction, diastolic BP on arrival, and the prevalence of hypertension between patients with border zone infarction and those with lacunar infarction. **Conclusions** : In border zone infarction, ipsilateral carotid stenosis or occlusion is the most important precipitating factor, and systolic BP on arrival and the history of hypertension treatment are also important factors.

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Intracerebral Hemorrhage after Evacuation of Chronic Subdural Hematoma

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Background : Intracerebral hemorrhage occurring after evacuation of a chronic subdural hematoma(SDH) has been reported as an extremely rare complication. This report documents on additional case of postoperative intracerebral hemorrhage casung progressive neurological deterioration that occurred after the removal of a chronic SDH. **Case** : A 72-year-old male was admitted with progressive headache, gait disturbance, and behavior change. He had been treated on a daily regimen of glicrizide 40mg and atenolol 50mg under the diagnosis of diabetes and hypertension since 5 years ago. He denied any history of head trauma. On admission, he showed decreased attention & mild left hemiparesis with normal blood pressure. Magnetic resonance imaging revealed large bilateral chronic SDH with mild shift of the midline structures to the right. The hematomas were evacuated via burr hole. Initially the patient improved after surgery, but a few hours later he developed progressive lethagy and left hemiparesis. A postoperative CT scan revealed a right putaminal hemorrhage. Repeated burr hole irrephination and closed-system drainage were performed. But his level of consciousness and left hemiparesis was aggravated progressively and putaminal hematoma increased in size on second postop CT scan. Eventually he expired with a sudden cardiac arrest due to myocardial infarction. **Comment** : The mechanism of this occurrence is still unclear, various structural and dynamic factors having been postulated to explain it. Hemorrhage into undetected areas of contusion, rapid perioperative parenchymal shift causing direct vascular damage, and a sudden increase in intracerebral blood flow combined with defective vascular autoregulation may be responsible.

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Unusual Pattern of Steal Phenomenon due to Isolated Bracheocephalic Trunk Stenosis

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Background : An obstuctive lesion of a brachiocephalic artery may cause inversion of the normal pressure gradient. Usually, symptomatic patients with severe degree stenosis or occlusion of the bracheocephalic trunk show the reversal of blood flow in the ipsilateral vertebral and common carotid arteries. We had experienced a case with unsual pattern of steal phenomenon. **Case** : A 61 year-old male visited neurologic department because of recurrent amaurosis fugax and vertigenous sensation during exercise of right arm. There was no parenchymal lesion in MRI. MR angiogram showed both well traced flow in anterior circulation and right vertebral hypoplasia. Transcranial doppler showed the reduced flow with normal direction in right extracranial carotid arteries and reversal of blood flow in right vertebral artery. Angiog-raphy revealed that right vertebral artery was feeded from the contralateral one and right common carotid artery siphoned from the ipsilateral vertebral artery. No stenotic lesion in other cerebral vessels were found. **Comment** : Isolated innominate artery stenosis without other vascular lesions is very unusual. It is infered that blood flow of right common carotid artery might have been compensated through the ipsilateral vertebral artery despite a hemodynamically significant stenosis of innominate artery. Combinding with clinical history and neurologic examination, transcranial doppler is a useful screening method to investigate the collateral routes & cerebral hemodynamics in asymptomatic patient with stenosis of innominate artery.

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Malignancy Induced Cerebral Infarcts -A Case Report-

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Background & Significance : Unexplained thromboembolism may be an early marker of the presence of a malignant tumor before signs and symptoms of the tumor itself become apparent and ovarian cancer presenting with symptoms of hypercoagulability and thromboembolism is rarely reported. **Case** : We present a case of ovarian cancer with a cerebrovascular disease as the presenting symptoms. A 58-year-old woman presented with bilateral cerebral infarcts and bilateral cerebellar infarcts. Work-up for etiologies of stroke including angiography failed to reveal the cause and she was diagnosed as having stroke of undetermined etiology. She was treated with oral anticoagulant. After 2 month later, she suffered from deep vein thrombosis and pulmonary thromboembolism. Ovarian adenocarcinoma was found and removed. After 3 days of surgical operation, she suddenly developed cortical blindness with bilateral occipitoparietal hemorrhagic infarcts in brain MRI. The extensive workup for hypercoagultion syndrome was normal. After surgical removal of the cancer and chemotherapy with short course of intravenous anticoagulation, no further thromboembolism developed. **Conclusion** : Evaluation of underlying cancer should be done in patients presenting with multiple sites of venous thrombosis and mixed arterial and venous thrombosis refractory to warfarin therapy

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A Case of Vertical Gaze Palsy Associated with A Unilateral Infarct in the Midbrain on MR Imaging

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Background & Significance : In patients with midbrain infarction. It is rare that clinical manifestations are pure vertical gaze palsy. We experienced one case of a patient with pure vertical gaze palsy associated with a unilateral infarction in the midbrain. **Case** : We experienced one case of a 55-year-old man with sudden-onset double vision and left side swaying. On admission, neurologic examination showed upward and downward gaze palsy on voluntary and smooth pursuit movements, and vertibulocephalic maneuver. Bell's phenomenon and horizontal gaze were not impaired but light reflex was impaired. Based on these findings, supranuclear dissociated vertical gaze palsy was diagnosed. T2 weighted MR images revealed the rostral midbrain which including the rostral interstitial nucleus of the medial longitudinal fasciculus(riMLF) and dorsomedial region to the red nucleus and the decussation of brachium conjunctivum. The posterior commissure was spared. The clinical findings was slightly improved for the admission of 3 weeks, then he had limited vertical gaze palsy, and left side swaying possible to self ambulation. **Conclusion** : We report a rare case of pure vertical gaze palsy in stroke.

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Effects of 7-Nitroindazole on Delayed Neuronal Damage of Hippocampus in Transient Global Ischemia Model of Gerbil

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Background & Objectives : Since nitric oxide(NO) causes relaxation of vascular smooth muscle, inhibition of platelet aggregation, and activation of NMDA receptor, it

s associated with pathogenesis of ischemic lesion. The elationship between cerebral ischemia and NO has been ontroversial and it is suggested that the effects of NO epend on the stage of evolution of ischemic process as well as types of NO. The present study was designed to nvestigate the effect of neuronally derived NO(nNO) on levelopment of delayed neuronal damage of hippocampus n gerbils. 7-nitroindazole(7-NI) was used as selective nhibitor of neuronal NO synthase(nNOS). **Methods** : The ransient global ischemia was induced by bilateral com-non carotid arteries(CCA) occlusion for 10 minutes fol-owed by 1 or 3 day reperfusion. All gerbils were ther-noregulated for the entire duration of anesthesia. Gerbils were randomly divided into four groups: Group 1, schemic control(n=6); Group 2, vehicle(n=6); Group 3, 7-NI(25 mg/kg) given intraperitoneally just after CCA ramping(n=11); and Group 4, 7-NI given 40 minutes after CCA cramping(n=10). Each group was divided into two subgroups(1 or 3 day reperfusion). The ischemic neuronal damage was evaluated in subiculum-CA1 & CA2 areas of ippocampus. **Results** : The results showed typical delayed neuronal damage in hippocampus of Groups 1 & 2. Group 3 showed similar changes of neurons in subicu-um-CA1 & CA2 with Groups 1 & 2 at 1 day, compared with significantly less damage of neurons at 3 days. Group 4 showed similar changes of neurons in subiculum-CA1 compared with Groups 1 & 2 at 1 & 3 days. In contrast, neurons in CA2 showed significantly less change at 3 days. At 3 days, subiculum-CA1 of Group 3 showed sig-nificantly less neuronal damage compared with Group 4. **Conclusion** : The earliest possible injection of nNOS nhibitor into patients with transient global ischemia would be helpful for prevention of progressive neuronal damages.

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Secondary Vascular Events after Primary Intracerebral Hemorrhage

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Background & Objectives : Secondary vascular events (VE) in the patients with spontaneous primary intracere-bral hemorrhage(ICH) were not fully understood. The aim of this study is to analyze the type and incidence of VE after first spontaneous primary ICH. **Patients & Methods** : We reviewed the medical records and interviewed the patients in 195 patients with spontaneous primary ICH. We analyzed the patients with and without previous ischemic event(group 1 and 2) and consequent VE includ-ing stroke, coronary artery disease(CAD), and peripheral vascular disease. **Results** : Secondary VE occurred in 19 patients(9.7 %) of the 195 patients ; ICH in 10(53 %), cerebral infarct in 8(42 %), and CAD in 1(5 %). In 70 of group 1, the types of second VE were cerebral infarctions in 5(7.1%), and ICH in 2(2.8%). In 125 of group 2, cere-bral infarction was 3(2.4%) and ICH was 8(6.4%). Among group 1, none of 6 patients wtih antiplatelet drug developed recurrent VE. However, 5 of 64 patients with-out it experienced recurrent VE. **Conclusions** : Ischemic vascular events after ICH are more common in the patients with previous history of ischemia. Therefore, we suggest that antiplatelet treatment may be considered in these patients after resolution of hematoma.

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Dysphagia and Aspiration Following Unilateral Hemispheric Stroke

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Background & Objectives : Dysphagia may occur following unilateral hemispheric stroke, but it is unclear if specific supratentorial anatomical sites are critical for swallowing difficulty and aspiration. The objective of this study was to determine whether the neuroanatomical sites were associated with increased risk of aspiration in patients with unilateral hemispheric stroke. **Methods** : Twenty-one dysphagic patients with unilateral hemi-spheric stroke were examined by neurologists and under-went brain magnetic resonance imaging and surface elec-tromyography to estimate swallowing difficulty. They were divided into groups by right or left and anterior or posterior locations with reference to the central sulcus. **Results** : Ten of 21 had lesions on right cerebral hemi-sphere and 6 of 21 on left and 5 of 21 on both. Sixteen of 21 patients with dysphagia had lesions on anterior loca-tion of cerebral hemisphere and aspiration pneumonia developed in 11 of 15 patients with right or both hemi-

spheric stroke. Lesion analyses revealed that right side and anterior location appeared to be critical in predicting patients at risk of aspiration. **Conclusion** : Dysphagia may not be related to the side of unilateral hemispheric stroke, but aspiration might be related to the right side and anterior location of the cerebral lesion.

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Coexistence of Acute Ischemic Stroke and Peripheral Vascular Disease : A Preliminary Report

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Background & Objectives : Although coexistence of stroke and coronary artery disease has been widely studied, that of stroke and peripheral vascular disease has never been appreciated in Korea. We aimed to find out how many patients with acute ischemic stroke was associated with significant peripheral vascular disease. **Methods** : We recruited serial in-hospital patients with acute ischemic stroke who had neurologic deficit lasting >24 hours, but within 7 days after symptom onset at a university hospital. We took a history of intermittent claudication, palpated pulsation of the dorsalis pedis artery and conducted vascular duplex sonograghy for evaluating the arteries in the lower extremities. All the patients were divided into two groups; normal or steno-occlusion group based on sonographic findings. The normal group included normal or irregular vessel wall. The steno-occlusion group included mild(<20%), moderate(21-90%), or severe(>90%) stenosis, and occlusion of the arteries. All of the patients were evaluated by brain magnetic resonance imaging and magnetic resonance angiography. **Results** : The patient number of normal group was 13 of 24(54%: normal=1, mild atherosclerosis=12), and that of steno-occlusive group was 11(46%: mild stenosis=6, severe stenosis=2, occlusion=3). The mean age of steno-occlusive group(64.0) was slightly older than that of normal group(61.2). The male:female ratio was 8:3 in steno-occlusive group and 7:6 in normal group. Among the studied risk factors, hyperlipidemia(total cholesterol>200mg/dl, triglyceride>190mg/dl) was significantly more frequent in normal group(12/13) than in steno-occlusive group(5/11). The weak or absent pulsation of the dorsalis pedis artery was 5/11 in steno-occlusive group and 2/13 in normal group. **Conclusion** : About a half of the 24 patients with acute ischemic stroke had peripheral steno-occlusive lesions. Therefore, it seems reasonable to evaluate peripheral vessels in acute ischemic stroke patients, especially in male, and vice versa. Further studies with sufficient numbers of the patients are warranted.

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Hypertrophic Olivary Degeneration after Cerebellar or Brain Stem Hemorrhage

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Backgroud & Significance : Hypertrophic olivary degeneration(HOD) is secondary degenerative change due to loss of neural stimulation to inferior olivary nuclei. Inferior olivary nuclei receive afferent fibers from the dentate nucleus of cerebellum, red nucleus, basal ganglia and cerebral cortex and project efferent fibers to opposite cerebellar hemisphere and form the neural connection of “Guillain-Mollaret triangle” combined with ipsilateral red nucleus and opposite dentate nucleus. MRI demonstrates abnormal hyperdense lesion in the ventral part of medulla oblongata on T2-weighted imaging. **Cases** : Two patients with ipsilateral HOD following pontine tegmental hemorrhage and surgical excision of a brain stem cavernous malformation, respectively, and one with contralateral HOD following cerebellar hemorrhage are presented. In one patient with cerebellar hemorrhage, old hematoma were identified as being located in the dentate nucleus. The contralateral inferior olivary nuclei were hyperintense on T2-weighted images. In two patients with pontine hemorrhage, the old hematomas were in the tegmentum and the ipsilateral inferior olivary nuclei, which were hyperintense. **Conclusion** : HOD is a secondary change occurred by lesions that involve the central tegmental tract of brain stem, dentate nucleus of cerebellum, or superior cerebellar peduncle. Olivary degeneration after cerebellar or brain stem hemorrhage should not be confused with ischemic, neoplastic, or other primary pathological conditions of the medulla.

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중대뇌동맥영역의 뇌경색 환자에서의 장기 예후에 영향을 미치는 요인과 사망원인

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Background & Objectives : 중대뇌동맥 영역의 뇌경색증(middle cerebral artery territory infarction; MCA-CI)은 가장 흔한 뇌경색증의 하나로, 뇌졸중 후 사망은 물론 심각한 장애의 원인이 되지만 대부분은 계획적인 치료를 받지 못하는 실정이다. 또한 이러한 환자들의 장기 예후 및 사망에 대한 통계는 잘 알려져 있지 않고 있다. 따라서 본 연구는 MCA-CI 환자들에서의 사망, 사인, 장기 예후 및 예후와 관련된 요인들에 대해 알아보기 위해서 시도되었다. **Methods** : 조선대학교병원에 입원하였던 259명의 MCA-CI 환자 중 적어도 1년 이상 지속적 추시가 가능하였던 68명을 대상으로 후향적 연구를 하였다. 입원 당시의 의무 기록을 바탕으로 기왕력, 검사실 소견 및 임상적 소견을 조사한 후 modified Rankin scale(MRS)로 평가하였다. 전체를 Independent군(독립적인 생활이 가능한 경우; MRS 0-3점), Dependent군(MRS 4-5 점) 및 사망군 으로 나누어 장기 예후에 영향을 주는 요인들을 비교 분석하였고, 사망한 경우는 사망 원인을 조사하였다. **Results** : 68명의 MCA-CI 환자 중 42명(62%)가 남자였으며, 입원당시 평균연령은 67.6±11.3(range 35-87)세, 추시 기간은 평균 28.9±14.5(range 12-60)개월 이었다. 추시기간 동안 39(57.4%)명이 사망하였고, Independent군은 16(23.5%)명, Dependent군은 23(19.1%)명 이었다. 입원시의 혈당 ($p<0.05$)과 혈압 ($p<0.05$), 그리고 입원시의 NIH Score($p<0.01$)와 환자의 연령($p<0.01$)이 장기 예후에 영향을 주는 요소로 나타났다. 사인은 발병 3주 이후 가정 간호 과정 도중 악액질등의 전신상태의 악화로 인한 사망원인이 18명(46.1%)으로 가장 많았고, 뇌졸중으로 인한 급성기 사망이 14명(35.8%)이었다. **Conclusion** : 내원시의 혈당과 혈압, 그리고 초기의 신경학적 장애의 정도와 연령이 예후에 영향을 미치는 중요한 요인이므로, 후유장애를 감소시키기 위해서는 당뇨, 고혈압등의 고위험 인자 관리가 중요할 것으로 사료된다.

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A Case of Dural Arteriovenous Malformation Treated by Combined Transvascular Embolization and Surgical Ligation

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Background : The treatment of dural arteriovenous malformations(DAVMs) remains problematic. A variety of treatment stratergies for DAVMs are offered in the literature, including ligation of the feeding arteries, coagulation or excision of nidus and venous drainage, transarterial or transvenous embolization or combination thereof. Recently we experienced a case of dural AVM on the superior sagittal sinus which has been known ralative low incidence and high hemorrhagic risk. **Case** : A 46-year-old female was admitted to our hospital complaining of headache. She showed a forehead mass like vascular lesion and pulsatile vascular engorgement on both temporal areas. MRA and cerebral angiogram showed communication of bilateral external carotid system and superior sagittal sinus via both superficial temporal artery, middle meningeal artery, occipital artery, and venous drainage via deep venous system such as internal cerebral vein, vein of Galen and straight sinus. This findings were consistent with dural AVM or fistula. She was successfully treated with endovascular embolotherapy and surgical removal. The patient's presenting symptoms, headache and vessels engorgement, were subsided without complication. **Conclusion** : Our case shows a striking clinical and radiological improvement with transvenous embolization and surgical ligation of dural AVM involving superior sagittal sinus. Therefore, this case emphasizes the potential role of endovascular treatment in dealing with complicated dural AVMs.

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Moyamoya Disease and Hemiplegic Migraine: A Case Report

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Hemiplegic migraine syndrome can be caused by primary headache disorders(migraine with aura, familial hemiplegic migraine, alternating hemiplegia of childhood) or by underlying disorders like mitochondrial disease, headache with neurologic deficits and CSF lymphocytosis(HaNDL), cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy(CADASIL), and episodic ataxia type 2(EA-2). We herein report an extremely rare case(the second report in the literature) who presented with hemiplegic migraine as a manifestation of moyamoya disease. A 17 years old adolescent boy with history of seizure presented with episodic hemiparesis without, or with migraine headache once or twice a month. His headaches consistently on the right side, frequently associated with nausea, lasted for all day long, and sometimes with right hemiparesis for about 30 min. during the headache. He had a history of head trauma(8 years ago) without immediate post-traumatic headache. His mother had had migraine without aura. The brain MRI, MRA, and conventional angiography revealed characteristic findings of moyamoya disease. We think moyamoya disease should be included in the differential diagnosis of hemiplegic migraine syndrome. This case also gives us significant pathophysiologic implications on hemiplegic migraine in migraine syndromes.

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The Acute Phase Response and the Volume of Stroke; Retrospective Study.

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Background : The role of the acute phase response in stroke has been controversial, with some studies suggesting that preexisting infection accountsfor most of the acute phase response. However, it has been reportedthat acute phase makers- C-reactive protein(CRP), fibrinogen(FIB), etc -to be prognostic for cerebrovascular and cardiovascular ischemic events, but it has been not yet clear whether the predictive value of CRP is independent of FIB. Recently, there has been a report on the concentration of cytokines or acute-phase proteins(APP) to be higher in patients with large infarcts(greater than 3 cm) and lowest in patients with lacunar syndromes. There-fore, the acute inflammatory response to tissue injury, which is marked by elevated level of APP and by leukocytosis, may have an important causal role in stroke. **Objective** : To better understand the acute inflammatory response in cerebral infarction, we studied for the association between the level of acute phase markers(CRP, WBC, FIB) and stroke volume. **Methods** : CRP, WBC and FIB were measured during the first 48hrs at stroke onset on 76 acute ischemic stroke patients uncomplicated by infection. **Results** : Large territorial infarction had higher base line CRP levels than perforating infarction(mean 1.4303±2.0779 VS 0.3294±0.6623, P=0.02). But, there was no significant correlation between the level of other markers and stroke volume. **Conclusion** : Our data shows some correlation between infarction volume and serum CRP level. The data suggest that the inflammatory process may be involved in the process of cerebral infarction and the magnitude of this response may be related to the infarction size.

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Clinical and Radiologic Features of Symptomatic Small Deep Cerebral Infarcts

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Background : Small deep infarct can be associated with small-vessel occlusive disease, large-vessel disease, low-flow or thrombo-embolic mechanism. This study is designed to investigate relationship between small deep infarcts and vascular diseases. **Methods** : We studied 154 patients who had symptomatic, small-sized(<20mm), single, subcortical infarction(basal ganglia, corona radiata, centrum semiovale) who were admitted to our hospital from June, 1996 to April, 1999. They were evaluated about the lesion site and

vascular status of the carotid system and middle cerebral artery, using MRI, MRA or conventional angiography, and cervical dupplex sonography. **Results** : Among 154 patients with small deep infarction, 100 were related with small artery disease(64.9%), 38 with middle cerebral artery disease(26.7%) and 16 with carotid artery disease(10.4%). The basal ganglia and basal ganglia with corona radiata area were more frequently responsible lesion sites in both small artery disease(n=59, 59%) and middle cerebral artery disease(n=28, 73.7%) than carotid artery disease(n=1, 6.3%). The centrum ovale or centrum ovale with corona radiata area were frequently involved lesion sites in carotid artery disease(n=10, 67.5%). **Conclusion** : Although small artery disease was the most common cause of the small deep infarction(65%), middle cerebral artery and carotid artery disease could make it in 35%. Middle cerebral artery disease was more frequent than carotid artery disease, which might be associated with intracranial occlusive disease which is known to be more common in Asians than in Caucasians.

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A Case of Acute Ischemic Stroke after Sildenafil Use

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Background : Sildenafil(Viagra, Pfizer), the oral phosphodiesterase-5 inhibitor for treating male erectile dysfunction, has usually a modest vasodilator effect, but it can cause significant hypotension when taken with organic nitrates. Although sildenafil's adverse effects seem to be few and mild except for rarely precipitating myocardial infarction, its relation to stroke is neither evaluated nor established. We report a case of acute ischemic stroke immediately after sildenafil use. **Description** : A businessman in his 6th decade of life was admitted due to sudden right hemiparesis. He was a heavy alcohol intaker without other stroke risk factors. He had sexual intercourse after taking a tablet of sildenafil and significant amount of alcohol(1 bottle of soju). Thereafter he took a bath in the sauna, then hemiparesis and facial asymmetry developed after 70 min. of taking sildenafil. A brain MRI showed acute ischemic infarction in the left posterolateral thalamus - thalamogeniculate atery territory. A brain MRA showed focal narrowing of the left PCA(P2). **Conclusion** : The peak blood level reaches about 60 min. after taking sildenafil, which is the same as the time lapse(70 min.) from taking the sildenafil to symptom onset in this patient. Thus we postulate that sildenafil precipitated his stroke by further lowering blood pressure under the given condition of focal PCA stenosis and presumptive hypotension caused by alcohol intake and dehydration. Futher studies are warranted on potential adverse effect of sidenafil precipitating or causing stroke in subjects with simultaneous intake of alcohol or with stroke risk factors.

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Clinical Analysis of Chronic Subdural Hematoma

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Backgroud : Chronic subdural hematoma is frequently difficult to diagnose,because its mode of clinical presentation may mimic that of various neurologic conditions. The author analyzed the clinical aspect of chronic subdural hematoma. **Methods** : Between Jan 1,1995 and June 1,1999 62 patients with chronic subdural hematoma who admitted in Kang Nam St. Mary hospital were retrospectively studied by reviewing the medical records ,CT and MRI scans. **Results** : In theses cases, history of head trauma was found in 46cases(73%) ,chief complaints at admission were headache 23(44.4%), hemiparesis 13(20.6%), behavioral change 10(15.9%). And older group had more frequently focal neurologic deficit(mean age 67.3) and larger amount of hematoma(P=0.001). The gait disturbance group was apt to have larger amount of hemorrhage. **Conclusion** : The clinical manifestation of chronic subdural hematoma were complex and diverse, but older group had more frequently focal neurologic deficit and larger amount hemorrhage and gait disturbance group was apt to be lager amount of hemorrhage.

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Atherothrombotic Cerebellar Infarction : Vascular Lesion-Magnetic Resonance Imaging Correlation of 31 Cases

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Background and Purpose : Correlation of MRI findngs with atherosclerotic vascular lesions has rarely been ttempted in patients with cerebellar infarction. The aim of this study was to correlate the MRI lesions with the vascular lesions seen on conventional cerebral angiograohy in cerebellar infarction. **Methods** : The subjects ncluded 31 patients with cerebellar infarcts who underwent both MRI and conventional cerebral angiography. We analyzed the risk factors, clinical findings, imaging study and angiography results. We attempted to correlate MRI lesions with the vascular lesions shown in the angiograms. **Results** : The vascular lesions seen on angiograms were subdivided into 3 groups: large artery disease(n=22), in situ branch artery disease(n=6), no angiographic disease with hypertension(n=3). The proximal segment(V1) lesions of vertebral artery were the most common angiographic features in patients with large artery disease in which stroke most commonly involved PICA cerebellum. The V1 lesions with coexistent occlusive lesions of the intracranial vertebral and basilar artery were correlated with cerebellar infarcts which had no predilection for certain cerebellar territory. The intracranial occlusive disease without V1 lesion was usually correlated with small cerebellar lesions in PICA and SCA cerebellum. The subclavian artery or brachiocephalic trunk lesion was associated with small cerebellar infarcts. The in situ branch artery disease was correlated with the PICA cerebellum lesions which were territorial or non-territorial infarct. No angiographic disease with hypertension was associated with small sized cerebellar infarcts within SCA, AICA, or SCA cerebellum. **Conclusions** : Our study indicates that the topographic heterogeneity of cerebellar infarcts are correlated with diverse angiographic findings. The result that large artery disease, in which non-territorial infarcts are more common than territorial infarcts, is more prevalent than in situ branch artery disease or small artery disease suggest that even a small cerebellar infarct can be a clue to the presence of large artery disease.

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A Case of Thrombotic Thrombocytopenic Purpura(TTP) Associated with Ticlopidine

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Backgrouond & Object : TTP is a life threatening multisystem disease characterized by thrombocytopenia, microangiopathic hemolytic anemia, progressive neurologic changs and renal failure. Ticlopidine, a widely used antiplatelete agent, has been rarely associated with TTP, but it's occurrence has not been reported in korea yet. We experienced a case of TTP developed in 4weeks of ticlopidine treament for stroke prevention. **Case** : A 69 year old female patient with a history of hypertension and diabetes mellitus, suffered from an acute onset stroke. Ticlopidine 250mg Bid was started and she showed uneventful clinical course. The platelte count was normal on 1st and 12th day of ticlopidine administration. Around the 25th day at home, she developed purpura, gum bleeding, dyspnea and stuporous mental status. Platelete count was 5,000/ml and peripheral blood smear revealed evidences of microangiopathic hemolytic anemia. Brain MRI showed newly developed multiple infarction. Under the diagnosis of TTP plasma exchange was performed immediately and the condition was eventually returned to base line following 5times of plasma exchange and aggressive supportive treatment. **Conclusions** : Ticlopidine use maybe associated with the development of TTP, a potentially life threatening condition. The onset of ticlopidine associated TTP is difficult to predict, despite close monitoring of platelete counts.

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Clinical Significance of Diffusion Weighted MR Images in Ischemic Stroke

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Background & Objectives : In the hyperacute stage of schemic stroke, Proton and T2 weighted MRI may appear ıormal in the first several hours after onset of symptoms. 3ut since diffusion weighted MRI is sensitve to molecular liffusion of water molecules, it can detect ischemic lesion nore preciously than conventional(T2 and Proton)MRIs. *N*e performed this study to evaluate the usefulness of the liffusion weighted MRI in acute stage of cerebral infarction. **Methods** : Diffusion weighted MRI and T2 weighted MRI were performed in 47 patients with acute infarction in the :arotid and vertebral artery territories. Images were evaluat-ed by neuroradiologist blinded to clinical presentation. **Results** : All the patient except three revealed infarction esions in either T2 weighted MRI or Diffusion weighted MRI. In twenty patients, diffusion weighted imaging was ıble to detect infarction location which did not be shown by T2 weighted MRI. Most of these patients(18/20) had carotid erritory infarction. **Conclusion** : Diffusion weighted MRI is ıseful tool in imaging of acute cerebral infarction.

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Hypertensive Encephalopathy Associated with Occlusion of Visceral Arteries

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Background & Significance : Hypertensive encepha-o-pathy(HE) occurs most often in patients with rapidly worsening “essential” hypertension. Sometimes HE will levelop in a setting of acute or chronic renal disease, ıcute toxemia, disseminated vasculitis, and the immedi-ıte postoperative phase of carotid endarterectomy. It is rarely reported that HE associated with multiple visceral arterial occlusion. **Case** : A 34-year-old man who had no previous history of hypertension presented with a sudden onset of right flank pain. This pain was relieved sponta-neously. Three days later, he developed headache, nau-sea, and visual loss with recurrence of diffuse colicky abdominal pain. Blood pressure was 200/120 mmHg and MRI was compatible with HE. Abdominal CT scan showed wedge-shaped low density lesions in the right kidney and spleen and hematoma-like fluid collection. Abdominal angiography revealed right renal artery steno-sis with aneurysmal dilatation and occlusions of both splenic and hepatic artery. Abdominal and visual symp-toms were spontaneously recovered without surgical intervention. **Conclusion** : These findings could be explained that primary renal artery dissection induce sud-den elevation of blood pressure and subsequent HE, which is followed by visceral artery occlusion. We report the case of a previously normotensive patient represent-ing acute abdomen associated with HE.

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Endogenous Plasminogen Activator Expression after Focal Cerebral Ischemia in Rats

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Background & Objectives : Urokinase-type plasmino-gen activator(u-PA) and tissue-type plasminogen activator(t-PA) play important roles in fibrinolysis, cell migration, tissue destruction, angiogenesis and tissue remodeling. However, little is known of the activity of endogenous plasminogen activators(PAs) in ischemic brain. **Methods** : To evaluate whether cerebral ischemic injury induces endogenous PAs, we measured PA activity from brain homogenates, and frozen tissue sections. Brain homogenates were prepared for direct casein zymography from control non-ischemic rats(n=2) and rats at 2 hours, 4 hours, 24 hours, 7 days and 14 days(n=2, each time point) after MCA occlusion(MCAo). Frozen sections for in situ zymography were obtained from control rats(n=2) and rats at 2 hours, 4 hours, 24 hours, 7 days and 14 days(n=2, per time point) after suture occlusion. **Results** : By direct casein zymography, u-PA was increased at 2 hours($p<0.05$), 4

hours($p<0.05$) and 24 hours($p<0.05$) after stroke in the schemic hemisphere. t-PA was also significantly increased compared to control rats at each time point($p<0.05$) and reached a maximum at 4 hours after stroke. In situ zymography of coronal sections showed increased t-PA and u-PA activity in the ischemic hemisphere. **Conclusion** : This study demonstrates that u-PA and t-PA increase in rat brain after stroke.

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Is It Transhemispheric Diaschisis ?

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Background & Significance : Remote changes in electric activity, blood flow, and metabolism are called diaschisis. We report a patient who showed progressive quadriparesis and sensory change with Rt. parietal lobe infarct. **Case** : 40 year-old, right handed woman presented with progressive paresthesia and Lt. leg weakness. 10 days ago, she felt electric shooting sense on the plantar surface of left foot and 3 days ago, she developed Lt.leg weakness. She had no past-medial illness. On neurologic exam, Proximal motor power of Lt. lower extremity was grade IV, and distal power was grade II with hyperreactive reflex. Other extrimities showed normal power. There was hypesthesia below T10 on right and below T12 on left. So our first impression was myelopathy. But the next day, she complained ascending paresthetic sense on trunk below T4. On 3rd hospital day, she showed slight apathic appearance and dysarthria. We checked brain MRI, which showed right MCA infarction and Rt. ICA occlusion. On 4th day, although she showed mutism and abulia, she could communicate with writing perfectly. She showed left hemianopsia and more progressed left heparesis(grade I/I). She also showed right lower extremity weakness(gradeIV) and generalized hyperreflexia. On 7th day, Rt hemiparesis was disappeared. **Conclusion** : We suggest that ascending quadriparesis and rapid recovery of Rt hemiparesis might be caused by transhemispheric diaschisis.

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Clinical Correlations with MRI, MR Spectroscopy, and Acetazolamide Challenge SPECT

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Background & Significance : The presumed pathogenesis of the stroke-like episodes in patients with MELAS(mitochondrial encephalomyopathy, lactic acidosis, and stroke-like episodes) were either a mismatch between perfusion and metabolism or the impaired autoregulation of cerebral blood flow but remains controversial. To explain the pathogenesis of the stroke-like episodes in patients with MELAS syndrome, we performed the brain MRI, MR spectroscopy and acetazolamide challenge SPECT. **Case** : A 26-year-old man presented recurrent episodes of generalized seizure, hemiparesis and visual perception disturbance. The diagnosis of MELAS was confirmed by molecular genetic analysis showing 3243 mt DNA point mutation. The T-2 weighted MR imaging demonstrated high signal intensities in both occipital regions and subcortical white matter of left frontoparietal area. After 45 days follow up brain MRI revealed resolution of subcortical white matter lesions of left frontoparietal area but no changes of both occipital lobe lesions. The 1H-MR spectroscopy showed elevation of lactate and decrease of N-acetylaspartate contents in the involved area. The Tc99m-HMPAO SPECT revealed perfusion defects of bilateral parietooccipital area. After IV injection of acetazolamide, perfusion defect of right parietooccipital area was recovered but no interval change of the corresponding contralateral area. The digital subtraction 4 vessel angiogram revealed normal finding. **Conclusion** : These findings demonstrates that coexistence of the mismatch between perfusion and increased metabolic demand and the impaired autoregulation of cerebral blood flow may be responsible for the pathogenesis of stroke-like episodes in MELAS syndrome.

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A Case of Deep Cerebral Venous Thrombosis Associated with Advanced Gastric Cancer

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Background & Significance : Deep cerebral venous thrombosis involving the internal cerebral vein, great vein of Galen, and the straight sinus can cause bilateral thalamic or basal ganglia infarction. Venous thrombosis associated with malignancy is reported to be resistant to anticoagulation treatment. **Case** : A 59-year old man was admitted with altered consciousness and quadriparesis. He had been suffered from advanced gastric cancer for 18 months. Edematous low signal intensity on the bilateral basal ganglia, thalamus, and basal brain were observed on T1-weighted MRI. Thrombi in the internal cerebral vein and the straight sinus were shown on the post-contrast sagittal MRI. Low molecular weight heparin was administered for 15 days. He became alert and oriented at 6th hospital day. Motor and sensory deficits were recovered to premorbid level after 15 days. On the MRI after a month later, edematous lesion and thrombi in the sinuses resolved. **Conclusion** We report a case of deep cerebral venous thrombosis occurred in a stomach cancer patient, which was successfully treated with low molecular weight heparin.

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Cerebrovascular Autoregulation and White Matter Lesion

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Background & Objectives : It had been reported that Doppler frequency(DF) change of middle cerebral artery (MCA) with CO_2 partial pressure represent cerebral vasoreactivity. The aim of this study is to determine the significance of hemodynamic factors in the development of white matter lesion, associated with vascular stenosis. **Methods** : Between Jan.1998 and July.1999, 117 patients (M:F=91:26 57.4°æ12.5) with stroke who performed MRI, MRA, carotid sonography and trascranial Doppler sonography(TCD) were studied. Vasoreactivity was evaluated by change of mean of DF and interhemispheric asymmetric index(IHA) under apnea and hyperventilation. The severity of white matter lesions were measured by 4-graded scale at four sectors(frontal horn, ventricular body, trigon, and occipital horn) of each three level(basal gangalia, periventricular, and centrum semiovale level). We evaluated proximal artery steno-occlusion, and other risk factors of stroke affecting hemodynamic status. **Results** : Vasoreactivity under apnea was correlated with white matter lesion, especially periventricular area($P< 0.01$). IHA under apnea was correlated with vascular stenosis($P<0.01$). Influencing factor for vasoreactivity was hypertension($P<0.01$). Among the risk factors, age and hemoconcentration were correlated with white matter lesion($P=0.001$, $P=0.02$). **Conclusion** : We suggest the hemodynamic reserve are well correlated with white matter lesion. The stenotic vascular lesion might be an affecting factor in this relation.

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The Clinical Features of Ischemic Stroke in Cancer Patients

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Background & Objectives : Cerebrovascular disease is a clinically significant problem in patients with cancer. In addition to well-known risk factors for stroke, various cancer-related conditions including thrombotic endocarditis, intravascular coagulation, septic embolism and tumor embolus have been proposed to cause cancer-related ischemic stroke(CRIS). Thus, their clinical features appear to be different from those of non-cancer stroke patients. **Methods** : After extensive search through admission medical records between Jan., 1993 and June, 1999, 42 patients with CRIS were included. Their clinical features including the type and staging of cancer, risk factors, neuroradiological findings and prognosis were reviewed and compared with the data of non-cancer

stroke patients registered in Yonsei Stroke Registry (YSR). **Results** : CRIS occurred in 0.1 - 0.7% of cancer patients, depending upon the type of cancer, which accounted for about 2% of all ischemic stroke patients admitted during the same period. The most common type of cancer was stomach, followed by lung, pancreas, colorectum and liver. Sixty percent of CRIS patients had advanced cancer with disseminated metastasis. One third of CRIS patients had no known risk factor for stroke, while those were found in 89% of patients in YSR. The most common lesion seen on brain CT/MRI was single major vessel territory infarction, followed by multiple embolic infarction, most of whom had no risk factor for embolism. Echocardiography and angiography revealed no remarkable finding. More than half of the CRIS patients showed progression of clinical symptoms and 65% of them died due mostly to herniation and septic complication. **Conclusion** : Although CRIS is relatively rare in patients with ischemic stroke, significant number of patients showed progressive clinical course and ended to death. Thus, careful observation as well as intense warning for the prognosis appears to be required upon presentation.

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Predictive Factors Related to an Early Mortality in Acute Ischemic Stroke

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Background and Objectives : Most of stroke-related deaths occur shortly after the onset of symptoms. Early prediction of death after stroke may help to improve the stroke management. We sought to determine predictive factors of an early mortality in patients with acute stroke. **Methods** : For this study, we investigated 1,000 consecutive patients with acute ischemic stroke, who were registered in the Yonsei stroke registry and data-bank(YSRDB). An early mortality was defined as a death during the hospital period and a hopeless discharge. Variable clinical and laboratory parameters from YSRDB were compared between patients alive and those who died. For statistical analysis, we performed univariate anlaysis and stepwise logistic regression to assess the independent outcome. Values of 2P less than 0.05 were considered statistically significant. **Results** : There were 56 deaths(5.6%) related to an acute ischemic stroke. Thirty-seven patients died from stroke itself such as brain herniation(28 patients) and brainstem dysfunction(9 patients). Infection, myocardial infarction, and others were the cause of death in 7, 3, and 9 patients respectively. Laboratory parameters related to an early mortality were high initial fasting sugar, ESR(erythrocyte sedimentation rate), and fibrinogen. Clinical factors included old age, initial high NIH scores, multiple territorial infarctions, and previous cardiac disease history. Multivariate anlaysis showed that the ESR(early death patients 14.29(15.37 vs survivors 5.4(12.11), and fibrinogen(542.69(290.35 vs 400.38(145.05) were independently related to an early mortality. **Conclusion** : Many clinical and laboratory parameters were related to an early mortality. Among them, high ESR and fibrinogen appeared to be independent predictors of an early death.

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Acute Bilateral Cerebellar Infarcts in the Territory of Posterior Inferior Cerebellar Artery

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Background : Acute bilateral cerebellar infarcts in the territory of posterior inferior cerebellar artery(PICA) are rare. A few case descriptions have been reported, but clinicoradiological and etiological correlation has not been studied. **Objective** : To study the clinical, topographical and etiological patterns of acute bilateral cerebellar infarcts in the PICA territory. **Methods** : We evaluated 12 patients with acute bilateral cerebellar infarcts in the PICA territory confirmed by MRI and/or diffusion-weighted image. **Results** : We found three different topographical patterns: bilateral medial PICA(mPICA) territory infarcts(Group I, n=6); unilateral whole PICA + contralateral mPICA territory infarcts(Group II, n=4); and bilateral small multiple infarcts(Group III, n=2). Arterial lesions in Group I were unilateral PICA(n=3) or unilateral or bilateral vertebral artery(VA) disease(n=3); in Group II, unilateral VA(n=3) or PICA(n=1) disease on the side of whole PICA infarct; and in Group III, bilateral VA disease(n=2). Clinical fea-

ures included gait ataxia(100%), vertigo or dizziness(100%), headache(66.7%), nystagmus(50%), limb ataxia(33.3%) and dysarthria(25%). Stroke outcome was favorable in all patients, but three patients had recurrent stroke in the brainstem following diagnosis of cerebellar infarcts. Conclusions: Patterns of arterial lesions underlie different topographical patterns of bilateral PICA territory infarcts. Stroke mechanism was largely attributed to intraarterial embolism from VA disease. We speculate that an anomalous common mPICA for both mPICA territories may be associated with the pathogenesis of the lesions in most patients in Group I and II, and that simultaneous multiple embolism from bilateral VA disease, in Group III.

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Central Hypoventilation Syndrome : Clinico-Radiologic Correlation

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Background : A respiratory dysfunction could classified as central, obstructive, and mixed group. In these groups, the central hypoventilation syndrome(CHS) could be caused by lesions in respiratory nuclei, tract, and cerebral cortex. We tried to correlate the clinical findings of patients with radiologic anatomical sites. **Method** : We analyzed the clinical symptoms and signs, brain MRI findings, and hospital courses of 5 patients who showed CHS. **Result & Conclusion** : Through the radiologic findings, we found that the anatomical sites which could cause CHS were nucleus ambiguus, nucleus solitarius, dorsal motor nucleus of vagus nerve, a part of medial lemniscus, corticospinal tract, and inferior olivary complex. We could rule out the other possibilities of hypoventilation through the investigation. Finally, all of them were diagnosed as brainstem infarctions. The patients who revealed bilateral and multiple lesions showed very worse prognosis.

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What Factors Will Predict the Recurrence of Ischemic Stroke ?

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Background & Objectives : Information about clinical predictors for recurrence of stroke has not been enough. We analyzed the vascular risk factors, subtype, vascular territory, severity, and pathophysiolgic mechanisms associated with recurrence of stroke among the patients who had been controlled their risk factors after first index stroke from Jan.1 1997 to July. 31 1999. **Methods** : We examined 370 patients hospitalized with first index stroke and then followed up at least six month after index stroke to identify clinical predictors for recurrence of stroke. We reviewed the demographic variables(age and sex), vascular risk factors(DM, hypertension, atrial fibrillation, hypercholesterolemia, previous stroke or transient ischemic attack history, smoking), stroke subtype(large, cardioembolic, small artery disease), vascular territory(anterior versus posterior circulation), and severity(scores based on the Bathel index at first admission) of stroke in these patients. We compared those variables between the patients group experienced recurrence of stroke and the remainders, and also evaluated the characteristics of recurrent stroke. **Results** : We identified 26 recurrent events after first index stroke during this study period, resulting in recurrence rate of 7.03%. Mean age is 64(SD 9.24) year-old and mean follow-up period is 291.55(SD 131.99) days. Most of them are male(22/26). Twenty-five patients have been taken antiplatelet agent and only three patients(3/26) taken anticoagulation. The patients had hypertension(19/26), DM(14/26), lacunar infarction(20/26) and minor neurological deficits(18/26) of index stroke. Recurrent stroke was mostly large artery infarction(14/26), and small artery infarction(8/26), cardioembolism(3/26), one patient has recurred as hemorrhage at putamen. The recurrence of stroke was most common within 1year after index stroke(14/26) and recurred at same vascular territory(18/26). None of above demographic variables and vascular risk factors were statistically associated with recurrence of stroke when compared with not recurred patients. **Conclusion** : The recurrence of stroke was most commonly occurred in men within 1st year after index stroke, and

n the same vascular territory. Large artery infarction was nost common subtype of recurrent stroke. Contary to the previous studies, none of those vascular risk factors correated with recurrent stroke. But we have some limitations hat too many patients were lost during follow-up periods nd the potential for selection bias. Large prospective studes regarding clinical predictors about recurrence of stroke ncluding subtype, site, and pathophysiologic mechanisms would be needed.

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Diffusion MRI in Patients with Transient Ischemic Attacks

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Background & Objectives : We studied the patients with transient ischemic attack(TIA) using diffusion weighted imaging(DWI) to determine(1) the incidence of DWI abnormalities in TIA patients;(2) whether the presence of DWI abnormality correlated with the clinical factors. **Methods** : Clinical, conventional MRI, and DWI data were collected on 19 patients with symptoms of cerebral TIA for 1 year period. **Results** : Eight of the 19 TIA patients(42.1%) demonstrated focal abnormalities on DWI. The patients with ischemic abnormalities in DWI were older(mean age 67 years) and all patients had hypertensions as risk factors. The patients without abnormalities in DWI were younger(mean age 57 years) and risk factors for stroke were variable(hypertension in 6 patients, smoking only in 2 patients, no risk factors in 2 patients). And these patients had similar frequency of TIA(2.1 vs 2.5) and shorter duration(2.4 vs 5.5 hours) compare to patients with abnormalities. **Conclusion** : Diffusion MRI demonstrated ischemic abnormalities in nearly half of clinically defined TIA patients. These abnormalities were related with other multiple factors such as age, underlying risk factors as well as TIA durations.

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Lobar Localization by Semiology and EEG in Localization - Related Epilepsy Patients with Normal MRI

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Background : The value of MRI for detecting etiologies of epilepsy has been well established. However MRI may not detect any pathological lesion in patients with localization-related epilepsy(LRE) diagnosed by electro-clinical findings and may miscontrude correct lobar localization of LREs because of false negative finding. In LREs with normal MRI finding, we investigated the lobar localization capability by semiology and/or EEG in order to evaluate the limitation of MRI in lobar localization of LREs and to find out localizing value of semiology and EEG. **Method** : Among 173 LRE patients diagnosed by ILAE criteria, 97 patients without abnormal finding in brain MRI were selected for this study. We evaluated lobar localization rate(LLR) by semiology only, by EEG only, and by either semiology or EEG. We investigated concordant lobar localization rate between semiology and EEG. **Result** : LLR by semiology was 60.8%(59/97) and LLR by EEG was 29.9%(29/97). LLR by either semiology or EEG was 67.0%(65/97). The concordant localization rate between semiology and EEG was 20.6%(20/97). The concordant localization rate of the two parameters for the temporal lobe was 19.6%(19/97) and that of the extratemporal lobe was 1.0%(1/97). Case which were localizable by semiology but disconcordant by EEG was 1/97(1.0%). **Conclusion** : Despite the negative MRI finding miscontruding us in diagnosing of LREs as being uncertain, either semiology or EEG can make lobar localization possible in patients with normal MRI. We conclude that MRI alone is not a useful strategy in lobar localization of LREs.

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A Case of Anterior Cervical Cord Infarction Associated with Vertebral Artery Occlusion

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Background and Objectives : Spinal cord infarction occurs infrequently and may have diverse causes. In the cervical cord, the anterior spinal artery is supplied by anterior radicular arteries arising from vertebral arteries and cervical arteries. Cervical cord infarction is commonly considered to be due to occlusion of the anterior spinal artery, but a similar clinical presentation can occur in radicular artery occlusion. We describe a case of ant spinal artery syndrome with right vertebral artery occlusion. **Case** : A 77-year-old man presented with sudden onset of right-sided neck pain and quadriparesis. On admission, he had developed paraplegia and distal motor weakness of both upper limbs dissociated sensory disturbance, and loss of bladder function. Routine hematological and CSF studies revealed no abnormalities. MRI revealed symmetrical infarction of the ventral one third("snake-eye" conformation) of the spinal cord segment C5 to C7 and severe spondylotic degeneration. Median SSEP study were within normal limit. MR angiography findings showed right vertebral occlusion. The patients was treated with intravenos steroid, but clinical course was unfavorable. **Comments** : We report a case of anterior cervical cord infarction with typical MRI findings and MR angiography.

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Recurrent Transient Ischemia Due to Vertebral Artery Stenosis Mimicking Classical Migraine

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Background : The nature of migraine stroke remains controversial and stroke events mimicking migraine are not well known. **Case Report** : A 65-year-old hypertensive and diabetic man was admitted to Asan Medical Center due to vertigo, headache and paresthesia in the left arm and leg, Before this event, he had suffered from recurrent, intense frontal headache lasting several hours for three years. The frequency of the headache varied from several times a day to once in several months. The headache was always preceded by scintillating scotoma lasting approximately for one minute. On examination, he showed left homonymous hemianopia and right sided paresthesia with slightly decreased pinprick sensations. MRI showed infarction in the right posterior cerebral artery(PCA) territory, and cerebral angiogram showed severe stenosis of the left vertebral-basilar artery junction and occluded right PCA. He was treated with heparin, which was switched to coumadin. He never experienced headache until at 16 months of follow up although there remained left inferior quadrantanopia. Discussion and **Conclusion** : The recurrent headache of this patient resembles classical migraine. However, prolonged cessation of the headache by anticoagulation suggests that the migraine attacks may be transient ischemic attacks due to recurrent thromboembolism.

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Dysphagia Following Pontine Stroke

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Background & Objectives : It has been reported that a pons lesion may result in dysphagia(e.g., aspiration). However, there has not been any studies focused on dysphagia due to a pontine stroke, therefore, patterns and characteristics of such dysphagia are unknown. The purpose of the study is to investigate dysphagia characteristics and clinical variables that might be associated with the dysphagia. **Methods** : We examined 53 patients with a pontine stroke who were consecutively referred to the Language-Speech-Swallowing Clinic due to their suspicious swallowing difficulties after being admitted to the Department of Neurology, Samsung Medical Center between January, 1995 and July, 1999. Of them, only 35 patients(men:16, women:19) without a previous stroke were included in the study. The mean age was 66.7 years with a range of 44 to 86 years. All went through the bedside swallowing evaluation and the videofluoroscopic swallowing(VFS) study. The average post-onset time at

he time of VFS study was eight days. **Results** : Nine out of 35(26%) patients aspirated. The other 24(74%) patients who did not aspirate all had an isolated unilateral pontine nfarction. One of the nine aspirators also had an isolated nilateral pontine infarction while the other eight aspirators had a concomitant lesion elsewhere(five patients), ilateral pons involvement(one patient), or a pontine hemorrhage(two patients). Five aspirators out of the nine(56%) were silent aspirators without any aspiration symptoms. The main cause of aspiration was significantly delayed swallowing reflex, which results in a large amount of esidue in the vallecular spaces. None of the aspirators presented absent swallowing reflex or dysfunction in the upper esophageal sphincter. A forward-stepwise logistic egression statistical procedure was performed in order to explore the association between aspiration(dichotomous "yes" or "no") and neurologic/clinical variables(e.g., coexistent lesion, side of lesion, facial palsy, dysarthria, delayed swallowing reflex). Co-existent lesion(p=.0006) and delayed swallowing reflex(p=.0026) were significantly associated with aspiration. **Conclusion** : Unlike the common belief, dysphagia only due to an isolated unilateral pontine infarction is very rare. However, a massive disruption such as a pontine hemorrhage would cause dysphagia because it would damage the areas along the swallowing-related neuraxis. Presence of facial palsy or dysarthria was not associated with aspiration.

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Clinical and Pathphysiological Characteristics of Transient Ischemic Attacks in Korean Patients

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Background : The pathophysiologic mechanisms and clinical manifestations of transient ischemic attack(TIA) may differ among different ethnic groups. **Method** : We retrospectively evaluated risk factors, clinical pictures, brain magings and angiogram findings of 126 consecutive patients(84 men and 42 women) with a relevant history of recent(< 1 month) TIA who were admitted to Asan Medical Center between May 1997 and July 1999. We determined the pathomechanisms of TIA based on the TOAST criteria. **Result** : 83 patients had carotid system TIA and 28 had vertebrobasilar system TIA. 68 patients had lacunar symptoms and 25 had cortical symptoms. Permanent stroke developed in 35 patients(27.8%), and anatomical lesions were found in 72 patients(57.1%). 47 patients(36.5%) had small vessel disease, 58 patients(45.8%) had large vessel disease, while only 7(5.6%) had cardiogenic embolism. The causes were undetermined in 15 patients. Among the patients with large vessel disease, 25(43.1%) had intracranial carotid system arterial disease, 11(18.9%) had extracranial carotid artery disease and 22(37.9%) had vertebrobasialr artery disease. There was no significant correlation between clinical findings and pathophysiologic mechanisms. **Conclusion** : As compared to western population, lacunar symptoms secondary to small-vessel disease is common while cardiogenic embolism is a rare manifestation of TIA in Koreans. Of the large artery disease, intracranial artery disease is more common than extracranial diseases. Pathophysiologic mechanisms are not determinant of clinical symptoms.

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Effect of Duration of Ischemia and Body Temperature on Expression of Bcl-2 and Bax in Gerbil Global Ischemia

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Background and Objectives : It is well known that the transient global ischemia causes delayed neuronal death(DND) in CA1 area of gerbil hippocampus. Although it is still controversial whether DND is necrosis or apoptosis, the induction of apoptosis-regulating proteins during the process of neuronal death has been reported previously. However, the exact role of Bcl-2 and Bax for DND is not well understood because variable results are confusing. It is supposed that the duration of the ischemia and the body temperature may influence the induction of Bcl-2 and Bax, which may be related to DND. **Methods** : Global ischemia was induced in Mongolian gerbils for 2,5, and 10 minutes under the rectal temperature of 36(C and 32(C. Coronal sections of hippocampus were evaluated 48 hours after ischemia with hematoxilin-eosin(H&E) and immunohistochemical staining to Bcl-2 and Bax. **Results** : Neurons in CA1 area were intact in 2 min ischemia, while partial or significant ischemic changes were observed in 5-10 min ischemia of 36(C setting, which were less severe in

32(C. Both Bcl-2 and Bax were positive in CA3 and CA4 area regardless of the duration of ischemia and body temperature. In CA1 area of 36(C setting, Bcl-2 was definitely positive in 2 min ischemia, while negative in 5-10 min schemia. Bax was negative in 2 min and 10 min ischemia, while positive in 5 min ischemia. In 32(C setting, Bcl-2 was also positive in 2 min ischemia and partially positive in 5-10 min ischemia. The pattern of Bax expression was not different from 36(C setting. **Conclusion** : These results indicate that Bcl-2 expression is well correlated with neuronal survival in global ischemia. Mild ischemia induces Bcl-2 which may be anti-apoptotic, while moderate schemia reduces Bcl-2 with induction of Bax. In severe schemia, both are not expressed probably due to the accelerated neuronal death or severely inhibited protein synthesis. Hypothermia seems to preserve Bcl-2 partly in moderate to severe ischemia, which may be neuroprotective. In conclusion, the complex mechanism of DND, which seems to be in the spectrum from apoptosis to necrosis, may be determined by the severity of ischemia.

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Apolipoprotein E Polymorphism in Korean Patient with Ischemic Stroke

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Background & Objectives : Apolipoprotein E plays an important role in the regulation of the lipid metabolism and nervous system. And the(4 allele of the apolipoprotein E has been related to the occurrence of schemic stroke, but it is controversial. We have evaluated the relation between apolipoprotein E genotype / allele and the occurrence of ischemic stroke. **Methods** : The apolipoprotein E genotypes of 112 patients with ischemic stroke were studied by DNA analysis and PCR. The relative frequencies of the apolipoprotein E alleles and genotypes of patients were compared with 77 control subjects. The patient groups were divided according to TOAST classification. Comparisons among the groups were performed by Chi-square. **Results** : The allele & genotypes frequencies in patients did not differ from the control subject. Also, frequencies of genotype & allele showed no difference among subgroups of ischemic stroke. **Conclusion** : It has been suggested that the(4 allele of the apolipoprotein E has been related to the occurrence of ischemic stroke. But according to this study, apolipoprotein E did not relate with ischemic stroke in Korean.

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A Case of Proximal MCA Occlusion with Thrombocytosis of Uncertain Cause

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Background & Significance : The significance of polycythemia as a risk factor for thrombosis has been established, but the role of thrombocytosis in the pathogenesis of hemostatic complications remain controversial. There have been reported cerebral ischemia associated with primary thrombocythemia, but rarely reported with reactive or uncertain cause thrombocytosis. **Case** : A 45-year-old man presented with left hemiparesis, more prominent in arm, which developed about 1 month ago. Brain MRI scan disclosed subacute cerebral infarction in right basal ganglia, corona radiata and temporal lobe. Four-vessel angiography revealed obstruction of M1 portion of MCA and luminal narrowing with irregularity. Except mild hypertension, the only laboratory abnormality was elevated platelet count(1,280°ø109/L) on repeated CBC, which did not resulted from myeloproliferative diseases or reactive causes. **Conclusion** : We report a case of proximal MCA occlusion associated with thrombocytosis of uncertain cause. Because determining whether thrombocytosis is a primary or secondary event in this patient may be difficult, further prospective clinical studies are needed to resolve the role of thrombocytosis in causing stroke.

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Branch Atheromatous Disease : Alternative Stroke Subtype

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Background & Objectives : According to the TOAST classification, four stroke subtypes can be divided, but sometimes large artery disease result in small arterial infarct and thus raise diagnostic dilemma. We tried to solve this problem by application of another stroke subtype ? branch atheromatous disease, but documentation of this subtype has been so scanty in the literature so far. Based on this concept, we have classified our stroke databank and propose the criteria of branch atheromatous disease. **Methods** : From Inha University Stoke Registry of recent 2 years, 440 acute ischemic stroke patients who admitted within 1 week after onset were recruited. For the subclass of branch atheromatous disease, we used additional criteria among large artery atherosclerosis : 1) Infarct location must be in the penetrating artery territory ; 2) Infarct shape must be the whole territory of at least one penetrating artery ; 3) No proximal embolic source or hemodynamically significant stenosis is found. **Results** : Among 440 acute stroke patients, large artery atherosclerosis was the most frequent subtype(44%), followed by undetermined etiology(20%), small vessel occlusion(19%), cardioembolism(16%), and other determined etiology(1%). From 194 large artery atherosclerosis subtype, 54(27%) patients(M:F=1:1) were noticed with branch atheromatous disease by above criteria. According to the vessel study(MRA:50 ;TCD:46 ;TFCA:2), 21(38%) patients had underlying large artery pathology. Topographical distribution of branch atheromatous disease was : deep basal ganglionic or capsular infarct(28); pons(17); thalamus(4); and other brainstem(5). Hypertension was the most frequent(64%) risk factor, followed by diabetes mellitus(30%), cigarette smoking(25%), prior stroke history(23%), and high fibrinogen level(16%). **Conclusion** : The concept of atheromatous branch disease helps to clarify problematic cases that do not fit into the either lacunar infarct or large artery occlusive disease in the TOAST classification system. Diagnosis of atheromatous branch disease need to exclude alternative possibilities in patients with appropriate clinical and neuroimaging findings for branch disease. We suggest the introduction of the branch atheromatous disease and further evaluation is warranted for the establishment of precise subtype classification, which affects the treatment option.

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Availability of Diffusion-weighted Magnetic Resonance Imaging in Patients with Transient Ischemic Attacks

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Background and Objectives : Transient ischemic attacks(TIAs) are warning sign of ischemic stroke and myocardial infarction. It has been well described that TIAs demonstrate cerebral infarcts on CT and conventional MRI. TIAs accompanying cerebral infarction on neuroimaging have worse prognosis. The more detection of cerebral infarction will predict more exact prognosis. Diffusion-weighted magnetic resonance imaging(DWI) is very sensitive methods to detect ischemic lesions. We hypothesized that DWI showed more exact acute ischemic lesions in patients with TIAs also. We hoped to know the availability of DWI in patients with TIAs. **Methods** : TIAs are defined according to the classification by National Institute of Neurological Disorders and Stroke. We collected 31 carotid TIAs patients visited Samsung Medical Center from May 1998 to June 1999. We analyzed clinical features, vascular risk factors and results of conventional MRI and DWI. We divided these patients into 2 Groups of presence(Group A) or absence(Group B) cerebral infarction on diffusion MRI. **Results** : 17 men and 14 women with mean age of 62(11.7 years(range of 35-84 years) were collected. Groups A included 13 patients(42%) and Group B included 18 patients(58%). Two Groups showed similar age and clinical symptoms. Symptom duration was no significant difference between two Groups. DWI revealed more lesions not shown in conventional MRI. This additive information of distribution of ischemic lesions suggested embolic mechanism. Conclusions: No specific clinical and laboratory features explained cerebral infarction in TIAs. DWI detected more effectively a hyperacute lesion, tiny lesion or acute lesion intermixed with previous ischemic areas than conventional MRI. DWI are available to exact and rapid diagnosis, decision of

causing mechanism and choice of adequate management n patients with TIAs.

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A Case of Sneddon's Syndrome

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Sneddon's syndrome consisits of livedo reticularis and schemic cerebrovascular disease, which was reported by Sneddon in 1965. Although the nature and the pathogenesis of this syndrome remain currently unknown, this syndrome appears frequently in patient with antiphospholipid antibody. The 27-year-old right handed female was admitted due to abrupt memory disturbance. She suffered from word finding difficulty, incoherent speech, and right homonymus hemianopsia. She had showed recurrent skin lesions in both extremities and trunk, which were purpuric macular appearance since the age of 17. On neurologic examinations, immediate memory disturbance, sensory aphasia, alexia without agraphia, right homonymous hemianopsia, and livedo reticularis on both extrimities and trunk were disclosed. Brain MRI showed high signal intensity in the left middle cerebral artery territory, suggesting the left middle cerebral artery infarction. 4-vessel angiography revealed multiple small arterial occlusions. Echocardiography showed mild MR and AR. Serum VDRL, FTA-ABS, and lupus anticoagulant were positive. Following laboratory tests were negative or normal : CBC, ESR, CRP, RA factor, ANA, serum complement, cold aggutinin, cryoglobulin, anti-ds-DNA, LE cell test, TFT, and Anticardiolipin antibody. The patient was medicated with antiplatelet agent. Sensory aphasia and visual field defect were gradually improved after medication. This rare condition should be considered as one of the causes for stroke in young adults..

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The Probability of Mean Flow Velocities of TCD in the Stenoocclusive Disease of Major Cerebral Arteries

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Background : It has been known to be good correlation in the evaluation of MCA stenosis with the mean flow velocities of TCD comparing with angiography. But there was no proven data showing correlation of two studies regarding to the other vesseles including anterior cerebral artery(ACA) and posterior cerebral artery(PCA). **Purpose** : To confirm the efficacies of the mean flow velocity of TCD in evaluating intracranial cerebral arteries including PCA and ACA. **Methods** : 115 patients who underwent both cerebral angiography and TCD were reviewed. Angiography was performed a mean of 10ŸN7 days after TCD. Interpretation of angiography was performed without input about TCD by radiologist. We compared mean flow velocity(mFV) of TCD according to degree of stenosis of each artery. **Results** : In our study, there was good correlation of mFV with the severities of stenosis in the MCA and basilar artery. But there was no difference in the mFV between normal and abnormal groups in the ACA, PCA and vertebral arteries. **Conclusion** : The effectiveness of TCD was accepted in the stenoocclusive disease in the MCA and basilar arteries. But there was no effectiveness the other vessel including verterbral, ACA and PCA.

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Anterior Cerebral Artery Territory Infarction: Clinicoradiological Study

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Backgrounds & Objectives : Anterior cerebral artery (ACA) territory infarction is uncommon and its etiology has not been fully investigated. The aim of this study was to verify its stroke mechanisms and to make clinicoradio-

ogical correlations. **Methods** : We studied 42 patients who had brain image findings compatible with ACA infarction. We analyzed the clinical features, CT/MRI and angiography. **Results** : Among the etiologies, atherosclerosis was the most common(74%), while cardiac embolism was the cause in only 2 patients(5%). Most frequently involved anatomic structures were the corpus callosum(rostrum, genu) and the superior frontal area, whereas whole ACA was rarely involved(1 patient). Clinical features were: hemiparesis(69%: arm>leg, 7%; arm=leg, 55%; arm<leg, 38%), sensory deficit(19%), leg monoparesis(14%), apahy(36%), sphincter incontinence(33%), language disorder(10%), alien hand syndrome(7%), memory disturbance(7%), and callosal disconnection syndrome(2%). Angiography performed in 38 patients showed ACA disease in 31 patients(stenosis/occlusion at A1 in 31%, at A2 in 21%, and at preicallosal artery in 5%). Stenoocculsive site of ACA did not predict the extent of infarction. **Conclusion** : The pathogenesis of ACA infarction is related mostly to atherosclerosis. Poor correlation between the size of infarcted area and the location of occlusion may be explained by the variable collateral circulation.

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The Relationship between Clinical Presentation and Angiographic Characteristics in Adult Moyamoya Disease Patients

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Background : We reviewed medical records, brain image and cerebral angiography to study the relationship between the type of presentation(e.g. hemorrhage, infarction, TIA, asymptomatic) and angiographic findings in adult moyamoya disease patients. Subjects and **Methods** : Since 1995, thirty two patients(male, 14; female, 18) were included in this study. Twenty five patients were symptomatic and 7 patients were diagnosed incidentally. The age distribution was from 16 to 61 years(mean : 39.9 years). Cerebral angiography was reviewed for the evaluation of stenoocclusive lesion, and brain image(CT, MRI) was reviewed for the type and site of lesion. **Results** : Brain CT and/or MRI showed hemorrhage(16; 50%), infarction(7; 21.8%), and no parenchymal lesion(9; 28%). In sixteen patients presented with hemorrhage, intracerebral hemorrhage was in eight(50%), intraventricular hemorrhage in seven(43.8%), and subarachnoid hemorrhage in one patient(6%). The sites of parenchymal hemorrhage were basal ganglia(2), subcortical area(3), and thalamus(3). The sites of cerebral infarction were basal ganglia(3), periventricular white matter(3), subcortical area(2), and territory region(3). Fourteen patients(43.8%) showed moyamoya phenomenon on angiography. Suzuki stage at initial presentation was mostly stage 3 in hemorrhage(8/15; 53.3%), infarction(6/7; 85.7%), TIA(2/2; 100%), and asymptomatic patients(5/7; 71.4%). Seventeen patients(53%) showed the same developmental degree of Suzuki stage bilaterally, nine patients(28.1%) showed different stage each other, and the other six patients(18.8%) showed unilateral stenoocclusive lesions. **Conclusion** : Hemorrhage was most common presentation in adult moyamoya disease patients. Angiographic stage of the stenoccclusive lesions was not essentially different whether the clinical presentation was hemorrhage, ischemic insults or asymptomatic.

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Claude Syndrome Caused by Paramedian Midbrain Infarction -A Case-

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Background : Paramedian midbrain infarction limited to the oculomotor nucleus fibers are uncommon. Claude syndrome is midbrain syndrome which is characterized by oculomotor palsy with contralateral cerebellar ataxia and tremor. **Case** : A 62-year-old woman who had a history of diabetes and hypertension complained of a vertigo suddenly developed. In neurologic examination, she presented the left 3rd cranial nerve palsy and cerebellar ataxia in her right side. The brain MRI scan was performed, which revealed a lesion just caudal to the red nucleus that consisted with infarction. MR angiography finding was unremarkable. after two weeks, she showed left MLF(medial longitudinal fasciculus)-like syndrome in the eye and ataxia was improving state. **Comment** : The Claude syndrome is rare, moreover midbrain infarction as the cause of this syndrome is quite rare. We report a case of Claude syndrome by midbrain infarction involving the red nucleus.

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Biswanger's Disease Associated with Alzheimer's Pathology(An Autopsy Case)

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Background : Binswanger's disease(BD) is an illness of elderly hypertensive patients characterised clinically by disorders of memory, mood and cognition ; focal motor signs ; and less often, a pseudbulbar syndrome with deterioration of gait and sphincter control. The illness is usually slowly progressive. The important pathological features of BD are wide spread degeneration in the deep white matter with diffuse and patchy axonal and myelin loss with gliosis. The more diffuse lesions in the centrum semiovale have been related to myelin rarefaction that spares the U-fibers. The MRI appearance of BD is multiple confluent white matter lesions of various size, many quite small and concentrated around the basal ganglia and periventriclar areas. **Case** : A 80 year-old hypertensive man admitted with slowly progressing dementia and gait disturbance. On first admission, he had no obvious focal motor and sensory deficits. His gait was wide-based, unstable and short. Spinal tapping was performed and results were normal and his symptoms were not improved. MRI showed multiple punctuate high signal intencities in both basal ganglia, thalamus, pons and deep white matter in T2 weighted image. TFCA showed no definite abnormality. Patient died and autopsy was performed. Gross and microscopic finding was suitable for Binswanger's pathology, but mild Alzheimer's pathologic finding was associated also. **Comment** : We report a Binswanger's disease associated with Alzheimer's pathology(An Autopsy case).

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Isolated Cortical Venous Thrombosis without Dural Sinus Involvement

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Background & Significance : Isolated cortical venous thrombosis is rarely diagnosed and can be overlooked. Thrombosis of dural sinuses, particularly of the lateral or superior sagital sinuses, usually develops with hypercoagulable state and otorhinologic infections, but isolated coritcal venous thrombosis with chronic otitis media has rarely been reported. **Case** : A 33-year-old male presented with sudden weakness of left lower extremity and paresthesia of left side of the body from the previous day. Before two weeks, he had a partial epileptic seizure with left foot jerking, followed by unresponsiveness. He also used to visit an ENT clinic to treat his purulent chronic otitis media. We could observe focal high signal intensity on right parietal lobe on T2 weighted image in brain MRI and temporal bone CT showed a right chronic otomastoiditis without erosion of basal skull. Digital subtraction angiogram showed an obstruction of cortical vein on right parietal area. On the other hand, the results of other tests such as protein C, protein S, antithrombin III, anti-cardiolipin antibody, and anti-phospholipid antibody were negative. **Comment** : It is a case of isolated cortical venous thrombosis without dural sinus involvement associated with chronic otomastoiditis of the same side.

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Prolonged Exposure to EGF Induces Neuronal Death in Cortical Culture

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Backgrounds & Objectives : Previously, we have shown that several neurotrophic factors paradoxically induce neuronal necrosis in cortical culture. In the present study, we

examined whether epidermal growth factor(EGF) shares the toxic effects on neurons. **Methods** : Cortical cell culture containing both astrocytes and neurons were obtained from mouse embryos as previously described. Cultures were used for experiments after 10 days in vitro. **Results** : Exposure of cortical cell culture to EGF for 48 h resulted in extensive neuronal death. The EGF-induced neuronal death was blocked by an antioxidant trolox, indicating that the death is largely mediated by oxidative stress. An EGF receptor-specific tyrosine kinase inhibitor, and a NOS inhibitor, but not glutamate antagonists, attenuated the EGF-induced neuronal death. However, EGF exposure did not alter the production of nitrites. **Conclusion** : EGF can induce NO-mediated death of cultured cortical neurons, perhaps by rendering neurons vulnerable to normally sublethal NO. Supported by Creative Research Initiatives of the Korean Ministry of Science and Technology.

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Middle Cerebral Artery Dissection as an Uncommon Cause of Ischemic Stroke in Middle Cerebral Artery Territory

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Background & Significance : Focal middle cerebral artery(MCA) dissection is very rare manifestation among the cerebrovascular pathologies. Up to the present, MCA dissection usually has been considered to arise from trauma and internal carotid arterial pathology(extended dissection etc). Furthermore, cerebral infarctions in MCA territory are mainly caused by atherosclerotic narrowing or embolization resulting from other risk factors. We experienced a case of ischemic stroke in MCA territory caused by focal MCA dissection, in which no other pathologic process was discovered. **Case** : A 38-year-old right-handed man developed left facial palsy, dysarthria, and left hand clumsiness with right frontotemporal severe headache. He had no trauma history. Brain MRI scan showed acute infarction in right MCA territory. Conven-tional cerebral angiography revealed dissection on M2 portion of right MCA, and no other vascular pathology except for tiny aneurysm on left internal carotid artery bifurcation. **Conclusion** : MCA dissection may be considered to be one of the causes of ischemic stroke in MCA territory.

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Elevation of Hepatic Enzymes during Heparinization in Acute Stroke

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Background : It is well known that heparin is used to treatment of acute cerebral infarction. However, complications of heparin are well known that bleeding, thrombocytopenia but elevation of hepatic enzymes are rare. **Objectives** : We evaluated the incidence and correlation of increase of hepatic enzymes(AST/ALT) during heparinization in acute infarction. **Methods** : Fifty patients with acute ischemic stroke and vertebrobasilar insufficiency were used heparin. The mean age of patients were 60.8±12.8 years and the patients were no hepatic disease. The dosages of heparin is used 20.000unit/day(mean duration : 4.7±1.3 day). The variation of hepatic-enzymes were tested per 3 days. We followed up until levels of hepatic enzyme were decreased after heparin was stopped. **Results** : The elevations of hepatic enzymes were 28 patients(56%). The elevation of hepatic enzymes was 4.3±1.3 day after heparin were started. The decrease of hepatic enzymes was on 4.6±2.2 day after heparin were stopped. The initial AST was 27.3±11.3IU/L and ALT was 25.1±13.8IU/L. The mean elevation level of AST/ALT were 133.4±96.1IU/L/157.9±123.4IU/L. The level of hepatic enzymes was normalized after heparin were stopped 15 days. **Conclusion** : The heparin is well used by means of anticoagulants. The heparin is attributed to elevation of hepatic enzymes but toxic side effects are less so. We carefully follow up hepatic enzymes during heparinization.

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Changes of Magnetic Motor Evoked Potentials in Hemiparesis due to Cerebral Infarction

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Background : The Motor evoked potentials(MEP) study may be useful in the evaluation of the degree of impairment in the motor nervous system and in the determination of the

prognosis. **Objectives** : The purpose of this study is to evaluate the status of central nervous system in acute and subacute state of cerebral ischemia by comparing the changes of MEP in the initial and follow-up study. **Methods** : Twenty patients with hemiparesis caused by ischemic stroke were recruited for this study. We tested MEP within 7 days and followed-up after 14 days after symptom onset. The cerebral motor cortex area, cervical area for upper extremity and lumbar area for lower extremity were stimulated by transmagnetic stimulator. The CMCT was measured with the difference in MEP caused by stimulating the vertical area and spinal area. The CMCT of hemiparetic patients were classified into three groups-normal, delayed, and no evoked MEP groups. **Results** : The CMCT in hemiparetic side of acute ischemic stroke patients were significantly delayed($P < 0.05$) compared with the control group. The CMCT of hemiparetic side in the follow-up study showed no significantly difference in comparison to the control group. The prognosis of motor improvement was better in the groups of delayed MEP than the groups of no evoked MEP. **Conclusion** : The CMCT of hemiparetic and contralateral sides were delayed in acute ischemic stroke, compared with control group and were returned to normal boundaries in subacute state. But in the most cases with no MEP response in the initial study, also showed no MEP response in the follow-up study. The recovery occurred in the subacute state in cases with mild hemiparesis, whereas recovery did not occur in the subacute stage in case with severe hemiparesis.

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A Case of Transient Ischemic Attack Associated with Scrub Typhus

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Background and Significance : Recently, several articles have pointed to the possibility that generalized inflammatory conditions might act as a triggering factor, particularly in the context of acute infections. And recent studies suggest an association of coronary heart disease with Richettsia tsutsugamushi infection. But cerebrovascular complications of Tsutsugamushi infection is very rare. **Case** : A 45-year-old-man was transferred to our hospital due to aphasia and right hemiparesis from a private clinic, where he had been admitted for 8 days due to fever and abdominal pain. He worked outdoors all the day, 3 weeks ago. And there ware no family history and any risk factors of stroke noticed. On physical examination, he had an eschar on his left mandibular area and low grade fever. His neurologic signs disappeared during the second admission day. The brain MRI and conventional cerebral angiography showed no specific findings including the evidence of vasculitis. But the EEG revealed intermittent slow wave activities in the left hemisphere. On CSF study, opening pressure(140 mmHg), protein(33 mg/dL) and sugar concentration were normal but mild pleocytosis(WBC: 25/mm3, monocyte: 100%). The conventional culture studies of blood and CSF showed no specific organism but antibody titers to Richettsia tsutsugamushi in serum were elevated(initial antibody titer 1:320, and 10 days later, also 1:320). **Conclusion** : We report a case of transient ischemic attack associated with scrub typhus and will discuss the interaction of stroke and infection or inflammation, because early treatment and prevention of infection in a high-risk population may be associated with a reduction in stroke incidence.

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Mediation of BDNF-induced Oxidative Neuronal Necrosis by the Trk-B Signaling

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Backgrounds & Objectives : Whereas neurotrophins such as BDNF can promote oxidative neuronal necrosis in cortical culture, the receptor signaling cascades involved have not been elucidated. In the present study, we examined the possibility that TrkB receptor activation is necessary for this phenomenon. **Methods** : Cortical cell cultures prepared from embryonic mice were used. **Results** : Exposure of cortical cultures to 50~100 ng/ml BDNF for 48 h induced neuronal death accompanied by marked swelling of cell bodies, which was blocked by the addition of an antioxidant trolox. Exposure to BDNF induced Trk-B autophosphorylation, Erk-1/2 activation, and Protein kinase A(PKA) activation. Suggesting that

hese cascades contribute to death, a tyrosine kinase nhibitor genistein, a MEK-1 inhibitor PD98059, and a PKA inhibitor H-89 blocked BDNF-induced neuronal leath. **Conclusion** : These results suggest that in addition o p75NTR that mediates cell death in certain conditions, Trk-B should be listed as a mediator of neurotrophin-nduced neuronal death.

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Vertebrobasilar Insufficiency due to Cervical Spondylosis

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Background & Significance : Vertebrobasilar insufficiencies secondary to vertebral artery occlusion with rotational head motion have been reported in several cases. Up to the present, the mechanisms have been considered compression by bony spurs, muscular and tendinous insertions. We experienced a case of vertebral artery occlusion induced by head rotation movement and investigated the mechanisms. **Case** : A 58-year-old man developed transient dizziness, horizontal diplopia, blurred vision and visual field narrowing whenever he turned his head to the right side. He had hypertension. Brain MRI scan showed no definite abnormalities. Conventional cerebral angiography revealed occlusion of the left vertebral artery at the level of C1-2 nterspace with head turned to the right, but showed normal filling of the left vertebral artery in the straight position. Right vertebral artery was totally occluded. Three-dimension CT angiography demonstrated that C3 and C4 were block vertebrae with limitation of C2 rotational movement resulting in C1 hyperrotation at the time of right head turning and this hyperrotation of C1 brought about occlusion of left vertebral artery between the margin of the C1 transverse foramen and the margin of the C2 transverse foramen. **Conclusion** : Rotational vertebral occlusion is a cause of vertebrobasilar symptoms. Dynamic angiography is helpful in diagnosis.

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Two Cases of Concomitant Cerebral Infarction during Management of Intracerebral Hemorrhage: How to Manage the Cerebral Infarction?

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Background & Significance : The hemorrhagic transformation after cerebral infarction is well characterized, but data regarding to management of the cerebral infarction which was newly appeared during management of ICH are scant. **Case 1** : A 51-year-old man was admitted with severe headache. Initial brain CT scan revealed right caudate nucleus hemorrhage with IVH. Fourteen days after admission, he showed disorientation, severe vertigo, and visual disturbance. There were multiple acute infarctions(right cerebellum, both cerebral hemispheres) on follow-up brain MRI. We prescribed low-molecular-weight heparin. **Case 2** : A 73-year-old right handed woman was admitted with language disturbance with subtle right hemiparesis. Initial brain CT scan revealed left temporoparietal lobar hemorrhage. Eight days after admission, neurologic deficits were newly appeared. There was acute left pontine infarction on follow-up brain MRI. We prescribed antiplatelet agent. **Comments** : We report two cases of concomitant cerebral infarction which was newly developed during management of ICH. It was managed with heparin or antiplatelet drug without complication.

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Clinical Manifestation of Spinal Cord Infarction

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Background & Objective : Spinal cord infarction(SI) is not a common neurological disorder. Predisposing factors, clinical manifestation, natural history, and prognosis

of Korean patients with spinal cord infarction have not been reported. **Methods** : We analyzed medical records of 13 patients admitted to the Yongdong and Shinchon Se-verance Hospitals from 1988 to 1999 due to SI. Spinal MRI studies were performed in all 13 patients. **Results** : Ten patients were men and three were women. Their mean age at the onset was 54.3 years(range=23-69 yrs). Nine of the 13 patients had predisposing factors (seven had hypertension, one had diabetes mellitus, and one had esophageal varix bleeding). Four of the seven patients with hypertension developed SI in association with aortic dissection. Ten patients had thoracic sensory level and three had lumbar sensory level, and none had cervical sensory level. The mean of sensory level was T9. Five of the thirteen had anterior spinal artery syndrome, five had spinal apoplexy, and the remaining three had posterior spinal artery syndrome. All, except the three patients with posterior spinal artery syndrome, had nearly complete paraplegia at the onset and none of them was able to walk until the mean follow-up period of 1.5 months. **Conclusion** : The mean sensory level of SI is higher than that of the known spinal cord watershed zone(T4). Spinal apoplexy and posterior spinal artery syndrome occur more frequently than reported previously. Patients with anterior spinal artery syndrome and spinal apoplexy have poor prognosis.

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Diagnosis and Monitoring of Acute Middle Cerebral Artery Occlusion with Transcranial Doppler Ultrasonography

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Background : Transcranial Doppler ultrasonography (TCD) is an useful tool for assessing middle cerebral artery(MCA) stenosis and occlusion in acute ischemic stroke. Continuous or frequent TCD monitoring might provide the information about natural or therapeutic course of MCA occlusion in acute MCA stroke. Objective: To characterize the different flow pattern in acute MCA occlusion using TCD before and after recanalization during acute treatment including thrombolysis. **Methods** : We prospectively studied nine patients with acute middle cerebral artery(MCA) infarct within 6 hours of stroke onset who had MCA occlusion identified by MR angiography(MRA) and/or conventional angiography(CA). Follow-up MRA were performed within a week. They were examined by initial TCD as soon as possible after admission within 24 hours after stroke onset, and more than one follow-up TCD were performed in all patients within a week. Five patients were treated with tissue plasminogen activator intravenously, 1 with intra-arterial urokinase, 3 with anticoagulation. **Results** : On initial MRA and/or CA, occlusion of MCA stem(n=7) or division(n=2) were detected, and the combined ICA occlusion were seen in 3 patients. Recanalization of occluded MCA on follow-up MRA was seen in 4 patients. Occlusion of MCA, absent flow signal at certain or all depth of MCA, was found in 8 patients at first TCD exam. Follow-up TCD study revealed recanalization of occluded MCA was seen in 3 patients. In two of 3 patients, a local increased flow velocity with subsequent turbulance, which was called “pseudostenosis”, was found at second exam, and this flow pattern disappeared during further follow-up TCD. In remaining one, absent flow signal at certain depth of MCA restored to normal flow velocity with reduced pulsatility index(PI) without showing pseudostenosis pattern. Recanalization of MCA with persistent ICA occlusion on follow-up MRA was found in one patient after thrombolysis, initial asymmetric low flow velocity of MCA changed to normal flow velocity with reduced PI in follow-up TCD. In remaining 5 patients of nine, no recanalization was seen on follow-up TCD and MRA. **Conclusion** : TCD can allows early differentiation of the patency and dynamic change of acute MCA occlusion. In acute MCA occlusion, different flow pattern, changing with time, may be found.

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Insulin-induced Oxidative Neuronal Injury in Cortical Culture

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Backgrounds & Objectives : We examined the possibility that insulin has a neurotoxic action in cortical culture. **Methods** : Cortical cultures were obtained from embryonic

nice as previously described. **Results** : Whereas insulin attenuated neuronal apoptosis in mouse cortical culture induced by exposure to staurosporine, 48 h of exposure to insulin alone induced neuronal necrosis via oxidative stress. Exposure to insulin activated PKC, p38 MAP kinase, and PI3 kinase. Inhibitors of tyrosine kinase, PKC, or p38 MAP kinase, but not PI3 kinase, attenuated the insulin neurotoxicity. In contrast, a PI3 kinase inhibitor wortmanin, but none of the others, reversed the anti-apoptotic effect of insulin. In addition, macromolecule synthesis inhibitors and selective NMDA antagonists blocked the emergence of insulin neurotoxicity, suggesting that induction of proteins, perhaps including NMDA receptors, may contribute to the insulin neurotoxicity. **Conclusion** : The present study suggests that insulin can be both neuroprotective and neurotoxic in the same cell system but via different signaling cascades.

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The Effects Of Demographic and Health Characteristics On Cognitive Function Among Rural Community Populations In Korea

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Background & Objective : To assess the relation between cognitive function and demographic and health characteristics among rural community populations in Korea. **Method** : We administered Korean version of the Mini-Mental State Examination to 917 subjects(320 men, 597 women), ages 35 to 91 years, with cluster sampling. Multivariate analyses were performed to find cognition-related characteristics. **Results** : Cognitive function measured by the MMSE scores were deeply related to age, education, gender, and marital status($p<0.01$), but not to hypertension, DM, stroke, smoking, and drinking. Older age, less education, female gender, and widowed or single marital status were associated with the low MMSE scores. **Conclusion** : Not only age and education but also gender adjustment are needed in interpreting the MMSE scores of rural community populations where the education level and social activity of women are low to avoid overestimation of cognitive impairment.

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Clinical Characteristics of Patients Admitted Yongin Hyoja Geriatric Hospital

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Background : As the size of the elderly population has increased compared to the whole, there has been growing concern over potential health problems and geriatric hospitals for elderly people. However, these emerging needs for geriatric hospitals, there is no data on the clinical characteristics of patients being admitted to geriatric hospitals so we studied medical record of patients addmitted to Yong-in Hyoja Geriatric Hospital during a recent 20 months period. **Object** : By clarifying the clinical characteristics of elderly patients admitted to a geriatric hospital, the basic data for understanding and treating elderly patients could be made. **Methods** : We analyzed the medical records of 345 patients who were admitted in Yong-in Hyoja Geriatric Hospital from November 1998 to July 1999. The diagnosis of patients was largely subgrouped according to the existence of dementia, and subsequent detailed diagnosis was made. **Results** : (1) The average age of patients was 74.59 year-old and there were slightly more females than males admitted(ratio, 1.15 : 1).(2) Most of patients suffered from dementia(62.1%), and vascular dementia was the most common(31.6%), followed by Alzheimer dementia(19.15%).(3) Compared to vascular dementia, patients of Alzheimer dementia had more severe cognitive dysfunction, psychosis, and agitation, while vascular dementia had more problems in activity of daily living(ADL) and were more dysphoric than Alzheimer dementia(4) The average hospital duration was 3.54 months and incidence of significant illness after admission was 29.8% and the mortality rate was 10.9%.(5) The most common cause of death was infection(45.2%), followed by cardiovascular problems(16.2%). **Conclusion** : In addition to significant illness and mortality after admission, most patients admitted to a geriatric hospital had severe cognitive and behavioral problems. Therefore, adequate medical and neurological assessment and treatment for the aged may be necessary.

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Unilateral Autotopagnosia due to Corpus Callosal Infarction : A New Disconnection Syndrome

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Background & Objectives : Callosal disconnection syndrome, such as unilateral limb apraxia, unilateral alexia, or alien hand sign, results from disturbance of interhemispheric integration regarding to specific callosal fibers. Unilateral autotopagnosia, misidentification of own body part, was suggested as a disconnection syndrome with the case of corpus callosal infarction in 1995, but hasn't been reported since then. **Case :** A 58-year-old, right handed man was admitted for dysarthria and dysphasia. His medical and social history was not remarkable except diabetes mellitus. On neurologic examination, he showed autotopagnosia as well as ideomotor apraxia in left hand. He had a great difficulty in pointing to the named body part of his body with his left hand, although always correctly pointed the same part with his right hand. Brain MRI revealed infarction in both midpons and the body of corpus callosum extending to splenium. **Conclusion** : We report a case with unilateral autotopagnosia in corpus callosal infarction. This may be a new callosal disconnection syndrome, due to diconnection among the left parietal lobe functioning as a center for constructing an own body schema and right motor cortex.

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Effect of Induced Visual Motion on Line Bisection Performance in Normal Subjects

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Background and Objectives : Many studies demonstrated that optokinetic stimulation(OKS) influences line bisection performance in normal subjects and even in patients with hemispatial neglect. These experimental designs required subjects to attend a stationary target on a moving background, therefore inducing motion illusion of the target(induced visual motion, IVM). However these studies have not considered the IVM. The current study tested whether the IVM affects line bisection performance in normal subjects. **Methods** : Thirty two(16 men and 16 women aged 28.0(5.3 years) right handed normal volunteers were asked to bisect stationary lines with a background of horizontal OKS. These stimuli were generated by computer and displayed on a large screen via beam projector. The OKS was varied according to the direction(leftward or rightward) and the speed(100 cm/s or 650 cm/s), producing 4 different experimental conditions. Subjects performed 10 trials of line bisection per condition. **Results** : Results of all conditions were compared with those of base line condition in which there was no OKS background. In the fast OKS conditions wherein subjects reported little IVM, bisection error was drawn in the same direction of the OKS, a result replicating findings of previous studies. Conversely, in the slow OKS conditions in which subjects reported that the target appears moving, the bisection mark deviated in the opposite direction of OKS. **Conclusion** : These results suggest that an illusory motion induced by moving background may modulate attentional bias in normal subjects and that IVM can be used for therapeutic purpose in patients with hemispatial neglect.

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Stroop Test : Its Localization and Correlation

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Background and Objectives : Localization of Stroop test has been controvertial. Recently, functional neuroimaging data using Stroop test have been reported. This study has been designed, first, to evaluate localizing meaning of Stroop test, and second, to see if these areas are correlated with the functional neuroimaging data. **Methods** : From the neuropsychological test database from May, 1997 to June, 1999 in Dept. of Neurology of SNUH, 31 patients were selected who had shown abnormal performance. The criteria of the normal range was determined by a control study of the neuropsychological test aged from forties to seventies. The cutoff value was more than 2.5 in time of the interference / time of color naming. The MRI were reviewed to localize the lesion. Recent literature of functional neuroimaging using Stroop test were reviewed to correlate the lesion with the fuctional neuroimaging data. **Results** : Out of 31 patients, four showed lesion in frontal lobe(4 in right, 0 in left), seven in temporal lobe(2 in right, 4 in left, 1 in both), four in parietal lobe(1 in right, 3 in left), three in occipital lobe(2 in right, 1 in left), five in basal ganglia(1 in right, 2 in left, 2 in both), three in thalamus(o in right, 2 in left, 1 in both), one in corpus callosum and 23 showed unlocalizable lesion. From functional neuroimaging data using Stroop test, the activated area included cingulate cortex, mesial frontal area, inferior parietal area, caudate nuclei and thalami. **Conclusion** : From the lesional analysis based on MRI, clusters in left temporoparietal area, basal ganglia and right frontal lobe were identified. Left temporoparietal area are related with language, basal ganglia are related with frontal-subcortical circuits. Upon correlation with functional neuroimaging data, basal ganglia showed good correlation but the right frontal lobe have some disagreements. The discrepancy on right frontal areamight be due to first, that the sample size was small and second, that the procedures were different. That is, activation procedure reveals all parts that are involved in Stroop test while lesional study reveals only critical parts of them.

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Two Cases of Primary Progressive Aphasia

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Background & Significance : Primary progressive aphasia(PPA), characterized by a progressive deterioration of language typically starts before 65 years of age, is an uncommon degenerative disorder. But the clinical features of PPA were different from other degenerative brain disorders. Nonverval cognitive functions and other neurologic functions of PPA are relatively preserved for a long period, even though speech fluency and naming skills are severely affected. **Case :** Two patients, one was 61 years old male and the other 62 years old female, presented with a slowly progressive language dysfunction for several years. The initial symptoms were disability to speak in complete sentences, word-finding diffulty. But they have no problems in other daily living activities. Neuropsychological and language scales revealed dysfunction of executive aspects of language such as speech fluency and naming skill, but receptive language functions and nonverbal cognitive functions such as memory, visuospatial skill, calculation were relatively preserved in both cases. And the brain imaging showed atrophic changes in the left perisylvian and adjacent temporal region in both cases also. **Conclusion and Comment** : We report uncommon the two cases of PPA, which were diagnosed with clinical manifestations, analysis of various neuropsychological scales, and correspondency of brain imaging.

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Hormone Replacement Therapy in Korean Women with Alzheimer's Disease

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Background & Objectives : Our group has reported herapeutic plausibility of hormone replacement thera-oy(HRT) in women with AD(J Kor Neurol Ass 1998;16 : 302-808). Randomized, prospective, open-labeled clinical rial was designed to elucidate therapeutic efficacy of HRT in AD, compared with tacrine. **Methods** : Fifty-five women with AD were randomized for six-month treatnent with tacrine(40 mg qid, N=26)) or HRT(N=29). Conjugated equine estrogen(0.625 mg/D) alone was given n patients without uterus(N=3), and micronized progesterone(100 mg/D) was added in case of intact uterus. Neuropsychological tests(K-MMSE, K-HVLT, K-BNT, COWA, GDS, HDS, and IADLS) were performed at baseline, 1, 3, and 6 months of therapy. **Results** : Drop-out rate was comparable between tacrine(34.6%) and HRT(44.8%) groups. No differences at changes in K-MMSE, K-HVLT, COWA, GDS, and HDS were found between two groups. Compared with tacrine, HRT revealed better improvement of IADLS score($p<0.05$, repeated measures ANOVA). Interaction by Apo E4 allele was identified at GDS and HDS. In Apo E4(-) group, significantly better response in K-MMSE and HDS was observed in HRT group. **Conclusion** : In treatment of AD, HRT is as effective as tacrine overall and even better at IALDS. Response patterns of K-MMSE, GDS, and HDS are different by the presence of Apo E4 allele.

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A Case of Antiphospholipid Antibody Syndrome(APAS)

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Background & Significance : Antiphospholipid antibody syndrome(APAS) was introduced to describe patients presenting recurrent vascular thrombosis, recurrent fetal loss, thrombocytopenia and elevated titer of antiphospholipid antibody. Especially, catastrophic APAS is uncommon and its CNS manifestation is also rare. We report a case presenting encephalomyelopathy with positive anticardiolipin antibody that is compatible with catastrophic antiphospholipid antibody syndrome. **Case Report** : A 28 years old female patient was admitted presenting paraplegia and sensory change at lower extremities. Brain and spinal MRI showed high signal intensity at T2WI in spinal cord up to medulla and hypothalamus region. During hospital stay, the patients symptom was aggravated to pons region. Severe thrombocytopenia was occurred also. After plasma exchange, the patient was improved in mentality but quadriplegia persisted. The diagnosis was supported by thrombocytopenia, positive anticardiolipin antibody isotype IgG and IgM, low titer of ANA and livedo reticularis. **Comment** : Without definite underlying disease and large vascular thrombosis, antiphospholipid antibody causes microangiopathy manifested as renal, pulmonary, CNS and cardiac diseases. It is potentially life-threatening condition that requires high clinical awareness.

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A Case of Graphemic Buffer Agraphia in Sporadic OPCA

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Background & Significance : There have been a few reports of graphemic buffer agraphia. The lesions of the patients were left frontal or parietal area. We report a case of OPCA who showed graphemic buffer agraphia with moderate cerebellar dysfunction. **Case :** A 60-year old right-handed woman visited Seoul National University Hospital due to incoordination of movement and dysarthria. She also complained of spelling errors. On neurologic examination, she showed moderate cerebellar dysfunction. On neuropsychological test, she showed mild frontal dysfunction such as simple attention deficit. Interestingly, when she performed dictation and spontaneous writing, she showed spelling errors in type of substitution. But when she copied same sentences, she didn't show spelling error. There was diffuse atrophy in cerebellum and brainstem obviously, but the cerebrum was normal in brain MRI. In PET study, metabolism of cerebellum was decreased especially in right side and even in left fronto-parietal area. **Conclusion** : Graphemic buffer agraphia can be seen in OPCA and that may due to disruption of cerebello-cerebral connections or cortical neuronal loss.

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A Case of Apraxic Agraphia due to Left Parietal Lobe Infarction

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Background & Significances : Apraxic agraphia is described as difficulty in writing letters, writing spontaneously, and writing to dictation. Copying or oral spelling are usually less impaired. The lesions causing apraxic agraphia are usually in the parietal lobe, especially the superior parietal lobule opposite the preferred hand(dominant parietal lobe). We herein report a case of pure agraphia after a ischemic lesion in the left superior parietal lobule, who showed characteristic impairment of writing. **Case :** A 73-year-old(Rt handed man) suddenly developed difficulties in writing. On initial examination at ER, he could not perform both dictation and spontaneous writing tasks but he could copy figures or letters without much difficulties. Although he could spell his name with an effort, he was able to read and name objects correctly. These symptoms had been improved rapidly and then he had little problem in writing 1 day later. Brain MRI taken 52 hours after symptom onset revealed an acute ischemic lesion in the left superior parietal cortex. MRA showed no abnormalities. **Comment** : We report a case of apraxic agraphia due to an acute cortical infarction in Lt. parietal lobe. The features of agraphia in this case suggest that his agraphia was caused by impairment of retrieving visual letter image.

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Comparison of Two Screening Tests in Dementia : The Mini-Mental State Examination(MMSE) and the Revised Hasegawa's Dementia Scale(HDS-R)

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Background & Objectives : The Mini-Mental State Examination(Folstein et al., 1975) and the Revised Hasegawa's Dementia Scale(Imai & Hasegawa, 1994) have been widely used for screening dementia. The present study was conducted to compare the efficiencies of these two tests. **Methods** : We administered the Korean version of MMSE(K-MMSE) and the Korean version of HDS-R(K-HDS-R) to 59 probable Alzheimer's disease patients (AD) and 59 vascular dementia patients(VaD), and 57 healthy elderly. Three groups were age- and education-matched. There was no difference in the severity of dementia(CDR=1.2±.8) between AD and VaD. **Results** : The correlation between the K-MMSE and the K-HDS-R was .91. To compare the probabilities of correctly identifying dementia, the areas under Receiver Operating Characteristic(ROC) curves of the K-MMSE and the K-HDS-R were compared. It was found that the K-HDS-R discriminates both AD and VaD equally well from the healthy elderly, in contrast to the K-MMSE that identifies AD more correctly

han VaD. The probabilities to identify AD were the same for both tests, whereas VaD were identified better by the K-HDS-R than the K-MMSE. For the K-MMSE, the cut-off point that maximized the efficiency of identifying dementia was 26 of a possible 30(sensitivity : .87, specificity : .77, positive predictive power : .89, negative predictive power : 75). For the K-HDS-R, it was 23 of a possible 30(sensitivity : .91, specificity : .91, positive predictive power : .96, negative predictive power : .83). However, positive predictive powers of both tests based on a realistic prevalence of dementia in Korea(e.g., 12%; Kim et al., 1999) were signifcantly reduced to .34 and .57 each on the above cut-off points. **Conclusion** : These results indicate that the K-HDS-R is the more efficient measure than the K-MMSE for screening the early stage of dementia.

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Systemic Lupus Erythematosus Leukoencephalopathy

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Background & Significance : Central nervous system involvement in systemic lupus erythematosus(SLE) has been shown to be a relatively common and serious complication of disease. Neuropsychiatric manifestations in patients with SLE are attributed to vasculitis, autoantibodies against neuronal cell membrane and hypercoagulable states. However there are remaining problems to clarify the uniform diagnosis criteria for neuropsychiatric lupus, clinicopathologic correlation and optimal management. **Case :** A 44 year-old female patient had a history of recurrent arthralgia. Headache, mild dizziness and gait disturbances had appeared for 2 months. She was admitted for disorientation, memory impairment, dysarthria and fever. Laboratory findings showed anemia, thrombocytopenia, complement depletion, proteinuria, and anti-Sm antibody seropositive. The other patient was 41 year-old female and had malar rashes and photophobia. She had a myalgia, fever and generalized edema recently and she was admitted for left hemiparesis and mental drowsiness. Laboratory findings showed fluorescent antinuclear antibody test seropositive and anti-Ro antibody seropositive. Both of them were performed magnetic resonance scanning with gadolinium enhancement and had hypersignals in bilateral subcortical white matters, internal capsule and basal ganglia on T2 weighted images. The former was expired because of massive pulmonary hemorrhage and sepsis but the latter was improved to independent daily activities. **Conclusion** : We describe 2 patients with unusual leukoencephalopathy primarily caused by SLE. Although leukoencephalopathic changes of subcortical white matter have been commonly considered as diffuse cerebral edema, arteriolosclerosis could thought to be significant pathogenetic factor.

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Hippocampal Neurodegeneration without Motor Deficits after Concussive-like Brain Injury in Apolipoprotein E-deficient Mice

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Background & Objective : Although the underlying pathogenic mechanism of Alzheimer's disease(AD) is still evasive, recent molecular genetic studies have identified several causative and/or susceptibility genes of the disease such as the amyloid precursor protein, presenilin 1, presenilin 2 and allele 4 of apolipoprotein E(apoE, protein; APOE, gene). Environmental influences such as, lack of education, traumatic brain injury, oxidative stress, environmental toxins, hormonal imbalances and alterations in immune or inflammatory responses may also contribute to the pathogenesis of AD. Thus genetic susceptibility and environmental risk factor may have synergistic effects on the development of AD. The purpose of present report was to assess whether the gene(APOE) and the environmental risk factor(traumatic brain injury) could interact in hippocampal neuronal degeneration. **Methods** : We investigated the histopathological changes of hipoccampal regions after mild concussive-like brain injury without motor deficits in apoE-deficient mice using the recently described novel weight-drop device(Tang et al, 1997). **Results** : Control mice revealed minimal neurodegenerative changes limited to CA2 and CA3, while apoE-deficient mice showed widespread neuronal degeneration throughout hippocampal subfields and part of dentate gyrus. **Conclusion** : The **results** of this study indicate that even very mild traumatic brain injury could result in widespread hippocampal damage in apoE-deficient mice.

This again supports the hypothesis that apoE might play a neurotrophic or neuroprotective function in the central nervous system.

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The Expression of Trk A Receptor in Human Melanocytes as a Model System for the Study of Pathogenesis in Alzheimer Disease

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Background & Objectives : Cutaneous melanocytes and neurons have common embryologic origin and morphologic characteristics. Besides cutaneous melanocytes share with neurons many signaling molecules. So these qualities suggest that human melanocytes might provide a useful model system in which to investigate normal and pathologic process of central nervous system neurons. It is well known that Alzheimer's brain showed increased β amyloid protein production and/or deposition. **Methods** : To evaluate whether human malanocyte after treating Alzheimer patient's serum or βamyloid protein induce similar expression of Trk A receptor as a nerve growth factor, we measured Trk A receptor expression from human cultured melanocytes after treating Alzheimer patient's serum(n=10) by immunofluorescent studies. Trk A receptor expression from human melanocytes after treating βamyloid protein and normal serum was measured as a positive(n=3) and negative(n=3) control, respectively. **Results** : By fluocytometry analysis for quantification of Trk A receptor expression, the percentage of fluorescent amount after treating Alzheimer patients serum group(3.75°æ2%) showed significantly increased expression compared with normal serum group(1.9±0.6%)($p<0.05$). There was no significant difference of the percentage of fluorescent amount between Alzheimer patients serum treated group and β amyloid protein treated group(4.2±1.3%). **Conclusion** : These findings suggests that human melanocytes provide a valuable in vitro model for studies of Alzheimer disease.

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A Case of Primary Sjögren's Syndrome Mimicking Multiple Sclerosis

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Background & Significance : Sjögren's syndrome is a chronic autoimmune disorder characterized by lymphocytic infiltration of lacrimal and salivary glands, leading to keratoconjunctivitis sicca and xerostomia. Skin lesions in Sjögren's syndrome are usually manifested as xeroderma or vasculitis. CNS symptoms may be presented as one of extraglandular manifestations. Though rare in incidence, Sjögren's syndrome needs to be differentiated from multiple sclerosis. **Case :** A 45-year-old woman had suffered from dry eyes and dry mouth for 7 years without any detailed evaluation. Four years thereafter, she had weakness in both lower extremities, voiding difficulty, and sensory loss below the umbilicus. One month later, she complained of visual dimness and gait disturbance. On neurologic examinations, she showed decreased visual acuity, weakness, spasticity, hyperreflexia, and hypesthesia of both lower extremities. The cerebrospinal fluid profiles and MRI findings suggested multiple sclerosis. She was treated with systemic corticosteroid. Skin lesions developed and neurologic symptoms were aggravated in the course of tapering corticosteroid. Ophthalmological examination revealed hyposecretion of tears. The biopsied specimen of minor salivary gland revealed periductal lymphocytic infiltration. Immunologic studies were compatible with Sjögren's syndrome. She was treated with hydrochloroquine 400mg/day resulting in improvement of skin lesions and neurologic symptoms. **Conclusion** : Sjögren's syndrome should be differentiated from multiple sclerosis if patients have exocrine dysfunction in addition to clinical features of multiple sclerosis.

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Effects of Lesion Site, Hippocampal Sclerosis, and Intelligence on Verbal and Visual Memory Performance

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Background & Objectives : Temporal lobe, especially hippocampus, takes an important role in memory. Previous studies(e.g., Jones-Gotman, 1986) found that after left temporal lobectomy there were impairments in verbal memory, whereas impairments in nonverbal visuospatial memory were reported after right temporal lobectomy. However, this material specific memory model remains controversial(Glosser et al., 1995). The purpose of this study is to find the effects of the hippocampal sclerosis on verbal and visual memory in LTLE and RTLE, while controlling the intelligence found to be closely related to memory(Ryu et al., 1999). **Methods** : Forty-seven patients with LTLE(mean age=28.2°æ8.1) and 36 patients with RTLE(mean age=27.4°æ6.3) participated in the study. Each group was divided into four subgroups based on the presence of hippocampal sclerosis and the level of intelligence(High IQ & Low IQ). Logical Memory Test as a verbal memory measure and Rey-Osterrieth Complex Figure Test(RCFT) as a nonverbal memory measure were administered. **Results** : In Low IQ group, there was no difference in memory measures between the patients with and without hippocampal sclerosis regardless of the lesion site. In High IQ group, however, LTLE with hippocampal sclerosis performed worse not only on immediate & delayed recalls of the Logical Memory Test but also on immediate recall of the RCFT than those without hippocampal sclerosis, whereas there was no difference in memory measures between RTLE with and without hippocapmal sclerosis. **Conclusion** : The effects of hippocampal sclerosis on verbal and visual memory were found only in high-intelligent LTLE. This result questions the validity of material-specific memory model and reconfirms the influence of intelligence on memory found in Ryu et al.(1999). Furthermore, it suggests the possibility that the left hippocampus would be more important in memory than right hippocampus regardless of the modality of memory, as Hitch et al.(1995) argued.

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A Pilot Study on Relationship between Haptoglobin and Posttraumatic Epilepsy

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Background & Objectives : Close relationship between the presence of iron or iron-containing protein in the brain and the development of posttraumatic epilepsy was well recognized. Reduced plasma haptoglobin might interfere with the normal clearance of hemoglobin from the injury site. We evaluated the correlation between plasma haptoglobin and posttraumatic epilepsy. **Methods** : Using an immunonephelometric technique, we measured plasma haptoglobin level in 30 patients with posttraumatic epilepsy, 35 non-epileptic patients with head trauma, and 35 normal controls. **Results** : The plasma haptoglobin level was 76.69±43.97 mg% in patients with posttraumatic epilepsy, 121.54±51.29 mg% in non-epileptic patients with head trauma, and 115.76±52.95 mg% in normal controls. The plasma haptoglobin level of patients with posttraumatic epilepsy was significantly lower than that of normal controls and non-epileptic patients with head trauma($p<0.05$). **Conclusions** : Our pilot study suggests that low level of plasma haptoglobin may be associated with develoment of posttraumatic epilepsy.

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Epidemiologic Study of Unprovoked First Seizure in Kang-Nam St. Mary's Hospital

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Background and Objectives : The clinical approach to the first unprovoked single seizure had been remained controversial. Without any information of it, rational therapy, appropriate follow-up strategies and evaluation cannot be planned. The aim of this study is to obtain more informations about natural history and prognosis of single unprovoked seizure. **Methods** : We retrospectively analyzed the

patients with newly diagnosed seizure who visited or admitted to Kang-Nam St. Mary's Hospital during 6 years. **Results** : One hundred twelve patients were recruited. The range of onset age was 2 to 72-year-old. 23 patients(21%) had single, first seizure and the others had the recurred seizure, never treated. 23 patients(21%) had underlying illness such as stroke, perinatal problem etc. Types of seizure were classified as complex partial seizure with secondary generalization(44%), primary generalized tonic-clonic seizure(33%), complex partial seizure(15%), and the others(simple partial seizure, unclassified seizure, etc.)(7%). 39 patients(34.8%) showed abnormal findings in EEG. 41 patients(36.6%) showed brain MRI imaging abnormality. Peak time to seizure recurrence was within 6th months(55.4%) after the first seizure. Risk factors for seizure recurrence were electroencephalographic abnormality(p=0.017) and age of seizure onset(p=0.03). **Conclusion** : We suggest that when a patient visited for the first single seizure, eletroencephalographic data and age of onset could be a predicting factors for prognosis and the patient should be observed closely within 6 months.

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Effect of Intelligence on the Relationship Between Memory and Hippocampal Sclerosis

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Background & Objectives : It has been observed that, despite of the presence of hippocampal sclerosis, the epileptic patients with high average IQ scores showed the normal range performance in memory tests. This study was conducted to examine the effect of intelligence on the relationship between memory and hippocampal sclerosis. **Methods** : One hundred twenty-three patients with medically intractable epilepsy(mean age=28.47±8.71, education year=11.89±2.73) were given Korean-Wechsler Adult Intelligence Scale(KWIS), Korean California Verbal Learning Test and Logical Memory Test as verbal memory measures, and Rey-Osterrieth Complex Figure Test as a nonverbal memory measure. The presence of hippocampal sclerosis was screened by means of magnetic resonance imaging(MRI). The subjects were divided into two groups based on the mean score of KWIS Full Scale IQ : Low IQ group(range : 80-102, n=62) and High IQ group(range : 103-135, n=61). Each group re-divided into two groups according to the presence of hippocampal sclerosis. **Results** : There was no difference in memory performances between the patients with and without hippocampal sclerosis in Low IQ group. The patients in Low IQ group performed worse than average level(<16%ile) in all the memory tests regardless of hippocampal sclerosis. In High IQ group, however, the patients with hippocampal sclerosis performed more poorly in all memory tests than those without hippocampal sclerosis, although their absolute levels of performance were still in the normal range(>16%ile). **Conclusion** : This result showed that the memory of the patients with high intelligence can be in the normal range, although they have hippocampal sclerosis. Therefore, it suggests that the level of intelligence should be considered for the clinical judgement of memory impairment.

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A Case of Aphasic Status with Brain SPECT demonstrating Focal Hyperperfusion

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Background & Objectives : An absence or an arrest of speech is not a rare manifestation during the ictal or postictal condition. Although, epileptic aphasia or aphasic status is rarely reported. We experienced a patient with aphasic status that was confirmed by 99m-Tc-ECD SPECT. **Case :** A 79-year-old male was admitted through ER, who had sudden onset of aphasia. In K-WAB(Korean-version Western Aphasia Battery) test, his aphasia was compatible with Wernicke's aphasia(AQ=54.50). Brain MRI including diffusion imaging showed no newly developed abnormal findings except for old hemorrhagic infarction in left posterior temporal area compared with the MR images taken one year before. The routine scalp EEG revealed left temporal continuous slowing. Tc-99m-ECD SPECT demonstrated focal hyperperfusion area on left temporal cortex. After medication of phenytoin, his aphasia was much improved and two months later follow up brain SPECT showed no focal

hyperperfusion area. Follow up K-WAB test revealed improved score(AQ=70.00) and no epileptiform discharge was seen in EEG except for continuous slowing in left temporal area. **Conclusion** : It is not easy to diagnose simple partial seizure, especially when manifestating with nonmotor symptom such as aphasia. In this case, Wernicke's aphasia was the only symptom suspecting seizure disorder although the scalp EEG could not show definite epileptiform discharge. Tc-99m-ECD brain SPECT showed that there was a focal hyperperfusion area which was supposed to be a seizure focus. Brain SPECT might be useful to diagnose simple partial seizure manifestating as aphasia with uncertain EEG findings.

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Newly-Developed Psychosis following Temporal Lobectomy : 2 Cases

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We report two cases of newly-developed psychosis after temporal lobectomy. First case is a 46-year-old man who presented recurrent postictal psychosis 1 year after right temporal lobectomy. His seizure onset was age 20. Preoprative interictal EEG showed bilateral independent temporal spikes. Right hippocampal atrophy was noted on MRI. Mesial temporal sclerosis was confirmed pathologically. His psychotic symptoms, including violent behaviors, auditory hallucination, persecutory delusion, and even self injury, developed after lucid interval(12-36 hours) following a cluster of seizures including secondary generalized tonic clonic seizures. Oral haloperidol was used and led to behavior control in a few days. Second case is a 44-year-old woman with mesial temporal lobe epilepsy who underwent left temporal lobectomy. Her seizure onset is age 15. Right temporal spikes were frequently observed on preoperative interictal EEG. MRI showed left uncal calcified granuloma and small cystic lesion at the dentofimbrial fissure area with definite ipsilateral hippocampal atrophy. She presented paranoid delusion 6 months after surgery. The paranoid delusion was usually related to increased sexuality. Treatment with perphenazine was started. Cystic lesion with calcification on MR was pathologically diagnosed as cysticercosis. Even if postoperative psychosis is rare, that should be observed carefully because temporal lobectomy is an ever-increasing treatment.

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쥐에서 단발성 경련이 중첩성 경련에 미치는 영향

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김지훈 · 최재영 · 박성민 · 김영인

연구배경과 연구목적 : 카이닉산을 전신주입하면 중첩성 경련과 주로 변연계에 신경세포 손상을 일으킨다. 최근보고에 의하면일측 해마내 카이닉산 주입이 반대측 카이닉산 주입에 의한 경련에 대한 내성을 유도 즉 경련의 역치를 높이는 역할을 하고 이것이 경련의 횟수와 세포 손상의 정도를 감소시킨다는 결과가 있다. 유사하게 이러한 내성의 예로서 hippocampal kindling**이 카이닉산으로 유발된 경련으로 인한 신경세포 손상을 방지한다는 보고가 있다. 이러한 내성의 개연성에 근거하여 단발성 경련이 연속된 중첩성 경련으로 인한 세포손상에 어떠한 영향을 미치는지 알아보고자 한다. 연구방법 : 동일한 조건에서 사육한 건강한** Sprague-Dawley**계 흰쥐를** 1) saline control **군** 2) saline-KA(kainic acid) **군** 3) pentylenetetrazole **군** 4) pentylenetetrazole-KA **군으로 나누워** pentylenetetrazole**로 단발성 경련을** kainic acid**로는 중첩성경련을 일으켰다.각각의 흰쥐는 경련파 측정을 위하여 전극을 부착하였고 경련활동을 관찰하였다. 모든실험동물은 마지막 약물 투여후** 72**시간뒤 단두한 뒤 뇌를 꺼내어 파라포름알데하이드에 저장하였다. 그리고** 15 **마이크로미터 두께로 절단하여 니슬 염색을 하였고 현미경으로 해마부위의 신경세포수를 관찰하였다. 연구결과 : 뇌파와 경련활동 관찰에서** 4)**군은** 1)**군에 비해 경련파 발생이 늦었으며 경련의 강도와 횟수가 적었으며 경련파의 진폭과 횟수도 적은 것으로 관찰되었다. 조직검사소견으로는** 3)**군에서는 세포 손상이 거의 없었으며** 4)**군에서는** 2)**군에 비해 세포 손상이 현격하게 적어 단발성 경련이 중첩성 경련으로 인한 뇌세포 손상을 줄여준다는 결과를 보였다. 결론 : 이 실험 결과는 단발성 경련은 뇌세포 손상을 일으키지 않았으며 카이닉산으로 유발된 중첩성 경련의 신경세포 손상을 방지할 수 있었다. 이러한결과는 허혈에의한내성뿐만 아니라 경련에 있어서도 내성이 있음을확인할 수 있었다.**

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The Value of Multi-Modality Image Registration in Neocortical Epilepsy Surgery

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Background & Objectives : The localization of seizure focus in neocortical epilepsy is often difficult. To improve the accuracy of localization and surgical outcome, multi-modality image registration was performed in intractable neocortical epilepsy patients. **Methods** : Five neocortical epilepsy patients were included. Long-term video-EEG monitoring with scalp electrodes, thin-section brain MRI, ictal and interictal SPECT, FDG-PET and invasive monitoring if necessary were performed. In addition to visual inspection, brain images of different modalities were interpreted by 3-dimensional MRI rendering, subtracted SPECT, and subtracted SPECT and PET registered with 3D MRI to narrow down epileptic focus. According to these analyses, subdural electrodes were placed over the brain regions including imaginary epileptic focus. The segmentation of subdural grid electrodes in brain CT images were registered with 3D brain MRI to locate electrode position on the brain surface, and to localize epileptic focus on the patient's brain surface through ictal EEG discharges recorded on subdural electrodes. With these analyses of multi-modality brain images, tailored cortical resection was performed. **Results** : Case 1 showed that ictal-interictal subtracted SPECT registered with MRI could localize the epileptic focus in non-lesional epilepsy. Case 3 showed the accurate placement of subdural electrodes over epileptic focus with the help of multi- modality image analysis(MRI co-registration with ictal, interictal, subtracted-SPECT, and PET). Case 2 and 4 showed the location of epileptic focus and its anatomical relation with the lesion were revealed by 3D MRI co-registration with ictal or interictal and subtracted SPECT. Case 5 showed the sparing of precentral gyrus in diffuse temporoparietooccipital lesion could be possible with narrowing down of epileptic focus by subtracted-SPECT registered with 3D MRI. **Conclusion** : The multi-modality image registration was useful in epilepsy surgery as the following points; 1. to find the precise localization of epileptic focus in non-lesional epilepsy, 2. to know the relation of the epileptic focus with the lesion, 3. to place subdural electrodes correctly covering epileptic focus, 4. to localize correctly epileptic focus, irritative zone and functional area on the patient's brain surface during surgery.

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A Case of Non-convulsive Status Epilepticus Characterized by Ictal Hemiplegia

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Background & Significance : Partial non-convulsive status epilepticus presented with prolonged hemiplegia is unusual manifestation. **Case :** A 39-year-old woman had several episodes of transient right hemiplegia, lasting several hours to one day. On neurologic examination during the ictal period, she had alert consciousness without aphasia, head and eye-ball deviation to the right side, and right hemiplegia. Brain imagings did not show any abnormality. EEG-CCTV recording of ictal period showed continuous ictal discharge on left hemisphere coincided with ictal hemiplegia. After administration of intravenous diazepam, neurological deficit reverted to normal, and continuous epileptiform discharge also disappeared. **Conclusion** : We report a case with prolonged hemiplegic attacks due to a non-convulsive status epilepticus.

가 야 금

Movement Disorder I

좌장 : 이 명 종 교수
이 명 식 교수

1

Clinical Analysis of Progression in Parkinson's Disease

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Background and Objectives : It had been reported that several clinical features are related to progression in Parkinson's disease(PD). We evaluated the variables to determine what can affect the initial profiles and progression of patients with PD and investigated the effects of dopamine. **Method** : In 290 patients with parkinsonism, who visited St. Mary and KangNam St. Mary's hospitals between February 1987 and March 1999, A total of 265 patients fulfilled the idiopathic PD; 140 of them had appropriate data for the purpose of this study. we analyzed following variables : sex, age at onset, initial type, duration before reaching medical advice, initial and current Hoehn and Yahr(HY) stage, age at reaching HY stage III, usage of dopamine and it's side effects. **Result** : The mean age of onset was 60.7 years(SD 10.3)(male : 56, female : 84). The patients with tremor type had a tendency to seek a medical advice in earlier stage(p=0.01). Older patients at PD onset progressed more rapidly than younger patients (p=0.04). Patients who took levodopa earlier had a tendency to show a lower disability.(p=0.004). But the advent of levodopa elicited no difference in the rate of progression (p>0.05) **Conclusion** : The age at onset might be an important contributing factor in progression of PD. However, other factors such as sex, type, duration of illness, levodopa were thought to have less role in it.

2

Amantadine as Treatment for Levodopa Induced Dyskinesia in Parkinson's Disease

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Background and Objective : Dyskinesia is a common side effect complicating long-term levodopa therapy for Parkinson's disease. However, the pathogenesis of dyskinesia has not been completely understood. In recent animal studies, it was reported that NMDA(N-methyl-D-aspartate) antagonist reduced levodopa-induced dyskinesia. These findings suggested that hyperfunction of NMDA receptors on striatal efferent neurons contributed to the pathogenesis of dyskinesia. Amantadine has recently been shown to antagonize central NMDA receptors. We assessed the amantadine efficacy in levodopa-induced dyskinesia in parkinsonian patients. **Method** : Eighteen parkinsonian patients with levodopa-induced dyskinesia participated in a placebo-controlled, cross-over study. We prescribed amantadine 100mg daily as starting dose, which was built up every four days and titrated up to 400mg a day. After two weeks of wash-out period, placebo was given as same schedule. The doses of levodopa and other antiparkinsonian drugs were unchanged during this period. We assessed the duration and disability of dyskinesia(UPDRS part IV, item 32 and 39) based on diary and interview. **Result** : Amantadine was superior to placebo in reducing duration of dyskinesia in nine patients(50%) and disability of dyskinesia in ten patients(55.5%). The reduction of duration and disability of dyskinesia was correlated with the dose of amantadine. **Conclusion** : These findings suggest that amantadine can improve levodopa induced dyskinesia and support the view that hyperfunction of NMDA receptors contributes to the pathogenesis of levodopa induced dyskinesia.

3

123I-IPT SPECT in Parkinson's Disease and Multiple Systemic Atrophy

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Background & Objective : Functional imaging of dopamine transporter is useful for diagnosing idiopathic Parkinson's disease(IPD) and assessing disease severity. However, its value in differential diagnosis of other extrapyramidal disorders has been uncertain. The purpose of this study was to evaluate the usefulness of the dopamine transporter image using 123IPT-SPECT for differentiating between the PD and multiple systemic atro phy(MSA).

Method : We studied 14 normal controls, 77 patients with IPD(mean age 56 yr, range of age 29~85 yr, male : female 38 : 39), and 8 patients with striatonigral degeneration type MSA(mean age 56 yr, range of age 38-66 yr, male : female 4 : 4) in whom the disease is mild. Four regions of interest(ROI) in each side were drawn at the level of basal ganglia on each image set which were obtained 60minutes after injection of tracer. ROI-1 corresponded to caudate nucleus, ROI-2 to ROI-4 corresponded to putamen with anterior to posterior order. The ratios of the specific to non-specific striatal uptake were obtaining by the activity of the basal ganglia ROIs to that of the occipital cortex. **Results** : Global striatal uptake ratios were significantly decreased in all patients with IPD and MSA, compared with normal control group($p<0.01$). Regional analysis within the striatum revealed that the uptake ratios decreased more prominently in the posterior than anterior putamen in MSA and IPD patients(ROI-2 IPD 1.73+0.78 MSA 1.54+0.83 vs ROI-4 IPD 0.75+0.57 MSA 0.38+0.33)(IPD $p<0.01$ MSA $Z=0.002$, $p=0.01$). And the decreasing tendency of regional uptake ratios from anterior to posterior putamen did not show significant difference between both groups. **Conclusion** : In view of similar pattern of tracer uptake in both IPD and MSA, we suggest that 123IPT-SPECT does not differentiate between IPD and MSA and that clinical features are more important in the differential diagnosis between IPD and MSA.

4

Clinico-anatomical Parameters of Thalamic Infarction Causing Dyskinesias

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Background & Objectives : Focal lesions confined to thalamus may cause dyskinesia. However, clinical variables of thalamic lesions leading to dyskinesia are unknown. **Methods** : We studied 24 patients who had unilateral lesion confined to thalamus. Eight of the 24 patients developed dyskinesia(7 dystonia, 1 hemichorea) and the remaining 16 patients improved without aftermath. All of them had stroke. By overlapping axial and coronal T2 weighted brain MRI(1.5tesla) scan studies on the atlas of Morel, we estimated precise topography of lesions. We measured the volume of lesions on brain MRI scan studies. **Results** : The median of the longest diameter of lesions leading to dyskinesia(median=12.1, range=5.0~17.43mm) was significantly longer than that of patients without dyskinesia(median=7.1, range=4.71~10.29mm).($P<0.001$) The median of the volume of lesions causing dyskinesia(median=257.2, range=44.6~2242㎣) was significantly larger as compared with that of patients without involuntary movement(median=71.8, range=34.5~275.5㎣).($P<0.05$) The most commonly involved thalamic nucleus was ventral posterolateral nucleus in both groups. However, in patients with dyskinesia centromedian thalamic nuclei were involved more frequently than in those without dyskinesia.($P<0.05$; Chi-square test) **Conclusions** : This study showed that patients with large thalamic lesion involving centromedian nuclei develops dyskinesia more likely.

5

Status of Korean Patients with Parkinson's Disease Before Diagnosis

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Background : Many Korean general practitioners and non-neurologists are not familiar with symptoms and signs of Parkinson's disease(PD). So, Korean patients with PD have to seek many medical persons until they are correctly diagnosed as PD. During that period, they receive unnecessary treatments spending time and money. We analyzed conditions in which patients with PD are placed before the diagnosis. **Methods** : Using a questionnaire, we interviewed 102 patients with PD and their care givers who visited department of Neurology of Yongdong Severance Hospital. The questionnaire included their first parkinsonian symptoms, age at the onset, first medical facilities they visited after the onset, sum of expenses for medical treatment, and time interval between first visit to medical facilities and correct diagnosis. We also studied patients' and their primary care givers' educational background, monthly income, and amount of their psychological stress for expenses for medical treatment. **Results** : Fifty-one were men and fifty-one were women.. Their mean age at the inquiry was 64.1 years. As their first medical facilities, oriental medicine was chosen in 47 patients(46.1%), university hospitals in 26(25.5%), general hospitals in 14(13.7%), private clinics in 11(10.8%) and paramedical facilities in 4(3.9%). Their clinical diag-

noses were uncertain in 48(47.1%), stroke in 27(26.5%), PD in 17(16.7%), lumbar disc herniation in 4(3.9%), arthritis in 4(3.9%), and others in 2(2.00%). It took the mean of 33.9 months from the onset of parkinsonian symptoms to diagnosis of PD. During that period, thirty patients(29.4%) felt significant psychological stress for medical expenses. Care givers of PD patients making less money visited more number of medical facilities until they were diagnosed correctly. There was negative correlation between period of school education and amount of money spent for correct diagnosis. **Conclusions** : About 84% of Korean patients with PD carried a variety of wrong clinical diagnoses for the mean of 33 months until they were correctly diagnosed as PD. To prevent further unnecessary economic expenses and physical damage of Korean patients with PD, more education for primary physicians and medical students is considered to be necessary.

거 문 고 A

Cerebrovascular Disease III

좌장 : 고 재 영 교수
임 병 훈 교수

1

Serum Levels of Chemokines in Patients with Acute Ischemic Stroke and with Carotid Atherosclerosis

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Background : Chemokines are molecules with chemotatc activities on selective leukocyte populations and are subgrouped into αchemokine acting primarily on PMNL and βchemokines attracting mainly lymphocytes and monocytes. We conducted a prospective study to investigate the serum level of Interleukin(IL)-8, Monocyte chemoattractant protein(MCP)-1, and Macrophage inflammatory protein(MIP)-1αin patients with acute ischemic stroke, and carotid atherosclerosis. **Method** : Serums were sampled from patients acute ischemic stroke(n=20, <24 hrs), with persistent schemic neurologic deficit associated with carotid atherosclerosis(n=10, >1 month), and from control subjects without a history of vascular disease(n=10). Concentrations of chemokines were measured by enzyme linked immunosorbent assay(ELISA). **Results** : Compared with atherosclerotc patients and control subjects, the serum level of IL-8 was significantly elevated in patients with acute ischemic stroke(p< .05). The serum level of MCP-1 in patients with atherosclerosis was higher than that in patients with acute schemic stroke, and normal control. However the serum level of MIP-1αshowed no significant difference between patients with ischemic stroke or carotid atherosclerosis and control subjects. **Conclusions** : This study demonstrate that IL-8 can be involved in acute ischemic stroke and MCP-1 play a role in pathogenesis of atherosclerosis.

2

Neuroprotective Effect of Riluzole and Nilvadipine in Transient Focal Cerebral Ischemia of Rat

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Background and Objectives : Various neuroprotective agents studied in animal experiment were abandoned in clinical use because of side effects. Verification of neuroprotective effect with drugs already in clinical use or enhanced effect with combined use of two or more neuroprotective agents may be of great significance. Riluzole and nilvadipine, widely used drugs for treatment of amyotrophic lateral sclerosis and hypertension, were reported to have neuroprotective effect in some animal experiments. We investigated the neuroprotective effect of these drugs with single and combined use in animal model of focal cerebral ischemia. **Methods** : In Sprague-Dawley rat, focal ischemia was induced by occlusion of middle cerebral artery with nylon filament for 2 hours. Thirty minutes prior to occlusion, intraperitoneal injection of vehicle(control; n=15), riluzole(8mg/kg; n=10), nilvadipine(0.5mg/kg; n=10), or riluzole and nilvadipine(8mg/kg and 0.5mg/kg; n=13) was done. After 4 hours of reperfusion, 8 coronal sections of brain were obtained and stained with 2,3,5-triphenyltetrazolium. Photographs were taken for each section and the volume of infarction was calculated with image analyzer. Temperature was maintained at 36.5+5'C and blood glucose level was measured during operation. Mann Whitney-U test was used for statistical analysis. **Results** : Body weight was not different among each group while blood glucose(mean+SD, mg/dl) was higher in rats treated with riluzole(109.4+27.3) than in rats treated with vehicle(85.3+19.4) and riluzole with nilvadipine(87.2+19.7)($p<0.05$). The volume of infarction (mean+SD, mm^3), when compared to control(193.7+59.1), was significantly smaller in rats treated with riluzole (73.5+83.4), nilvadipine(59.6+69.1), and riluzole with nilvadipine(71.2+83.9)($p<0.01$). However, there was no difference of mean infarcted volume between riluzole with nilvadipine and riluzole and nilvadipine. **Conclusions** : Our study showed that riluzole and nilvadipine have neu-

oprotective effect in transient focal ischemia of rat, hough combined use of them did not show any further effect.

3

4G/5G Polymorphism in the Promotor Region of the PAI-1 Gene and Alu-repeat I/D Polymorphism in the t-PA Gene in Ischemic Stroke

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Background & Objectives : Reduced fibrinolytic capacity due to increased plasminogen activator inhibitor-1(PAI-1) activity and decreased tissue-type plasmonogen activator(t-PA) activity has been associated with thrombotic disorder. There are evidences that 4G/5G polymorphism in the promoter region of the PAI-1 gene is related with circulating PAI-1 level, and Alu-repeat polymorphism in the t-PA gene may be candidate gene for ischemic cardiovascular disease. We studied the association of the polymorphism in the gene for PAI-1 and t-PA with ischemic stroke. **Method** : A case-control study was performed. Subjects with ischemic stroke(n=60), hypertensive control(n=100), and normotensive control(n=100) were enrolled. We genotyed all subjects for 4G/5G polymorphism in the promoter region of the PAI-1 gene and the Alu-repeat insertion/deletion(I/D) polymorphism in intron 1 of the t-PA gene by polymerase chain reaction. **Results** : Ischemic stroke patients had a higher number of homozygotes for the 4G/4G of the PAI-1 gene compared with hypertensive control(odds ratio [OR]=2.0; p=0.03), and normotensive control(OR=2.68; p=0.005). The frequency of the 4G allele was high as well(OR=1.47; p=0.09, OR=1.84; p=0.009, respectively). However, the number of I/I genotype of t-PA gene in ischemic stroke patients was virtually identical to hypertensive control(OR=0.64; p=0.20) and normotensive control(OR=0.85; p=0.66). The frequency of the I allele was not different(OR=0.7; p=0.15, OR=1.03; p=0.86, respectively). **Conclusion** : We conclude that the 4G/5G promoter polymorphism of PAI-1 gene is associated with an increased risk of ischemic stroke, however the I/D polymorphism of the t-PA gene is not associated with an increased risk of ischemic stroke.

4

Hypothermia Decreases Apoptosis in Neurons following Global Ischemia

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Backgrounds & Objectives : Previous studies have demonstrated that hypothermia prevents delayed neuronal death following transient ischemia. Although both apoptosis and necrosis have been shown to contribute to neuronal cell death, the ability of hypothermia to prevent apoptosis remains unknown. **Methods** : To test the hypothesis that hypothermia reduces neuronal injury in part by decreasing apoptosis, gerbils that underwent hypothermia and normothermia were subjected to 10 min of global ischemia. The patterns of expression of the proapoptotic and antiapoptotic genes bax and bcl-2 were examined immunohistochemically in hippocampal CA1 area of the gerbil brain at 24. 72 h and 7 days after ischemia. **Results** : Expression of the cell death promoting protein bax was decreased and that of apoptosis-blocking protein bcl-2 was increased in hypothermia compared with normothermia. The intensity of bcl-2 and bax peaked at 72 h. The TUNEL assay localized fewer and sparsely stained nuclei within CA1 of hypothermia compared with normothermia. **Conclusions** : These **results** suggest that hypothermia reduces delayed neuronal death in part by decreasing apoptosis after transient global ischemia.

5

Cytokines and Acute Ischemic Stroke

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Background & Objectives : Cytokines appear to be produced primarily in response to external stimuli. So we conducted a prospective study to determine a clinical signifi-

:ance of IL-6 level in acute ischemic stroke. **Methods** : 95 :onsecutive patients with clinical signs of cerebral ischemia were included in this study at Paik Hospital, Kosin University Gospel and Dong-A University Hospital. Symptom onset within 24 hours patients were included. Patients with inflammatory central nervous system disease, ntracranial bleeding, concurrent major cardiac, hepatic, enal, caner patients were excluded. Plasma was immedi- ıtely separated by centrifugation and stored at -70℃. ELISAs were performed. **Results** : The mean value of IL-6 in the patients group was 83.41±310.73 pg/ml, control groups was 13.54±5.83 pg/ml, atherosclerotic group was 16±17.32 pg/ml. There was a correlation between infarction size and level of IL-6. **Conclusion** ; IL-6 is a pleiotropic cytokine involved in the regulation of many aspects of the inflammatory response and associated with acute ischemic stroke syndrome and size of infarction, so modulation of IL-6 may theapeutic benefit in stroke.

거 문 고 B

Neurophysiology I

좌장 : 이 상 복 교수
하 정 상 교수

1

Habituation of VEP in Normal Subjects and Migraineurs

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Background & Objectives : There has been a few reports that migraineurs do not show habituation in VEP or that the habituation of VEP of migraineurs is dependent on spatial frequency. In this study we investigated the habituation of normal subjects with respect to the spatial frequency in order to examine the specificity of spatial frequency in habituation process. Also we compared VEP habituation between migraineurs and normal subjects. **Methods** : We recorded VEPs at left, middle and right occipital electrodes according to the Queen Square montage with 4 Hz stimuli in 20 normal subjects(mean age=26.7) and 5 migraineurs(mean age = 26.8). Testing and adapting check sizes were three(0.25(,1(,2(). Two hundred responses were averaged at each recording block. The percent decrease of P1 amplitude at each spatial frequency was calculated as an index of habituation. **Results** The data of normal subjects is shown in table below and showed that habituation is robust only with with higher spatial frequency of adapting and testing stimuli. Migraineurs showed little habituation even with high spatial frequency. **Conclusion** : There is specificity of testing and adapting spatial frequency in habituation process in normal subjects. In migraineurs, habituation even with high spatial frequency were not observed and this may be due to hyperexcitability during interictal period.

	2˚(adapting stimuli)	1˚(adapting stimuli)	0.25˚(adapting stimuli)
2˚(testing stimuli)	3.3% (p=0.646)	10.2% (p=0.284)	22.1% (p=0.074)
1˚(testing stimuli)	16.4% (p=0.139)	9.4% (p=0.436)	30.7% (p=0.013)
0.25˚(testing stimuli)	30.4% (p=0.007)	29.1% (p=0.007)	13.8% (p=0.017)

2

Scalp EEG Seizure Onset Pattern in Temporal Lobe Epilepsy

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Background & Objective : We investigated temporal lobe seizure onset patterns recorded by scalp EEG with regard to pathologic substrate and prognostic value for surgical outcome. **Methods** : Seizure onset was analyzed in 77 patients with intractable temporal lobe epilepsy who underwent temporal lobectomy. Seizure onset patterns were categorized into 3 types based on Ebersole's classification. Pathologic substrate was divided into mesial temporal sclerosis(MTS) and the others(Non-MTS). Waveform at seizure onset was classified as several types based on their morphology. Surgical outcome was divided into seizure-free or not. **Results** : 1) Overall, seizure onset pattern showed a possible correlation with outcome($p < 0.1$). Type 1 onset was significantly related to good outcome in MTS($p < 0.05$) whereas no onset pattern related to outcome in Non-MTS. 2) Waveform showed a significant correlation with outcome in Non-MTS($p=0.05$) : rhythmic sinusoidal wave onset was associated with poor outcome(25%). 3) There are no differences in onset pattern and waveform between MTS and Non-MTS. However, type 2 onset was more common in a subset of failed MTS patients($p<0.05$) whereas rhythmic sinusoidal and sharp wave onset were more common in a subset of seizure-free MTS patients. **Conclusion** : Even if seizure onset patterns in MTS are not different from those in Non-MTS, certain onset patterns are associated with surgical outcome depending on pathologic substrate.

3

Transcranial Doppler Characteristics of Lacunar Infarction Comparison with Stroke-free Hypertensive Patients and Healthy People

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Background & Objectives : Transcranial Doppler ultrasonography(TCD) is a non-invasive and easily applicable nehod for evaluating cerebral hemodynamics. We previously reported its use in hypertensive(HiBP) patients for monitoring progression of vascular damage as well as screening high-risk group for ischemic stroke. In order to define TCD characteristics of high-risk hypertensive patients for stroke, we compared TCD measurements of hypertensive patients with lacunar infarction(LI) with stroke-free HiBP patients and healthy controls. **Methods** : Study subjects were 50 LI patients(56 years, 28 men & 22 women), 69 age and gender-matched stroke-free HiBP patients(54 years, 36 men & 33 women), and 59 age- and gender-matched healthy controls(55 years, 32 men & 27 women). Subjects with diabetes, with poor temporal window bilaterally, with significant large vessel lesions suspected by either angiography or TCD were excluded. TCD measurements of the MCA and cervical ICA were compared. **Results** : Velocity measurements of the MCA except diastolic velocity were comparable among groups, but pulsatility index(PI) was significantly higher in LI than HiBP and controls. In the ICA measuremtns, mean and systolic velocity was higher in LI than other groups, but PI was comparable to HiBP. Hemispheric index(MCA/ICA) was significantly lower in LI than other groups. **Conclusion** : In LI patients, PI of the MCA was significantly increased compared with HiBP patients as well as healthy people. Considering reduced hemispheric index, increased PI in LI patients presumably reflects increased vascular resistance in distal vessels. This TCD finding can be useful in detecting high-risk group for ischemic stroke, especially small vessel disease, among HiBP patients.

4

A study of Lyapunov Index and Fractal Dimension Analysis in Variable Age Groups by Digital EEG

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Background & Objectives : Fractal Dimension(FD) could be an index of correlation between variable parameters in non-linear chaotic signals. We tried to demonstrate that EEG wave is compatible with chaotic waves by measuring the Lyapunov exponent index and compared the difference of FD between variable age groups(10th,30th,60th). **Methods** : We estimated the Lyapunov exponent index and the FD from digital EEG data among five persons in each normal age groups by using the software which is programmed in our laboratory. Statistical analysis was done with SPSSwin 8.0. The statistical differences of Lyapunov exponent index and FD between each electrodes and each age groups were done with ANOVA and paired sample t-test. **Result** : The Lyapunov exponent indexes were larger than 1 in each elecrode and age group. There is no statistical difference in FD between each electrodes and each age groups. Except in 30th age group. In this group the FD of right hemisphere is larger than that of left hemisphere. **Conclusion** : The result of Lyapunov exponent index means EEG wave is a non-linear chaotic signal. And the results of FD suggest that chaotic parameters of right hemisphere is larger than those of left hemisphere at rest at least in younger people.We think that chaotic parameters can be a useful tool in investigating the variable diseases or brain states .

5

Independent Component Analysis(ICA) of Eyeball Movements

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Background & Objectives : Independent Component Analysis(ICA) is a signal processing algorithm to separate independent sources from unknown mixed signals and can be applied to separate artifacts and independent neural sources from EEG recording. This study was designed to extract individual components of eyeball movements from scalp EEG. **Methods** : Digital EEG signals were recorded using international 10-20 system during eye closure, eye opening and blinking. 18 EEG tracings using bipolar montage were analyzed by ICA algorithm into 18 independent components. Each components were reviewed and selected and reconstructed into original montage. **Results** : Among 18 components, two components which were thought to represent eyeball movements were obtained. Each components were inversely projected into original bipolar montage. This inverse projection showed separated vertical and horizontal eyeball movements components. **Conclusions** : This results suggests that the ICA analysis of EEG can separate vertical and horizontal eyeball movements and may be applied to separate other EEG artifacts and source signals from unknown mixed sources recording of EEG.

Movement Disorder II

좌장 : 최 일 생 교수
전 범 석 교수

1

Subthalamic Nucleus Lesion Protects Dopaminergic Nigral Neuron Degeneration in 6-OHDA induced Early Parkinson Rat Model

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Background & Objectives : The subthalamic nucleus(STN) activity has been shown to increase in the patients with Parkinson's disease(PD) as well as animal models of PD. It has been proposed that the STN may play a role in the progressive death of nigral dopamine (DA) neurons in PD. To investigate the role of the excitatory afferents from the STN in the death of nigral DA neurons after striatal 6-hydroxydopamine(6-OHDA) injection in 6-OHDA induced early Parkinson rat model. **Methods** : Nigral DA neurons were detected by use of tyrosine hydroxylase immunolabeling. Sprague-Dawley rats were subjected to unilateral, ibotenic acid-induced destruction of the STN 2 weeks after making the early Parkinson model by intrastriatal 6-OHDA injection(2.5 μg/μl). Sham lesion of the STN were made by injecting phosphate-buffered saline. One weeks after STN ablation, lesion of nigrostriatal DA neurons were induced by repeated intrastriatal injection of 6-OHDA(2.5 μg/μl). **Results** : Intrastriatal injection of 6-OHDA caused a progressive loss of nigral tyrosine hydroxylase-positive DA neurons in a dose dependent manner(1 μg/μl, 2.5 μg/μl, 5μg/μl). The dose of 2.5μg/μl(total 8.75g) of 6-OHDA was suitable for the early Parkinson model. Previous ablation of the STN significantly attenuates the loss of DA neurons in rats receiving 6-OHDA. Sham lesion of the STN didn't affect DA neuron death induced by the toxin. **Conclusions** : The results indicate that the excitatory inputs from the STN may contribute to the 6-OHDA-induced death of nigral DA neurons under a condition of the early Parkinson state.

2

Comparision study of the Clonidine Stimulation Test and the External Anal Sphincter Electromyography in Idiopathic Parkinson's Disease and Multiple System Atrophy

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Background : Distinction of multiple system atrophy (MSA) from idiopathic parkinson's disease(IPD) is not easy, despite their different pathophysiology and some clinical features. Electromyography of the external anal sphincter(Sph-EMG) has been known as a useful diagnostic tool for MSA. Recently, the clonidine stimulation test(CST) that stimulates growth hormone(GH) release is being debated whether to differentiate MSA from IPD or not. However, these two tests have not been compared in validity yet. Objective : To confirm validity of the CST and compare it with that of the Sph-EMG, **Method** : We investigated 10 patients with IPD and 22 patients with MSA-p(parkinsonian type), and 15 patients with MSA-c(cerebellar type). We measured concentration of GH at basal, 15min, 30min, 45min, 60min after intravenous clonidine injection and analyzed spontaneous activities, MUPs, and recruitment pattern with Sph-EMG. **Results** : Serum GH concentration significantly increased at 30min after clonidine injection in IPD(mean±SD : 4.01±4.50 ng/ml), but not in MSA-p(mean±SD :(0.94±2.81 ng/ml), MSA-c(mean±SD :(1.15±2.18 ng/ml)($p<0.05$). There was no difference between MSA-p and MSA-c. The sensitivity and specificity of CST were not significantly different from those of Sph-EMG(95% vs 86.4 %, 80% vs 70%, respectively). However, we found that the combination of CST and Sph-EMG could markedly increase the specificity, positive predictive value in MSA(100% and 100%). **Conclusion** : Our **results** support that the CST is very useful and the combined evaluation of CST with Sph-EMG is more helpful in the distinction of MSA from IPD

3

Clinical Significance of Hyperintense Pallidum on MRI in Patients with Chronic Liver Disease(Acquired Hepatocerebral Degeneration)

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Background & Objectives : Hyperintensity in the globus pallidus(HIGP) on MRI has been oberved in patients with advanced chronic liver disease(CLD). It has been proposed that HIGP may represent subclinical evidence of brain damage due to hepatocellular dysfunction, so called acquired hepatocerebral degeneration. Occasionally extrapyramidal symptoms and signs can be accompanied, but detailed clinical manifestations related with HIGP have yet to be elucidated. **Methods** : Among the patients who took brain MRI between July, 1996 and June, 1999, patients who revealed hyperintensity in the globus pallidus in T1-weighted MRI were included in this study. We investigated the neurological symptoms and signs of those patients through extensive reviews of their medical records as well as detailed examination. **Results** : Among 258 CLD patients who took brain MRI, 19 patients showed hyperintense pallidum on T1 axial images compatible with hepatocerebral degeneration. All but 3 patients with HIGP had complications related with advanced CLD, which included splenomegaly(16 patients), ascites(11) and esophageal varix(7). Nine patients had previous episodes of mental deterioration(hepatic encephalopathy). Among them, 7 patients did not show EPS(2 developed ischemic stroke). Among 12 patients with EPS, 5 showed parkinsonian features including resting tremor(4 patients), gait disturbance with postural instability(4), bradykinesia and rigidity(3). Four patients showed asterixis, two showed dementia and two patients showed only EOM disturbances including inferior gaze palsy and slow saccades. **Conclusion** : Splenomegaly is the most common complication of CLD in patients with HIGP, which was found in all symptomatic patients. HIGP did not directly indicate basal ganglial dysfunction. Clinical presentations related with HIGP were variable from full-blown parkinsonism to pure gaze dysfunction. Further clinico-pathologic correlation is required in future studies.

4

Temporal Bone MRI Study in Hemifacial Spasm

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Backgrounds & Objectives : Hemifacial spasm(HS) has been attributed frequently to vascular compression of facial nerve root exit zone from brainstem. A recent brain CT scan study showed that patients with HS had narrower posterior fossa than normal controls. However, cause relationship between narrowed posterior fossa and vascular tortuosity is unknown. **Methods** : In 25 patients with HS and 29 controls, using temporal bone MRI, we measured petrous angle(PA) and pons diameter index(PDI) to define correlation between severity of posterior fossa narrowing and compression to brainstem. We compared severity of narrowing of posterior fossa between patients with and without tortuous arteries in posterior fossa. We also compared degree of narrowing of posterior fossa and clinical severity of HS. **Results** : The mean≠standard deviation) of PA of 24 patients with HS(115.5±6.0˚) was significantly smaller than that of controls(118.6±4.8˚). The mean±æstandard deviation) of PDI of patients with HS(82.5±4.7%) was significantly greater than that of controls(77.3±3.7%). However, there was no correlation between PA and PDI in patients with HS. There was no correlation between degree of narrowing of posterior fossa and clinical severity of HS. **Conclusions** : Patients with HS have deformed brainstem and narrower posterior fossa as compared with controls. However, narrow posterior fossa does not seem to be a single important factor causing deformity of brainstem or tortuous arteries in posterior fossa.

5

Abnormal N30 Component of the Somatosensory Evoked Potentials in Patients with Asymmetric Parkinsonian Symptoms

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Background and Purpose : The clinical usefulness of frontal N30 potentials in Parkinson's disease is still controversial. We conducted the frontal N30 potentials in patients with asymmetric parkinsonian symptoms to find out the clinical correlation of SEP to the symptoms. **Methods** : Twenty-one patients with Parkinson's disease and eighteen normal controls, aged from 45 to 83, were recruited for this study. Stimulators were placed on both arms and median nerve SEPs were recorded from frontal electrode(F3/4) according to the international 10-20 system in all subjects. The stimuli consisted of 0.2msec square wave pulses delivered at a rate of 2 Hz(bandpass 20 to 3000 Hz). The peak latency of N30 and the amplitude of P22/N30 were assessed. Values of latency and amplitude in the two groups were compared with, using two-tailed Student's t-tests. Spearmann's correlation was used to evaluate the association between the response to stimulation of the more affected side and the UPDRS score. **Results** : The amplitude of P22/N30 of more affected side(n=17) is significantly lower than that of less affected side($p<0.05$). The UPDRS score of more affected side is correlated with P22/N30 amplitude with the p-value of 0.013. **Conclusion** : The frontal N30 component of the median SEP may be a useful tool in evaluating clinical severity of parkinson's disease.

거 문 고 A

Cerebrovascular Disease IV

좌장 : 이 광 호 교수
윤 병 우 교수

1

Measurement of Regional Cerebral Flow in Normal Rabbits Using Echo-planar Perfusion-sensitive Magnetic Resonance Imaging

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Background & Objectives : The quantitative measurement of cerebral blood flow is an essential research tool for the study of cerebral hemodynamics. Recently, the magnetic resonance(MR) perfusion weighted imaging(PWI) in association with high magnetic susceptibility contrast agents has been introduced for the measurement of regional cerebral blood flow(rCBF) in non-invasive manners and the purpose of the presenting study was to qualify the usefulness of the PWI using echo planar technique. **Methods** : Twenty-four adult New Zealand white rabbits were used in the study. The PWIs using echo-plana technique were serially obtained for 40 seconds at a frequency of 1/sec. with the bolus injection of the contrast media, and the time versus signal intensity curves were obtained. Then, the regional cerebral blood volume(rCBV) and mean transit time(MTT) of the contrast agents were calculated in selected regions of interest(in cerebral cortices and basal ganglia). Finally, mean rCBV ratio was calculated in cerebral cortex at vertex and basal ganglia using the values from cerebral cortex at convexity as references. **Results** : The calculated mean rCBV ratio and MTT of cerebral cortex and basal ganglia was as follows(mean rCBV ratio; 0.97±0.35 in cortex, 0.99±0.37 in basal ganglia, mean transit time; 9.83±1.63 sec. in cortex, 9.42±1.13 sec. in basal ganglia) and there has been no statistically significant differences between two areas(P=0.05). **Conclusion** : The MR PWI using echo-planar technique is a non-invasive and reliable method for objective and rapid quantitation of rCBF in selected regions of interest. It has several advantages over other methods of cerebral blood flow estimation and our study shows it would be very useful in the future research of cerebral hemodynamics and pathomechanism of ischemic stroke.

2

Acute Multiple Infarcts on Diffusion-Weighted MRI

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Background : A few studies have addressed the issue of acute multiple cerebral infarcts(AMIs), but they were based on CT or conventional MRI. Diffusion-weighted image(DWI) is superior to conventional MRI in easier detection of acute small ischemic lesions and discrimination of acute lesions from chronic infarcts or white matter high signal intensities. **Objective** : To determine the frequency, topographical patterns and stroke mechanisms of AMIs detected on DWI. **Methods** : We studied 328 consecutive ischemic stroke patients who underwent DWI and conventional MRI/MRA within 4 days of symptom onset. AMIs were defined as non-contiguous high signal intensities on DWI in more than one vascular territory. Stroke mechanism was determined by TOAST criteria. **Results** : We found acute multiple lesions on DWI in 88(26.8%) of total patients. AMIs in anterior circulation(AC) were found in 62 cases; unilateral hemisphere in 42, and bilateral hemisphere in 20. Seventeen had AMIs in posterior circulation(PC), and 9 in both anterior and posterior circulations(APC). The stroke mechanisms were large artery atherosclerosis(LAA) in 54 cases(42 in AC, 10 in PC, 2 in APC), cardioembolic(CE) in 22 cases(10 in AC, 6 in PC, 6 in APC), small artery occlusion(SAO) in 5(all in bilateral hemisphere in AC), and other or undetermined in 7 cases(5 in AC, 1 in PC, 1 in APC). The most common cause of stroke was LAA in AMIs in AC and PC, and CE in AMIs in APC. Hemorrheological abnormalities(n=14) or malignancy(n=4) were associated with AMIs in bilateral hemisphere in AC, and SAO was the main presumed cause of stroke in bilateral small deep infarcts. **Conclusions** : Acute multiple infarcts in different vascular territories occur in about a quarter of patients with ischemic stroke. LAA and CE were the main causes of stroke, and hemorrheological abnormality may be a contributing factor in the pathogenesis of bilateral acute cerebral infarcts. These results suggest that different topographical patterns are associated with different vascular pathology and stroke mechanism.

3

Diffusion MRI in Transient Ischemic Attacks

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Background & Objectives: Transient ischemic attacks (TIAs) means transient neurological symptoms resolving within 24hrs. The pathological change of TIAs were controvers whether they are changed or not and it is difficult to find the lesion on conventional MRI. We used diffusion MRI for detection of early and transient change of TIAs patients and evaluated the significance of its diagnostic value. **Method** : The patients whose symptoms were lasting less than 24hrs were included in this study. We performed routine MRI and diffusion imaging with 1.5T MR system. Diffusion imaging was performed using a slice thickness of 5mm with 0.3mm interslice gap. **Results** : Eleven of the 41 TIA patients(26.8%) showed focal abnormalities on diffusion-weighted imaging and normal results on conventional MRI. **Conclusion** : The diffusion weighted imaging is more helpful for detection of focal abnormalities and evaluation of TIAs patients than conventional MRI. And it may contribute the explain of pathophysiology of TIAs.

4

Analysis of Cortical Cerebral Blood Flow Patterns in Subcortical Infarction using Perfusion MR Imaging

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Backgrounds & Objectives : Hemodynamic status in stroke patient is paramountly important factor determining pathomechanism of stroke as well as subsequent outcome. Perfusion imaging(PI) is a new magnetic resonance technology becoming increasingly available for the evaluation of extent of a hypoperfused area impending infarction. We aimed to know the hemodynamic status of non-infarcted cortical areas in subcortical cerebral infarction and to find parameters indicative of functional impairment. **Methods** : Total 12 patients obtaining PI within 48 hours of symptom onset were selected. We analyzed non-infarcted cortical hemodynamic status by relative regional cerebral blood flow(rCBF) maps and time-to-peak(TTP) delay patterns using PI. Also we analyzed the vascular status using magnetic resonance angiography(MRA). **Results** : Out of 12 patients, 6 patients had ipsilateral carotid system or intracerebral parent vessel abnormality and others(n=6) had intact vascularity. Six patients with vascular abnormality showd marked decrease of rCBF(mean : 5.5%, $p=0.03$) and delay of TTP(mean : 4.33 seconds, $p<0.001$) in the non-infarcted cortex of lesion side in comparison with group without vascular abnormality. NIHSS and BI scores at 7th day after onset were well correlate with the degree of perfusion defect($p<0.05$) rather than on admission. **Conclusion** : Although this data is a preliminary study with a small size, we could postulate that PI is useful to predict possible stroke mechanism as well as subsequent outcome in subcortical infarction.

5

Noninvasive Quantitative Assessment of Cerebral Blood Flow(CBF) using 99mTc-ECD SPECT with adjunctive Radionuclide Angiography in Ischemic Stroke

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Background and Objectives : Quantitative CBF measurements are essential for diagnosing ischemic lesion and evaluating the therapeutical effects and predicting the prognosis of cerebral ischemia. Even though several methods have been introduced, these techniques are too cumbersome and invasive to be applied to routine studies. In this study, a non-invasive simple method for the quantitative evaluation of CBF(hemispheric and regional) is presented using 99mTc-ECD SPECT with adjunctive radionuclide angiography. **Methods** : Twenty normal controls and 27 patients with unilateral carotid ischemic stroke were selected. Brain perfusion index(BPI) of each hemisphere was measured in each subject by acquisition

of serial radionuclide angiography after injection of 20ml of 99mTc-ECD. With Lassen's correction algorithm of curve-linear relationship between the brain activity and blood flow, rCBF on transaxial SPECT slice corresponding with MRI lesion sites(ischemic core, border zone and contralateral mirror locus) were calculated. In order to evaluate the cerebral reserve capacity, same procedures were performed after diamox injection in patient group. **Results** : BPI values for normal controls showed a significant negative correlation with advancing age(r=-0.64 p=0.021) and hemispheric BPI were 11.02(1.6 and 7.8(1.4 for normal controls and patients, respectively. Significant differences were observed between two groups(p=0.0012). rCBF obtained from core zone(12(2.5 ml/100g/min) , border zone(29.9(8.1) and contralateral mirror locus(52.1(15.1) were clearly defined in each subject of patients group. The cerebral reserve capacity after diamox injection were also easily quantified in patient group and these results are well correlated with conventional angiographic findings. **Conclusion** : Measurements of BPI and rCBF using 99mTc-ECD SPECT with adjunctive radionuclide angiography could be an useful, simple and non-invasive method in evaluation of the cerebral blood flow in the ischemic stroke.

거 문 고 B

Neurophysiology II

좌장 : 서 정 규 교수
김 승 현 교수

1

Sympathetic Skin Reflex and Cardiovagal Autonomic function in Essential Hyperhidrosis

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Background & Objectives : Essential hyperhidrosis is a pathologic condition of excessive sweating in palm, sole and other area of body surface. Although reason for hyperhidrosis is stil unclear, it might be due to hyperactivity of dermal sympathetic flow or regulatory dysfunction. The purpose of this study was to determine the diagnostic value of autonomic function test in essential hyperhidrosis. **Methods** : We investigated 21 essential hyperhidrosis patients and 27 age-matched controls. The patients were rated by subjective feeling of sweating, and the amount of sweating is measured by semiquantification method during 5 minutes with continuous low current electric stimulation. We also took sympathetic skin reflex(SSR) test, blood pressure change in upright tilt, R-R interval variation with respiration and Valsalva ratio. **Results** : The amplitude of SSR test is significantly increased in palmar hyperhidrosis patients.($P<0.05$) The latency of SSR and systemic cardiovagal reflex in hyperhidrosis patients show no difference to the normal controls. **Conclusions** : This results implicated that the SSR and other autonomic nervous function tests may be useful methods in diagnosis of essential hyperhidrosis.

2

Cutaneous Silent Period Findings and Neurophysiolgic Value in Peripheral Neuropathy

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Background & Objectives : Stimulation of the cutaneous nerve during a steady muscle contraction induces a brief suppression of the muscle's electromyographic activity, which is known as the cutaneous silent period(CSP). It is not clear whether the CSP occurs through inexcitability of the spinal motoneurons or through presynaptic inhibition of the excitatory inputs to motoneurons that sustain voluntary contraction. To investigate role of the peripheral pathways mediating this response and clinical usefulness in peripheral neuropathy we studied the CSP in the patients with documented peripheral neuropathy by nerve conduction study(NCS). **Methods** : Studies were performed in 24 patients with diabetes, 6 patients with other neurologic disorder(ALS 4 cases, myelopathy 1 case, dystonia 1 case), and age-matched normal controls. NCS were done in the one upper limb and the CSP was evoked by a single electrical stimulus to the digital nerve of the fifth digit while the subject maintained a constant voluntary abduction of the thumb. To assess excitability of the motoneuron, F-waves were also elicited during the CSP in ALS and myelopathy patients. **Results** : The CSP(mean±SD) in normal controls was 88.6±10.7 msec for onset latency and 31.2±9.8 msec for silent period duration. These findings were within the normal limits determined in previous reports. In diabetic patients, onset latency of the CSP was 86.3±11.8 msec in patients with polyneuropathy and 89.3±11.5 msec in patient without peripheral neuropathy. The silent period duration was 36.0±18.5 msec and 33.1±12.6 msec respectively. No statistically significant difference was found compared to the normal controls. However, the onset latency in the ALS and myelopathy cases seemed to be delayed and F-waves were not inhibited. **Conclusion** : Peripheral pathways lesion did not interfere the CSP and spinal motoneurons remained excitable to peripheral nerve stimulation during the CSP. These data support the hypothesis that the CSP is mediated by a spinal inhibitory reflex that is subject to supraspinal descending control. Delayed onset latency in the ALS and myelopathy may be related with increased supraspinal processing time in these disorders.

3

Can the Imagination of Movement Increase the Excitability of the Corticospinal System ?

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Background : It is well known that motor evoked

potentials(MEPs) elicited by transmagnetic stimulations(TMSs) of the motor cortex are facilitated by voluntary muscle contraction. However, there is no evidence of an imagination-induced increase in neuronal excitability within the central nervous system. **Objectives** : In this study we determined the effects of the imagination of movement on MEP induced by magnetic stimulation of the motor cortex and cervical spine. **Methods** : Twenty two healthy volunteers(eight men and fourteen women) were studied. TMSs were performed at rest and while one is imagining that he is abducting or adducting his right thumb. MEPs were recorded from the right abductor pollicis brevis(APB) and adductor pollicis(AP) muscles simultaneously. **Results** : The imagination of movement caused the changes in the onset latency of the compound muscle action potentials(CMAPs) in APB and AP muscles elicited by stimulation over the motor cortex. But the imagination caused no significant change in the onset latency of CMAPs elicited by stimulation over the lower cervical spine. The changes in the central motor conduction times(CMCTs) account for these onset latency changes. With the imagination of abduction, there are significant reduction in the CMCTs in APB muscle (10.8%) and prolongation in AP muscle(5.8%), whereas, there are prolongation in the CMCTs in APB muscle(7.4%) and reduction AP(6.1%) with the imagination of adduction. **Conclusions** : These findings indicate that the imagination of movement increases the excitability of the human corticospinal system. The imagination-induced increase in excitability within the central nervous system may account for motor preparation and clinical phenomenon, facilitation. And reciprocal inhibition may be accountable for the prolonged onset latency in the antagonist muscle.

4

Initial Motor Unit Recruitment in Stroke Patients with Spastic Hemiparesis

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Background & Objectives : Changes in firing pattern and in the recruitment order of single motor units have been claimed to be characteristic of central motor lesions, and a reduced firing rate was found in upper motor neuron lesions. But these findings have been rarely studied before in Korea, so we studied initial motor unit recruitment pattern in stroke patients with spastic hemiparesis. **Methods** : We studied six patients(3 men and 3 women) whose mean age was 60.6±7.4 years. A mean 20.6±16.2 months had elapsed since the stroke. To compare the initial motor unit activation patterns in proximal and distal segments of plegic limb with their contalateral unaffected counterparts, we studied the onset and recruitment intervals in biceps brachii and first dorsal interossei muscles in plegic and healthy arms. In a single muscle we examined from 5 to 10 individual motor units. And in a single motor unit both the onset interval and the recruitment interval was examined. **Results** : The mean onset interval in plegic limb was significantly($p<0.05$) longer than unaffected limb at proximal and distal location : biceps brachii 118.5(17.8ms vs 96.1(8.3ms(n=58); first dorsal interossei 125.8(16.7ms vs 101.5(17.2ms(n=38). The mean recruitment interval in plegic limb was also significantly($p<0.05$) longer than unaffected limb : biceps brachii 87.7±14.9ms vs 73.4±11.5ms(n=53); first dorsal interossei 96.3±16.4ms vs 87.7±14.1ms(n=38). **Conclusion** : The first recruited motor unit had a lower baseline firing rate and the second recruited motor unit potential appeared earlier in plegic than in healthy muscles. And these findings may explain one of the reason for paresis in stroke patient

5

Significance of Vestibular Evoked Myogenic Potentials in Evaluating Vestibular function

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Background & Objectives : Loud monaural clics evoke myogenic potentials in the tonically contracting ipsilateral sternocleidomastoid muscle(SCM). Clinical studies have suggested that these myogenic potentials are of vestibular origin, especially inferior vestibular nerve. Neurophysiological experimental studies also suggest that they are most likely to be of saccular origin. These potentials are called vestibular evoked myogenic potentials(VEMPs). Vestibular neuronitis(VN) affects only part of the vestibular nerve trunk, usually the superior division(horizontal canal paresis) which may be detected by caloric test. But inferior vestibular nerve involvement in VN may not be

detected by caloric test. So we compared results of caloric test and VEMPs in clinically suspected VN in order to evaluation of inferior vestibular nerve function among negative caloric response group in VN patients. **Methods** : 21 normal controls were selected to determined the normal data of VEMPs. Patients group were consisted of clinically confirmed peripheral vertigo(vestibular neuronitis 7, BPPV 4, Meniere's disease 3). Auditory brainstem responses(ABR) and VEMPs were performed in all subjects according to our protocol(Re-cording site : upper half of SCM / rarefaction clicks : 0.1ms, 100-dB / stimulation rate 5Hz / analysis time 50ms). **Results** : All control groups were normal VEMPs responses. The normal control latency of p13 / n23 was 11.3±1.2 / 19.1±1.8, respectively. 3 of 7 VN patients, caloric test were normal but VEMPs was absent on the affected side in 2 patients, normal in 1 patients. All of these patients, ABR was normal. In the patients with BPPV and Menier's disease, VEMPs were also normal. **Conclusions** : These results suggest that if caloric test is normal in acute VN patient, VMEPs could provide different information from the ABR and caloric test and that could be helpful in diagnosing inferior vestibular nerve involvement in patients with VN.

가 야 금

Movement Disorder III

좌장 : 김 재 우 교수
하 충 건 교수

1

Characteristics of Hemichorea : Clinico-radiologic Localization and Pathophysiology

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Background : Chorea is thought to be caused by disruption of basal ganglia modulation on thalamocortical motor pathway, which is due to structural damage, selective neuronal degeneration, neurotransmitter receptor blocker and metabolic factor. To evaluate the clinico-radiologic localization of hemichorea and to propose the possible pathophysiology of hemichorea. **Methods** : We reviewed medical records, brain MRI and SPECT of 21 patients with hemichorea who admitted St. Mary's hospital during last 6 years. **Results** : The etiologies were stroke(15 cases), hyperglycemia(4 cases) and systemic lupus erythromatosis(2 cases). The lesion sites from brain MRI were corpus striatum, globus pallidus, subthalamus, thalamus and parietal lobe. The 11 cases among them showed the contralateral hyperperfusion on thalamus and the hypoperfusion on basal ganglia in brain SPECT. **Conclusion** : These results suggest that hemichorea could be caused by multiple etiologies and anatomical lesions, and the contralateral hyperactivation of thalamus revealed by SPECT may play a role in hemichorea.

2

Evaluation of Tremor : A Development of Computerized Tool using Three-Axial Accelerometer

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Background and Objectives : Tremor constitutes one of the most important symptoms of neurological disorders. To objectivise tremor symptoms, commonly employed methods were subjective rating scales and acceleorometry. The aim of our work is to improve the measurement of the human tremor tridimensionally using three-axial accelerometer. **Methods** : We designed a measuring set consisting of three-axial accelerometer, multichannel amplifier and A/D converter, with an interface(RS-232C) linked to a microcomputer. The set includes specific software to indicate various frequencies of tremor in three axis of tremor movements on PC monitor using spectral analysis. This software allowed to elaborate graphically the tremor acquiring a trace in one of the three axis. Twenty patients with disabling tremor of upper limbs before and on therapy were studied using subjective rating scales and our device. **Results** : The rating scale evaluation of each patient was compared to the data obtained by the device. The values of amplitude and frequency corresponded to the scores of the clinical scales. **Conclusion** : This tool is an objective method to evaluate the tremor which gives reproducible data otherwise depending on subjective evaluations. With the addition of EMG analysis, it would do much for differential diagnosis of tremor. And it can make help in determining clinical effects of tremorlytic drugs.

3

The Efficacy and Safety of Ropinirole as an Adjunct to Levodopa in Parkinson's Disease

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Background & Objectives : Ropinirole is a non-ergoline, relatively pure D2 agonist. The aim of this study was to evaluate the efficacy and safety of ropinirole in the treatment of Parkinson's disease(PD). **Methods** : Seventy six cases with PD were included. Each patient was randomly allocated to receive either ropinirole(RPN) or bromocriptine(BRM) over a 16-week period. All subjects were not optimally controlled on L-dopa due to motor fluctuation. The optimal dosage of RPN or BRM in each group was obtained according to dose titration schedule. Response was defined as at least 20% reduction of total daily dose of L-dopa. Clinical status was also assessed using the Unified Parkinson's Disease Rating Scale(UPDRS), Clinical Global Impression(CGI), reduction of off duration on diary. **Results** : Thirty seven patients received RPN(male : female = 21 : 16, age

58.0ŸN7.9 years, dose 7.9ŸN2.2 mg/day) and thirty nine received BRM(male : female = 20 : 19, age 58.9ŸN8.7 years, dose 15.4ŸN4.3 mg/day). The end-point analysis, on an intention-to-treat basis, revealed significant difference(odds ratio 2.995, 95% C.I.(1.157, 7.751)) in response rate. A statistically significant improvement in CGI was also observed in RPN compared to BRM group(p=0.046). Other parameters, including >20% improvement in the UPDRS motor score, >20% reduction of 'off' duration did not show significant difference between two groups. However, the mean 'off' duration was significantly reduced in RPN group(p=0.0001). Per-protocol analysis showed similar results. There was no significant difference between two groups in the overall incidence of adverse effects. The most common side effects were dizziness, dyskinesia, nausea/vomiting. There was no evidence of any chronic effect of the study drugs on vital signs and clinical laboratory tests. **Conclusion** : Ropinirole is a safe and well-tolerated drug and provided superior overall efficacy compared with bromocriptine as an adjunct to L-dopa.

4

Abnormal Saccadic Latency Improves after Levodopa Treatment in Parkinson's Disease

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Background & Objectives : Majority of previous studies on eye movments of patients with Parkinson's disease(PD) found no abnormalities in saccadic latency. However, such studies had limitation by either inclusion of small number of patients or previous levodopa treatment. We studied changes of saccadic latency in patients with PD before and after levodopa treatment. **Methods** : We included 12 de novo patients with PD and 10 age-matched controls. Using computerized electronystagmography, we measured saccadic latency for randomly moving 56 targets in patients with PD and controls. We compared saccadic latncy of patients with PD with that of controls. In patients Unified Parkinson's Disease Rating Scale(UPDRS) scores were measured before the study. We measured UPDRS score and saccadic latency after one month of levodopa treatment. We compared changes of UPDRS score and saccadic latency measured before and after levodopa treatment. **Results** : Saccadic latency was prolonged in de novo PD patients compared with that of controls($P<0.001$). Saccadic latency improved significantly after levodopa treatment($p<0.05$). UPDRS score improved significantly after levodopa treatment($p<0.05$). Percentage of improvement of saccadic latency and UPDRS score was correlated($p<0.05$). **Conclusion** : Patients with PD have a long saccadic latency for randomly moving targets, and such abnormality responds to levodopa treatment as their parkinsonian motor deficits.

5

Release Reflexes in Parkinson's Disease

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Background : Several of the release reflexes are prominent in patient with Parkinson's disease(PD). The prevalence and clinical value of release reflexes in PD have been discussed by may authors. However, the published findings and conclusions on release reflexes in PD are controversial **Objective** : The present study is attempt to assess the clinical usefulness of each physical sign and in particular to consider whether or not it has any specificity for PD Method 202 Patients who have been followed up to at least 3 years were selected for the present study by using the PD database at Kansas university medical center. The relationships between each reflex and the duration of clinical symptom, those between each reflex and the severity of disease, and those between each and MMSE score were analysed. Relationship between reflex and each symptom and clinical significance of multiple reflexes were also analysed. **Results** : One or more of the reflexes had been elicited from 128 of the patients, an overall incidence was 63.0%. The glabellar reflex was the most frequently elicited out of three reflexes. Furthermore the glabellar reflex have high relationships with each symptom of PD except postural disturbances. The severity have higher relationships with each reflex than other factors. The group with multiple reflexes have the higher relationships with each factor rather than group of no reflex or group of single reflex. **Conclusions** : The results led us to conclude that glabellar reflex have more relationships with the clinical

status of PD than two other reflexes and the elicitation of two or more reflexes have more relationships with the clinical status of PD than that of each single reflex.

거 문 고 A

Cerebrovascular Disease V

좌장 : 김 영 현 교수
정 진 상 교수

1

Hemodynamic Parameters in Crossed Cerebellar Diaschisis in Hemispheric Infarct :Assessment with Dynamic Susceptibility Contrast MR imaging

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Background & Objective : Diaschisis, defined as functional depression remote from the infarct site, matched functional depression of regional cerebral blood flow and metabolism described using PET scanning. But, this image modality cannot be applied routinely to stroke patient. Dynamic susceptibility contrast MR imaging, perfusion MRI may be an interesting modality, as hemodynamically weighted MRI. The authors investigated hemodynamic parameters of remote crossed cerebellum in hemispheric infarct. **Methods** : All of 15 patient had unilateral supratentorial infarct. MR imaging was used during intravenous bolus injection of gadolinium and was acquired at the anatomic level of cerebellum. Regional cerebral blood flow(rCBF), regional cerebral blood volume(rCBV), mean transit time(MTT) and time to peak(TP) were determined over both cerebellar hemisphere of interest. **Results** : rCBF and rCBV values for contralateral cerebellar hemisphere were significantly decreased compared to iplsilateral cerebellar hemisphere(p=0.001, 0.001). MTT and TP values, however, had no difference between contralateral and ipsilateral cerebellar hemisphere. **Conclusions** : The authors suggest that rCBF and rCBV be decreased but TP & MTT have no change. It may differential point with other hemodynamic changes surrounding infarct tissue such as misery perfusion or incomplete infarct.

2

The Response of the Basilar Artery to Photo-stimulation Measured by Transcranial Doppler

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Background & Objectives : It is well known that the posterior cerebral artery(PCA) can be stimulated by light and so forth, when measured by transcrnial Doppler(TCD). But it remains uncertain whether the basilar artery(BA) can also be stimulated by light. **Methods** : Using a light-bulb(200 lux), we measured the changes of the mean flow velocity(MFV) by photo-stimulation in both the proximal PCA and the proximal BA in 36 healthy young volunteers(mean age, 27.9 years(24-39 years); male : female = 13 : 23) using 2MHz pulsed-wave TCD ultrasonography. **Results** : There were distinctive increases in mean flow velocities reacting to photo-stimulation in both the PCAs and the BA. There was no significant side difference for the whole group in the PCAs(Right, 14.32±8.30%; Left, 13.53±8.63%). The MFV in the BA increased significantly by 12.75±6.74%, which was about the same amount of MFV increase in the PCA(13.92±8.45%) by the same photo-stimulation. The blood flow response adapted nearly completely within about 1 minute without significant side difference(right PCA, 97.31%; left PCA, 97.30%; BA, 97.57%). Only a subject did not respond to photo-stimulation in the BA. **Conclusion** : These findings suggest that the proximal BA responds well to photo-stimulation, as good as in the PCA, and the metabolic regulation of cerebral blood flow from photo-stimulation is very rapid. These TCD data in the normal subjects may be useful for further studies on pathophysiology of stroke in the posterior circulation.

3

Methyenetetrahydrofolate Reductase(MTHFR) Polymorphism in Korean with Stroke

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Background & Objectives : Hyperhomocysteinemia s associated with artherosclerosis. A mutation(677T) in he gene encoding methlyenetetrahydrofolate reductase MTHFR) is believed to be a common independent cause of artherosclerosis in the Western people. We tried to letermine whether MTHFR genotype would be strongly elated with cerebrovascular disease. **Methods** : Two group of subjects were studied - control(n=30) and cere- bral infarction(n=35). The MTHFR mutant genotypes were determined by PCR and restrictive digestion with HinfI. The statistical anlysis was done by Chi-square. **Results** : The numbers of the MTHFR heterozygote T677T in patients group and control group were 2 and 1. The allele & genotypes frequencies in patient group did not differ from the control subject. **Conclusion** : These results suggest that the frequency of MTHFR mutation 677T in Korean is very lower compared with the Western people. We thought that further sutudies should be made for these relationship.

4

Is Hypolipidemia Associated with Multifocal Signal Loss Lesions on Gradient-echo MRI?

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Background & Objectives : In the review of literature, hypocholesterolemia have been generally accepted to be he risk factor for intracerebral hemorrhage(ICH), and mul- tifocal signal loss lesions(MSLL) on gradient-echo MRI(GE-MRI) have been believed to be microbleeds due to hypertensive microangiopathy. The purpose of this study was to investigate the correlation among hypolipidemia, ICH and MSLL. **Methods** : We prospectively examined 198 patients who have checked GE-MRI from March, 1997 to July, 1998. MSLL on GE-MRI were counted by two neurologists separately and determined as abnormal by consensus. Cholesterol levels and the other lipid profiles were examined within 24 hours after admission. On medical histories and physical and laboratory findings, the risk factors that may affect the MSLL on GE-MRI were also analyzed. **Results** : MSLL and ICH were found in 71 patients(35.9%) and in 35 patients(17.7%) respectively, and the number of hypocholesterolemic patients(<160mg/dl) was 50(25.3%). Multivariate analysis revealed that hypertension, hypocholesterolemia and leukoaraiosis on axial T2-weighted MRI were the independent risk factors for MSLL($p<0.05$), but ICH was correlated only with hypertension($p<0.05$). Especially, hypocholesterolemic effects to MSLL were prominent in hypertensive patients($p<0.05$). On analysis of lipid profiles, hypoLDL(<100mg/dl) and hyperHDL(>55-65 mg/dl) were associated with MSLL. **Conclusion** : In this study we have found that hypocholesterolemia is closely associated with microbleeds on GE-MRI and its effects are more accentuated in the hypertensive patients. The effect of hypolipidemia on hypertensive cerebral vasculature should be more investigated in the future.

5

Hyperinsulinemia Associated with Cerebral Macroangiopathy in First-ever Stroke Patients

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Background and Purpose : Recently several evidences have related hyperinsulinemias to coronary atherosclerosis. However, little attention has paid to their roles in cerebrovascular atherosclerosis. Although microvascular endothelium has been known to be more susceptible to metabolic and mitogenic effect of hyperinsulinemia rather than large vessel endothelium, it is still controversial considering thrombogenic effect. The purpose of this study is to clarify which type of ischemic stroke is associated with

hyperinsulinemia. **Method** : Two hundred thirty two consecutive first-ever ischemic stroke patients were classified into three groups; 1) large artery atherosclerosis group (LAA, n=97), 2) small-vessel occlusion group(SVO, n=102), and 3) cardioembolism group(CE, n=33), based on clinical presentations, brain imaging studies and cerebral angiographies. Patients who had undetermined causes were excluded. We analyzed the difference of demographic feature, stroke risk factors, plasma glucose and insulin levels in fasting and postprandial state, lipids profiles among each groups. **Results** : Prevalence of hypertensions and diabetes were higher in SVO and LAA than in CE. There were no significant differences in risk factors, age, sex, blood glucose and insulin levels at fasting and postprandial state and lipid profiles between LAA and SVO groups. When the patients with hypertension or diabetes or hyperlipidemia, which directly were related to hyperinsulinemia, were excluded from each group, there was only statistically significant difference in postprandial insulin levels between LAA and SVO. **Conclusions** : This study suggests that increased postprandial insulin levels may potentially represent a pathogenetic factor of the development of cerebral angiopathy in large artery atherosclerosis.rather than small artery occlusion.

거 문 고 B

Neurophysiology III

좌장 : 박 규 현 교수
정 근 호 교수

1

Clinical Patterns, Laboratory Tests, and Neuroimaging of Multiple Sclerosis in Korea- Experience in Samsung Medical Center

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Background & Objectives : It is well known that the prevalence rate of multiple sclerosis(MS) is low in Korea and patients with Asian type MS show a selective involvement of optic nerve and spinal cord. We investigated the characteristics of Korean MS patients to describe the differences. **Methods** : Thirty patients were diagnosed as having clinically definite MS by Poser criteria. We reviewed medical records, results of laboratory tests and MRI of these patients. Using brain MRI criteria suggested by Fazekas, we calculated its sensitivity in Korean patients. The criteria required at least two of the followings 1) size of plaque > 6mm, 2) abutting ventricular bodies, 3) infratentorial location. **Results** : Twenty-two patients were women, 8 men. The mean age of onset was 32.8+9.8. Out of all 30 patients the initial symptoms were caused by the involvement of spinal cord in 9, optic nerve in 8 and brainstem in 7 patients. Fifteen of 30 patients revealed involvement of the optic nerve and spinal cord(50%) and 10 of them were exclusively confined within optico-spinal system(33.3%). The clinical course was relapsing and remitting in 27(90%) patients and chronic progressive in 3(10%). Oligoclonal band was positive in 4 of 24 patients(16.7%). IgG Index was higher than 0.7 in 5 of 22 patients(22.7%). Brain MRI criteria were satisfied in only 13 of 28 patients(46.4%). **Conclusion** : The clinical patterns involving optico-spinal system were most common and the sensitivity of oligoclonal band and IgG Index is much lower in Korean patients. The brain MRI criteria for the diagnosis of MS suggested by Fazakas seem to be too strict in Korean patients.

2

Comparison of Multiple Sclerosis and Recurrent Myelitis

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Backgrounds & Objectives : The characteristic features of Asian type of multiple sclerosis(MS) were more frequent involvement of spinal cord and optic nerve. However, it is not clear whether MS in Asians may present with a predilection for optic-spinal involvement or only transitional form of myelitis. To find the characteristics of Asian type of MS, we analyzed myelitis and MS patients. **Methods** : We classified 68 adult patients of myelitis and MS by etiologic distribution : acute monophasic myelitis, recurrent myelitis, Asian and Western type of MS, and compared the clinical, laboratory, and radiologic profiles. **Results** : The etiologic distributions were followings : Acute monophasic myelitis in 31 patients(46%), recurrent myelitis in 9(13%) and definite MS in 28(41%). In definite MS, 11 patients(39%) were classified as Asian type and 17(61%) as Western type. The age of onset was significantly higher in Asian type than in Western type of MS(42 vs 31 years, P=0.02). On brain MRI, all studies in recurrent myelitis(4 pts) and Asian type MS(4 pts) groups were normal, while all studies in Western type MS(12 pts) group was compatible with MS. On spinal cord MRI, the average length of the high signal intensity on T2-weighted sagittal image was as follows : 3.9 vertebral segments in 22 acute monophasic myelitis patients(71%), 3.5 in 8 recurrent myelitis patients(89%), 3.0 in 6 Asian type MS patients(55%), 1.0 in Western type MS patients(36%). **Conclusion** : Asian type of MS showed different clinical and radiological findings from Western type of MS. Clinical, CSF and radiological findings share several features with myelitis groups. Asian type of MS may represent distinct disease, different from Western type of MS.

3

Cycloheximide, ZVAD-FMK, or Trolox Attenuates 5-fluorouracil-induced Oligodendrocyte Death in Murine Cortical Culture

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Background & Objective : 5-Fluorouracil(5-FU) is used clinically as an anticancer drug. However, one of adverse effects of this drug is selective cerebral white matter injury. This study was performed to delineate mechanism of the white matter injury and to develop the preventive intervention for the injury. **Methods** : Mixed oligodendrocyte/astrocyte cultures were prepared from neocortices of postnatal 1 to 3 day-old mice. After 2-3 weeks, the cultures were exposed to 5-FU and other drugs. Oligodendrocyte death was assessed by counting the number of viable galactocerebroside-positive(Gal-C(+)) cells per 100x field. **Results** : Mixed oligodendrocyte/astrocyte cultures exposed to 5-FU(10, 30, 100 uM) for 24 hours developed concentration-dependent oligodendrocyte death. Most oligodendrocytes were damaged by 100 uM 5-FU, but there was little damage on astrocytes. Not only cycloheximide(protein synthesis inhibitor) and ZVAD-FMK(caspase inhibitor) which are known to block apoptosis, but also trolox, vitamin E analog antioxidant, attenuated the 5-FU-induced oligodendrocyte death. NBQX, an AMPA receptor antagonist, however, did not affect the cell death. **Conclusion** : These findings suggest that 5-FU induces oligodendrocyte death via apoptotic process, and that anti-oxidants may prevent the 5-FU induced white matter injury in cancer patients.

4

Changes in Brain Complexity During Valproate Treatment in Patients with Partial Epilepsy

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Background & Significance : The effect of valproate (VPA) on human electroencephalography(EEG) was studied to investigate the changes in brain complexity using nonlinear dynamics analysis. **Methods** : Nine patients with complex partial seizure, who were not exposed to antiepileptic drug(s) previously, were studied as subjects. EEG data were collected before and after VPA therapy. Changes in brain complexity were examined by means of nonlinear analysis using spatial linear mode complexity(SLMC) algorithm of EEG, where SLMC value reflects the brain complexity. Nineteen normal healthy people were included as the control group. **Results** : The patients' mean SLMC value prior to VPA therapy was lower than that of the control, which indicates the reduced brain complexity. The value was increased significantly after long-term VPA therapy. **Conclusion**s : These results suggest that epilepsy patients have interictal abnormalities, which is seen as brain complexity reduction. VPA reverses this trend in part. The nonlinear analysis of EEG may be useful for evaluating effect of antiepileptic drug.

5

Transcranial Magnetic Stimulation-Evoked Inhibition of Voluntary Muscle Activity(Silent Period)

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Background and Significance : Transcranial magnetic stimulation(TCMS) of the motor cortex has been estabil-

shed as a noninvasive method for examination of the central motor system. The silent period(SP) is a transitory suppression of electromyographic(EMG) activity during sustained voluntary contraction. After stimulation of the affected side, prolongation as well as reduction of SP in patients with stroke was described. But it is unclear that SP is related with the degree of motor disability, the involvement of cerebral cortex or pyramidal tract. **Method** : Sixty-nine patients with stroke were examined(mean age, 60 years; range 35 to 83 years; 41 men, 28 women). Transcranial magnetic stimulation during sustained muscle contraction was performed at the vertex. Electromyographic activity was recorded via surface electrode placed over the abductor pollicis brevis muscle on both sides. Stimulation thresholds were determined on each side by increasing stimulus intensity in increments of 5%. After we determined the threshold, a stimulus intensity of threshold plus 30% of threshold intensity was applied. Measurements were reproduced five times on each hand. SP was measured from beginning of the MEP to the return of uninterrupted voluntary EMG activity. **Results** : (1) Significant prolongation of the SP recorded from affected side compared with unaffected side was observed(Mean±SE(msec), affected side : 122.94±6.6, unaffected side : 103.57±3.96, $P<0.05$). (2) Significant correlation of motor disability(fair, good, normal) with SP was observed(fair group : 162.35±22, good group : 132.94±10.65, normal group : 100.63±6.6,$P<0.05$). (3) Significant prolongation of the SP was observed in pyramidal tract involvement group compared with no pyramidal tract involvement group(involve group : 139.2±11.96, uninvolved group : 106.19±4.74, $P<0.05$). (4) No significant prolongation of the SP in patients with cortical involvement group and no cortical involvement group were observed(involve group : 143.7±27.35, uninvolved group : 118.6±5.58, $P>0.05$). **Conclusion** : These findings suggests that measurement of SP is a useful indicator of pyramidal tract involvement and the degree of motor disability in patients with stroke.

가 야 금

Cerebrovascular Disease VI

좌장 : 김 명 호 교수
이 병 철 교수

1

Cerebral Hemodynamics During Head-up Tilt in the Patients with Carotid Stenosis : Assessment with Transcranial Doppler Sonography

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Background & Objectives : In steno-occlusive cerebrovascular disease, cerebral blood flow(CBF) autoregulation can be impaired and constant CBF during fluctuation in blood pressure cannot be guaranteed. Passive tilting(PT) is established test for cardiovascular autoregulatory function by provoking BP change. To comprehensive test for cerebral vasomotor reactivity with a increase of sensitivity and specificity, author combined the tilting test and apnea and hyperventilation. **Methods** : All of 17 patients had severe stenosis(10) or occlusion(7) on carotid artery, symptomatic or asymptomatic ischemic stroke on corresponding territory and good vasoreactivity on diamox SPECT. Blood pressure(BP), Doppler frequency(DF) on both MCA were monitored under normoventilation, hyperventilation, and apnea before and after 60O PT. **Results** : PT induced nonsignificant changes in mean BP and mean DF. In the patients with occlusion, orthostasis significantly decreased asymmetry of mean DF between both MCA(p=0.006 under normoventilation, 0.047 under hyperventilation, 0.067 under apnea), and pulsatility of DF showed no changes during PT, however, during hyperventilation, pulsatility index ratio[PIDF/PIBP] on symptomatic side was significantly increased by PT(p=0.032). In the patients with stenosis, asymmetry of mean DF was reduced by PT during normovetilation(p=0.036), and pulsatility of DF on symptomatic side showed increase under hyperventilation and apnea during PT(p=0.025, 0.023). **Conclusion** : This combined methods might provide more comprehensive and sensitive cerebral hemodynamic assessment. We suggest that changes of pulsatililty be the sentive parameter and asymmetry of mean DF between both MCA represent vascular reservor during PT.

2

Prognosis of the Patients with Acute Cerebral Infarction Associated with Internal Carotid Artery Occlusion

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Background : The outcome of acute cerebral infarction with internal carotid artery(ICA) occlusion is variable. But the factors influencing the prognosis have not been defined well. **Objective** : To verify the factors affecting survival and prognosis of acute stroke with ICA occlusion. **Method** : Among the patients who were admitted to Asan Medical Center due to acute stroke from March 1996 to July 1999, the presence of ICA occlusion was confirmed in 110 patients. We evaluated the risk factors, initial NIH stroke scale, and electrocardiogaphy of the patients. The pattern of cerebral infarction was classified into 6 groups, and the presence of collateral flows and MCA flow of occluded side was evaluated. We surveyed the survival status of the patients by telephone. **Results** : The borderzone infarction was the most common(37.8%), and followed by large territorial infarction(23.4%). Median follow-up duration was 640 days, and 22 deaths were detected in that period. All of eight patients (7.2%) died in acute phase had large territorial infarction. The predictable factors for survival were initial NIH stroke scale, and the presence of collateral flow from anterior communicating artery($p<0.05$, respectively). The survivors from acute infarction died 6.2% in the first year and 5.8% in the second year. **Conclusion** : Collateral flow pattern and the severity of initial neurologic deficit are important prognostic factors in acute stroke with ICA occlusion.

3

Interobserver Agreement on the Diagnosis of Subtypes of Acute Ischemic Stroke in the TOAST Classification

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Background & Purpose : The study was conducted to

nvestigate the interobserver greement on the diagnosis of stroke subtypes based on the TOAST classification. **Methods** : The patients were randomly selected from Yonsei Stroke Registry, who had MRI, cerebral angiography(either DSA or MRA), and transesophageal echocardiography. The clinical and laboratory data of these patientswere presented to two staff neurologists who were blind to study patients. A protocol was formulated for stepwise classification based on clinical information and CT, as the first step , MRI as the second step, angiography the third step, and TEE as the final step. The neurologists independently classified the stroke subtypes according to the protocol. **Results** : Fifty patients were assessed. The overall agreement between two neurologists was high(k = 0.783). However, there were significant differences in the degree of agreement between the second and the third level classification; the interobserver agreement was higher after the presentation of angiographc data(k = 0.82) than that after the presentation of MRI(k = 0.48). The subtype classification based on the best clinical judgement and the TOAST classification system in 9 patients(18%) even after the full presentation of data. **Conclusion** : Interobserver agreement on the stroke subtype classification became high only after the presentation of cerebral angiography. The small but significant differences between the classifications based on the best clinical judgement and TOAST calssification suggest the importance of future revision of TOAST classification.

4

Magnetic Resonance Angiographic Findings in Patients with Isolated Vertigo

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Background & Objectives : Isolated vertigo can pose a diagnostic dilemma as to whether or not the etiology is vascular. We investigated the vascular pathology of vertebrobasilar system by magnetic resonance angiography(MRA) in cases of isolated vertigo without relevant MRI lesion. **Methods** : We enrolled 61 cases of isolated vertigo aged 43 to 82 years(mean age 64.1 years), 15 men and 46 women. MRA results were quantified on the basis of the severity of vascular stenosis, dolichosis and ectasia in the vertebro-basilar arteries. **Results** : MRA showed vertebrobasilar lesion in 28 patients(focal stenosis or occlusion of a intracranial vertebral artery in 10, diffuse hypoplasia or non-visualization of a intracranial vertebral arterty in 12, focal stenosis or occlusion of a extracranial vertebral artery in 1, diffuse hypoplasia or non-visualization of a extracranial vertebral arterty in 9, diffuse hypoplasia or non-visualization of the basilar arterty in 4, dolichosis of the basilar artery in 7). **Conclusion** : Our results highlight the importance of vascular etiology in patients with isolated vertigo.

5

The Mortality Rate and Prognostic Factors of Patients with Large Hemispheric Infarction

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Background & Objectives : Large hemispheric infarction(LHI) has reportedly various range of high mortality. Because of potential benefit of early therapeutic intervention such as decompressive hemicraniectomy or hypothermia, there is a need to find the mortality rate and initial prognostic factors in this type of infarction under maximum conservative intensive care. **Methods** : Fifty-three patients with CT proven LHI were subjected among 1649 acute stroke patients registered at the Hallym Stroke Data Bank since Jan. 1993. We analyzed the computerized databases for the mortality and compared inclusively demographic features, clinical characteristics, etiology, therapy modalities and CT findings of fatal group with those of survivors. **Results** : Twenty patients(37.7%) were expired among 53 LHI patients(mean age : 63.0(9.9, male to female ratio; 32 : 21). The mean time to expire was 160.4 hours. The fatal group had a significantly higher incidence of cardioembolism, uncontrolled BP during the acute stage, and extensive infarction territory(MCA+ACA). Risk factors for ischemic stroke such as hypertension, hyperlipidemia, smoking, previous stroke history, diabetes mellitus, and old age were not related to mortality. The initial mental status, NIHSS scores, early low densities and hyperdense MCA signs on brain imaging were not different between two groups. Nine patients

reated with I. A. urokinase were all survived and there were no significant difference in the incidence of hemorrhagic complication, early low density or hyperdense MCA sign, comparing with the group treated with other modalities. **Conclusion**s : We suggest that the control of severe hypertension during the acute stage can be important in the decrease of mortality rate and it is reasonable to apply thrombolytic therapy more extensively regardless of early low density lesion, if when the time window is in the range.

거 문 고 A

Headache & Others

좌장 : 정 경 천 교수
최 경 규 교수

1

Isolation of GDNF-inducible Genes in Vivo

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Background & Objectives : Glial cell line-derived neu·otrophic factor(GDNF) has potent trophic effects on lopaminergic neurons in vitro and exerts neuroprotective ıs well as neurorestorative effects in vivo. **Methods** : To ;earch for GDNF-induced genes in vivo, human recombi-ıant GDNF(5(g/2(l) or vehicle was injected intraventricu-arly in mice brain. One week later, brain poly(A)+ RNA was isolated and subjected to the PCR-select cDNA sub-raction hybridization method. Isolated cDNA fragments were sequenced and analyzed with homology searching in GenBank. And isolated cDNAs were radiolabled and used ıs probes in Dot blot analysis with RNA blots from GDNF-vs. vehicle-treated mice. **Results** : Total 138 cDNA frag-nents were isolated. Among them, 57 fragemts, had known gene sequences and 59 fragments were unknown genes. In lot blot, 15 known gene fragments and 10 unknown gene fragments showed differences in expression compared with GDNF and vehicle treatment. **Conclusion** : Molecular characterization of these genes should contribute to our ınderstanding of the intracellular mechanisms that mediat-ed the neurotrophic effects of GDNF and could give us ıints about alternate molecules with similar potential thera-peutic effects.

2

Airway CT during Sleep Apnea and Multi-level Airway Pressure Monitoring during Sleep in Obstructive Sleep Apnea Syndrome

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Background & Objectives : Although the measurement of upper airway size by CT scan during waking or sleep has been applied to detect the level of airway narrowing(LAN) in patients with obstructive sleep apnea syndrome(OSAS), the usefulness of this method has not been confirmed. We monitored multi-level airway pressures throughout the night of polysomnography and cine CT during sleep in patients with OSAS to find whether or not one time airway CT reflects the conditions of upper airway narrowing during sleep apnea. **Methods** : Three adult women and 9 men with OSAS had overnight polysomnography. Airway pressures were monitored by 4 micro-sensor(nasopharynx, just below uvula, hypopharynx, esophagus) or 2 micro-sensor(just below uvula, esophagus) catheter throughout the sleep study. The LAN was classified as above uvula, below uvula and mixed(simultaneous obstruction above and below uvula). All patients had neck CT scan at the levels of high retropalatal, low retropalatal, retroglossal, epiglottis and hypopharynx during sleep apnea with simultaneous recording of polysomnography. The airway opening sizes of all 5 levels were measured during sleep apnea and the normal respiration. LAN determined by CT scan during sleep apnea was classified as above uvula, below uvula and mixed pattern. **Results** : Four patients had mild OSAS(apnea-hypopnea index < 20/hour) and 8 had moderate to severe OSAS(apnea-hypopnea index >20/hour). The airway pressure monitoring showed that only 2 patients(16.7%) had LAN at either above- or below-uvula level and the remaining 10(83.3%) showed LAN of two or more patterns of above-uvula level, below-uvula level and both levels. The main sites of airway narrowing reflected by airway pressure monitoring were above-uvula level in 3 patients(25%), below-uvula level in 2(16.7%) and both levels in 7(58.3%). CT scan during apnea showed that airway obstruction occurred at above-uvula level in 2 patients(16.7%), below-

uvula level in 3(25%) and at both levels in 6(50%). In comparison of airway pressure monitoring with CT scan, the LANs of only 3 patients(25%) were concordant, those of 7(58.3%) partially concordant, and those of 2 (12.5%) discordant. **Conclusion**s : CT scan during sleep apnea does not reflect correctly the airway narrowing sites in OSAS because most patients showed airway narrowing patterns of two or more kinds during different apneic episodes of sleep.

3

Classification Issues of Migrainous Headache That Does Not Meet the IHS Criteria

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Background and Objectives : Migrainous headaches that do not meet all the IHS criteria have no appropriate classification criteria(MHA). We characterized those headaches by comparing with typical migraine without aura that meet full criteria of the IHS criteria(MOA). **Methods** : A total of 648 patients presented with MHA and MOA at the Migraine Clinic of Samsung Medical Center. They were divided into two Groups : Group I : MHA fulfilling the items of A to C except D of the IHS criteria(during headache at least one of the followings : nausea and/or vomiting, photophobia and phonophobia)(n=306); Group II MOA fulfilling all 4 items(n=342). We investigated and compared the demographic features, accompanying symptoms, and interictal hemodynamic patterns on transcranial Doppler(TCD) between both groups. **Results** : The mean ages at the examination were 31.4((10.31) years for Group I and 33.0((11.75) for Group II. Of them 540 patients were female(83.3%). Among the Group I, 143(46.7%) patients had no associated symptoms at all, while 162(53.2%) had eyeball pain and 12(3.9%) had dizziness instead of associated symptoms of the item D. Associated symptoms of Group II patients included nausea and/or vomiting in 333(97.4%), eyeball pain in 304(88.9%), phonophobia or photophobia in 73(21.3%), and dizziness in 75(21.9%). Most patients of Group I responded well to anti-migraine therapy. The mean blood flow velocities on interictal TCD were not different between both Groups but significantly elevated compared to the control. **Conclusion**s : MHA seems to share a common clinical and pathophysiological features of MOA in that it meets the 3 of 4 items for MOA of the IHS criteria, in that hemodynamic patterns on interictal TCD are quite similar to those of typical MOA, and in that it also responses well to anti-migraine therapy. Thus, we suggest that MHA should be classified as MOA even if the item D is missing or at least that eyeball pain at the time of migraine attack, a quite common accompanying symptom, should be added to the item D.

4

Clinical Correlation of TCD Abnormalities in Migraineurs

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Background & Objectives : It is a well-known phenomenon that migraineurs frequently have abnormal findings on transcranial Doppler(TCD) but its pathogenesis and clinical meanings are not clear. We investigated the correlation between clinical parameters and TCD abnormalities in migraineurs. **Methods** : A consecutive series of migraineurs who visited the outpatient clinic and underwent TCD were gathered prospectively. Clinical parameters were investigated; age, sex, a period from onset of headache to visiting clinic, frequency, duration, laterality, pulsatility, and severity of headache, presence of nausea, vomiting, photophobia, phonophobia, and aura, aggravation of headache by routine physical activity, and response to sumatriptan. TCD was performed during headache-free period. During the same period, TCD data in subjects who did not have a history of vascular event and headache were piled up. To interpret TCD results, absolute flow velocity of cerebral arteries and side to side difference were examined and values higher than the two standard deviations of control data, subdivided according to age group and sex, were considered as abnormal. The severity of TCD abnormalities was graded by using the number of abnormal vessels in each case; normal, mild to moderate, and severe. **Results** : One hundred thirty seven migraineurs(30.8±10.5 years, 30 males and 107 females) were recruited. TCD abnormalities were found in 84 patients(61.3%) and the number of abnormal arteries in these patients was 3.0±2.7(1~14). Abnormal findings were most common in anterior cerebral artery(in 27.7% of patients), followed by middle cerebral artery(in 24.8%), vertebral artery(in 20.4%) and etc. The presence of aura

was negatively correlated with abnormal TCD(p=0.049). Pulsatility was strongly correlated with abnormal TCD(p=0.003) and there was dose-response relationship between the presence of pulsatility and the grade of TCD abnormality(p=0.006). Other parameters were not significant. Sumatriptan was administered in 52 patients and response to sumatriptan and abnormal TCD were negatively and marginally correlated(p=0.086). **Conclusion** : This study revealed the negative correlation between aura and abnormal TCD and the positive dose-response relationship between pulsatility and the grade of TCD abnormalities. Besides, the correlation between the response to sumatriptan and TCD findings was suggested. Further study with larger scale will be necessary.

5

Clinical and Electro-oculographic Analysis of Saccadic Intrusions in the Patients with Various Neurologic Diseases

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Background and Objectives : Saccadic intrusions include square-wave jerks, macrosaccadic oscillations, ocular flutter and opsoclonus, which are caused by excessive discharge of burst neurons or loss of tonic excitation of pause cells. These saccadic oscillations should be differentiated with electro-oculography(EOG) with the presence of intersaccadic interval or direction of ocular movement. We analyzed the clinical etiology and EOG findings showing saccadic oscillations in the patients with neurologic diseases. **Methods** : Standard EOG battery were performed in the patients complaining of oscillopsia or showing involuntary jerky ocular movement with 2-channel(bitemporal horizontal and vertical recording). **Results** : On the EOG findings, rapid, repetitive, horizontal, symmetrical, and sinusoidal movements without intersaccadic intervals(ocular flutter) were recorded in 3 patient(2-meningoencephalitis, 1-OPCA). Rapid, involuntary, continuous, repetitive, conjugate saccadic movements in all directions(opsoclonus) without intersaccadic interval were noted in 2 patients(1-lithium toxicity, 1-oat cell carcinoma). Intermittent, irregular burst of microjerky wave(about 200μV) during fixation suggesting fixation instability were found in 2patients(one of parkinson's disease and the other of Huntington chorea). **Conclusion** : The various patterns of ocular movement disorders are presented in the numerous neurologic diseases. The EOG recordings are useful in differentiating abnormal ocular movements. We describe patients having diverse diseases and showing typical EOG findings of ocular flutter, opsoclonus, and fixation instability.

거 문 고 B

Epilepsy III

좌장 : 박 영 춘 교수
이 상 암 교수

1

Role of the Subthalamo-nigral Input in the Control of Pilocarpine Induced Seizures in the Rat

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Background & Objectives : The substantia nigra pars reticulata(SNr) is a critical site for the control of epileptic seizures. Potentiation of the inhibitory GABAergic input from the striatum to the SNpr suppress primary or secondary generalized seizures in the rat. The purpose of this study was to examine the possible involvement of the excitatory glutamatergic input from the subthalamic nucleus(STN) to the SNr in the control of both the electroencephalographic and the motor components of pilocarpine-induced seizures in the rat. **Methods** : Sprague-Dawley rats were subjected to bilateral, MK-801(100ng/500nl) injection into the SNr and muscimol(100ng/500nl) injection into the STN 30 minutes before the administration of pilocarpine(400mg/kg i.p.). The behaviors, EEG and pathology of hippocampus were compared with those of controls. **Results** : Microinjections of either an N-methyl-D-aspartate(NMDA) antagonist or a GABA A agonist in the subthalamic nucleus, significantly reduced motor seizures and epileptiform discharges. **Conclusions** : These results provide evidence for the involvement of the subthalamo-nigral projection in the modulation and the propagation of the epileptiform discharges and the motor component of pilocarpine-induced seizures.

2

A Genetic Mouse Model of Limbic Seizures with the Phospholipase C β1 Knock-out

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Background : We have previously shown that phospholipase C(PLC) β1 is coupled to the signal transduction of muscarinic acetylcholine receptor in the brain and the defect of this signaling in PLC β1 knock-out(-/-) mice resulted in spontaneous epileptic seizures. **Methods** : To assess the increased brain derived neurotrophic factor (BDNF) in hippocampus of PLC β1(-/-) mice immediately after starting seizures, we selected mice at P22 from each group. To assess the changes of hilar interneurons or synaptic reorganization in hippocampus of PLC β1(-/-) mice between before and after epileptic seizures, we selected mice at P15 and P45 from each group. Samples were prepared for neurotransmitter or neuropeptide immunohisochemistry, BDNF immnohistochemistry, neuron counting, and Timm's staining, respectively. Also, we have identified the origin of seizure in PLC β1(-/-) mice to be hippocampus by recording electroencephalographic(EEG) activities using multiple electrodes. **Results** : This finding along with the behavioral manifestation of seizure indicates that PLC β 1(-/-) mice display limbic seizures with secondary generalization. Furthermore histopathological analyses of hippocampi of the PLC β1(-/-) mice showed that characteristic changes of temporal lobe epilepsy(TLE) in humans or animal models. Thus, hippocampi of PLC β1(-/-) mice that had experienced seizures showed an increased expression of BDNF, followed by loss of hilar interneurons, increased immunoreactivity of neuropeptide Y on mossy fiber, and mossy fiber sprouting in dentate gyrus. **Conclusions** : PLC β1 knock-out mice may provide a useful tool for studying the mechanism underlying TLE, especially in elucidating the modulatory function of muscarinic acetylcholine system in the process.

3

Preserved Responsiveness in Unilateral Temporal Lobe Epilepsy : Can it be a Lateralizing Sign?

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Background & Objectives : Preserved responsiveness (PR) during the automatism had been reported, suggesting a partial seizure from right hemisphere. But the degrees of responsiveness and relationship with the language dominancy were not studied yet. We analyzed the partial seizures(sz) in 132 patients(pts) with unilateral temporal

obe epilepsy(TLE) to reveal the meaning of PR. **Method** We reviewed the interviews during the ictal period in video-EEG monitoring, which consisted of four categories including verbal and nonverbal commands. We calculated the percentage of number of correct responses(CR). We analyzed the characteristics of sz with PR, which were defined as sz having more than one correct response during the ictal period. The speech dominancy could be determined in 8 pts who had undergone Wada test. **Results** : Among 132 pts, 11 pts(8.3%) had sz with PR(9 pt; psychomotor sz only, 2 pts; secondarily generalized sz). In 8 pts with PR and Wada test, 2 pts had sz from dominant hemisphere(DH; 6 sz) and 6 pts from nondominant hemisphere(NDH; 16 sz). The CR of sz originated from DH was 6.1 to 61.8(mean 33.9±26.5), while the CR from NDH was 57.5 to 80.6(mean 69.0±21.7). The CR was significantly different between sz from DH and those from NDH was significant($p<0.05$). Conclusion : The CR was significantly higher in sz from NDH than that of sz from DH. In spite of the language impairment, PR with lower CR can be observed in sz from DH. In conclusion, PR with higher CR in TLE might be a lateralizing sign suggesting sz from NDH.

4

Spectral and Non-linear Analysis of EEG in Variable Mental States of Normal Person

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Background & Objectives : We performed the spectral and fractal dimension analysis of digital EEG data which is known as a kind of non-linear biologic signals, to compare the differences between the variable mental activities, and to find out the significance of chaotic pattern. **Methods** : The different 10 kinds of task was performed(eye opening, eye closure, calculating, listening to music, to remember something..., etc.) during the period of taking EEG. Each tasks performing signals were recorded as Digital EEG for more than 1 Min. We used our own software of CHASIM to run a spectral and fractal dimension analysis. The statistical analysis was performed in ANOVA, paired t-test using SPSS 8.0. **Results** : In left temporal electrode(T5), the fractal dimension in eye opening was decreased compared to other mental status. For right frontal and temporal electrode(F4, A2), fractal dimension increased when music or noise was given. Left frontal electrode(F7) showed significant differences only in eye opening and listening to music. But the difference between each electrode in variable mental tasks did not show statistical significances. **Conclusion** : At least we could conclude that there are higher dimension and parameter correlation on right frontal and temporal areas in auditory stimulation. Still, the meaning of these results is not in hand, but we hope to find out the way to applicate the non-linear chaotic analysis in the field of CNS disease and brain function.

5

lInduction of Immediate Early Gene Encoded Protein in the Rat Hippocampus after Penicillin-induced Partial Seizures

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Background & Objectives : There have been enormous reports that continuous seizure activity induces long-term changes of specific neurons. Immediate early gene is supposed to be linked in this process. The purpose of this study is to investigate the effect of simple partial seizures on the immediate early gene expression in the rat hippocampus which is not clearly understood. **Methods** : Epidural electrodes were placed in male Sprague-Dawley weighing 150-220 grams and penicillin(Pc) was applied cortically. After focal epileptiform discharges were successfully identified, EEG was followed daily basis until sacrifice. Cardiac perfusion and extraction of the brain was done at 2, 4, 24 hours and 1 weeks after the Pc application. Sixteen rats were evenly distributed in 4 groups. Immunocytochemical staining with specific antisera(Santa Cruz) was performed. **Results** : The epileptiform discharges were induced within an hour after topica1 penicillin application. Two hours after penicillin application, dentate gyrus(DG) was moderately stained and pyramidal cell layer, amygdala, pyriform cortex, cerebral cortex were stained weakly. At 4 hours after penicillin application, DG and other regions were very

weakly stained. At 24 hours, DG was stained maximally and so did in amygdala, pyriform cortex, and cerebral cortex. One week later, DG was stained moderately and amygdala, pyriform cortex were stained weakly. Conclusion : This data showed partial seizures can induce immediate early gene encoded c-jun protein until late period in the rat hippocampus, amygdala, and pyriform cortex, which suggested that even partial seizure can affect distant brain area for a significant period.

가 야 금

Systemic Disease

좌장 : 박 성 호 교수
이 광 수 교수

1

Localization of Phospholipase D on the Human Chromosome and Developing Rat Brain

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Background & Objectives : Phospholipase D(PLD) catalyzes the hydrolysis of phosphatidylcholine to phosphoatdic acid and choline. Hence PLD is implicated in a broad spectrum of physiological processes and disease, including mitogenesis, cell differentiation, metabolic regulation, secretion, neural and cardiac stimulation, inflammation, oncogenesis and diabetes. The signal-dependent activation of PLD has been observed in a variety of brain and neural-derived cells. **Methods** : Human chromosomal locations of PLD1 and PLD2 were investigated with fluorescent in situ hybridization(FISH), using 3.1kb and 3.4kb probes respecively. Developmental neural expression patterns in rat of PLD1 and PLD2 were also observed with in situ hybridization histochemistry. **Results** : The PLD1 was assigned to human chromosome 3q26 and expressed most strikingly in selected ventricular neural cells lining spinal cord and brain from E14 to E20. The PLD2 was assigned to human chromosome 17p3.1 and expressed in differentiating ventricular neural cells from E18 and multiple regions of the postnatal rat brain. **Conclusion** : We first investigated the localization of PLD1 and PLD2 on the human chromosome. Neural expression patterns of PLD in developing rat brain suggest that PLD1 activation is induced during neuronal differentiation and PLD2 is involved in neuronal cell migration during postnatal period.

2

Clinical Significance of MRI Findings in Central Nervous System Lupus

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Background & Objectives : Various MRI abnormalities have been reported in central nervous system(CNS) lupus, but their correlation with pathogenesis and clinical manifestations have not been studied. We aimed to determine the clinical significance of MRI lesions in the patients with CNS lupus. **Methods** : We reviewed 56 lupus patients(9 men and 47 women, age=31.4?11.9 years) who were examined with brain MRI due to their CNS symptoms during 1990~1999 in Seoul National University Hospital. The MRI findings were classified into 4 categories; 1) diffuse cortical atrophy(n=17), 2) deep white matter small lesion(n=35), 3) diffuse periventricular high signal intensities(n=13), and 4) cortical infarct(n=12). The clinical manifestations were divided into cerebral(localizing sign, seizure, or mental deterioration)(n=23), psychiatric(n=13), and others(including meningitis, myelopathy, or neuropathy)(n=20). Disease duration, lupus activity, renal or hematologic involvement, antiphospholipid antibodies, and echocardiography at the time of CNS symptoms were also investigated. **Results** : In the comparison of cerebral(n=23) and non-cerebral(n=33) patients, the frequency of diffuse cortical atrophy, deep white matter small lesion, and diffuse periventricular high signal intensities were not different; while these abnormalities were significantly frequent in the patients with longer(>10 years) disease duration(p=0.008, 0.037, and 0.040 respectively). Cortical infarcts were observed almost in cerebral patients(11/23) and tended to develop more in the patients with active lupus(7/19, p=0.07). Furthermore cortical infarcts were mainly located in the posterior temporo-parieto-occipital area. Hemorrhage occurred in 2 patients(1 ICH with IVH, 1 SAH) invariably with severe thrombocytopenia. **Conclusion**s : Among MRI findings of CNS lupus, cortical infarct seems to be related with disease activity, while others(diffuse cortical atrophy, deep white matter small lesion, and diffuse periventricular high signal intensities) are associated with disease duration.

3

ALS Immunoglobulins and Cerebrospinal Fluid Reduced Voltage-gated Calcium Current in PC12 Cell Line

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Background and Objectives : Although the exact pathogenesis of amyotrophic lateral sclerosis(ALS) is unknown,

	CSF group		Ig G group	
	ALS	Control	ALS	Control
Basal Calcium	1.16	0.96	1.15	0.98†
% of calcium increment after low K^+	4.7	18.7†	5.1	40.1†
% of calcium increment after high K^+	79	314†	114	159

†$p<0.05$.

Recent studies suggest a prominent role of calcium current. This study is to determine the alteration of calcium current to response of ALS immunoglobulins(IG) and cerebrospinal fluid(CSF) using PC12 cell line. **Method** : PC12 cells were pre-incubated with IG and CSF from five ALS and control subjects. Calcium current was measured by a change in fluorescence of the Ca++ chelating dye, Fura-2. This technique allowed intracellular calcium determination at a single cell level. We measured basal calcium level and voltage activated calcium level using low K+(33mEq/L) and high K+(150mEq/L) activation. **Results** : The results are summarized in table. **Conclusion** : A significant decrease of calcium influx is found in the PC12 cell line applying CSF and IG from ALS patients. This suggest IG and CSF from ALS patients may have common pathophysiologic mechanism that modulates calcium channels resulting in motor neuron degeneration.

4

Comparison of the Efficacy of Amphotericin B and Fluconazole in the Treatment Cryptococcal Meningitis

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Background : In cryptococcal meningitis, administration of Amphotericin B(AmB), alone or in combination with 5-Fluorocytocine, was the standard regimen until the late 1980s, despite a relatively high failure rate, a high incidence of adverse reactions, and the inconvenience of prolonged intravenous treatment. Since then, because of its good tolerability and availability in oral form, fluconazole(FCZ) has been widely treated in patients with cryptococcal meningitis. Objective : To comparison of the efficacy of AmB and FCZ and analysis of the factors associated with outcome and survival. **Method** : A clinical analysis was carried out in 40 patients with cryptococcal meningitis who were admited at Severance hospital from 1984 to July 1999. **Results** : We retrospectively analyzed clinical outcome of cryptococcal meningitis in patients initially treated with AmB(24 patients) or FCZ(16 patients). Not significantly, a good outcome was achieved in FCZ group(75%) than AmB group(58%) and a side effct was high in AmB group(88%) than FCZ group(56%). Neoplastic disease as a risk factor, abnormal mental status, high opening CSF pressure are associated with poor outcome and death. **Conclusion** : Fluconazole appears to be as effective as amphotericin B, but prospective study will determine the best treatment regimen for patients with cryptococcal meningitis

5

Neurologic Manifestations and Characteristics of CNS Involvements in Systemic Lupus Erythematosus

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Background & Objectives : This study is designed to evaluate various patterns of neurologic complication(NC), laboratory parameters(LPs) associated with NC, and their clinical significance in patients with systemic lupus erythematosus(SLE). **Methods** : Fifty-one SLE patients fulfilled the criteria of ARA and combined with NC were selected. The various patterns of NC, the clinical profiles including age, duration of disease, number of involved organ system, and the LPs such as levels of C3, C4, Anti-dsDNA, APA, FANA, ESR, Hb, ENA were investigated in these selected patients. Especially, LPs were compared in each NC. **Results** : Common NC in 51 patients were migrainous headache(12), seizure(8), aseptic meningitis(7), and vasculitic focal infarction(5), behavioral changes(3) and various type of peripheral neuropathy(9). Additionally, dermato/poly-myositis(3), lupoid sclerosis(2), choreoathetosis(1) and Moyamoya disease(1) were noted. The mean age was 33 year-old. Average duration

of disease from the diagnosis to NC was 41 months. Involvement of organ system was common in the patients with NC(65%). On the analysis of LPs, anti-dsDNA titer and C4 level were more important than others and APA was strongly associated with vasculitic focal infarction, lupoid sclerosis, choreoathetosis, and Moyamoya disease. **Conclusion** : SLE could bring out various patterns of NC. And, Anti-dsDNA titer and level of C4 were significant laboratory parameters associated with NC. At the end, as an etiology of rare diseases such as chorea, Moyamoya diseases, transverse myelitis, and young onset stroke, SLE, especially associated with APA, should be included in differential diagnosis.

거 문 고 A

Behavioral Neurology Dementia

좌장 : 김 범 생 교수
한 설 희 교수

1

Change of Cognitive Function after Posteroventral Pallidotomy for the Treatment of Parkinson's Disease

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Background & Object : Earlier approaches to pallidotomy for refractory Parkinson's disease had significant complication rates. Recent approaches show fewer complications and better results, but the effect of pallidotomy on cognition is unclear. this study was conducted to examine the neuropsychological effect of unilateral pallidotomy. **Methods** : Neuropsychological test was performed on 10 patients with medically refractory Parkinson's disease at base line and 1 to 2 months after unilateral pallidotomy.Neuropsychological battery includs Korean version of mini mental state examination, Hopkin's verbal learing test, Rey figure memory test, Stroop test, Digit span forward and backward, word fluency(letter and category), Korean version of Boston naming test and geriatric depression scale. **Results** : Pallidotomy patients showed no significant changes of cognition from baseline to retest.Depression did not related to preoperative or postoperative cognition. Depression score improved in the patients with good pallidotomy outcome. **Conclusion** : Sterotactic unilateral ventral pallidotomy does not seem to produce cognitive declines in most patients.

2

Practical Method for Measuring Vertical Eye Movement

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Background and Objectives : Limitation of vertical eye movement(VEM) is associated with various neurological disorders such as dementia or parkinsonism and plays a crucial role in the differential diagnosis. However, norms from previous studies are impractical for bedside evaluation because range of VEM was quantified as an angle rather than a distance. The current study is to develop a practical method for measuring VEM and to provide norms in normal adults. **Methods** : Subjects were 120 normal individuals with age ranging from 20 to 79 years(10 men and 10 women per decade). With the chin and the forehead fixed, subjects were asked to look straight ahead(neutral gaze), maximally upward and then downward. Range of VEM was measured in millimeters using a scale applied vertically along the lateral margin of corneal limbus. Range of upward VEM(UVEM) was defined as a displacement of lower corneal limbus from neutral to maximum upward gaze while that of downward VEM(DVEM) as a displacement of upper corneal limbus from neutral to maximum downward gaze. This bedside evaluation(direct method) was compared with a video method in which the VEM was videotaped by a digital video camera whose images were transferred to computer screen for detailed analysis. **Results** : The results of direct method correlated highly with those of video method(r=0.814). There was also a good inter-rater reliability(r=0.727). Range of UVEM by video method for subjects from 3rd to 8th decade were 8.4±1.4, 8.2±1.4, 7.6±1.6, 7.4±1.3, 6.9±1.2, 5.7±1.9 mm and those of DVEM were 8.6±1.2, 7.9±1.1, 8.2±1.5, 8.4±1.3, 6.8±1.3, 5.7±1.2 mm. **Conclusion** : We suggest that our method for measuring VEM is practical and useful for quantifying limitation of VEM in adult population.

3

Gradient echo MR Imaging in Vascular Dementia Associated with Small Vessel Disease

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Background and Objectives : The clinical spectrum of cerebral amyloid angiopahty(CAA) includes lobar hemorrhage, transient neurologic attacks and progressive dementia. Anecdotal reports also describe patients with leukoencephalopathy whose clinical features mimic vascular dementia(VD) associated with lacunar state or

Binswanger's disease. Thus we performed gradient echo MRI in patients with VD from small vessel disease to identify patients with cortical microbleeds suggestive of CAA. **Methods** : Twenty six(14 men and 12 women aged 71.4(9.7 years) patients with VD associated with small vessel disease and 14 control patients with probable Alzheimer's disease(5 men and 9 women aged 72.0(6.3 years) were imaged with gradient echo imaging in addition to conventional imaging sequences. According to the location of microbleeds, patients were classified into cortical and extracortical(basal ganglia, thalamus, pons, cerrbellum) group. **Results** : Microbleeds occurred in 17 of 26 patients with VD whereas none of the AD patients showed such changes. Of the 17 patients with microbleeds, 14 had microbleeds distributed mainly in extracortical regions, which were suggestive of changes associated with hypertension. However the remaining 3 of 14 patients had microbleeds located mostly in the cortical area, a result consistent with probable CAA. **Conclusion** : Patients with petechial cortical hemorrhages that were highly suggestive of CAA were not rare(11.5%) among patients with VD. Although pathologic confirmation of these radiologic changes is needed, these results provide a clinical importance in the management of VD associated with small vessel disease.

4

Parietal Dysfunctions associated with Sporadic Cerebellar Cortical Atrophy : A Crossed Parieto-Cerebellar Diaschisis ?

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Background & Significance : Evidences indicating the relationship between cerebellum and cognitive function are growing, and the crossed cerebro-cerebellar diaschisis has been well demonstrated. However, parietal lobe dysfunction has rarely been reported in degenerative cerebellar disorders. **Case** : A 32-year-old, right-handed man was admitted for slowly progressive gait ataxia, dysarthria, changes in personality, and cognitive decline. Neurologic examination revealed dysarthria, bilateral horizontal gaze nystagmus with normal saccade, hyperreflexia, mild dysdiadochokinesia, and gait ataxia. Aside from frontal/executive dystunction, neuropsychological assessments were remarkable for agraphesthesia, astereognosis, ideomotor apraxia in both hands, visuospatial dysfunction, left hemispatial neglect on the line bisection and copying tasks, a finding suggestive of parietal lobe dysfunction. Brain MRI demonstrated diffuse cerebellar cortical atrophy with flattening of midbrain and pons. Gene studies for triplet repeat diseases were negative for SCA-2 and SCA-6. HMPAO-SPECT showed the decreased perfusion in left cerebellum and right superior parietal cortex. **Conclusion** : The parietal dysfunction in this patient may represent a part of diffuse degenerative process of the cerebellar or cerebral cortex. However, the SPECT findings support for a disruption of cerebello-parietal connections that might have caused parietal lobe dysfunctions including neglect and apraxia.

5

Functional Magnetic Resonance Imaging during Pantomiming Gestures

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Background & Objectives : The purpose of this study was to identify the functional fields activated in relation to the gestural movements. **Methods** : Using functional magnetic resonance imaging(fMRI), we mapped brain activity in 10 right-handed normal volunteers during activation and control tasks. The activation condition consisted of pantomiming tool use gestures with either left hand or right hand whereas control condition comprised repetitive oppositional movements between thumb and index finger. **Results** : Activated cortical regions were highly lateralized to the left hemisphere during pantomiming tool use regardless of hand used. Praxis with either hand commonly activated superior parietal lobule, supplementary motor area,

premotor area of the left hemisphere, and the cerebellar vermis. However minimal activation occurred in inferior parietal lobule which has been known to be critical area for praxis generation. Compared to left hand praxis, right hand praxis exhibited additional activation in left putamen and posterior part of left inferior temporal gyrus. **Conclusion** : Our findings concur with neuropsychological observations that the left hemisphere in right handers mediates programming and executing skilled movements and within the left hemisphere praxis is predominantly subserved by parietal lobe, supplementary motor area and premotor area. However, unlike previous lesion studies, our study suggested that superior parietal lobule more than inferior parietal lobule may play an important role in gesture production.

거 문 고 B

Epilepsy IV

좌장 : 이 상 도 교수
허 균 교수

1

Seizure Localization and Ictal Perfusion Patterns of Subtracted SPECT in Partial Epilepsy

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Background & Objectives : Although a hyperperfusion of ictal SPECT is increasingly used in the localization of epileptic foci, the meaning of ictal SPECT hypoperfusion has not established. The purpose of this study is to determine whether the detection of focal hypoperfusion as well as hyperperfusion by subtracted SPECT improves the localization of seizure focus. **Methods** : Total 61 patients with intractable epilepsy had presurgical evaluation including interictal/ictal SPECT and SPECT subtraction, and epilepsy surgery afterward. Five different kinds of SPECT images(interictal SPECT, ictal SPECT, hyperperfusion, hypoperfusion and hyperperfusion-hypoperfusion combined analysis in subtracted SPECT) were separately interpreted by three blinded reviewers, and the injection times of radioisotope were also considered. **Results** : The ictal perfusion patterns of subtracted SPECT images were(a) diffuse hyperperfusion,(b) focal hyperperfusion,(c) both hyper- and hypoperfusion, and(d) focal hypoperfusion only. The concordance rate of seizure localization to the final epilepsy focus was higher for the combined subtraction images(57/61, 93.4%) than the hyperperfusion(51/61, 82.0%) or hypoperfusion images alone(15/61, 24.6%). In 4 patients, despite radioisotope being injected during ictal period, subtracted SPECT showed ictal focal hypoperfusion at epileptic focus. **Conclusions** : These results indicate that the hypoperfusions as well as hyperperfusions in ictal SPECT are important for localizing seizure focus. This phenomenon may be explained by intra-ictal postictal state of an initial seizure focus or by a steal phenomenon of peripheral propagation.

2

Neocortical Epilepsy with Non-lesional Cases on MRI: Presurgical Evaluation and Surgical Outcome

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Background & Objectives : Presurgical evaluation and surgical management of intractable epilepsy with non-lesional cases on MRI is the most challenging area. The aim of this study was to analyze the usefulness of individual evaluation modality and to evaluate the surgical outcome. **Methods** : In 43 non-lesional neocortical epilepsy patients treated surgically at SNUH between December 1994 and July 1998, we analyzed the localizing and lateralizing value of semiology-ictal scalp EEG, FDG-PET, and ictal SPECT in comparison with the results of invasive study and evaluated the surgical outcome. **Results** : Epileptogenic foci could be localized and lateralized in 58.1% and 86.0% by semiology-ictal scalp EEG, 47.4% and 73.7% by FDG-PET, and 25.0% and 66.7% by ictal SPECT. During a mean follow-up of 2.7 year, 30(69.8%) patients had worthwhile improvement(seizure reduction > 90%), and 13(30.2%) patients had no worthwhile improvement. Surgical outcome of frontal lobe epilepsy was less favorable compared with the remaining areas($p<0.05$). Conclusion : Semiology-ictal scalp EEG, FDG-PET, and ictal SPECT were useful as independent and confirmatory presurgical evaluation modality in non-lesional neocortical epilepsy. Though the surgical outcome was less favorable than in medial TLE and lesional neocortical epilesy, many patients with non-lesional neocortical epilepsy would be benefit from surgical treatment.

3

Significane of Chronic Epilepsy in Primary Brain Tumors

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Background & Objectives : A small but significant pro-

portion of patients with brain tumors continued to have seizures postoperatively. These could no all be explained simply by failure to adequately resect the tumor mass. **Method** : We selected 99 patients who were admitted with seizure attacks and operated with primary brain tumor between 1993 and 1999 at Yonsei University Hospital. We divided patients into chronic epilepsy group(CEG)(seizure attack(1 year) and acute epilepsy group(AEG)(seizure attack<1 year). We investigated the differences of clinical, pathological, and laboratory findings between two groups. **Results** : Of 99 patients, 43 were CEG and 56 were AEG. Among the various factors, seizure recurrence(no etiology) rate was significantly higher in CEG than AEG($p<0.05$). But, the laboratory abnormalities and tumor residue or recurrence on MRI findings were significantly higher in AEG than CEG($p<0.05$). Glioblastoma were more frequently found in AEG and astrocytoma in CEG, but the differences were not statistically singnificant. **Conclusion** : There were the differences of epileptogenesis between two groups. We suggest that the brain tumor patients with chronic epilepsy have to be investigated with extensive work-up including invasive electrophyosiologic study.

4

Is Febrile Convulsion A Preferential Association with Temporal Lobe Epilepsy or Hippocampal Sclerosis on MRI?

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Objective : Although a history of febrile convulsion(FC) is often obtained in epilepsy patients, the preferential association of febrile convulsion with temporal lobe epilepsy(TLE) or with hippocampal sclerosis(HS) on MRI is not clear. **Methods** : We prospectively obtained the information about FC in an epilepsy clinic. We classified epilepsy syndrome into generalized epilepsy(GE), TLE, extratemporal epilepsy(ETLE), unclassified partial and undetermined epilepsy by standardized criteria. We divided MRI findings into normal, HS and other congenital abnormality groups. The incidence of antecedent FC was evaluated in relation to epilepsy classification or MRI findings. We calculated kappa values for inter- and intra-observer reliability for classification of epilepsy syndrome. **Results** : The agreement of epilepsy classification was reliable(intra-observer kappa value=0.78, inter-observer kappa value= 0.77). Thirteen percent of studied patients(72/537) had a FC and 38% of FC(27/72) were a complex FC. TLE was more likely to be preceded by FC{25%(42/166)} than ETLE{6%(12/189), $p<0.05$} or GE{13%(12/93), $p<0.05$}. Whereas, GE was more likely to have non-complex FC {100%(12/12)} than partial epilepsy {55%(32/58), $p<0.05$}. HS group were more likely to be associated with FC {48%(27/56)} than normal {14%(33/232), $p<0.05$} or other congenital abnormality on MRI {6%(3/45), $p<0.05$}. **Conclusions** : FC is preferentially associated with TLE or HS on MRI. HS may be caused by complex FC rather than cause FC.

5

The Clinical Features of Posthypoxic Multifocal Myoclous

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Introduction : Generalized, bilaterally asynchronous myoclonic twitches after hypoxic brain damage are not uncommon findings in clinical practice. However, there have been a few reports which include detailed descriptions on the clinical courses of acute posthypoxic myoclonus. This reports reviews our experince in 41 cases of posthypoxic multifocal myoclonus.Patients and **Methods** : We retrospectively analysed etiology, clinical course, nature and duration of myoclonus, EEG and brain CT findings in the patients who developed acute multifocal myoclonus after hypoxic brain damage during last seven-year period from 1992 to 1999. Patients who had possible explanations for seizures or myoclonus other than hypoxic-ischemic events were excluded. **Results** : Fourty-one patients aged 24 to 81 year-old(mean : 57.8) were included in this study. All patients were semicomatose to comatose at initial presentation. All but 3 patients with pulmonary edema had a history of cardiorespiratory arrest, caused by probable cardiogenic origin in 15 cases, acute asthmatic attack in 10 cases, upper air way abstruction such as epiglotitis, tracheal stenosis , hanging and aspixia origin in 8 cases, and uncertain origing in 5 cases. Time interval between hypoxic

damage and onset of the myoclonus was 2 to 24 hours (average : 7.9). Myoclonus was exaggerated or provoked by auditory or noxious stimuli 24 patients and six of them were also by light touch. It was not affected by IV lorazepam, IV diazepam or phenytoin loading, but controlled by valproate loading in 9 cases and pentotal coma in 12 cases. Spontantaneous remission took place in 12 cases when the patients were deteriorated into deep coma(brain death). The majority of EEGs showed diffuse suppression and three patients showed a burst-suppression pattern. Ictal EEG demonstrated intermittent generalized spike and polyspike activities or PLEDs which suggested that myoclonus was central origin. Most patients died within a week and 5 patients remained in a persistent vegetative state. **Conclusions** : We conclude that posthypoxic multifocal myoclonus may reflect severe diffuse cortical damage and, when present, imply a poor prognosis. It may be a transient manifestation of severe cortical damage before neocortical neuron death and aggressive control would not be necessary in most patients.

거 문 고 C

좌장 : 손 영 호 교수
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1

Systemic Lupus Erythematosus Presenting as Pseudotumor Cerebri Syndrome

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Backgrounds & Significance : Pseudotumor cerebri is a syndrome of intracranial hypertension without mass lesion or enlarged ventricle. Several conditions known to interfere with CSF absorption pathways can produce the pseudotumor cerebri syndrome. Pseudotumor cerebri syndrome has been reported in a few sporadic cases in patients with systemic lupus erythematosus(SLE). **Case** : A 16 year-old female was referred to our department because of severe headache and seizure. She experienced severe headache, vomiting and visual disturbance before 3 monthes. The diagnosis of intracranial hypertension was confirmed by increased cranial pressure(cerebrospinal pressure 560 mm H2O) in the absence of any abnormal radiologic findings of the brain. Physical examination showed papilledema and malar rash. The serologic test of ANA, RA factor and Anti-dsDNA antibody were positive which confirm the diagnosis of SLE. **Conclusion** : We described a 16-years-old woman whose first clinical manifestation of SLE was pseudotumor cerebri syndrome.

2

Evolution of Clinical Features in Huntington's Disease : A 6 Year Follow-up Observation

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Background & Objectives : The clinical triad of Huntington's disease(HD) includes inheritance, chorea and dementia. Besides generalized chorea that is the most prominent movement symptom, various other movement abnormalities are also often accompanied. Moreover, these symptoms and signs are changed as HD progressed. Although many cases with Huntington's disease have been reported in Korea, long-term follow-up observation of those patients have not yet been made. Here we present a patient with genetically-confirmed Huntington's disease who showed remarkable change of clinical manifestation during 6 year follow-up. **Case Report** : In 1993, a 37 year old man was admitted to Yonsei Medical Center because of generalized chorea and personality change which developed 4 years before and progressed thereafter. On neurological exam, he showed generalized involuntary movement persisting while waking, mild dysarthria and dysphagia, and postural instability. He also was mildly dementic that his Wechsler Intelligence Scale was 73. During follow-up at OPD, his chorea became more severe as the time passed despite of remarkable increase of Haloperidol up to 12mg/day. Postural instability and bulbar symptoms were also progressed. After five years of follow-up, his symptoms were being changed that the amount of involuntary movements became lessened. Follow-up neurological exam was performed in May, 1999, that revealed minimal chorea only in supine position, but prominent bradykinesia and rigidity, and upper motor signs including ankle clonus. Triple nucleotide repeat test confirmed the clinical diagnosis of HD. **Conclusion** : This case provides good information about the evolution of clinical manifestation of HD from early to late stage.

3

MERRF with Features of Leigh's Syndrome : A Case of Mitochondrial 8344 MERRF Mutation

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Background & Objectives : MERRF is a subgroup of mitochondrial diseases and many patients with MERRF have the point mutation of mtDNA at 8344 bp. 8344 mutation of mtDNA is also associated with other diseases including Leigh's syndrome(LS). **Case** : A 23-year-old man who had been diagnosed as MERRF 2 years ago admitted due to aggravation of his myoclonus and ataxia after febrile illness. The day after admission, he felt respiratory difficulty and later he showed central hypoventilation. The T2-weighted brain MRI showed symmetric lesions on periaqueductal gray matter which was similar to LS with central hypoventilation. He died 5 months

ater. **Conclusion** : This case shows that features of LS would be caused by increased metabolic requirement in case with MERRF with 8344mtDNA mutation.

4

H-1 MR Spectroscopy Findings in Wilson's Disease: The Evidence of Direct Neurotoxicity as Another Pathophysiological Mechanism

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Background & Objectives : In Wilson's disease(WD), he lenticular nuclei, particulary the putamen, are primarily affected due to accumulation of excessive copper. The white matter involvement was reported uncommonly with unclear nature of the lesion. Magnetic resonance spectroscopy(MRS) was performed to compare the nature of lesions between the basal ganglia and white matter. **Case** : A 29-year-old man was diagnosed WD at the age of 15 and had been treated with D-penicillamine. He admitted due to secondarily generalized seizures without any aggravation of neurologic signs. MRI showed increased signal intensity(SI) in T2WI in right frontal area, which was responsible for the seizure. This finding was contrast to those of hypointense SI in bilateral globus pallidus and substantia nigra in T2WI but no significant signal changes were noted in T1WI in the same area. These MRI findings are uncommon in WD, which is one of the subgroup reported in literatures but give us the opportunity to consider the possibility of another pathophysiological hypothesis. MRS findings revealed decreased N-acetylaspartate(NAA) to creatine(Cr) ratio in both basal ganglia and right frontal white matter compared to contralateral side even though the SI of those areas in T2WI was definitely different as we mentioned above. We thought that these would be another pathophysiological mechanism for neuronal damage, which was direct neurotoxicity in addition to the neuronal loss by degenerative change due to the accumulation of copper. **Conclusion** : We report MRS findings which could be suggestive of the evidence of direct neurotoxicity without definite neuronal loss as another pathophysiological mechanism in a case of WD who showed uncommon SI in MRI finding.

5

Clinical and Electroencephalographic Characteristics of High dose Kainic-acid induced Status Epilepticus

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Background & Objective : We correlated behavioral features with the EEG characteristics of systemic KA-induced status epilepticus(SE) which is not fully standardized yet. **Methods** : Seventeen male Sprague-Dawley weighing 150-220 grams were used. SE was induced 5-7 days after placement of epidural electrodes, using 13mg/Kg kainic acid i.p.. EEG was monitored and the behaviors were continuously observed until the end of SE. **Results** : Mild limbic seizures of facial clonus and head nodding were repeated after initial akinesia which was apparent within minutes of KA injection. Each limbic seizure rapidly progressed into moderate seizures of bilateral upper extremity clonus, rearing which cycled about 3 to 7 minutes. These cycles were interrupted by period of akinesia. Each cycle was merged as SE progressed, finally long rhythmic cycles with no interrupted akinesia ensued. More vigorous limbic motor seizures of rearing, falling, and jumping were followed. After these vigorous motor seizures, rats entered subtle SE. 535.4(221-706) minutes after the initial injection, all the rats recovered. In the EEG, akinesia and discrete seizures mostly consisted of intermittent flat periods with low voltage irregular sharps/spikes. With the lapse of time, each cycle was prolonged and was followed by less severe EEG activity of low amplitude intermittent sharp waves. Continuous ictal discharges with flat period, and PEDs were coincided in a single cycle. Even during subtle SE, rhythmic cycles were consisted of PEDs and continuous spike/sharp waves. PEDs were gradually replaced by spike/sharp waves and rats recovered from SE. **Conclusion** : As with behavior, EEG sequence in systemic KA-induced SE was composed of series of rhythmic cycles, in which we could find characteristic EEG patterns of SE.

6

A Case of Brachial Plexitis after Varicellar Zoster Infection

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Background & Significance : Varicellar zoster virus can be reactivated to cause peripheral nerve destruction and inflammation with neuronal loss and necrosis in the dorsal root ganglion. We report a case of brachial plexus neuritis after varicellar zoster infection without root involvement. **Case** : A 67-year-old woman visited our clinic with acute onset of monoparesis on her right arm(Grade II). The patient experienced severe pain and vesicular formation on her right upper arm 5 days earlier. It was diagnosed as herpes zoster. On the electrophysologic study, no potentials in right axillary motor nerve was noted, and decreased NCVs and amplitudes of the musculocutaneous motor and sensory nerve were observed. Insertional activities in the biceps, brachioradialis, deltoid, rhomboid, and pronator teres muscles were increased. Denervation potentials and polyphasic motor unit potentials were noted in the deltoid, biceps and rhomboid muscles, although the paraspinal muscle EMG was normal. After 4 months of follow-up, her motor weakness and pain were not improved. **Conclusion** : This case shows that herpes zoster can cause brachial plexus neuritis involving the motor and sensory nerves.

7

Orbital Pseudotumor Presenting with Unusual Isolated Inferior Rectus Muscle Palsy

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Background & Significance : Orbital pseudotumor is a benign idiopathic inflammatory disorder without identifiable local or systemic cause. Clinical manifestation is characterized by exophthalmos, lid or conjunctival edema, decreased ocular motility, ptosis, and pain or other inflammatory signs. Only isolated extraocular muscle palsy without other ocular manifestation is rare finding of orbital pseudotumor. Etiology is granulomatous inflammation by sacoidosis or Wegener granulomatosis and inflammatory response to infection with tuberculosis, syphilis, and mycosis or parasites. Orbital trauma can elicit granulomatous inflammatory reaction rarely. **Case** : A 31-year-old woman was presented with diplopia. Two years prior to admission she had diplopia which was improved with steroid treatment. Eleven years ago, she had a history of facial bone fracture by traffic accident. Neuro-ophthalmologic examination showed only the left inferior rectus muscle palsy. Orbital CT scan revealed a reactive granulation tissue in the left inferior part of the orbit without bone destruction. The diplopia was completely relieved after steroid treatment. **Conclusion** : This case of orbital pseudotumor is presented with recurrent attack of diplopia, isolated inferior rectus muscle palsy, and favorable response of the steroid treatment which is caused by orbital trauma.

8

Vertebrobasilar Infarcts in Patients with Previous Isolated Vertigo

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Background and Objectives : The identification of patients with vertebrobasilar insufficiency as the cause of isolated vertigo is important because it is not a benign course. We evaluated clinical characteristics, site of the ischemic lesion, the location of the corresponding vascular lesion and the etiology of vertebrobasilar infarcts in patients with previous isolated vertigo. **Methods** : We selected patients who had presented with frequent episodes of isolated vertigo for at least days before vertebrobasilar stroke between Jun 1, 1996 and May 30, 1999. We used MRA to assess posterior circulation in 151 patients with vertebrobasilar infarct, together with MRI and echocardiogram. **Results** : We found 29 patients who had previous isolated vertigo before vertebrobasilar infarct. Most of these patients had episodic vertigo(all lasting minutes) for from one day to seven days before vertebrobasilar infarct. Cerebellum was the most common infarcted site(16 patients) followed by

pons or brainstem with cerebellum(every 5 patients). 17 patients had one of two abnormal patterns on MRA : focal or widespread vertebrobasilar stenosis. MRA finding was compatible with infarcted site proven by MRI in 15/17 patients. 12 patients had the other likely etiology : presumed small-artery disease associated with chronic hypertension in 3 patients, cardiac embolism in 2 patients and undetermined in 7 patients. **Conclusion** : Our finding suggested isolated vertigo can be the only forecast manifestation of vertebrobasilar infarct. MRA is helpful for evaluation of patients with isolated vertigo because the high frequency of severe intracranial large-artery disease in these patients.

9

A Case of Fahr's Disease Presenting with Hemiparkinsonism and Complex Partial Seizure

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Background & Significance : Fahr's disease is a type of intracerebral macroscopically visible calcifications which are vascular nonarteriosclerotic bilateral calcifications of striatum, pallidum, cortex, centrum semiovale and dentate nucleus. these characteristic features may support the diagnosis easily by neuroradiological means, not neurological one, if not calcium metabolism disorders such as hypoparathyroidism pseudohypoparathyroidism and pseudopseudohypoparathyroidism. it presents clinically as a complex syndrome of choreoathetosis, tremor, ataxia, dementia, parkinsonism and seizure. **Case** : A 74 year old male presents with a chief complaint of initiation difficulty of left leg and resting tremor of left arm and leg over 4 months and he had also complex partial seizure recently. Brain CT and MRI revealed massive symmetric basal ganglionic dentate calcifications and there was no evidence of calcium metabolism disoders on laboratory findings(normal serum PTH, calcium and phosphate) and morphologic features suggestive of Albright's hereditary osteodystrophy. **Conclusion** : We report a case of Fahr's disease.

10

Relationship of Pachymeningeal Enhancement on Brain MRI and CSF leakage on Radioisotope Cisternography in Patients with Orthostatic Headache : Is loss of CSF volume caused by CSF Hyperabsorption or Decreased Production?

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Backgrouond : Orthostatic headache(OH) is a cardinal symptom of low CSF pressure headache. Other characteristics are extensive pachymeningeal contrast enhancement(PCE) on brain MRI and CSF leakage(CSFL) on radioisotope cisternography(RIC). Although the mechanism of OH has not been clarified yet, loss of CSF volume reflected by PCE has been suggested as a pathogenenesis according to Monroe-Kellie rule. We tested the following hypotheses : 1)OH is caused by loss of CSF volume, 2)CSF volume loss is caused by hyperabsorption of CSF or 3)by decreased production of CSF. **Method** : 19 patients with cryptogenic OH were recruited. In 18, lumbar puncture, brain MRI and RIC were performed. We evaluated duration of headache from onset to first evaluation, presence of PCE and CSFL. Firstly, we compared duration of headache between patients with and without PCE. Secondly, between the two groups, we analyzed difference in CSF fistula rate and in CSFL rate on RIC. **Results** : Mean duration(16.1±19.6) of OH in 13 patients with PCE was significantly longer than in those without PCE($P<.05$). CSF fistula was detected in 13 patients and CSFL was present in 16 patients. There was no significant difference in CSF fistula rate($P>.05$) and in CSFL rate between those with and without PCE. In 16 patients regardless of PCE, delayed appearance of radioisotope along interhemispheric and sylvian regions was shown on RIC. **Conclusions** : OH may be caused by CSF volume loss, however, whether CSF volume loss is caused by CSF hyper-absorption or decreased production remains to be clarified.

11

Rhinocerebral Mucormycosis ; Cases and Review

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Background & Significance : The rhinocerebral form of mucormycosis, an opportunistic fungal infection complicated by poorly controlled diabetes or immunocompromised patients, is characterized clinically by rapidly evolving oronasal and intracranial involvement and fatal course. **Case** : Two patients, with history of long-standing diabetes mellitus, presented with sudden blindness and multiple cranial nerve palsies. Composits of CSF were normal and MRI showed no abnormality except for pansinusitis in both cases. Biopsy of the necrotic lesion in oral or nasal cavity revealed typical funcgal hyphae. Rhizopus species were obtained by fungal culture. Despite aggressive antifungal therapy and surgical debridement in one case, they had no clinical improvements. **Conclusion** : We report the two cases of rhinocerebral mucormycosis with rapidly progressive multiple cranial nerve palsies and the typical mycotic feature in cultures.

12

A Case of Myasthenia Gravis(MG) Showing Markedly Abnormal Incremental Respsonse at the Tetanic Nerve Stimulation

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Background & Significance : Repetitive nerve stimulation test(RNST) is a vary useful diagnostic tool for neuromuscular junction disorder. Abnormal decremental response at the low rate of stimulation is a characteristic electrophysiological finding of the neuromuscular junction disorders. And markedly abnormal incremental response(usually above 100%) at the high rate of stimulation represents presynaptic neuromuscular junction disorder. But there has been no report showing markedly abnormal incremental response with tetanic nerve stimulation in MG or other postsynaptic neuromuscular junction disorders. **Case** : A 23-year-old woman was admitted to our hospital due to limb weakness and left eyelid ptosis. She didnot complain autonomic nerve system dysfunction symptoms. And neurological examination revealed mild proximal limb muscle weakness, drooping left eyelid and normoactive tendon reflexes. Tensilon test was positive. Serum anti-AchR antibody titer was 9.19 nmol/l, and anti-VGCC Ab was negative. Abnormal decremental responses were prominent in several muscles : from -29% to -61%. With 50Hz of tetanic stimulation, 159% of incremental response was calculated on anconeus muscle. Chest CT revealed thymic hyperplasia, and no demonstrable abnormal lesion was seen in lung parenchyme. Thymectomy was done. Pathological finding was follicular hyperplasia with large germinal centers. **Conclusion** : We report a case of MG showing markedly abnormal incremental response on anconeus muscle at the radial nerve tetanic stimulation.

13

Associated Autoimmune Diseases in Myasthenia Gravis

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Background & Objective : Patients with myasthenia gravis(MG) are not uncommonly suffered from the coincident autoimmune diseases(AIDs) such as hyperthyroidism, rheumatoid arthritis(RA), and systemic lupus erythematosus(SLE). However, the clinical data on the prevalence of AIDs in MG are scanty. We investigated the types and clinical characteristics of MG and associated AIDs. **Methods** : We reviewed the medical records of 156 MG patients who were treated in Chungnam National University Hospital from Jan. 1990 to May 1999. Prevalence of AIDs, clinical symptoms, response to the treatment of MG, specific type of MG were analyzed in the patients who had MG and AIDs simultaneously. **Result** : In twelve(7.6%, 5 men and 7 women) out of 156 MG patients had other AIDs. The AIDs associated with MG were hyperthyroidism(8 patients, 5.1%), RA(2, 1.2%), SLE and pure red cell aplasia(1 each, 0.6%) in the decreasing order. Most of the MG with hyperthyroidism were women (6/8). Seven out of eight patients associated with hyperthyroidism had ocular symptoms as their sole myasthenic symp-

oms, whereas four our of five patients with AIDs other than he hyperthyroidism showed generalized myasthenic symp-oms. In the patients with MG and hyperthyroidism, becom-ng euthyroid state generally needed longer period(1-6 years) han the patients without MG. **Conclusion** : Hyperthyroidism was the most frequent AIDs in MG patients and their symp-oms were less severe(Osserman classification GI). Hyperthyroidism associated with MG tend to be refractory han hyperthyroidism alone.

14

A Case of Herpes Zoster Infection in the Trigeminal Nerve Mandibular Branch

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Background & Significance : Herpes Zoster infection epresents the reactivation the latent infection of sensory ganglia of spinal and cranial nerve by the varicellar zoster virus. Among cranial nerve, trigeminal, and especially its opthalamic division is the most commonly involved. Herpes zoster infection along with mandibular division has been rarely reported. The following case demonstrates that n rare instances, only mandibular division of the trigeminal nerve maybe involved. **Case** : A 65-year-old woman was admitted because of severe burning headache. She has reg-ularly taken antihypertensive medication. And also she's overused medication in drug store for joint pain. Before admission, she has been treated in dental clinic for two weeks. A clinical examination showed hypesthesia over the distribution of the Lt. mandibular nerve and there were mucocutaneous vesicular formation on the same area. Routine blood examination were normal and screening for ANA, RA, CEA and alpha FP were all negative. The result of VZV(Varicella Zoster Virus) IgG and VZV IgM were 3.6(positive >0.9) and 0.4(positive>1.1), respectively. Blink reflex was done and showed left afferent pathway defect. **Conclusion** : We have described a rare case of her-pes zoster of the mandibular nerve in 65-year-old woman with osteoarthritis and hypertension. We should be aware of herpes zoster infection in patient with facial pain, partic-ularly if it is severe, sudden onset, associated with specific dermatome and in drug overused old aged patients.

15

Clinical Characteristics of Posttraumatic Epilepsy

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Background and Objectives : Posttraumatic epilep-sy(PTE) is one of the most common and serious compli-cations of head injury. Objectives of the study were to analyze clinical peculiarities of patients with PTE and to demonstrate the incidence of PTE. **Methods** : We ana-lyzed clinical peculiarities of 21 patients with PTE. According to seizure onset after head trauma, immediate PTE, early PTE, late PTE was classified. Severity of head injury was designated severe, moderate, and mild by Glasgow Coma Scale. We compared incidence of PTE with severity of head trauma. **Results** : Immediate PTE was noted in 3(14.3 %) patients. Two patient had recur-rent seizures. Five(23.7 %) patients had early PTE. Late PTE developed in 13(62 %) patients. Severe head injury was noted 7 patients(33.3%), moderate in 7(50.5%), mild in 3(14.3%). Late PTE have subdural hematoma(16%), traumatic intracranial hemorrhage(46%), and epidural hematoma & intracranial hemorrhage(38%). **Conclusion** : The severity of head trauma and the duration of coma did not influence the presence of PTE. Only intraparenchymal lesions have demonstrated a significant correlation with a greater incidence of later seizures.

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Amyotrophic Lateral Sclerosis Combined with Hashimoto's Thyroiditis : A Case Report

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Background & Significance : Although the etiology and pathogenesis of ALS is unknown, increasing evidence sup-ports a role for autoimmune mechanisms in motor neuron degeneration and death. Clinical evidence for an autoim-mune etiology of ALS has been indirect and circumstantial

but includes an increased incidence for some autoimmune diseases(especially thyroid disease) in patients or their first degree relatives. Significance evidence has accruded suggesting that antibodies to voltage-gated calcium channel are observed in some patients with sporadic ALS and that such antibodies alter the function of these ion channels in vitro and in vivo. Therefore, the coexistence of immune disease in ALS supports that an altered immune system may contribute to disease pathogenesis. **Case** : A 55 year old women was admitted to our department due to dysarthria and weakness of lower extremity. Four months before admission she had developed dysarthria, mild dysphagia, muscle weakness. She had had a history of diabetes and taken oral hypoglycemics since 3 years ago. On physical examination, she showed a thyroid enlargement. On neurological examination, she showed a tongue atrophy, muscle weakness, thena atrophy, fasciculation, and increased deep tendon reflex.Cytological findings of thyroid were compatible with Hashimoto's thyroiditis. Muscle biopsy findings were compatible with motor neuron disease. Thyroid function tests showed a euthyoid state. **Conclusion** : Our case showed a finding of ALS combined with Hashimoto's thyroiditis. And, the simultaneous presentation with ALS and Hashimoto's thyroiditis led us to consider whether this was simply a chance association or not.

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Magnetoencephalographic Analysis of Epileptic Foci in Patients with Seizure Disorder

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Background and Objectives : Some patient with epilepsy who are intractable for antiepileptic medication and/or have structural lesion may benefit from epileptic surgery. The most important thing of epileptic surgery is which area is exact epileptic foci. Magnetoencephalography(MEG) have provided additional accurate information of epileptic activity and anatomical information on magnetic source image(MSI) makes clinician to enhance diagnostic and therapeutic approach. We evaluated diagnostic value of MEG for epileptic surgery in two patients with epilepy. **Methods** : We investigated the interictal epileptic activity with a 122channel whole head magnetoencephlography(Neuromag-122, Neuromag Ltd.) with simultaneous EEG recording. The single dipole model was used for dipole estimation. And it was mapped the epileptic activity on a three dimensional MRI image. **Results** : The current dipole of interictal EEG spike were localized in right inferior frontal, temporal and left temporal area of postoperative epileptic patient and revealed in left temporal area in another patient. **Conclusion** : MEG may provide useful information in epileptic case. In clinical application, we can manipulate surgical plan more accurately. And also, MEG as a noninvasive method is more comfortable way of reevaluation in unsuccessful postoperative epileptic patient.

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A Case of Respiratory Failure after Recovery of Cholinergic Crisis in Organophophate Poisoning : The Intermediate Syndrome

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Background & Significance : Acute neurotoxic effects during the cholinergic phase of organophophorus insecticide poisoning and delayed neurotoxic effects appearing two to three weeks later are well recognized. The intermediate syndrome of organophophate poisoning arises in the time interval between the acute cholinergic crisis of fasciculations and muscle weakness and the delayed neuropathy attributed to inhibition of the neuropathy target esterase. **Case** : A 37 years old male ingested organophophate(fenthion) incidentally. After apparent recovery from the cholinergic crisis with a conventional therapy but before the expected onset of delayed polyneuropathy, the respiratory failure appeared suddenly with paralysis of proximal limb muscles, neck flexors, and several motor cranial nerves 25 hours after poisoning, after a well-defined cholinergic phase. This patient need mechanical ventilatory support and recovery from the intermediate syndrome was complete. The clinical manifestation and elelctrophysiologic study support the clinical diagnosis of intermediate syndrome. **Conclusion** : Intermediate syndrome relates to the severity of poisoning not the specific organophophate and to prolonged inhibition of acetylcholinesterase activity

of the erythrocytes, brain and muscle endplate with pre and post synaptic impairment of neuromuscular transmission. It is not related to an incipient delayed neuropathy.

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Isolated Rest Tremor is a Parkinson Disease

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Background and Object : As Parkinson disease(PD) is a degenerative disease, its early manifestation can be very deceptive. In clinical practice, we encounter patients with fragments of parkinsonism and wonder whether these patients are early cases of PD or not. Rest tremor is considered more than a cardinal feature and almost diagnostic of PD. In clinical practice, there have been cases of isolated rest tremor and they were suspected as a PD variant. Brooks et al showed that isolated rest tremor with minimal additional parkinsonian feature had decreased F dopa uptake thereby supported this suggestion. However, their patients showed poor response to antiparkinson drugs or even not tried. **Cases** : We experienced two cases of isolated rest leg tremor. A 55 year old female patient had prominent rest tremor in the right leg and showed mild right hand clumsiness. Other major features of PD such as bradykinesia or rigidity were not present. The second 68 year old female had only rest tremorn in the right leg without any additional parkinsonian symptoms or signs. Their brain MRIs were normal. [I123] beta CIT SPECT studies revealed decreased uptake in the contralateral striatum more decreased at the posterior portion. Their symptorms were relieved by antiparkinson medication. **Conclusion** : Isolated rest tremor is a PD.

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The Risk Factors Related to the Mortality of Generalized Convulsive Status Epilepticus

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Background & Objective : Status epilepticus(SE) is one of the most common neurologic emergency, causing a wide spectrum of clinical symptoms associated with significant morbidity and mortality. SE may be due to acute neurologic conditions such as encephalitis, meningitis, stroke, intoxication, antiepileptic drug withdrawl(AEDW), hypoxia, and head trauma. Except forAEDW, it may be present as the first manifestation of epilepsy. Despite improvement in the management of patients with SE, mortality is still high.Therefore, we evaluated the risk factors related to mortality and morbidity in patients with SE. **Methods** : We retrospectively reviewed the clinical course of 69 patients treated for generalized convulsive status epilepticus at the Dong San medical center from Janaury 1990 to July 1999. We evaluated following risk factors related to mortality and morbidity : previous epilepsy history, age,etiology, arriving time, time interval from onset to treatment, control of seizure, need for artificial ventilation, and need for anesthesia. **Results** : Overall case mortality and morbidity were 15.9% and 21.7 % respectively and these in first-ever seizure group were 81.8% and 41.7%, respectively. The risk factors related to the mortality were first-ever seizure(P=0.01), infection of CNS(P=0.01), need for ventilation(P=0.00), need for anesthesia(P=0.00), and uncontrolled seizure(P=0.00), wherase cerebrovascular disease was significantly related to the morbidity. **Conclusion**s : Based on this retrospective study, the risk factor related to SE is first-ever seizure presenting as SE, infection of CNS and poor response to treatment

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Mainly Upper Extremity form of CIDP

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Background : Most patients with CIDP have symmetrical weakness and sensory abnormalities, predominantly in lower extremities. And multifocal motor neuropathy usually shows asymmetrical weakness of upper extremities without significant sensory change. We are going to report a patient with sensorimotor demyelinating neuropathy, which is predominant in upper extremities clinically and electrophysiologically. **Case** : A woman aged forty five was admitted with a three-month history of tingling sense in her fingers of both upper extremities. One week before admission she developed tingling sense in perioral area, followed by flexion weakness of right fourth digit. Neurological examination did not show any motor weakness except flexion weakness of DIP joint of right fourth finger. Deep tendon reflexes are normal throughout except absent ankle reflexes. Nerve conduction studies showed demyelinating sensorimtor polyneuropathy which is predominant at upper extremities. One month after a 5-day course of IVIg, she did not complain of any tingling sense in fingers ,and did not show any motor weakness of the right fourth finger. The follow-up nerve conduction study one month later after IVIg treatment showed much improvement but still showed demyelinating evidence in upper extremities. **Conclusion** We consider this patient as having a variant of CIDP.

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Mutation Analysis of the Gene for Copper-zinc Superoxide Dismutase in a Patient with Familial Amyotrophic Lateral Sclerosis.

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Background & Objectives : Amyotrophic lateral sclerosis(ALS) is a progressive paralytic disorder resulting from the degeneration of motor neurons in the brain and spinal cord. Mutations in the copper/zinc superoxide dismutase 1(SOD-1) gene have previously been identified as the underlying cause of approximately 20% of FALS cases. we have sought to determine whether such mutations in SOD-1 underlie ALS cases in Korea. **Methods** : We have amplified the exons and introns (flanking regions) of the SOD-1 gene by polymerase chain reaction and direct sequencing of PCR products were performed. **Results** : One patient showed a mutation in the downstream intron of exon 4. Single base pair(A) is inserted between 13th and 16th base pair from the 3'-end of exon 4. **Conclusion** : This mutation appeared to be novel, however, the underlying mechanism whether it results in a SOD-1 protein dysfunction or a silent mutation need to be explored.

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A Case of Atypical Cogan's Syndrome

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Background & Significance : Cogan's syndrome consists of non-syphilitic keratitis, recurrent Meniere-like attacks and various systemic manifestations. We report a case of atypical Cogan's syndrome manifested with eye and ear symptoms with chronic meningitis. **Case** : A 40-year old male presented with headache and fever with conjunctival injection. CSF pleocytosis and meningeal irritation sign were detected, and then he was treated with antibiotics. On ophthalomologic exam, episcleritis was revealed. Five months later he felt tinnitus, hearing loss and vertigenous sense with persistent headache and eye symptoms. On neurologic exam, bilateral papilledema, conjunctival injection, sensoryneural hearing loss and bilateral dead labyrinth on Caloric test were observed. CSF lymphocytosis, positive lupus anticoagulant, and elevated ESR and CRP were detected. He was treated with prednisone after solumedrol pulse therapy. Headache and conjuntival injection were makedly improved, but moderate hearing difficulty persisted. **Comment** : Since usually there is an interval of several months between eye and ear symptoms, diagnosis of Cogan's syndrome may be delayed. Early diagnosis of Cogan's syndrome is important, because the earlier the steroid therapy for the hearing

oss is initiated, the more the patient's hearing can be saved.

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Acute Pandysautonomic Neuropathy

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Background : Acute pandysautonomic neuropathy(APN) s an uncommon clinical entitiy involving vasomotor, sudomotor, pupilomotor, secretomotor and other autonomic systems. Both sympathetic or parasympathetic fibers are nvolved with relative preservation of somatic sensory and motor function. Although APN shares several clinical features with GBS, it is not clear whether APN is a subvariety of GBS. We report two young patients with APN. **Case Description** : Patient 1 was a 18-year-old girl with recurrent fainting spells. Patient 2 was a 23-year-old man sufferring from unexplained nausea and vomiting. Both had a history of previous upper respiratory infection. They presented with gastroparesis, anhydrosis and orthostatic hypotension. Mild numbness and tingling sense was present, but motor power was intact. Neurologic examination showed bilateral tonic pupil, decreased pain and vibration sense, and absent tendon reflexes. Nerve conduction study indicated diffuse sensorimotor polyneuropathy. Nerve biopsy in patient 2 revealed axonal degeneration. After conservative management, gastrointestinal symptoms were improved in patient 2, however, patient 1 suffered from the symptoms lasting more than several months. **Comment** : These cases suggest that postinfectious dysautonomic symptoms in young patient may indicate the diagnosis of APN. Although the natural course is generally benign, accurate diagnosis and proper management may be mandatory for the better clinical outcome.

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Migrational Disturbances of Neocortex in Medial Temporal Lobe

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Background and Objectives : Hippocampal sclerosis is the principal pathology of medial temporal lobe epilepsy. Migrational disturbance of temporal neocortex is also known to be associated with hippocampal sclerosis. But its incidence and clinical significane is unknown. **Methods** : One hundred-three patients with temporal lobe epilepsy who underwent temporal lobectomy were included in this study. Hippocampal and temporal neocortical specimen were examined with H&E staining. All patients had definite hippocampal sclerosis. The presence or absence of migrational disturbance(microdysgenesis or cortical dysplasia of Taylor type) was determined by a neuropathologist blind to other clinical data. The effect of pathology on surgical outcome was also evaluated. **Results** : 90 cases (87.4%) had pathology of microdysgenesis on temporal neocortex. Cortical dysplasia of Taylor type were found in three cases. The observed patholgoy of microdysgenesis are as follows in the order of frequency; scattered heterotopic neurons in the white matter, subpial gliosis, cortical dyslamination, neuronal clustering, abundant corpora amylacea, increased neurons in cortical molecular area, loss of polarity of neurons, and subcortical heterotopic nodules. The presence of microdysgenesis did not correlate with poor surgical outcome. And any form of microdysgenesis did not correlate with poor outcome, either. But two of three of patients with severe cortical dysplasia had poor surgical outcome(Engel class III). **Conclusions** : Microdysgenesis of temporal neocortex was common pathology of medial TLE. It did not affect surgical outcome. But severe cortical dysplasia of temporal cortex might be related with poor surgical outcome.

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Dopamine Transporter Imaging as a Differential Diagnostic Tool in Parkinsonian Patients with History of Manganese Exposure

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Backgroud and Object : Manganese exposure can cause parkinsonism. Pathology is mostly in the lenticular nucleus, and does not involve presynaptic nigrostriatal system. Kim et al. reported a case of manganese-induced parkinsonism with characteristic clinical features, and supported the diagnosis by normal F-dopa PET study. **Cases** : Two patients were referred to us for the question of manganese-induced parkinsonism. They had a long history of occupational manganese exposure. Their MRI showed findings consistent with manganese exposure. However, their clinical features were very typical of idiopathic Parkinson disease. Furthermore, their parkinsonian features appeared years after manganese exposure. Therefore, CIT-SPECT was done and showed severe reduction of striatal CIT binding. **Comments** : We conclude that we should be cautious in making a positive diagnois of manganese-induced parkinsonism with a history of manganese exposure and positive MRI alone. The diagnosis should be supported by appropriate clinical history, examination, and dopamine transporter imaging/F-dopa study .

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Acute Bacterial Meningitis in Children and Adults : Causative Organism, Clinical Characteristics, Prognosis

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Background & Purpose : Many epidemiologic and microbiologic investigations have reported the variability in disease risk in different populations and races. Even with advances in the development of many powerful antimicrobial agents, and with increased nocomial infection, the development of resistant organisms, bacterial meningitis still remains a serious cause of morbidity and mortality in children and adults. However, basic epidemiologic information on bacterial meningitis in children, adults is lack. Therefore, We need to investigate the causative organism, clinical maniffestation, progosis in Korean children and adults. **Methods** : We analyzed retrospectively 148 medical records with final dianosis as bacterial meningitis. The dianosis of bacterial meningitis were based on culture-positive cases. **Results** : Of total 148 patients, 71 were chidren and 77 were adults. In children of community acquired meningitis, infection-related meningitis was the most common predisposing factor(23.3%). In adults, acute and chronic otitis media was the most common(21.7%). There was more frequent seizure in children than adults.(38.1%, 17.1%, $p<0.05$). In community-acquired meningitis, Streptococcus pneumoniae was the most common. However, in nosocomial meningitis, gram-negative bacilli was the most common. The prognostic factor associated with mortality rate in adults was the old age(>50 years), seizure($p<0.05$), mental change($p<0.001$). **Conclusions** : Our study will help to treat properly acute bacterial meningitis whether in children or adults, in community-acquired or nosocomial, although the causative organism is not documented.

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A Case of “Parkin” Disease in a Korean Female

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Background and Object : Kitada et al.(1998) reported a new gene defect causing autosomal recessive juvenile Parkinson disease in Japan. Since the report, reports have appeared that other ethnic groups show mutations in the same gene, and the phenotype is not limited to juvenile onset, signifying the importance of this gene. **Case** : As a part of systemic search for the genetic cause of Parkinsonism in Korean population, we screened the large deletion of Parkin gene in 40 young onset Parkinson disease(YOPD) patients. We identified a JPD patient with homozygous exon 4 deletion. This 20 year old girl presented with bradykinesia and tremor at age 12. She noted micrographia, leg dragging, and falling tendency. When seen at age 15, she had impassive face, mild rigidity worse on the left, bradykinesia, pos-

ural imbalance, and postural tremor. She did not have autonomic and cognitive changes. She had only mild sleep benefit. Her father died of motor vehicle accident at the age of 40. At the time of accident, he was reportedly normal. Her mother and younger brother are normal. She was started on Madopar 100mg qd and lisuride 0.2mg tid with complete resolution of neurological deficits. In 6 months, she developed wearing off. Madopar HBS 100mg bid and lisuride 0.4mg tid were prescribed with good response for 4 years. CIT-SPECT done at the age of 17 showed severe reduction of striatal CIT binding. Gene study showed homozygous deletion of Exon 4 of "Parkin" gene. This mutation was not seen in her mother and younger brother. CIT-SPECT done her mother showed specific striatal : occipital uptake ratio of 4.42 on the right and 4.57 on the left, which are just above the borderline uptake at her age. **Conclusion** : This case demonstrates that "Parkin" disease is present in Korean population and should be considered in a sporadic JPD.

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A Case of First Onset SPSE in Old Age Presenting as Pure Sensory Aura Continua of Limbic Origin

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Background & Significance : Nonconvulsive simple partial status epilepticus(SPSE) is a rare form of status epilepticus(SE). Among them the pure sensory aura continua of limbic origin is much more difficult to be experienced. This case is very interesting in terms of first onset nonconvulsive SPSE for this age group and in that the clinical semiology is pure sensory aura continua of limbic origin with mesial temporal signal change in MRI. **Case** : A 60-year-old right-handed women was admitted because of very brief frequent unpleasant foul odor, vertiginous sensation, and ascending nature of painful tingling sensation from both lower extremities for five days. Scalp EEG including nasopharyngeal electrodes and 2days CCTV-EEG monitoring confirmed frequent ictal discharges starting from the left mesial temporal structure which were timely concordant with clinical semiology. T2WI and FLAIR image in MRI revealed diffuse enlargement and increased signal intensity in left hippocampus and uncus which of the findings supports the possibility of the postictal change. Ictal SPECT(TC-ECD) also showed increased perfusion in left mesial and lateral temporal area including insula. Proton MR spectroscopy(MRS) was done. Those symptoms were effectively controlled by Carbamazepine monotherapy followed by parenteral phenytoin infusion. Follow-up EEG and proton MRS have been performed. **Comment** : We report a very rare case of first onset SE in old age presenting as pure sensory aura continua of limbic origin presenting which was confirmed with combined correlation of EEG, MRI, and proton MRS.

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Central Nervous System Involvement in Idiopathic Hypereosinophilic Syndrome

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Background and Object : In the hypereosinophilic syndrome(HES), neurologic involvement is common. Encephalopathy and storke are main clinical features, but there are few reports regarding its brain magnetic resonance image (MRI) findings. Most of previous studies correlated the endomyocardial fibrotic diseases of HES as the cause of thromboembolic stroke. We experienced some HES patients. They showed characteristic MRI findings which could be ascribed to the hypercoagulable state caused by eosinophilic granular proteins. **Method** : We included 5 patients who had persistent eosinophilia(>1500/μl) over 3 months, without definite cause of hypereosinophilia, and with clinical evidence of CNS involvement. **Resullts** : Clinical manifestations were encephalopathy in 3 patients, stroke-like manifestation in 2 patients. Brain MRIs commonly showed multiple nodular lesions along centrum semiovale and deeper white matter, which can be considered as border zone areas, and frontal cortex. In addition, 2 had bilateral temporooccipital lobe lesions with multiple cerebellar lesions in one patient. MR and cerebral angiography revealed no significant stenoses of extracranial and intracranial vessels. Cardiac evaluation including echocardiography showed no significant abnormal findings. They were treated with prednisolone, or cyclophosphamide/interferon. All patients nearly completely recovered except one who remained vegetative. Discussion and

Conclusion : In spite of different clinical manifestations , HES patients' MRIs showed similar findings. And MRI findings of embolic feature and failure to discover the embolic source favored thrombotic diathesis as a probable mechanism. This can be supported by recent investigations that major basic proteins and eosinophilic cationic proteins released from eosinophils can bind and inactivate thrombomodulin. Local intravascular thrombosis can occur without activated protein C, because the local balance between procoagulant and anticoagulant mechanism is broken.

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Does Electromagnetic Wave Enhance the Naloxone-induced Seizure?

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Background & Objectives : Applying naloxone to animals following chronic administration of morphine elicits an abstinence syndrome, including seizure. Since electromagnetic wave seems to enhance the dopaminergic transmission that is also activated by morphine, it was investigated whether this might be apparent in the EEG that was recorded telemetrically in awake rabbits. **Methods** : 10 healthy rabbits were exposed to electromagnetic wave(20 dBm & repeated dose) and their EEGs were recorded. After that, naloxone was given to experimental group. **Results** : In a moderated dose(20 dBm) electromagnetic : wave produced a desynchronisation and a general decrease of power in all of frequency bands except beta. After repeated administration of this dose(twenty daily 10 minute sessions), there were apparently no changes in EEG. When naloxone(0.25 mg/kg) was given to the 10 rabbits, 2 rabbits showed periodic theta rhythms and a clinical seizure occurred in a rabbit. **Conclusion** : The EEG changes suggest that electromagnetic wave can alter neuronal activities in the brain. The effects may be thermal in nature and microwave irradiation shares a common mechanism with physical and psychological stresses that also precipitate seizures.

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Diffusion-weighted MR Imaging in a Patient with Hypoxic Brain Damage

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Background & Objectives : It is well-known that vulnerable sites of hypoxic brain damage are globus pallidus and white matter, which are well-visualized with CT and conventional MR sequences. But diffusion-weighted MR imaging of hypoxic brain damage was rarely reported. We experienced a patient showing hypoxic brain damage involving bilateral perirolandic cortices in diffusion-weighted MR imaging. **Case** : A 79-year-old woman was admitted because of mental change, which occured during sleep due to exposure to LNG. Brain MRI of the patient showed high signal intensities on bilateral globus pallidus in both T2WI and diffusion-weighted image and revealed high signal intensities on bilateral perirolandic cortices in diffusion-weighted image but not in T2WI. **Conclusion** : We report a case of hypoxic brain damage involving bilateral perirolandic cortices. Diffusion-weighted MR imaging is more sensitive to acute cerebral cortical lesions in hypoxic brain damage than conventional MR sequences.

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CIDP in a Patient with Diabetes Mellitus and Chronic Renal Failure

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Background and Significance : Uremic, and diabetic neuropathies may closely resemble chronic inflammatory demyelinating polyneuropathy(CIDP) clinically. Electrophysiologically, those neuropathies may show some evidence of demyelination. So CIDP can be masquerading as uremic or diabetic neuropaties. We are going to report a case of CIDP patient with diabetes mel-

itus and chronic renal failure. **Case** : A 61-year old female patient has been suffered from chronic progressive tingling sense of her both feet and gait ataxia without significant motor weakness for several years. She was diagnosed as having diabetes mellitus in 1974 and has been treated with oral hypoglycemic agents or insulin since 1984. Early part of 1997, her clinician stopped medications for diabetes mellitus because she did not show hyperglycemia any more. At that time she was also diagnosed as having chronic renal failure and already could not walk by herself. Since March 1997 she has been on regular hemodialysis three times in a week. But she did not show any improvement in her neurological condition. We did nerve conduction study at early part of 1999, which showed some evidence of demyelination. So we treated her with deflazacort Febuary 1999. Three weeks later she could walk without assistance even though she showed some instability in her gait. **Conclusion** : It is important to think about the possibility of CIDP in a patient with diabetic or uremic neuropathies with some electophysiological evidence of demyelination, who does not show any improvement in his or her neurological states even after adequate treatments.

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Dopa-Responsive Dystonia : Two Case of Familial and Sporadic Dopa-Responsive Dystonia

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Background : The important clinical features of dopa-responsive dystonia(DRD) are onset of dystonia, usually affecting gait, in childhood : the concurrent or subsequent development of parkinsonian sign; and a dramatic therapeutic response to levodopa. We report the clinical features of two patients with fluctuating dystonia responsive to levodopa, and the survey of the family members. One family with 5 affected maternal family members and one patient with sporadic DRD was examined. **Case I** : A 11-year-old girl presented with difficulty in walking and weakness of his lower limbs for 3 years, especially towards the evening. Initial impression had listed by several examiners included spastic diplegia or cerebral palsy. We suggested the diagnosis of DRD when her parents reported that she had relatively no symptoms in the morning could walk to school without difficulty, but required physical support to walk home. DRD was finally diagnosed after a remarkable symptomatic response to levodopa. Her maternal family history revealed that all five affected members including her mother showed a wide spectrum of abnormal gait and parkinsonian features and good response to levodopa. **Case II** : A 10-year-old boy showed gait disturbance with toe walking, diurnal fluctuation and a dramatic therapeutic response to levodopa. His dopamine transporter imaging demonstrated normal C-11 WIN 35,428 binding in the bilateral caudate nuclei and putamen, a finding consistent with DRD. **Conclusion** : We report two childrens who showed the typical clinical characteristics of DRD, a consistent dopamine transporter imaging finding in one and was successfully managed with levodopa.

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Mitochondrial Neurogastrointestinal Encephalomyopathy(MNGIE)

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Background & Significance : Mitochondrial neurogastrointestianl encephalomyopathy(MNGIE) is clinically characterized by ophthalmoparesis, peripheral neuropathy, leukoencephalopathy, gastrointestinal symptoms(recurrent nausea, vomiting, or diarrhea) with intestinal dysmotility, and histologically abnormal mitochondria in muscle. **Case** : A 32-year-old female with aspiration pneumonia was consulted by department of respiratory internal medicine for intermittent nausea, vomiting and loose stool. She had a history of frequent nausea, vomiting, diarrhea, and borborygmi bowel sound since the age of 15. She was a generally cachectic appearance with short stature(151 cm in height, and 30 kg in weight). On neurological examination, external ophthalmoparesis with bilateral ptosis and quadriparesis with dominance in proximal muscles were present. She complained of subjective distal sensory impairment below both ankle joints. Level of lactic acid in serum was highly increased. The brain MRI(magnetic resonance imaging) showed a diffusely of increased signal intensity in the centrum semiovale and white matter with subcortical U-fiber. The MR Spectroscopy showed high

NAA peak, high lactic acid, and low choline peak. Nerve conduction velocity showed peripheral sensorimotor polyneuropathy. A few ragged-red fibers were found in the modified Gomori-Trichrome staining, and electromicroscopic finding showed characteristic intramitochondrial paracrystalline inclusions in a few muscle fibers and abnormal mitochondria embedded in the glycogen rich stroma. They showed several differently shaped rectangular lamellated paracrystalline inclusion. **Conclusion** : We report a case with MNGIE.

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Ocular Tilt Reaction according to Lesions of Graviceptive Pathway from Otoliths to Interstitial Nucleus of Cajal

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Background & Significance : Ocular tilt reaction(OTR) consists of skew deviation, ocular torsion, and head tilt, in which graviceptive pathway could be involved. Vertical diplopia from skew deviation is well described in brain stem lesions. The phenomenon can also result from peripheral vestibular lesions. **Cases** : We report three patients with tonic OTR due to upper or lower brain stem lesions and peripheral vestibular lesion. One patient with unilateral mesodiencephalic infarct had contraversive conjugate ocular torsion(OT), head tilt, and skew deviation. One with Wallenberg syndrome exhibited severe body lateropulsion and deviation of subjective visual vertical(SVV) ipsiversive to the lesion. One with acute vestibular neuritis showed ipsiversive OTR with monocular OT of lower most eye and deviation of SVV ipsiversive to the lesion. **Conclusion** : Deviation of SVV, lateropulsion of the body, and cyclorotation of the eyes are the perceptual, the ocular motor, and the postural consequences of a common lesion of central vestibular pathways that subserve the vestibuloocular reflex in the roll plane. Lateropulsion in patients with Wallenberg syndrome is interpreted as a postural consequence of an abnormal tilt of the internal representation of orientation in space. In patient with acute vestibular neuritis, OTR and tilt of the static visual vertical were interpreted as signs of an acute unilateral otolithic dysfunction.

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The Clinical Usefulness of Ictal SPECT in Temporal Lobe Epilepsy : The Lateralization of Seizure Focus and Correlation with EEG

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Background and Objectives : To analyze the relationship between ictal EEG and ictal SPECT and to evaluate the diagnostic usefulness of ictal SPECT as an independent presurgical evaluation technique. **Methods** : Sixty-eight patients with temporal lobe epilepsy who underwent temporal lobectomy, with good surgical outcome, were included in this study. Ictal SPECT was performed during video-EEG monitoring. The ictal EEG was analyzed in 5 second intervals from the initiation of the ictal rhythm. Lateralized EEG dominance was determined by the amplitude, frequency, or the regional patterns of ictal rhythm for each 5 second epoch. The total ictal EEG was divided into three periods : pre-injection(maximum 30 seconds), the initial part of post-injection(30 seconds), and the later part of post-injection(30 to 60 seconds) periods. The results of ictal SPECT were compared with lateralized EEG dominance of each period and at seizure onset. **Results** : Fifty-four of 68 ictal EEGs correctly lateralized seizure focus ipsilateral to the side of surgery. Ictal SPECT correctly lateralized the epileptogenic temporal lobe in sixty-one of 68 cases(mean injection time : 29.8 sec from the onset). By using multivariate analysis only the EEG dominance of the pre-injection period significantly correlated with the concordant hyperperfusion of ictal SPECT. Correct lateralization of ictal SPECT occurred in 11 of 13 cases with non-lateralized ictal EEG. **Conclusions** : Pre-injection neuronal activity seems to be important for the accurate interpretation of the hyperperfusded patterns of ictal SPECT. Ictal SPECT is an independent and confirmatory presurgical evaluation technique.

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A Case of Spinocerebellar Ataxia Type 6

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Background & significance : The spinocerebellar ataxia(SCA) type 6 was recently identified as a form of autosomal dominant cerebellar ataxia associated with small expansion of CAG repeats. According to the data from several published studies on SCA type 6, the CAG repeat numbers varies from 4 to 18 repeats on normal alleles and 21 to 30 on SCA type 6 chromosome. The clinical manifestation of patients with SCA type 6 is characterized by cerebellar ataxia and dysarthria. Many patients have horizontal gaze-evoked nystagmus, and some have limitation of eye movement on upward and lateral gaze. Imaging studies showed cerebellar atrophy with relatively sparing of the brain stem. **Case** : A fifty three year-old female presented with slowly progressive cerebellar ataxia, dysarthria and ossillopsia. She had horizontal gaze-evoked nystagmus. Family history was negative. Brain MRI revealed a moderate cerebellar atrophy, most prominent in the vermis with relative sparing of brain stem. Genomic polymerase chain reaction(PCR) analysis performed elsewhere showed increased number of CAG repeats. The patient carried 24 CAG repeats at the SCA6 locus. **Comment** : We report a sporadic case of genetically confirmed SCA type 6. Clinical manifestation and MRI finding in the case were similar to that of other foreign reports.

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Aphasic Status Epilepticus : Two Cases

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Background & Significance : Aphasic status epilepticus(ASE) is an uncommon presentation of a simple partial status epilepticus characterized by prolonged speech impairment with clinical-EEG correlation in the absence of an altered level of consciousness. We report two adult patients with prolonged aphasia and accompanying EEG abnormalities. **Case** : Total three episodes of ASE were documented in two patients. Patients were right-handed 58-year-old and 79-year-old women. Intracranial plasma cell granuloma involving left whole temporal lobe and old left temporo-parietal hemorrhage were intracranial causes of their ASE. Aphasic symptoms of these patients were characterized by difficult comprehension and jargon speech with clear consciousness. The duration of aphasia ranged 9-14 days. EEG showed continuous periodic lateralized sharp waves in one patient and discrete rhythmic theta to alpha avitivites in left temporo-parieto-occipital region in another patient. One patient treated with phenytoin and phenobarbital had recurrence with same electroclincial syndrome at 6 weeks later, the other patient did not develop further episode after phenytoin and carbamazepine at 2 year follow-up period. **Comment** : Although a rare condition in adults, ASE should be considered in the differential diagnosis of aphasia.

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Stroke in Hematologic Malignancy and Bone Marrow Failure Disorder

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Background : Various hematologic malignancies underlie a small proportion of all strokes. However, the etiology of stroke still remains uncertain in a large number of cases and clinical manifestation and outcome was not established. Patients and **Methods** : We retrospectively analyzed 4536 patients between 1994 to 1998 and selected 49 stroke patients. The mean age of stroke onset is 40.3 years among which 32 were male and 17 female patients. **Results** : Strokes is classified 20-intraparenchymal hemorrhage, 14 intracranial extracerebral hemorrhage and 15 ischemic infarct. Principal clinical pictures of intracranial hemorrhage were drowsiness and headache and of ischemic infarct were paresis and seizure. Multiple lobar hemorrhage and lobar hemorrhage were mainly observed(12/20) and cardioembolic infarct were 10/15 with evidence of non-bacterial endocarditis according to TOAST classification. Hemorrhagic strokes had poorer prognosis than ischemic strokes in neurologic outcome

scale. Stroke incidence in disseminated intravascular coagulation(DIC) was 15.1 per cent. However, low platelet count did not influence hemorrhagic and ischemic stroke incidence. **Conclusion** : Strokes are more common in hematologic malignancies and approximately 36.7 per cent of patients die as direct result of neurologic problem. Among etiologies, DIC probably is the basic mechanism enrolled underlying this important complication and frequently cause multiple lesions in ischemic and hemorrhagic stroke. Ischemic infarcts revealed the more focal neurologic manifestation.

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Myasthenia Gravis after allogeneic Bone Marrow Transplantation

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Background and Significance : Approximately 30% of long term survivors of allogeneic bone marrow transplantation(BMT) develop chronic graft-versus-host disease (GVHD), a condition in which clinical manifestations are similar to autoimmune diseases. Myasthenia gravis(MG) is well-characterized autoimmune disease which, on rare occasions, is diagnosed to chronic GVHD also after BMT. We report first case of MG after BMT in KOREA. **Case** Description : A 38-year-old woman, affected by chronic myeloid leukemia, received a BMT from his HLA identical brother. A mild acute GVHD developed during the first months after BMT. A typical clinical and electrophysiological picture of MG developed 3 months after BMT requiring medication with pyridostigmine and immunosuppression. Laboratory finding including acetylcholine receptor antibody and other autoantibodies was negative. Cytomegalovirus was detected in patient's neutrophil. **Conclusion** : Since the donor had no evidence of MG or other autoimmune diseases, this is likely to be an autoimmune complication of chronic GVHD. Other cases described in the literature are reviewed : a recurrent expression or coexpression of some HLA was recorded, indicating some genetic factors could predispose to this acquired disorder. Also, in our case, cytomegalovirus infection may be associated with certain immunologic phenomenon such as chronic GVHD.

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A Case of Fukuyama Congenital Muscular Dystrophy

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Background & Significance : Fukuyama congenital muscular dystrophy(FCMD) is an autosomal recessive inherited congenital muscular dystrophy with severe mental retardation. FCMD is endemic to Japan(incidence 7-12) and is rarely observed in other countries. We experienced a rare case of FCMD. **Case** : A 4-month-old infant was admitted to our hospital, who showed hypotonia, swallowing difficulty and developmental delay from birth. He had one elder brother and one elder sister. His sister achieved normal develpmental milestone but his brother had generalized weakness and mental retardation as like the patient and then died at 10 year-old. By taking history from his mother, the patient's intrauterine movement was decreased compared to his sister. But he wrinkled to light stimuli and had no ocular malfomation by ophthalmologic evaluation. Investigations showed normal nerve conduction, myopathic EMG and dystrophic changes on muscle biopsy. Brain MRI scan revealed diffuse cortical thickening, heterotopia and polymicrogyria. **Conclusion** : Although we could not confirm the genetic study, we could conclude the diagnosis of FCMD.

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Chronic Inflammatory Demyelinating Polyradiculoneuropathy in a 13-year-old Girl with Pes Cavus Deformity

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Background and Significance : Chronic inflammatory demyelinating polyradiculoneuropathy(CIDP) is a rare disease in children. When presented with hypertrophic peripheral nerves and pes cavus deformity, it is difficut to distiguish from hereditary neuropathy. We report a case of childhood CIDP with pes cavus deformity which had

been diagnosed by history, elctrophysiologic study, sural nerve biopsy and clinical improvement after treatment. **Case** : A 13-year-old girl visited our clinic because of progressive gait disturbance and muscle weakness of the lower extremities over the 1 year. Family history for gait disturbance or foot deformity was negative. On exam, pes cavus deformity was noted on both feet and tendon reflexes were absent. The Romberg test was positive with moderate gait ataxia. The nerve conduction study demonstrated marked slowing of conduction velocities, prolonged distal latencies and conduction block in median, ulnar, posterior tibial and peroneal nerves. Cerebrospinal fluid study showed increased protein content(57mg/dl). Sural nerve biopsy revealed distinctive lymphocytic infiltration in endoneurium with diffuse demyelination. After a course of high dose IVIg(400mg/kg) and subsequent corticosteroid treatment, definite improvement was seen both clinically and electrophysiologically. **Conclusion** : Although CIDP is much rare in childhood than in adulthood, it does occur in children. The recognition of this entity is important as it may mimic hereditary neuropathies presenting progressive gait disturbance with pes cavus deformity. A careful history taking, clinical examination and electrophysiologic study is crucial for the accurate diagnosis of this treatable disease.

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Juvenile Type Acid Maltase Deficiency in Brothers

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Background & Significance : Acid maltase deficiency (Pompe's disease) is an autosomal recessive disease caused by the deficiency of lysosomal acid maltase resulting in lysosomal accumulation of gylcogen. We report a case of biochemically proven juvenile type acid maltase deficency in brothers. **Case** : A 19-year-old man suffered from slowly progressive general weakness since his infacncy. He showed general muslce weakness with muscle wasting and positive Gower sign, high serum creatine kinase level. Although clinical myotonia was lacking, the needle electromyography revealed prominent myotonic discharge in association with myopathic changes. On frozen muscle sections, multiple vacuolar changes were seen which is PAS and acid phosphatase positive. He was confirmed to have acid maltase deficiency by biochemical enzyme assay using frozen muscle sample[acid maltase : 0.3(controls : 7.3+2.2), neutral maltase : 12.7(controls : 18.1+5.1)]. Paraffin-muscle sections of his elder brother, who suffered same symptoms and died of respiratory failure 5 years ago at age 19 in our hospital, revealed same pathological changes in retrospective reviews. **Conclusion** : The acid maltase deficiency can be divided into 3 subtypes according to its age of onset and clinical features - infantile, juvenile and adult types. Unlike the infantile type, which is the most common, the juvenile and adult type present with purely myopathic feature which are clinically indistinguishable from muscular dystrophy. In such cases, electrical myotonia is an important clue and frozen muscle biopsy with acid phosphatase stain is diagnostic. It is also important to recognize its association with respiratory failure which is frequently reversible with the optimal ventilatory and nutritional support. This is the first case of biochemically proven juvenile type acid maltase deficiency in Korea.

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Multifocal Conduction Block in Vasculitic Neuropathy

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Background & Significance : The presence of conduction block in nerve conduction study is generally accepted as an indicator of demyelinating neuropathy. However, we recently had a patient with rapidly evolving necrotizing vasculitis who showed multifocal conduction blocks in both upper extremities as a predominant feature in nerve conduction study. **Case** : A 62-year-old man presented with rapidly progressive weakness and tingling pains in all extremities which had got worsen for 1 month. He had a symmetrical distal leg weakness/sensory loss and asymmetric upper extremity weakness associated with multifocal sensory deficits. The deep tendon reflexes were only elicitable in both triceps muscles. On nerve conduction study, multifocal conduction block was found in both median and ulnar nerves without dispersion phenomenon. On second day after admission, purpuric skin lesion developed and the sural nerve biopsy revealed evidence of vasculitis associated with predominant axonal degeneration. At the following study 10 days

ater, the conduction block disappeared with worsening of distal compound muscle action potentials. **Conclusion** Although conduction block in general is a unique feature of demyelination, our case proves it also can occur in cases of rapidly evolving vasculitic neuropathy which is pathologically axonal in its nature. In our case, ongoing vasculitic nerve infarction seems to be responsible for the conduction block rather than demyelination associated with transient ischemia.

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Diagnostic Sensitivity of Several Muscles in Repetitive Nerve Stimulation Test for Myasthenia Gravis

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Background & Objectives : It is well known that repetitive nerve stimulation test(RNST) is much more sensitive to proximal muscles than distal muscles for diagnosis of myasthenia gravis(MG). We performed the study to know the most sensitive muscle between several muscles and types of MG in RNST. **Methods** : The study population consisted of 39 MG patients classified by modified Ossermann's classification. Using Stalberg's method, RNST was systemically performed in facial(orbicularis oculi and nasalis) and upper extremity(flexor carpi ulnaris, abductor digiti quinti and anconeus) muscles. **Results** : Although there were no statistically differences of the postive decremental response between orbicularis oculi and nasalis muscles, the facial muscles showed more prominent decremental response than upper extremity muscles in type I MG($p<0.05$). In type IIa MG patients, there were no significant statistical differences between facial and upper extremity muscles but statistically significant differences among upper extremity muscles. Among the 3 muscles of upper extremity, positive decremental response of anconeus muscles was significantly higher than other two muscles($p<0.05$). In type IIb MG patients, there were no significant statistical differences in all tested muscles in spite of increasd positive decremental response of RNST. **Conclusion** : On the basis of this study, RNST may be initially performed in orbicularis oculi or nasalis muscles in type I MG, in anconeus muscle in type IIa MG, and in abductor digiti quinti muscle in type IIb MG patients.

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Two Cases of The Symptomatic Dystonia Complicated by Tuberculous Meningitis

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Background & Significance : Symptomatic dystonias, which are related to the various types of the focal cerebral lesions involving basal ganglia, thalamus, and brainstem, have been reported before. Tuberculous meningitis complicating vasculitis and tuberculoma can gives rise to the focal lesions in these structures. **Case** : The two patients, who were diagnosed tuberculous meningitis by cerebrospinal fluid analyses, represented with cervical dystonia during the course of treatment. One was 16 year-old female with the tuberculous arachnoiditis, and the other, 56 year-old male with the hydrocephalus. The brain MRIs revealed evidences of the vasculitis and granuloma. Soon after corticosteroid therapy, their dystonias were somewhat relieved. **Conclusion & Comment** : We report and analyse the two cases of symptomatic dystonias caused by the tuberculous meningitis with focal cerebral involvement. As nonviral intracranial infections can form the focal brain lesions, certain extrapyramidal features may provide important clues about causation in the patients with the meningitis.

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A Case of Brain Abscess Associated with Vibrio Vulnificus

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Vibrio vulnificus, a ubiquitous virulent gram-negative organism, is a cause of fatal septicemia in immunologically compromised or chronically ill, particularly those patients who have liver cirrhosis. V vulnificus septicemia in patients with an underlying disease had been reported quite well in the literature, but V vulnificus meningitis or brain abscess associated with V vulnificus were very rare and had not been reported. We report a case of 65-year-old man with liver cirrhosis who had brain abscess associated with V vul-

nificus infection 3 days after eating raw seafoods. He was admitted because of severe headache, chills, nausea, abdominal pain and decreased mentality. Abdominal examination revealed a diffusely tender abdomen and physical signs of ascites. CSF examinaton identified the causative organism as V vulnificus, but this organism was not found from the blood. Contrast-enhanced T1-weighted MR image showed multiple, round, small hypointense abscess cavities with enhanced abscess capsule in the white matter. After antibiotic treatment, he had recovered without any disability.

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Central Pontine Myelinolysis Associated With Hypoglycemia

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Background and Significance : Central pontine myelinolysis(CPM) is a demyelinating disease mainly affecting the basis pontis, although other parts of the nervous system can be involved. The symptoms of CPM is rapidly evolving quadriplegia, dysarthria, and pseudobulbar palsy and varying degree of altered consciousness. CPM has been described mainly in association with rapid correction of hyponatremia, being reported both with hyponatremia and hypernatremia, hypokalemia, liver transplantation, renal transplantation, severe liver disease, chronic alcoholism, malnutrition, anorexia nervosa, and hyperemesis gravidarum. Severe hypoglycemia produces a variety of neurological symptoms, such as inability to concentrate, confusion, seizures, and coma. But CPM related to hypoglycemia is rare. **Case** : A 69-year-old female presented with altered mentality. She had been suffered from diabetes mellitus and managed by insulin. Neurological examination revealed comatose mentality, quadriparesis and bilateral extensor plantar response. But pupillary reflexes, extraocular movements of the eyes and corneal reflexes were intact. Blood glucose was 23 mg/dl, Na 145 mEq/l, serum osmolality 292 mosm/kg. A brain MRI showed diffuse high signals in the basis pontis in T2 weighted image consistent with CPM. During admission, blood glucose was normalized. About 1 week later, her symptoms were much improved. **Comment** : We report a case of central pontine myelinolysis associated with hypoglycemia.

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A Case of Parkinsonism in Alcohol Withdrawal

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Background & Objectives : Parkinsonian features associated with bilateral basal ganglia lesion can be caused by several disorders. There are Wilson's disease, toxic encephalopathy(esp. methanol induced), head trauma, infections, vascular diseases, hypoxic brain injury and mitochondrial cytopathy etc. Alcohol intoxication or withdrawal is one of rare precipitating or changing factors in parkinson disease. **Case** : We have recently experienced a case of severe parkinsonism occurred in alcohol withdrawal. A 41-year-old man suffered from bradykinesia, general rigidity, microphonia several days after cessation of chronic alcohol consumption. Brain MRI revealed bilateral basal ganglia necrosis and cortical atrophy. Other possible causes of parkinsonism associated with bilateral basal ganglia lesion were excluded by clinical and laboratory findings. **Conclusion** : We present a case of permanent alcohol withdrawal parkinsonism with bilateral basal ganglia lesions.

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A Case of Postconcussional Cerebellar Ataxia

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Background & Objectives : Acute and transient cerebellar dysfunction following head injury has been rarely reported in the literature. Cerebellar concussion causes cerebellar dysfunctions by synergistic effects of traumatic damage and ischemia. **Case** : We present a patient with transient cerebellar dysfunction following head trauma. Acute cerebellar signs, such as ataxia, nystagmus, and dysarthria, occurred just after head trauma and resolved gradually. Cerebrospinal fluid, computed tomography and magnetic resonance imaging studies could not demonstrate cerebellar lesion, although SPECT revealed perfu-

sion defects in the cerebellar region. This findings distinguish cerebellar concussion from cerebellar contusion. **Conclusion** : We report a case of a patient with transient cerebellar dysfunctions after concussion.

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Two Cases of Numb Cheek Syndrome

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Background & Significance : Isolated facial numbness usually indicates involvement of the trigeminal sensory system. The numb cheek syndrome, isolated cheek and gingival numbness, has many causes. This is a serious neurologic symptom, because it may suggest an underlying neoplastic etiology. **Case** : Two patients developed facial numbness. The first patient had headache and left cheek numbness which were associated with cavernous sinus tumor. The second patient had isolated left cheek numbness which was complicated with previous trauma. The fracture involved inferior orbital fissure. **Comment** : It is possible that the lesion related with numb cheek syndrome could be located at various parts of the trigeminal nerve branchs, mainly at infraorbital nerve. We identified these patients with brain MRI. These cases led us to conclude that in addition to neoplasms, various benign diseases involving branches of trigeminal nerve could develop numb cheek syndrome .

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A Case of Acute Cerebral Infarction Developed After Wasp sting Anaphylaxis

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Background & Significance : The variety of systemic and neurologic complications from anaphylaxis have been known. We experienced a patient of acute cerebral infarction after wasp sting, and thought that it was anaphylatic reaction to a wasp sting. Several mechanisms, including immune mediators and hemodynamic alteration, have been postulated. **Case** : The patient felt severe dyspnea immediately after wasp sting. Two hours after wasp sting, he was transfered to ER with altered mentality and right hemiparesis. Brain MRI showed hemorrhagic infarctions at both basal ganglia. The right hemiparesis improved by steroid therapy, but cognitive dysfunction persisted over 1 year. **Conclusion** : The suspected mechanisms include immunologic reaction of the wasp's venom, excessive sympathetic innervation to carotid artery, and transient initial hypotension. The immunologic mediators of venom, such as leukotriene and thromboxane, are vasoconstrictive and thrombogenic. The face and neck inflammation is suspected to aggravate arteritis through abundant sympathetic innervation to terminal branch of carotid artery.

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Reversible Focal Signal Abnormalities on MRI after Prolonged Partial Seizures Associated with Hyperglycemia : Two Cases of Subcortical Hypointensity on the T2WI

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Background & Significance : Reversible MRI abnormalities during and following the status epilepticus or prolonged seizures have been well reported. The findings were characterized by hyperintensity on T2WI at various regions. On the contrary, hyper or isointensity on T1WI and hypointensity on T2WI at basal ganglia were reported in hemichorea or ballism caused by hyperglycemia. Partial seizures associated with hyperglycemia are not rare, but MRI findings of these conditions have not been reported. For the first time, we report MRI findings in two patients with hyperglycemia induced prolonged partial seizure. **Case 1** : A sixty-two year-old female patient with diabetes presented with sudden onset of frequent eyeball and neck deviation to the left side. She took antiepileptic medication irregularly since she had one episode of seizure and transient right hemiparesis four years ago. On admission, her blood sugar was 458mg/dl. MRI revealed focal hypointensity on T2WI on dorsolateral frontal subcortical area, which was not present in previous MRI that was conduct-

ed four years ago. Her symptoms disappeared with successful control of blood sugar. **Case 2** : A sixty-seven year-old male was hospitalized for visual hallucination and phosphene on his left visual field with neck deviation to the left. His blood glucose level was 604mg/dl. MRI showed hypointensity on T2WI in broad area of right temporo-occipital white matter, predominantly on the occipital subcortical area. These changes disappeared in the follow-up MRI after the seizures subsided. **Conclusions** : We postulate that reversible focal MRI abnormalities in partial seizures associated with hyperglycemia may have same pathomechanism of hemichorea or ballism caused by hyperglycemia. It is probably due to gliosis, paramagnetic effect, or selective neuronal death in vulnerable sites for hyperglycemia. We first report these MRI changes in prolonged partial seizure associated with hyperglycemia.

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Recurrent Coma due to Thyrotoxic Encephalopathy

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Background & Significant : Among the neurologic complications of thyrotoxicosis, coma is seldom observed. The present case concerns a patient with recurrent coma as presenting symptom of a thyrotoxicosis with well responsive steroid. **Case** : A 63-year-old man was admitted to our hospital in comatose state.Dexamethasone was started with the presumptive diagnosis of brainstem infarction. In the 3rd day after admission he became marked improvement of mental state, agitation, tremor, visual hallucination and sinus tachcardia. There was a history of comatose state before one month. Routine hematologic and biochemical blood test were normal and echocardiography showed no evidence of cardiac embolic source.The serum T3 and T4 levels were elevated,TSH level was reduced below normal value. The EEG demonstrated left hemispheric slowing, maximal in the fronto-temporal region. Brain CT showed no abnormal structural lesion. The introduction of PTU and propranolol was then followed by a reduction of the dexamethasone. Eventually the patient was stabilized on prednisolone. **Conculusion** : We report a case of throtoxic encephalopathy with recurrent coma, stroke like symptom, normal Brain CT ,and diffuse EEG abnormalities that was successfully managed with steroid.

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Chorea-Ballismus with Hyperglycemia in Diabetes Mellitus

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Background & Objectives : Involuntary movements are sometimes caused by hyperglycemia. Neuroimaging(CT, MR, and single-photon emission CT[SPECT]) revealed abnormal signal change in corpus striatum on MRI, and blood flow change in striatum & thalamus on SPECT. **Method & Results** : Four diabetics presenting involuntary movements had brain imaging. 2 patients had bilateral choreoballismus, and 2 patients had hemichorea on the left side. Two had CT and MRI, and another two had CT or MRI. One had SPECT examination. CT studies in 3 of 4 patients showed hyperdense striatum(bilateral in 2 patients, right in 1 patient). T1-weighted MR images in 3 patients showed hyperintense lesions in striatum(bilateral in 2 patients, right in 1 patient). In one patient who had hemichorea on the left side, the brain SPECT revealed hyperperfusion at right thalamus and left cerebellum. All patients showed nearly complete resolution after correction of hyperglycemia. Some neuroleptic drugs are used. **Conclusion** : In patients presenting involuntary movements due to hyperglycemia in diabetes mellitus, CT and T1-weighted MR images showed unilateral or bilateral lesions of striatum. These imaging findings corresponded to the side of involuntary movement.

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Inclusion Body Myositis : Atypical Clinical Presentations

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Background & Significance : The clinical hallmark of

nclusion body myositis(IBM) is early weakness and ıtrophy of the qaudriceps and volar forearm muscles and slow progression with normal or mildly elevates serum CK level after the age of 50. **Case** : We experienced a 51-year old woman who presented initially proximal weakness on both lower extremities and then rapidly progressed to proximal upper extremities weakness and dysphagia for 1 month. Serum CK and LDH were elevated and muscle specimen from quadriceps femoris demonstrated nonspecific chronic inflammatory cell infiltration in endomysium and focal atrophy without rimmed vacuole. However randomly oriented abnormal intracytoplasmic filamentous inclusion was noted on electron microscopic examination. She showed poot response to prednosolone. **Comment** : We suggest that the clinical spectrum of IBM is wider than previously appreciated

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Post-Irradiation Multiple Cranial Nerve Palsies

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Background & Significance : Radiation may induce various neurologic complication especially for treatment of tumor. Cranial nerve palsies are uncommon complications of radiotherapy for head and neck cancer. We experienced the radiation-induced cranial nerve palsy in a patient with nasopharyngeal cancer. **Case** : A 60-year-old male complained of paresthesia on tongue, dysarthria, and difficulties in mastication and manipulating food in his mouth for 2 years. He had a history of nasopharyneal carcinoma, with bilateral radiotherapy treatment 8 years ago. The neurological examination revealed bilateral hypoglossal nerve palsies with wasting and weakness of the tongue and masication weakness, predominantly right side. Brain magnetic resonance imaging with gadolinium enhancement showed high signal intensity on T2-weighted images in white matter of bilateral anterior temporal lobe with gray matter sparing, partially focal enhancement. Bilateral hypoglossal and trigeminal nerve lesions were noted by nerve conduction study and needle electromyogram. **Conclusions** : We should follow up patients after radiotherapy for head and neck carcinomas and be alert to late sequelae, among which cranial nerve palsies can be fatal.

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Rapid Progression of Cerebral Hemiatrophy after Epilepsia Partialis Continua

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Background & Significance : Cerebral hemiatrophy associated with epilepsy is a rare condition and numerous congenital or acquired cases have been reported. Dyke-Davidoff Masson syndrome, perinatal asphyxia, and congenital vascular anomalies are the congenital diseases. Rasmussen's encephalitis, hemiconvulsion-hemiplegia-epilepsy syndrome, brain tumor, and postencephalitis are the acquired diseases showing cerebral atrophy with epilepsy. We report the unusual case showing rapidly progressive cerebral hemiatrophy after partial status epilepticus. **Case** : A 20-year old male who had a history of generalized tonic-clonic seizure for eight years, was admitted due to continuous partial seizure in left upper and lower extremity lasting for about 24 hours. Physical examination revealed a left hemiparesis, increased reflexes on the left side and MRI showed no significant abnormal findings. Seizure was controlled with administration of carbamazepine and vigabatrin. Three months later, left sided hemiparesis was still remained and rapidly progressive cognitive dysfunction was found. Rapidly progressed cerebral hemiatrophy when comparing with previous MRI performed 3 months ago, was noted. Brain biopsy and CSF study was performed for the diagnosis and to exclude Rasmussen's encephalitis. Microscopically, severe cortical atrophy and the loss of neuronal cells were showed and there was no perivascular infiltration. SPECT demonstrated decreased perfusion in the affected right cerebral hemisphere and deep gray matter. **Conclusion** : We report the case of a 20 year old man who showed rapid progression of cerebral hemiatrophy after epilepsia partialis continua.

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A Case of Probable Adult Onset Leigh Syndrome with Characteristic Clinal and MRI Findings

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Bacground & Significance : Leigh syndrome(subacute necrotizing encephalomyelopathy) is a progessive neurodegenerative disorder of heterogenous genetic etiologies which is usually of infancy and early childhood. But rarely, ts onset is in adulthood and the clinical manifestation is quite different from that of early onset. **Case** : A 34-year-old man was admitted at the department of neurology of HYUH, because of motor weakness and involuntary movements in the extremities, especially in right side which developed before one month. On past history, hypertension was diagnosed at the age of 18 and 1st attack of generalized tonic clonic seizure occurred at the age of 23 which recurred several times thereafter, and occasional dystonia and myoclonic jerk developed since he was 29-year-old. His mother and his older sister died of unknown disease which consisted of intermittent seizures and progressive neurologic deficits over several years. On neurologic examination, hemiparesis, hypesthesia, mild dysmetria, decomposition on the right side and truncal ataxia were revealed. Myoclonic jerky movement of extremities of both sides was found. The routine laboratory studies were within normal limit. Unique findings(bilaterally symmetrical high signal changes in the red nucleus and globus pallidus) was showed in the brain MRI which were compatible with Leigh syndrome. Level of lactate was 37.90mg/dl(normal; 4.5-19.8) in the serum and 23.30mg/dl(normal; 3-12) in the cerebrospinal fluid(CSF). Level of pyruvate was 1.50mg/dl(normal; 0.3-0.7) in the serum and 1.50mg/dl(normal; 0.3-0.7) in the CSF. Findings of the muscle biopsy were compatible with mitochondrial disease. After considering all the features, we clinically diagnose that patient was consistent with Leigh syndrome, and coenzyme Q, thiamine were medicated. The patient recovered over a month and discharged but the symptoms of intermittent dystonia and weakness persisted. **Conclusion** : We report a rare case which is strongly supposed to be a adult onset Leigh syndrome with a characteristic clinical and MRI findings.

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A Case of Cerebral Metastatic Synovial Sarcoma Initially Misdiagnosed with Arteriovenous Malformation(AVM)

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Background & Significance : Synovial sarcoma is a rare mesenchymal origin tumor and primarily occurs in the paraarticular regions of the extremities. Cerebral metastasis is rare even in the poorly differentiated histologic form. We report the unusual rare case of cerebral metastatic synovial sarcoma initially presenting as a solitary huge lobar hemorrhage mimicking AVM rupture. **Case** : A 31-year old healthy male was admitted with sudden headache, vomiting, and left sided weakness. Brain CT revealed a right parietal lobar hemorrhage. Under the impression of AVM rupture, angiography was performed, but no abnormal vascular anomalies were noted. With rapid neurologic deteriorations, diagnostic and therapeutic hematoma evacuation was done. There was no pathologic evidence of AVM or malignancy. Five days later after hematoma removal, postoperative CT showed the newly developed enhanced mass lesion which might had been compressed due to hemorrhage. Second operation was performed to exclude the possibility of metastatic cerebral lesion associated with the lung mass initially presenting benign nature. Pathologic confirmation was obtained as poorly differentiated synovial sarcoma with hemorrhagic brain metastasis. **Conclusion** : We report a patient who have the primary synovial sarcoma in lung and hemorrhagic metastatic brain tumor initially misdiagnosed with AVM. As a rare etiology of hemorrhagic metastatic tumor, synovial sarcoma should be included in differential diagnosis.

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Clinico-topographical Characteristics and Recovery Pattern of Partial Oculomotor Nerve Palsies in Midbrain Lesion

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Background & Objectives : The topographic arrangements of oculomotor fascicle while coursing through midbrain have been debated. Ksiazek(1994) have proposed a three dimensional topographic model of oculomotor fascicle. We hypothesized that the paretic pattern of extraocular muscles and their recovery courses might be different in each type where the lesion site is above/below or medial/lateral to oculomotor fascicle. We analysed the different pattern of oculomotor palsies and their recovery in the patients with midbrain lesion. **Methods** : Five patients showing isolated partial oculomotor nerve palsy and having definite midbrain lesion were selected. Midbrain lesions were classified into as follows : superior(lesion involving red nucleus), inferior(lesion at the level of inferior colliculus), medial(medial to red nucleus), lateral(lateral to red nucleus) and mixed type. **Results** : The distribution of partial oculomotor nerve palsies were as follows : superior type-2, mediosuperior-2, lateral -1. In two subjects of superior type, inferior rectus(IR) was involved in all patients, and pupillary involvement was noted in one. In the patients with mediosuperior type, levator palpabrae(LP), pupillary constrictor(P), medial rectus(MR) and inferior rectus(IR) were involved, but elevators(SR,IO) were intact. Among the involved muscles in mediosuperior type, first improvement begun in LP, and next was in IR, P. The MR was remained as paretic state for a long time. Elevator(IO, SR) and LP palsies were noted in lateral type and LP improvement was more rapid than elevators. In summary, IR was always involved in superior type and elevators involvement was prominent in lateral type, and combined paresis of depressor, MR and P was important finding in medial type. **Conclusion** : These results suggest that partial fascicular oculomotor palsies and their recovery are differently manifested depending on the lesion site of midbrain.

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A Case of Eclampsia with Irreversible Neurological Deficits

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Background and Significance : Hypertensive encephalopathy and eclampsia share similar pathophysiologic mechanisms. Presumptively, vasogenic edema and vasospasm have been proposed to account for supposed mechanism and majority of patients develop reversible neuroimaging findings and neurological manifestations. Although vasospasm is generally known as pathophysiologic mechanism in eclampsia, angiographic findings of vasospasm were rarely reported. This case showed permanent neurologic deficits. We confirmed cerebral vasospasm by angiography. **Case** : A 31-year-old woman developed symptoms consistent with eclampsia. The neurologic manifestations include generalized seizure, behavior disturbance, Balint syndrome, Gerstman's syndrome, cognitive dysfunction, and motor weakness of right lower extremity. An MRI demonstrated extensive, diffuse T2 hyperintense signal abnormalities involving subcortical white matter and adjacent gray matter with a posterior predominance. Cerebral angiography showed diffuse vasospasm. Six month later, neurologic manifestations are partially recovered. **Conclusion** : We report a rare case of eclampsia showing diverse unusual neurologic manifestations and irreversible neurological deficit, and confirmed cerebral vasospasm by conventional angiography.

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A Case of POEMS Syndrome

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Background & Signifigance : POEMS syndrome is a multisystem disease that presents polyneuropathy, organomegaly, endocrinopathy, immunologic problem(plasma cell dyscrasia), skeletal involvement, skin change and anasarca. Its pathophysiology has not been established yet and the incidence is rare. We experienced a case of POEMS syndrome

with difficulty for initial diagnosis because of only peripheral neuropathic manifestation. **Case** : A 54-year female was transffered from local clinic for evaluation of dyspnea and blurred vision after in-car accident. One year ago, she was diagnosed as Gullain-Barre syndrome presenting with weakness of lower extremity and she recovered with receiving IV immunoglobulin. But 2months later from that, her weakness was recurred and then chronic inflammatory demyelinating polyneuropathy was considered as a diagnosis for her symptom combined with electrophysiologic study. She was treated with steroid and distal weakness of lower extremities was improved incompletely. When she was reffered to our hospital, she revealed all the symptoms related with POEMS syndrome such as pericardial & pleural effusion, ascites, hypothyroidism and skin change. Serum electrophoresis showed monoclonal gammopathy. After diagnosis was confirmed, she was treated with steroid and melphalan. **Conclusion** : This is unusual case of POEMS syndrome which presented with remitting and relapsing course of peripheral demyelinating neuropathy and the late clinical manifestation of other systemic symptom.

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Subacute Combined Degeneration in Patient with Gastrointestinal Surgery

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Background & Objectives : Subacute combined degeneration is a metabolic disorder of the spinal cord due to vitamin B12 deficiency. We describe magnetic resonance imaging(MRI) findings of a typical case of subacute combined degeneration, which was induced by total gastrectomy. **Case** : A 72-year old man was admitted with both upper extremities weakness and abnormal sensory. 9 years ago, he was diagnosed as having stomach cancer. He was performed total gastrectomy with splenectomy. The complete blood cell counts and morphology revealed megaloblastic anemia. Nerve conduction study(NCV), electromyography(EMG) and somatosensory evoked potentials(SEP) showed diffuse sensorymotor peripheral neuropathy. Cervical magnetic resonance imaging(MRI) showed an increased T2-weighted signal, and decreased T1-weighted signal of the posterior columns of spinal cord. He was treated with vitamin B12 supplements and experienced gradual improvement in his clinical symptoms. **Conclusion** : If abnormal sensation and muscle weakness was developed after gastrointestinal surgery, Subacute combined degeneration should be considered in the differential diagnosis. In magnetic resonance imaging(MRI) findings, Subacute combined degeneration may produce an increased T2-weighted signal, and decreased T1-weighted signal of the posterior and lateral columns of spinal cord, mainly of the cervical segment.

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Decremental Motor Responses to Repetitive Nerve Stimulation in ALS : Three Case Report

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Background : Abnormal decremental response on repetitive nerve stimulation test has been reported in amyotrophic lateral sclerosis(ALS). The decrement probably results from unstable neuromuscular transmission through immature nerve terminal sprouts or neuromuscular junctions but could also be caused by abnormal neuronal function. Its presense suggests that active disease, and the decrease is found almost exclusively in patients with rapidly progressive symptoms. **Case** : Three ALS patients showed significant decremental responses of 13-26% of two trapezius and one nasalis muscles on slow rate repetitive nerve stimulation(3 to 5 Hz) of accessory and facial nerves. **Conslusion** : We report three cases of ALS with significant decremental motor responses of trapezius and nasalis muscles on slow rate repetitive nerve stimulation.

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Clinical, EEG Characteristics and Prognostic Factors of Neuronal Migration Disorder with Epilepsy

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Background & Objectives : Neuronal migration disor-

ler(NMD) is commonly associated with seizure disorder. The clinical courses of epilepsy associated with NMD are quite variable, which need to be evaluated for their proper herapeutic planning. This study was conducted to investigate the relationship between the prognosis and clinical variables in epileptic patients found to have NMD by MRI. Patients & **Methods** : Forty nine patients(M 33, F 16) registered to the Yonsei Epilepsy Clinic found to have NMD n MRI. Among those 31 patients were followed-up regularly over 2 years and included to the further study. They were divided into the control group(CG) and refractory group(RG) according to their responses to AED therapy. Clinical data, EEG, and MRI were reviewed for the analysis of correlation. **Results** : Various types of migration disorders, including hetertopia(15), cortical dysplasia(16), schizencephaly(8), pachygyria(7), septo-optic dysplasia(5), lissencephaly(5), porencephaly(4), tuberous sclerosis(4), polymicrogyria(2), macrogyria(1), and megalencephaly(1) were identified(n= No. of disorders). Some patients had 2 or more NMDs and other cerebral malformations(e.q. agenesis of corpus callosum) or other somatic anomalies(e.q. delayed development, strabismux, cleft lip). Mean age of all patients was 25.0(10.5 and seizure onset age was 13.6(9.7. Among many clinical variables, older age onset was the only siginificant factor related with good seizure($p<0.05$). Neurologic deficit, history of febrile seizure, head trauma, encephalitis, status epilepticus or family history of epilepsy were not statistically different between the groups. Types of NMD did not affect the prognosis, ,either. Initial EEG findings were normal 55.6% of SCG and 30.7% of SG, and did not show difference. However, in seizure group the area of EEG abnormalities were wider than MRI lesions($p<0.05$). **Conclusion** : NMD s a heterogeneous group and the prognosis of epilepsy was related to the age of seizure onset. In RG the area of EEG abnormalities was wider than MRI lesions.

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Experience With Gabapentin for Neuropathic Pain

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Background & Objectives : Gabapentin is a novel anticonvulsant with a unknown mechanism of action. This oral antiepileptic agent has begun to be used successfully in some cases of neuropathic pain. This report presents an experience of gabapentin in the patients with intractable neuropathic pain. **Methods** : 18 patients with unrelieved neuropathic pain who visted the KangNam St. Mary's Hospitial between December 1998 and July 1999 were included in this study. The three pain rating scales ,five item symptom score scale, visual analogue rating scale, and McGill's score, were used to measure pain intensity and pain quality. The dosage of drug was ranging from 300 mg/day to a maximum of 2400 mg/day for about 3 months. **Results** : 17 of the 18 patients reported remarkable pain relieves after introduction of gabapentin. Two of eighteen patients complained side effects such as upper gastrointestinal symptoms and mild rash. These were tolerable or medically manageable. **Conclusion** : The results suggest that gabapentin may be a safe and effective treatment in the management of some cases of neuropathic pain.

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The Pilot study of Effectiveness of Mexiletine in Focal Dystonia

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Background & Objectives : Patients with adult onset focal dystonia are usually resistant to conventional medical treatment with anticholinergics or muscle relaxants. Recently, there have been reports that oral mexiletine was remarkabley effective in these patients. So, we studied the clinical efficacy of mexiletine, a derivative oral form of lidocaine, for treatment of focal dystonia. **Methods** : 16 patients with focal dystonia, who visited the KangNam St. Mary's Hospital between December 1998 and July 1999 were included in this study. The baseline and follow-up data after introduction of mexiletine included disability score and response score to treatment. Clinical improvement was obtained with oral doses ranging from 300-600 mg/day for about 3.2 months. **Results** : 14 of the 16 patients had decrease in the intensity and the frequency of the symptoms on follow-up, whereas the remaining 2 patinets reported no interval changes at follow-up. One patient developed upper gastrointestinal symptom and was tolerable. **Conclusion** :

We suggest that oral mexiletine therapy may be a safe and effective treatment for focal dystonia.

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Hypnic Headache is Probably a REM Sleep Disorder

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"Hypnic headache" is a rare headache disorder of the elderly. It presents as a recurrent nocturnal headache, diffusely localized or unilateral that frequently awaken patients from sleep at a constant time. We herein describe three new patients with hypnic headache and a polysomnography from one of them. The patients were 57, 69 and 74 years old. They were two women and one man. They described history of nocturnal headaches ranging from 5 to 7 years. Headaches were unilateral pulsatile, bilateral pulsatile, and diffuse non-pulsatile in each patient. Neurologic examination, routine laboratory and neuroimaging studies were unrevealing at the time of diagnosis. A polysomnography from one patient(57 years old man) showed that the hypnic headache attack occurred during a REM sleep stage. To our knowledge, this is the first ever report of polysomnographic findings in hypnic headache.

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Two Cases of Partial Oculomotor Nerve Palsy in Midbrain Infarction

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Traditionally, monocular parital oculomotor pareses are localized to the cavernous sinus or retro-orbital lesion from diabetic mellitus, aneurysms of the internal carotid artery, inflammation by vrial infection or autoimmune diseases, neuropathy or neuromuscular disesases. Although rare, the monocular partial oculomotor paresis also can be caused by lesions of ventral midbrain because of their particular topographic arrangement. We present 2 cases with fascicular oculomotor nerve involvement from midbrain lesion, who presented with monocular partial oculomotor nerve palsy. One patient showed partial ptosis and slow saccadic movement of the right eye. The other patient showed parital ptosis and limitation of adduction and elevation in the left eye. They had normal pupil size and light reflexes. Brain magnetic resonance images showed focal infarction in the fascicular portion of the oculomotor nerve.

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The Acute Effect of Tobacco Smoking on Cerebral Blood Flow

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Background & Objectives : There has been no consensus about the effect of acute smoking on cerebral blood flow. Our study was designed to determine the effect of cigarette smoking on cerebral blood flow in smokers. **Method** : The age-matched ten non-smokers and twenty smokers were studied. All subjects abstained from smoking and caffeine-containing products for at least 8 hours prior to testing. Their right MCA mean velocity was measured by trans-cranial Doppler monitoring. Insonation depth was set between 50-60mm. The smokers smoked one cigarette, and the non-smokers inhaled air through an unlit sham cigarette. Right MCA mean velocity was measured at before and 1 min, 5 min, and 10 min after sham or tobacco smoking. **Results** : There was no significant difference in baseline mean velocity between two groups. The smoking group showed significant elevation of mean velocity at 5min after smoking($P<0.05$), but non smoker group did not. At 10 minutes, mean-velocities of the both group were not different compared with baseline velocity. **Conclusion** : The acute smoking induced cerebral vasoconstriction for a few minutes after smoking, and this effect disappeared thereafter.

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A Case of Posttraumatic Pressure Suppressible Myoclonus

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Background & Significance : Although myoclonus is usually caused by lesions at various levels of the central nervous system, the myoclonus originated from peripheral nervous system has been rarely reported. In addition, stimulus suppressible myoclonus of peripheral origin is extremely rare. **Case** : A twenty three years old woman had mild contusion on right knee by vehicle accident one month before admission. One week later, she had jerky, arrhythmic, and involuntary movement of right thigh occurring at rest, not walking or sleeping. A hypoesthesia and dysesthesia involved right medial calf area, corresponding to the sensory innervation of the saphenous nerve. Pressure stimulus on right medial malleolus area suppressed the myoclonic movement, which started again immediately after cessation of the stimulus. EMG recording of right vastus intermedius muscle showed bursts of spontaneous activity at 4-5 Hz. NCV, EEG, brain and lumbar spine MRI, and psychiatric tests were normal. Pharmacological and placebo test did not affect the myoclonus. The symptom began to improve eight months later, and occurred only after vigorous exercise. **Conclusion** : This findings support that myoclonus can be originated from peripheral nervous system and can be supressed by pressure stimulus.

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A Study for Association between Migraine and Mensturation

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Background & Objectives : Although an association between migraine and menstruation in women has been well recognized, the clinical studies of the menstrually related migraine are rare in Korea. We studied an association between migraine and menstruation. **Method** : 73 Women(age; 14-55 years) attending our hospital from Sep. 1 1998 to Aug. 30 1999 were enrolled. All patients were surveyed by direct or telephone interview. Enquiries were made concerned the relationship of their attacks with menstruation, onset age of migraine, and type of migraine classified using the International Headache Society system. **Results** : Fifty-eight(79.5%, 58/73) of women migrainuer had menstrually non-related migraine and fifteen women migrainuer(20.5%) had menstrually related migraine. Only 4 patients(5.4%) had true menstrual migraine which of type was migraine without aura. In 11 patients(15%), 80 percent of their attacks occurred between 2 days before menses and the last day of menses, and all but one had migraine without aura. Age of onset of menstrually related migraine(mean 21 years) was earlier than of menstrually non-related migraine(mean 25 years). **Conclusion** : This study suggests that menstrually related migraine is not common, and its type is almost always migraine without aura. The validation of those findings in large prospective population based study remains to be determined

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Periodic Paralysis as the First Manifestation of Hyperthyroidism

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Background : Clinically, Thyrotoxic periodic paralysis(TPP) can be differentiated from Familial periodic paralysis(FPP) only by the manifestations that are directly attributable to the thyrotoxic state. In most reports from Asian nations, it is suggested that the thyrotoxicosis is usually very obvious at the time of presentation. However, more recent reports tend to emphasize the subtlety of hyperthyroid symptoms in many patients with TPP. **Case** : One patient was a 45-year-old male and the other was a 43-year-old male. Two patients visted the emergency room because of quadriparesis. They had been in excellent health until that time. Physical examination confirmed flaccid weakness in all extremities, absent deep tendon reflexed and no sensory deficits. They had no striking features of hyperthyroidism and no palpable goiter. Serum potassium were below 2mEq/L. Thyroid hormone mea-

surements showed normal thyroid function with T3, T4, FT4, except TSH were 0.01(0.3-3.5uU/ml). Radioactive Tc-99m uptake by the thyroid gland(RATU) were mildly increased(6.3%, 4.7%). Their symtoms were completely resolved after potassium administration. Several months later after first attack, the thyroid studies were obtained because of the patient's recurrent problems with periodic hypokalemic paralysis, and not because of any apparent clinical features of hyperthyroidism. Follow-up study revealed biochemical hyperthyroidism : increased levels of T3, T4 and FT4. Although they had been euthyroid by clinical examination and the T4 were normal, biochemical hyperthyroidism at the time of their recurrent hypokalemic symptoms were demonstrated by a suppressed TSH of 0.01uU/ml and mildly increased RATU. They were treated with propylthiouracil. and then they have not suffered any further symptoms of periodic paralysis for about one year. **Conclusion** : 1. Clnical features of thyroid disease may be very subtle or virtually non-existent : as a result, thyroid function tests should be routinely monitored when a patient over the age of 40 first develops typical periodic paralysis. 2. The usual laboratory indication of thyrotoxicosis, an elevation of thyroxine, is often lacking, In such instances, a depression of TSH and increased RATU by the thyroid gland(thyroid uptake Tc-99m) are the sole evidence for thyrotoxicosis.

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The Apoptosis Suppressor Gene Bcl-2 Expression after Transient Forebrain Ischemia in Mongolian Gerbil

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Background & Objectives : Delayed neuronal cell death was produced in the CA1 area of the hippocampus following 5 minutes of forebrain ischemia in adult gerbils. The apoptosis play a role in these processes. The apoptosis is suppressed by Bcl-2 gene. Immunohistochemistry to Bcl-2 was examined in ischemic gerbil and control(sham-operated). **Methods** : Transient ischemia of brain was induced in diethylether-anesthetized gerbils by both common carotid arteries pulling method for 5 minutes. The control group was sham-operated only. The apoptosis and Bcl-2 gene expression was observed by TUNEL stain and immunohistochemistry method at 1, 6, 24, 72, and 120 hours after 5 minutes of transient global ischemia. **Results** : In the H-E stain, some cytoplasmic shirinkage was observed in the CA1 area of the ischemic damaged hippocampus, but not in the control group. In the immunohistochemistry, bcl-2 gene was expressed 1, 6, 24, 72, and 120 hours in the cortex, hippocampus, and dentate gyrus. The gross nuclear morphology of neurons expressing bcl-2 appeared normal. **Conclusion**s : The Bcl-2 gene inhibits apoptosis and promotes cell survival. Intense Bcl-2 immunoreactivity was closely related to the acquisition of resistance to neuronal cell death after brief ischemia.

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Neuropsychological Changes after Temporal Lobectomy : At 1-year Follow-up

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Background & Objectives : To evaluate the neuropsychological changes after temporal lobectomy at 1-year follow-up. **Methods** : We compared the results of preoperative and postoperative neuropsychological data of 24 patients with temporal lobe epilepsy who had standard anterior temporal lobectomy. Each patients underwent standardized batteries including the KWIS and WMS-R. **Results** : 1) Nine patients(4 left, 5 right) improved significantly in Full-Scale IQ. 2) Women improved significantly in Full-Scale IQ and performance IQ whereas men did not show any significant change in IQ. 3) Left temporal lobe epilepsy patients improved significantly in visual memory and tended to improve in performance IQ whereas right side patients showed significant improvement in total IQ. 4) Degree of improvement in IQ and memory parameters was significantly correlated with baseline status inversely. 5) The patients with the longer duration of seizures tended to be more neuropsychologically improved rather than those with the shorter. **Conclusion** : Certain neuropsychological changes after temporal lobectomy may be depended on various clinical factors.

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Rhino-orbito-cerebral Mucormycosis Complicated with Intracranial Hemorrhage

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Background & Significance : Rhino-orbito-cerebral mucormycosis is an uncommon but fulminant fungal infection that occurs usually in debilitated or immune suppressed patients. Intracranial lesions mostly develop secondary to vascular injuries such as cavernous sinus or internal carotid thrombosis, and ischemic cerebral infarction due to arteritis. However, intracranial hemorrhage complicated by mucormycosis is very rare. We report a case of the patient with fatal complicaton of intracranial hemorrhage presumably due to arteritis by mucormycosis. **Case** : A 66-year-old female patient with uncontrolled diabetes mellitus developed complete ophthalmoplegia in her left eye for two days. Rhinoscopic examination revealed black necrotic turbinate. Orbital CT scan and Brain MRI showed soft tissue material at left orbital apex and mild deformities in left lateral cavernous sinus. On the basis of radiological evidence and biopsy, a diagnosis of mucormycosis was established, and the patient went under surgical debridement followed by Amphotericin B infusion. On the following day, she suddenly developed right hemiparesis and mentality became stupor. Immediate brain CT scan revealed a large intracranial hemorrhage in left frontal head region. Emergent removal of hematoma and biopsy was performed. Pathologic examination demonstrated fungal invasion of small arterial wall and acute inflammatory reaction of the surrounding tissue. **Conclusion** : In case of fulminant fungal infection involving CNS, an aggressive surgical and medical management is necessary.

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Reversable Upper Motor Neuron Findings in Patients with Hyperthyroidism

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Background & Significance : Several neurologic syndromes have been well established to be associated with hyperthyroidism. However, the pyramidal tract dysfunction is rarely reported among patients with hyperthyroidism. We present three cases of hyperthyroidism with reversible upper motor neuron findngs. **Case** : A fifty year-old women had suffered hand tremor, and “jumpiness” of her legs while she was putting her legs on the brake pedal for one month. She was diagnosed with C5~C6 disc herniation two year ago. Follow-up cervical MRI did not reveal exacerbated bulging disc or other changes over two years. Her thyroid function test showed hyperthyroidism. A 23 and 34-year-old men came to the emergency room due to recurrence of lower extremities weakness for one months. They were diagnosed with thyrotoxic hypokalemic periodic paralysis. They had brisk DTRs despite of muscle weakness, unsustained ankle clonus and Babinski’s sign. All the three patients were treated with anti-thyroid drugs. As their thyroid functions were normalized, their ankle clonus became less prominent, followed by disappearance of Babinski’s sign. **Comment** : Upper motor neuron signs in patients with hyperthyroidism seem to be reversible and they responded to anti-thyroid medication relatively well, though the mechanism unclear. It would be important to consider hyperthyroidism in patients with upper motor neuron signs that are not well explained.

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A case of Cerebral Infarction Associated with Essential thrombocytosis

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Background and Significance : Ischemic cerebral infarction is rarely associated with essential thrombocytosis(ET). Abnormalities in the number and function of platelets may contribute to thromboembolic complications in patients with ET. **Case** : A 71 year-old woman was admitted by right hemiparesis and dysarthria. She had previous vascular complications outside the cerebral vessels such as myocardial infarction, deep vein thrombosis and pulmonary arterial embolism. She was known to have ET and be taking hydroxyuria for 4 years. Brain MRI and MRA revealed left frontotemporal lobe infarction with hemorrhagic transformation and atherothrombosis in multiple large vessels. Thorough laboratory examinations could exclude other risk factors of ischemic stroke. **Comment** : We report a case of large artery atheroembolic stroke as well as multiple vascular complications associated with ET.

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Asterixis due to Phenytoin in Left Thalamic Infarction

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Background and Significance : Asterixis is a disorder of motor control characterized by irregular myoclonic lapse of posture. The causes have been known that bilateral asterixis are due to metabolic, toxic encephalopathies, phenytoin, and that unilateral asterixis are due to focal brain lesion, especially in the thalamus. We found bilateral asterixis in the patient with left thalamic infarction that phenytoin have been used by control for neuralgia. **Case** : We report a 60-year-old woman who showed bilateral asterixis(right side dominant). She felt sudden onset of sensory disturbance of right side and her brain MRI revealed left thalamic infarction. We used carbamazepine for control of neuralgia on the right extremities. After 15 days, the thalamic pain was improved, but dizziness and mental deterioration was occurred. We changed carbamazepine to phenytoin(300mg/day) to control neuralgic pain. After 30 days, involuntary arrhythmic flexion-extension movements were occurred on her both wrist joints(right side dominant). This symptom was aggravated at sustained posture, relieved by certain action and disappeared when resting or sleeping state. The serum NH3 and CO2 were within normal limits. The serum phenytoin level was 19.6‹F/mg. The EEG showed background 6-8 Hz waves and intermittent 2-3 Hz delta waves. The EMG showed that the interference pattern was interrupted by 50 to 70 m/sec electrical silences of agonist and antagonist muscles during posture maintenance. Her asterixis was gradually subsided about 20 days later after stopping phenytoin medication. **Conclusion** : The bilateral asterixis may be suggested phenytoin side effect and right side predominance was suggested due to left thalamic lesion.

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Brain Mapping of Memory Encoding and Retrieval in Patients with Medial Temporal Lobe Epilepsy by Using Activation Positron Emission Tomography(PET)

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Background & Objectives : Recently, researchers try to study higher cognitive brain functions through 15H2O PET with success especially in the field of memory. However, studies by now have focused only on the normal functional mapping and those in pathologic states are rare. Thus, we performed activation 15H2O PET study for the encoding and retrieval of episodic memory in medial temporal lobe epilepsy(mTLE) patients to know whether the activated areas could be lateralized as is known in the Wada test. **Methods** : Subjects were six normal controls and six right and five left mTLE patients. PET scans were performed while presenting a set of 30 line drawings of common object with four second interval. After 30 minutes, PET scans were repeated while presenting the half-changed set. We processed the image with the SPM software. **Results** :

n the encoding, activated areas were localized well in the nferior or middle frontal gyrus bilaterally in the normal control but they were dispersed in the mTLE. In the etrieval, activated areas were localized in the bilateral infe- ior frontal gyri and right medial temporal area in the nor- nal control, but additional activations were found in the premotor area and angular gyrus in the mTLE. In the ncoding and retrieval, the activated field of the prefrontal reas contralateral to the epileptogenic zone tended to be wider. In the left mTLE, nearly all the activated areas were ateralized to the right cerebral hemisphere. **Conclusion** : Areas involved in the encoding and retrieval of the episodic nemory are dispersed and lateralized.

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A Case of Lsaac's Syndrome Associated with Lung Cancer

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Background & Significance : Isaac's syndrome(neu- romyotonia) is a syndrome of spontaneous occurring muscle activity of peripheral nerve origin, which can be triggered by voluntary or induced muscle contraction. Most cases appear to be idiopathic. This syndrome arises in association with a polyneuropathy, also with lung cancer and thymoma, with or without myasthenia. **Case** : A 63-year-old man admitted due to generalized muscle pain and stiffness for 20 days. He complained difficulty of standing and finger exten- sion after grasping. Chvostek's sign and Trousseau's sign were noticed. There were no evidence of muscle weakness or weight loss. Serum CPK, LDH, calcium, and electrolyte were normal range. The chest X-ray and CT scan showed a lung cancer. Neuromyotonic discharges were recorded at rest and NCV was normal range. The discharges persist throughout sleep, after diazepam injection, and with proxi- mal nerve block. Carbamazepine was administrated and then improved the symptoms. **Conclusion** : We report a rare case of Isaac's syndrome associated with lung cancer.

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The Clinical Factors affecting Nerve Conduction Studies(NCS) in Patients with DM

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Background & Objectives : Nerve Conduction Studies (NCS) is widely available and accepted in the assessment of diabetic neuropathy. It has been argued that HbA1c level was related with acute reversible neuropathy. The purposes of this study were to evaluate(1) the differences between diabetic patients and normal control in NCS and(2) the correlation between electrophysiological abnor- malities and clinical parameters in diabetic patients. **Methods** : We studied 29 healthy controls, 4 male and 25 female, and 117 diabetic patients, 78 male and 39 female, with or without polyneuropathy. The compound muscle action potential(CMAP), motor nerve conduction veloci- ties(MNCV) and distal latencies of median, ulnar, tibial, and peroneal nerves, and the sensory nerve actional poten- tials(SNAP) of median, ulnar, peroneal and sural nerves were recorded in all subjects. We investigated age, sex, and height in all subjects, and the clinical parameters(the duration of DM and HbA1c level) in diabetic patients. The relationship between NCS values and clinical parameters were analyzed. **Results** : Between control and diabetic group, there were significant differences in all components of the NCS performed in this study($p<0.01$). The most affected nerve in diabetic patients was sensory component of peroneal nerve(61.5%) in NCS. There were positive correlation between duration of diabetic mellitus and neu- rophysiological abnormalities of sensory nerves, and between HbA1c level and abnormalities of motor nerves($p < 0.05$). **Conclusion** : We concluded that HbA1c level was well correlated with diabetic neuropathy of the motor nerves and the duration of DM correlated with that of the sensory nerves.

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Myasthenia Gravis associated with Other Autoimmune Disease

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Background & Objects & Methods : Myasthenia gravis (MG) is an autoimmune disease against nicotinic acethylcholine receptor in skeletal muscles. In some patients of MG other organ-specific or organ-nonspecific autoimmune disease, such as rheumatoid arthritis(RA), systemic lupus erythematosus(SLE), or noninsulin-dependent diabetes mellitus(NIDDM) were also reported. For the identification of frequency of combined autoimmune disease and of the significance of occurring MG type between associated autoimmune disease and MG in thirty-nine patients, we reviewed one hundred twenty-four patients of MG retrospectively. **Results** Graves's disease(15 patients), SLE (5 patients), NIDDM(4 patients), RA(3 patients) and combination of above diseases(RA-SLE : 1 patient, DM-SLE : 1 patient), strong positive antinuclear antibody titer(above 1 : 160) in nine patients, alopecia(1 patient) and vitiligo(1 patient) were detected. The more occurring rate of the ocular type MG, than the genralized in fifteen patients of Graves' disease is the most significant($p<0.001$, Yates corrected chi-square test) among other combined autoimmune disease . **Conclusion** : The Graves' disease is the most frequently associated autoimmune disease in MG. The significantly occurring rate of ocular type of MG in Graves' disease suggest a possibility that the TSH receptor antibody or other immunologic mechanism in Graves' disease provoke ocular type MG.

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Case Report of Unusual Synkinetic Facial Movement : Marin-Amat Syndrome Varient ?

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Background & Significance : Marin-Amat syndrome is a rare facial synkinetic movement disorder manifesting with eye closure on jaw opening following facial nerve palsy. We report a 50-year-old man with Marin-Amat syndrome and also with eye closure on mouth protrusion. **Case** : A 50-year-old man had suffered from right facial paralysis. He showed decreased taste sense at right side of the tongue, but did not showed hyperacusis. He received streoid medication for a week and some physical therapy and some herb management was done. Then his facial palsy was completely improved 1 month from the time of onset. 7 months after the onset of right facial palsy, he began experiencing right eye closure by opening of the jaw or by mouth protrusion. During 6 months follow up, there is no change in his symptom. Electrophysiologic studies reveal normal conduction in the facial nerve. Muscle action potentials are normal. There are no denervation potentials in frontalis muscle. Blink reflex is also normal. **Comment** : The original form of Marin-Amat syndrome is eye closure on jaw opening. Our patient showed additional feature of eye closure on mouth protrusion. Aberrant regeneration of facial nerve could be suggested to explain the phenomenon.

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A Case of Behcet's Disease Presenting With Recurrent Transient Global Amnesia and Perimesencephalic Subarachnoid Hemorrhage

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Background & Significance : Behcet's disease is a systemic disorder characterized by nonspecific vasculitis with diverse symptoms. We report an unusual case of neuro-Behcet's disease presenting with recurrent transient global amnesia and perimesencephalic subarachnoid hemorrhage. **Case** : A 55-year-old man was admitted to Samsung Medical Center due to loss of consciousness for 5 minutes. During the last three years before admission, he had two episodes of transient global amnesia and an episode of aseptic meningitis. At initial attack(8-27-1996), he had only retrograde amnesia. At that time he had no evidence of Behcet's disease or brain lesion. Since then, he suffered from recurrent oral ulcers and uveitis. Transient global amnesia recurred after 8 months. A CSF study showed features compatible of aseptic meningitis. At the third attack(3-26-1999), he lost consciousness just after taking a sauna. Neurological finding was normal except neck stiffness. A CT showed perimensencephalic subarachnoid hem-

orrhage but cerebral angiography showed no aneurysm. He was treated with high dose prednisolone therapy and recovered without any sequela. **Conclusion** : Vasculitis related to neuro-Behcet's disease seems to play a role in transient global amnesia and perimesencephalic subarachnoid hemorrhage.

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Ipsilateral Ventricular Dilatation Associated with Carotid Stenosis

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Background and Objectives : Carotid stenosis can alter hemodynamic environment of ipsilateral cerebral hemisphere, thereby producing cerebral atrophy even in the absence of overt ischemic changes or infarction. However, his hypothesis has not been tested yet. This study explores whether ventricular dilatation without apparent ischemic changes is associated with ipsilateral carotid stenosis. **Methods** : Subjects were 16 patients with unilateral carotid stenosis more than 70% but without infarctions or white matter change in the cerebral hemisphere, and 27 age- and sex-matched normal controls. Their lateral ventricle volume was measured by outlining ventricular boundary using a manual pixel-wise method with the aid of PACS work station and then the laterality index(LI : left - right / left + right(100) was computed. **Results** : In 14 of 16 patients, ventricular asymmetry was considered to be present because their LI was greater than 2 SD from those of normal controls. The side of ventricular asymmetry was concordant with that of carotid stenosis in 11 of the 14 patients but discordant in the remaining 3. **Conclusion**s : Our results suggest that carotid stenosis can produce chronic hypoperfusion in ipsilateral cerebral hemisphere, resulting in ipsilateral cerebral atrophy or ventricular dilatation even without apparent infarction or ischemia.

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Single Photon Emission Computed Tomography Imaging in Transient Global Amnesia

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Background & Objectives : Although there are numerous studies on the etiology of transient global amnesia(TGA), the pathogenesis of TGA has not been fully elucidated. The purpose of this study is to investigate the cerebral blood flow changes in TGA. **Methods** : Cerebral blood flow changes were studied using Technetium-99m ECD SPECT in eight patients with TGA. SPECT was performed during ictal phase in one patient and performed after amnesic attack in seven patients. Pattern of cerebral blood flow changes in SPECT image was analyzed by visual inspection. Magnetic resonance imaging(MRI) was performed in all patients soon after attack. **Results** : Cerebral blood flow was decreased in the left temporal area in three patients and right temporal area in two patients. In both groups, the thalamus and basal ganglia were involved in variable combination. One patient showed hypoperfusion in the right basal ganglia. No blood flow changes were observed in remaining two patient. There is no ischemic changes on MRI in all patients. **Conclusion** : SPECT shows variable region of hypoperfusion in TGA, but mostly involved site is the temporal lobe. Although the mechanism of TGA is still unclear, hypoperfusion of temporal lobe is mainly responsible for memory disturbance of TGA.

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A Case of Perineuritis

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Background and Significance : Perineuritis is characterized by perineurial thickening and degeneration of perineurial cells. Usually this is associated with an inflammatory response and may result in distruction of perineurial

structure. Rarely, perineuritis is observed in patients with peripheral neuropathy. **Case** : A 67-year-old man suffered from dysesthesia in the right leg. One month later, dysesthesia also occurred in the left leg. Paresthesia developed in both hands and weakness of both lower extremities occurred after two months. Five months later, the weakness worsened and he was unable to walk at last. On neurologic examinations, weakness(grade III / III), hypesthesia and areflexia in both lower extremities were detected. Sensory disturbances were dominant in distal area. The CSF profile showed pleocytosis and elevated protein level(2.1g/dl). Nerve conduction study was compatible with sensorimotor polyneuropathy. Sural nerve biopsy revealed mild lymphocytic infiltration in perivascular area of perineurium. Motor and sensory disturbances improved gradually after steroid pulse therapy. **Conclusion** : We report a case of pathologically confirmed perineuritis, which was suspected chronic inflammatory demyelinating polyradiculoneuropathy clinically.

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Reflex Sympathetic Dystrophy : Mimicking Central Cord Syndrome

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Background & Significance : Reflex sympathetic dystrophy(RSD) has been reported in incomplete spinal cord injury or stroke, most often occurring unilaterally. Bilateral RSD has been rarely reported in patients with spinal cord injury. **Case** : A 30-year-old man was admitted to the hospital with a 4-month history of progressive lower extremity weakness, pain, and dependent edema. He fell downstairs 4 months ago. Paraparesis and decreased pain/temperature senses below T7 were noticed on neurologic examination. Spinal MRI, SEP, MEP, and sympathetic skin response revealed no abnormality. Thermogram showed low temperature of both lower extremity. He was treated with lumbosacral sympathectomy, and then the pain subsided. The temperature of both lower extremity normalized on the follow-up thermogram. **Comment** : We report a rare case of RSD mimicking central cord syndrome. The patient with unexplained localized pain and progressive weakness after spinal trauma may consider RSD.

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A Case of Myasthenia Gravis with Alopecia Universalis and Vitiligo

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Background and Significance : Myasthenia gravis can be accompanied by various autoimmune diseases including skin disorders. However, alopecia and vitiligo are rarely associated with myasthenia gravis. **Case** : We describe a 27 year-old woman showing myasthenia gravis with alopecia universalis and vitiligo. She had past history of fever of unknown origin and atopic dermatitis 4 and 3 years ago respectively, which were improved with oral steroid. Alopecia universalis and vitiligo had begun to develop during pregnancy since 26 years of age. Symptoms of myasthenia gravis appeared 3 months after delivery and progressed without responsiveness to anticholinesterase inhibitor. Follicular hyperplasia was revealed after thymectomy. After high dose intravenous methylprednisolone therapy and systemic steroid, myasthenia gravis, alopecia universalis and vitiligo begun to improve. **Conclusion** : The coexistence of myasthenia gravis, alopecia universalis and vitiligo supports the autoimmune hypothesis of these conditions and high dose intravenous methylprednisolone therapy may be effective treatment.

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A Case of Simultaneous Multiple Cranial Neuropathies in Diabetes Mellitus

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Background : Cranial mononeuropathies, particulary opthalmoplegia and facial palsy, are common entities in the diabetic population. However, simultaneous multiple cranial neuropathies due to diabetes are much less common. Often it is associated with other conditions such as brain tumor, head trauma etc.. **Case** : A 61-year-old diabetic man

presented with a ptosis, opthalmoplegia involving left 3rd, 4th, 6th cranial nerves and left facial pasly. The neurologic workup included CSF study, brain MRI and MRA, all of which were unrevealing. Electrophysiologic studies(blink reflex, nerve conduction study) showed abnormal finding. We controlled strictly blood glucose and tried the steroid herapy. Thirteen days later, he was discharged with partialy improved left ptosis. On follow-up examination 3 months later, his focal neurolgic deficits including opthalnoplegia and facial palsy were nearly improved. **Conclusion** : We report this rare simultaneous multiple cranial neuropathies in diabetes mellitus.

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Two Cases of Acellular Cryptococcal Meningitis in AIDS Patients

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Background & Objectives : Cryptococcus meningitis is extraordinarily common in AIDS patients, with reported incidences varying between 1.9% and 11.0%. Cryptococcal meningitis, particularly in HIV-infected patients, often results in relatively minor CSF(cerebrospinal fluid) changes and, in some cases, CSF profiles may be normal. We report here on the clinical manifestations of Cryptococcal meningiis in AIDS patients with acellular cerebrospinal fluid, previous unreported in KOREA, considered epidemiologically rare area before but recently focused. **Case** : Two cases were admitted with just headache and confirmed HIVnfected later. We reveiwed here the possible acellular mechanisms too. **Conclusion** : Acellular CSF may obstruct he diagnosis of cryptoccocal meningitis in AIDS patients, especially HIV screening test was not perfomed as routine o headache patients.

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A Case of Hemichorea-Hemiballism Associated with Hyperglycemia

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Background and Significance : Hemichorea-hemiballism(HC-HB) is a unilateral involuntary movement. An overall of 95% of the HC-HB can be accounted the result of an acute lesion of the contralateral subthalamic nucleus of Luys or luysial pallidal connections. The metabolic causes of HC-HB are rare, hyperglycemia is well known among them. **Case** : A 60-year-old women was admitted with progressive HC-HB of her left extremities. She was diagnosed diabetes mellitus 10 years ago, taken oral antidiabetic drug(Diamicron) intermittently. She felt involuntary movement of her left arm lasting two to five minutes. The next day, she had six similar movement spread to left lower extremity. On the third day, HC-HB was continuous. Involuntary ballistic movements consisting of flinging rotation and flexion-extension, affected her left proximal limbs. Involuntary choreiform movement involved the distal portions of these limbs. Venous blood sugar was 545mg/dl, serum osmorality was 306mosm/Kg, and other serology tests were negative. Brain CT scan showed no structural lesion. Brain MRI revealed left putaminal high signal intensity on T1WI and multiple small lacunar infarction on T2WI in centrum semiovale. Electroencephalography revealed intermittent brief runs of generalized theta slowing but no epileptiform discharge. HC-HB had a response to control of blood sugar and disappeared within 15 days. **Conclusion** : We report a patient presented with HC-HB associated with hyperglycemia and improved after controlled blood sugar.

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Diagnostic Value of Interictal and Ictal Epileptiform Discharges on Scalp EEG in Partial Epilepsy Patients with Good Surgical Outcome.

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Background & Objectives : Epileptiform discharges(ED) of partial seizures as recorded from video-scalp EEG monitoring can give initial information of epileptogenic focus in presurgical evaluation of localization-related epilepsies. The accuracy had been reported based on depth or imaging studies. We evaluated diagnostic value of ictal(IC) and interical(INIC) scalp EEG based on surgical outcome. **Methods** : We included 186 epilepsy patients with good surgical outcome according to modified Engel's classification. Video-scalp EEG monitoring was performed in all the patients. Based on presurgical evaluation and resected region, we determined epilepsy syndrome [frontal lobe epilepsy(FLE) : 16, temporal lobe epilepsy(TLE) : 147, parietal lobe epilepsy(PLE) : 10, occipital lobe epilepsy(OLE) : 5, combined lobe epilepsy(CLE) : 8]. We evaluated the localizaton of interictal epileptiform discharges which were more than 10% in frequency. And lateralization and localization of ictal EEG were analyzed too. **Results** : The localization of INIC ED was correct in 31% of FLE, 67% of TLE, 50% of PLE, 40% of OLE, 62.8% of CLE patients but false localization of them was in 3% of TLE, 20% of OLE. No INIC ED were observed in 38% of FLE, 10% of TLE, 40% of PLE, 40% of OLE. The localization of IC ED was correct in 56% of FLE, 49% of TLE, 60% of PLE, 60% of OLE, 38% of CLE but false localization of them was 6% of FLE, 15% of TLE, 20% of PLE, 0% of OLE, 13% of CLE. The lateralization of IC ED was correct in 63% of FLE, 74% of TLE, 70% of PLE, 100% of OLE, 62.5% of CLE, while no lateralization of them was in 25% of FLE, in 12% of TLE, 18% of PLE, 0% of OLE, 13% of CLE and bilateral independent lateralization of them was in 10% of TLE. **Conclusion** : The INIC ED was less frequently detected in extra-TLE than in TLE but localizing power of them in extra-TLE was not so different from that of IC ED in TLE. The lateralizing and localizing power of IC ED were so higher in extra-TLE than in TLE. INIC and IC ED can give accurate information of epileptogenic focus depending on epilepsy syndrome.

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Two Cases of Paroxysmal Sympathetic Storms

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Paroxysmal sympathetic storms(diencephalic seizure) is defined as the clinical features of episodic alteration in body temperature, blood pressure, heart rate, the level of consciousness coinciding with hyperhidrosis, salivation and extensor posturing. Although its mechanism is not certain, it is hypothesized as disinhibition of the central sympatho-excitatory regions in the diencephalon and brainstem. We experienced two cases of paroxysmal attacks of sympathetic overactivities. Case I, a 62-year-old man showed recurrent episodic spells of dizziness, diaphoresis, loss of consciousness and respiratory dfficulty, which were not controlled with anti-convulsants. MRI and EEG findings were normal. Finally, he died of cardiovascular collapse after crisis. Case II, a 77-year-old man, was admitted with comatose mentality. MRI showed diencephalon and brainstem infarction. After admission he had shown the recurrent episodes of spells similar to case I and normal EEG findings. His spells were aborted with bromocriptine. We report these cases with review of the literature of paroxysmal sympathetic storms.

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Neurological Complication after Surgery of Aortic Aneurysm

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Background & Objectives : Neurological complication after surgery of aortic aneurysm was not fully evaluated yet. **Methods** : From May 1999 to August 1999, 15 adult patients received patch replacement of ascending aorta and/or aortic arch using deep hypothermia circulatory arrest

with retrograde cerebral perfusion. **Results** : They were 7 men and 8 women, with average age of 56 years(21-79 years). There were 5 acute type A dissections and 10 ascending aorta aneurysms. All except 3 patients awaked within 1day after surgery and no death occurred. Neurological complication occurred in 4 patients(27%, 4 had infarct, 2 also had seizures). Infarct were detected on pons in 2 patients, on temporal and occipital lobe(PCA territory) in 1 patient, not identified in 1 patient. Seizures controlled with phenytoin loading in one and with pentobarbital infusion in the other within 3 days after the onset of seizures. **Conclusion** : Neurological complication after replacement of ascending aorta and/or aortic arch was not infrequent. Infarct after aortic surgery more frequently occurred in posterior circulation. Systemic evaluation and management of neurological complication is necessary to improve final outcomes of aortic surgery.

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Clinical Characteristics of Drug-induced Parkinsonism

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Background & Objectives : Drug-induced Parkinsonism (DIP) is the second common cause of Parkinsonism, after idiopathic Parkinson disease(IPD). Antipsychotic drugs frequently cause DIP. But the clinical characteristics of DIP did not get attention by neurologist. So we studied the clinical profiles of DIP patients. **Methods** : We reviewed the clinical profiles of thirty-one patients who showed Parkinsonism after antipsychotic drug treatment. **Results** : The mean age of patients was 45. As the first symptom, bradykinesia was in 26 patients(94%) and tremor was in 5 patients(6%). The 1st symptom appeared within 1 week after antipsychotic treatment in 25 patients(81%). Bradykinesia and rigidity were appeared in all DIP patients, symmetric distribution was more common(94% and 87% respectively). Tremor occurred in 27 patients(87%). In the patients with tremor, postural or action tremor was dominant in 15 patients(56%), and asymmetric distribution was more common(17/27, 63%). Rabbit syndrome was also observed in 5 patients(19%). Haloperidol was the most commonly prescribed drug in our study subjects. **Conclusion** : Symmetric bradykinesia was the most common 1st symptom in DIP patients. Asymmetrical postural or action tremor was relatively common in DIP.

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Isolated Musculocutaneous Nerve Palsy

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Background : The musculocutaneous nerve originates from the lateral cord, anterior division, upper trunk of the brachial plexus arising from C5, C6 and some fibers from C7 and isolated musculocutanous nerve palsy is extremely rare. We have seen a case of isolated musculocutaneous nerve palsy distal to its innervation of the coracobrachialis muscle. **Case** : A 19-year-old man visited our hospital because of right elbow flexion weakness. He was a soldier and his symptomes developed during a march with a knapsack on his shoulder. On neurologic examination, the patient had have weakness of right elbow flexion(G IV), decreased pinprick sensation on the musculocutaneous nerve dermatome and the right biceps tendon reflex was absent. Nerve conduction study was normal but needle electromyographic study showed 1+ fibrillations and positive sharp waves in both biceps brachii and brachialis without voluntary motor units in both muscles. The coracobrachialis muscle and other muscle were normal including cervical paraspinal muscles in right upper extremity. His symptomes improved rapidly. **Comment** : The musculocutanous nerve palsy is rare but should not be confused with C5, C6 radiculopathy, brachial plexopathy, or rupture of the biceps brachii muscle belly or tendon.

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Diffuse Signal Changes in Corpus Callosum after Decompression with Hydrocephalus

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Background and Significance : Hydrocephalus can cause focal or diffuse corpus callosal changes. Although the pathophysiological basis of these callosal changes remains unclear, the neural compression caused by active hydrocephalus and the conditions that follow ventricular shunting may contribute to the development of these changes. **Case** : A 58-year-old female patient visited us for management of her newly developed dysarthria and right hand clumsiness. She was diagnosed as diabetes for 4 years and was medicated with oral hypoglycemic agent regularly. She had gone through the ventriculoperoneal shunting operation before 2 years when she had had only a severe headache without gait disturbances or sphincter symptoms. Magnetic resonance images performed before 2 years revealed hydrocephalus with dilated cisterna magna and mild inferior vermian hypoplasia, which suggests Dandy-Walker variant. Magnetic resonance images scanned on our clinic showed right frontal shunt and interestingly diffuse atrophic changes and hypersignals on corpus callosum also with lacunar infarction on right internal capsule. Neuropsychological screening showed no definite abnormalities of the interhemispheric transfer of information. **Comment** : It has been proposed that the impingement of the corpus callosum by the rigid falx may contribute to partial hemispheric dysconnection, resulting from callosal axonal dysfunction. On the basis of our findings and literature reviewed, however, the persistence of radiographic findings after shunting, despite symptom improvement, implies a static process that may indicate a preexisting injury to the callosal fiber and the relative sparing of the splenium might account for the lack of neuropsychological deficits.

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The Evaluation of the Width of Pars Compacta in Parkinson's Disease on T2 Weighted Image of MRI and Its Clinical Correlations(Preliminary Study)

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Background & Objectives : Shrinkage of the substantia nigra pars compacta is observed in Parkinson's disease. We studied the width of pars compacta in Parkinson' disease as seen on routine magnetic resonance imaging and compared with clinical features. **Methods** : The width of pars compacta in 22 patients with idiopathic Parkinson's disease was analyzed by T2 weighted image of magnetic resonance image. The width between the red nucleus and the cerebral peduncle showing low signal intensity areas was measured as that of pars compacta. Patient were evaluated for severity of disease by Hoehn-and-Yahr scale and the Unified Parkinson's Disease Rating Scale(UPDRS). Pearson's product-moment correlation was used to determine the relationship between clinical parameters and the width of pars compacta. **Results** : The mean measured value of the width of pars comparcta was 2.87(0.97mm. This study shows significant reduction of the width of the pars compacta with disease duration progression($r= -0.525$, $p= 0.017$). While not significant statistically, there was a trend toward reduction of the width of the pars compacta as the Hoehn-and-Yahr scale or UPDRS. **Conclusion** : These results suggest that the width of the pars compacta is related to disease duration progression of Parkinson' disease and contribute to a better understanding of the pathogenesis of Parkinson's disease.

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Do N37 and P37 Potentials have Different Generators in Somatosensory Evoked Potential ? - Analysis using Gating Mechanism -

Young Seok Park, M.D., Jae Kwan Cha, M.D., Sang Ho Kim, M.D., Jae Woo Kim, M.D.

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Backgroud : The generators of N37 and P37 of posterior tibial nerve somatosensory evoked potential(PTSEP) have not been exactly known. Recently, some reports suggested that P37 and N37 might have different generators. We conducted a study to know the generators of P37 and N37 of PTSEP using gating mechanism. **Methods** : We evaluated subcortical and cortical somatosensoy evoked potentials(SEPs) with posterior tibial nerve stimulation in 2 experimental conditions of foot movement and compared them with PTSEPs in condition of full relaxation of foot. The experimental conditions were :(a) active flexion-extention of stimulated foot;(b) passive flexion-extension of the stimulated foot. We analyzed the latencies and the amplitudes of following potentials; P30, N37, P37, and N50. **Results** : The amplitude of P30 potential did not change during at any paradigms. The amplitudes of P37 and N50 potentials were significantly attenuated in both conditions. However, the amplitude of N37 showed no significant change in both conditions. **Conclusion**s : These results suggest that the generators of P37 and N37 of PTSEP be different in cortex.

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Thoracic Myelopathy Secondary to Ossification of The Posterior Longitudinal Ligament

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Department of Neurology, Hallym University College of Medicine

Background & Significance : Ossification of the posterior longitudinal ligament(OPLL) is a dense ossified plaque of variable thickness along the posterior margins of vertebral bodies & intervertebral disks. OPLL is most common in the midcervical(C3-C5) spine but rarely occur at thoracic spinal level. Thoracic myelopathy due to OPLL is rarely reported. The basic pathophysiologic processes of OPLL are hypertrophic bone formation in response to mechanical stress and spinal cord damage has been attributed to direct effects of chronic compression and to secondary circulatory disturbances of the anterior spinal artery. **Case** : A 71 year old female patient developed weakness in both lower extremities which had stepwise progressive course since 2 months ago. Neurological examination revealed impaired all sensory modalities below T6-7 spinal cord level. She showed hyperrflexia in both lower extremities and bilateral extensor plantar signs. T-spine MRI showed high signal intensity on T1WI and iso-signal intensity on T2WI on epidural space through T4-T5 spinal cord. Spiral CT showed ossified strip separated from the vertebral body compressing thoracic spinal cord. **Conclusion** : We report a rare case of thoracic myelopathy due to ossification of the posterior longitudinal ligament.

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A Case of Painful Legs and Moving Toes Syndrome

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Background and Significance : A syndrome of painful legs and moving toes(PLMT), characterized by severe burning pain in the legs and associated with peculiar involuntary movements of the toes, was first described in 1971. There has been no report on PLMT syndrome in Korea, yet. **Case** : A 70-year-old woman presented with pain and involuntary movements in both lower extremities. She had had excruciatingly severe causalgic nature pain in the area below both knees. The pain was not confined to specific dermatomes, myotomes, or peripheral nerve distributions and had the deep and boring character. The involuntary movements comprised flexion, extension, adduction, and abduction of the toes of both feet and continued constantly when awake. She felt no relief from the moving. Besides abnormal toe movements, the neurological examination was normal. The electrophysiological studies revealed no abmormality. Gabapentine relieved the sensory and motor symptoms significantly.

Conclusion : PLMT syndrome is a rare movement disorder. We report the first case of PLMT syndrome in Korea.

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Dysphagia in Neurologenic Population

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Background & Objectives : Dysphagia can be caused by various neurologenic disorders and thus, the characteristics might differ depending on the etiologies. We reviewed the cases of neurogenic patients with dysphagia and analyzed the results of the Videofluoroscopic Swallowing(VFS) study to identify their characteristics. **Methods** : Among the patients with dysphagia referred within the Department of Neurology, Samsung Medical Center from April, 1996 to March, 1999, the VFS studies were performed on four hundred fifty-four patients. These patients were divided into six groups : patients with 1)stroke(68.7%, n=312); 2)motor neuron disease(7.7%, n=35); 3)dementia(7.1%, n=32); 4)movement disorders(6.8%, n=31); 5)neuromuscular junction disease(2.0%, n=9); and 6)others(7.7%, n=35). Among them, we selected and analyzed 231 patient cases(50.9%) manifesting either aspiration or other significant swallowing deficits. **Results** : 1)We observed swallowing abnormalities in 48.8 %(n=150) in the stroke group, 51.7 %(n=16) in the movement disorder group, 77.8 %(n=7) in the neuromuscular junction disease group. The main dysfunction in these three groups was characterized by delayed swallowing reflex in pharyngeal stage. 2) Swallowing abnormalities were observed in 68.8 %(n=22) in the dementia group and 58.8 %(n=21) in the other disorders. In both groups, the proportion of the patients with oral dysfunction was approximately the same as that of patients with pharyngeal dysfunction. 3) 42.7 %(n=15) of the patients in the motor neuron disease group showed abnormalities, which were mainly associated with oral stage of swallowing. **Conclusion** : The patterns of dysphagia in neurogenic population are vary. Dysfunction in pharyngeal stage of swallowing is critical to cause dysphagia in most of the groups. However, noticeable dysfunction of preparation and/or transportation of bolus in oral stage is observed in the groups of dementia and the motor neuron disease.

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Isolated Facial Nerve Palsy as the Initial Manifestation of Relapse in the T-cell Acute Lymphoblastic Leukemia

Man-Seok Park, M.D., Jong-Ki Kim, M.D., Seung-Han Lee, M.D., Byeong-Chae Kim, M.D., Myeong-Kyu Kim, M.D., Ki-Hyun Cho, M.D.

Department of Neurology of Chonnam University

Background & Significance : Facial nerve pasly has been demonstrated as a sign of CNS involvement in leukemic patient. Almost all those patients have evidences of CNS involvement other than facial palsy, such as leukemic cells in CSF or overt evidence of leukemic activity in other organs. An isolated facial nerve palsy as the sole initial manifestation of aucte CNS leukemia especially in relapsed case is evidently very rare. **Case** : We treated a 18 year old male with T-cell acute lymphoblastic leukemia who developed bilateral facial nerve palsy as the sole initial sign of his relapse. There were no other signs of leukemic relapse in CSF examination. The follow up CSF examination after two weeks of onset revealed leukemic cells. Bone marrow aspiration & biopsy made confirm diagnosis of leukemic relapse. **Conclusion** : We report a patient who developed facial nerve pasly as the sole initial manifestation of relapsed T-cell acute lymphoblastic leukemia.

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Decompression Sickness Presenting as Blindness Responsive to Hyperbaric Oxygen Therapy

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Background & Objectives : The usual neurologic symptoms of decompression sickness(DCS) are the weakness of limbs, paresthesia, and/or voiding difficulties suggesting spinal involvement. The blindness after diving has been rarely reported as a sign of cerebral involvement in DCS. **Case** : A 36 year-old man who is a sports diver was admitted due to binocular total blindness, which occurred within a few minutes of reaching the surface. Immediate examination revealed no definite ophthalmologic or neu-

ologic abnormalities except blindness. Brain MRI showed the evidence of bilateral occipital ischemia. After rial of serial hyperbaric oxygenation using table VIa protocol, blindness improved. After this dramatic improvement, there detected slight improvement of the lesion on brain MRI 4 days after the treatment. **Conclusion or Comments** : We report a case of total blindness as a sole clinical sign of decompression sickness, which was responsive to hyperbaric oxygen therapy.

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Safety of Selegiline in the Treatment of Parkinson's Disease : Focus on Orthostatic Hypotension

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Background & Objectives : Selegiline, a selective, irreversible inhibitor of monoamine oxidase B is widely used in the treatment of Parkinson's disease(PD). Although selegiline has been known to be well tolerated, adverse effects of selegiline in our PD patients were common. Thus, we investigated the safety of selegiline, focusing on the prevalence of orthostatic hypotension(OH). **Methods** : Patients with PD who had received 5 to 10 mg/day of selegiline for more than one month were included. Adverse events were identified from aquestionnaire and self reporting. Blood pressure(BP) and pulse rate were measured in a supine position after a rest of ten minutes and three minutes after standing up. OH was considered as present when a fall of at least 20 mmHg of systolic blood pressure was recorded. Statistical analysis was performed to determine the relation between OH(and/or orthostatic dizziness) and disease characteristics(duration, age, sex) and the use of antiparkinsonian drugs. **Results** : One hundred and fifty five patients with PD were included. The most common adverse events related to selegiline were orthostatic hypotension/dizziness(53.5%), gastrointestinal discomfort(14.8%), sleep disturbance(1.9%) and increased severity of dyskinesia(1.3%) in order of frequency. Twenty of thirty one patients who had postural dizziness had to discontinued selegiline. In the patients with OH, age and the prevalence of hypertension or diabetes mellitus were significantly higher, compared to the patients without OH($p<0.05$). However, disease duration, sex, dosage of selegiline and duration of levodopa treatment did not show significant difference between two groups. **Conclusion** : The frequency of orthostatic hypotension and/or dizziness related to selegiline in PD was high. We suggest that selegiline should be used with caution especially in elderly patients, and frequent check of orthostatic BP is recommended in selegiline-treated patients during the follow-up period.

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Antioxidants Attenuate Cisplatin-induced Apoptosis by Decrease p53 Level but not Fas in Mouse Hybrid Neurons

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Backgrouond : Sensory neuronopathy is an undesirable side effect of cancer chemotherapy with cisplatin. Since the pathomechanism underlying the neuronal damage caused by cisplatin is currently unknown, we undertook investigation to answer this question using mouse dorsal root ganglion neuron-neuroblastoma hybrid cell line(N18DRG-D3). **Method** : The immunohistochemistry was done to elucidate the neuronal characteristics. Nuclear staining and DNA gel electrophoresis were done to confirm apoptosis. The expression of p53 and Fas was measured by Western blot. **Results** : These hybrid neurons showed neuronal phenotypes such as high molecular weight neurofilament protein(NF-H) and microtubule associate protein-2(MAP-2). Cisplatin induced dose- and time-dependent neurotoxic effect in hybrid neurons. After 48 hr of cisplatin treatment, hybrid neurons showed apoptotic nuclei as shown by Hoechst dye 33258 staining and DNA laddering on gel electrophoresis. But the cytotoxicity was markedly decreased by preincubation with Trolox or N-acetylcysteine. And cisplatin dependent p53 accumulation was delayed by Trolox and blocked by N-acetylcysteine, but Fas expression was not altered. **Conclusions** : These results indicate that cisplatin induces sensory neuropathy via apoptotic cell death mediated by oxygen radical. And antioxidants exert neuroprotective effects against cisplatin neurotoxicity by modulation p53 pathway but not Fas. Theses may explain the current limitation of antioxidants for cisplatin induced sensory neuronopathy.

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Positive ELISA test to Clonorchis sinensis in CSF - Is it true CNS Clonorchiasis ? -

Yeon-Heui Cho, M.D., Seong-Min Lee, M.D., Sung-Min Choi, M.D., Byeong-Chae Kim, M.D., Myeong-Kyu Kim, M.D., Ki-Hyun Cho, M.D.

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Background & Significance : Clonorchis sinensis, which commonly infect the biliary system of humans, is known to not invade the central nervous system. But a sort of liver fluke, Fasciola hepatica can invade the CNS. Futhermore serologic cross reactions are common in paracytic infestation. **Case** : A 61-year-old, chronic alcoholic, male patient admited for cirrosis of liver. Neurologic examination revealed mild weakness and decreased DTR. The CSF examination showed mild pleocytosis(WBC : 16/uL), protein 113mg/dL, glucose 124(serum : 303mg/dL). ELISA test were positive to Clonorchis sinensis in serum and CSF, but negative to Taenia solium. In a stool examination, Clonorchis sinensis ova were detected. The brain MRI showed small sized ring-like or nodular enhanced lesions involving cerebellum, periventricular and subcortical white matter on Gd-enhanced T1WI. The stereotactic brain biopsy showed perivascular infiltration of eosinophils and reactive gliosis. Four days distocide therapy was done. **Comment** : This result suggests that serum Ab to Clonorchis sinensis may cross react with Fasciola hepatica or cross the CSF through destruction of B.B.B. Therefore, the positive ELISA test to Clonorchis sinensis in CSF would not be a direct evidence of CNS invasion of Clonorchis sinensis.

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MR imaging in Amyotrophic Lateral Sclerosis

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Background & Objectives : Until recently, the role of maging in the evaluation of amyotrophic lateral sclerosis(ALS) was to exclude an underlying cause such as a compressive lesion of the foramen magnum. We reviewed twenty six patients with ALS including monomelic type who had abnormal MR imaging. **Methods** : Brain MRI was performed in nine patients(five men and four women, aged 34-78 years) and cervical MRI in seventeen patients(fifteen men and two women, aged 19-65 years). T1 and T2 weighted MR imaging of the brain or spinal cord was reviewed to investigate lesions of the pyramidal tract. **Results** : Nine patients showed spinal cord atrophy on T1 and T2 weighted MRI. Two patients of monomelic ALS showed focal asymmetric atrophy of lower cervical cord. T2 weighted MRI demonstrated high signal intensity of the lateral corticospinal tract of the spinal cord in eight of 17 patients. Two of 17 patients showed pyramid atrophy and high signal intensity on T2 weighted MRI. Three of the 17 patients showed no abnormal findings on MRI. T2 weight brain MRI demonstrated high signal intensity of the intracranial corticospinal tract in eight, precentral gyrus atrophy in three, and medulla atrophy in one of the nine patients. **Conclusion** : Brain and cervical MR imaging provides a useful information of upper motor neuron lesions in ALS. The characteristic lower cervical atrophy might help to diagnose monomelic ALS. High signal intensity along the pyramidal tract in ALS may correspond to the degenerative process of the upper motor neuron.

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A Case of Osteomalacic Myopathy

Sang-Soo Kim, M.D., Jae-Kwan Cha, M.D., Sang-Ho Kim, M.D., Jae Woo Kim, M.D.

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Background and Significance : Osteomalacia is a disorder in which mineralization of the organic matrix of the skeleton is defective. Proximal muscular weakness is common symptom of osteomalacia. However, diagnosis of osteomalacic myopathy is difficult because electromyographic findings are variable, sometimes normal and histologic findings are mainly normal. In korea, osteomalacic myopathy has not been yet reported. **Case** : A 23-year-old woman reported the gradual onset of gait disturbance and mild pain in the thigh. Her height shortened 4cm during previous 10 months. On neurologic examinations, proximal muscle weakness(grade IV^{+}/V) of the arms and the legs was disclosed. Pain did not interfere with assessment of muscle strength. calcium, vitamine D, parathyroid hormone and creatine kinase were normal. Alkaline phosphatase was 1045 IU/L(normal 70-290 IU/L) and serum

phosphorus was 1.8 mg/dl(normal 2.5-4.5 mg/dl). On roentgenography, multiple pseudofracture lines of the rib and erosion of the head of right femur were demonstrated. Bone scan showed multiple hot spots on the ribs, the head of right femur, the scapula and etc. The patient was medcated with calcitriol 1.0g and phosphorus 2.0g a day. On this regimen, she had recovered most of her strength and was pain free after 1 months. **Conclusion** : Osteomalacic myopathy should be considered as one of diagnostic possibilities when a patients complains of gradual myopathy with normal EMG and histology.

「 After Dinner Session 」

「 의학논문 작성법 」

서울대학교 의과대학 이비인후과 **민 양 기**

「 거부되는 원고 」

대한방사선의학회 편집위원회 간사 **임 정 기**

「 편집인 및 편집위원의 역할 」

한양대학교 의과대학 진단방사선과 **함 창 곡**

대한신경과학회 추계학술대회 229 ~ 231, 1999 ISSN 1225-7044

의학 논문 작성법

서울대학교 의과대학 이비인후과학교실

민 양 기

의학논문의 요건

1. 창의성(originality)
2. 결함없는 연구계획(complete study design)
3. 정확성(precision)
4. 간단명료함(clarity) 및 논리성(logic)
5. 투고요령 준수(correct formatting to the guidelines for authors)
6. 한글 및 영문의 자연스런 문장표현(practical expression in Korean and English)

의학논문의 구성

논문의 형식은 전문학술지에 따라 엄격하게 규정되어 있으나 그 기본골격은 Vancouver group이 결정한 것이 가장 많이 이용된다.

Title and Author(제목 및 저자)
Abstract(초록)
Body of the text
Introduction(서론)
Materials and Methods(재료 및 방법)
Results(결과)
Discussion(고찰)
Conclusion(결론) 또는 Summary(요약)
References(참고문헌)
Tables(표)
Legend for figures
Figures(그림)

* 서론과 고찰은 주관적이며, 방법과 결과는 객관적 이어야 한다.
* Conclusion section이나 Summary section은 생략할 수 있다.

Abstract(초록)

기능 : 논문의 overview-단독으로 읽더라도 내용이 쉽게 이해되어야 한다.
내용 : 논문의 모든 내용이 함축되어 포함되어야 한다.
1) 왜(question)₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩목적
2) 어떻게(what was done)₩₩₩₩₩₩₩₩₩₩₩₩₩₩재료 및 방법
3) 데이터(what was found)₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩결과
4) 의의(answer) 또는 결론₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩고찰 및 결론
유의사항
1. 간결하게 서술한다.(대부분의 journal이 250단어 이내로 제한하고 있다.)
2. 시제는 연구목적은 현재형 또는 과거형, 방법과 결과는 과거형, 결론은 현재형으로 표현한다.
3. Key word의 선택(Index term)-가능한 한 적은 수를(3~10개) 선택하며 American National Library of Medicine에서 제정한 Medical Subject Heading Terms에 포함된 것을 사용한다.

Introduction(서론)

기능 : What was the problem ?
Why did you do it ?
독자의 흥미를 일깨우고 독자들에게 사전정보를 준비시킨다.
내용 : 가장 중요한 부분으로 저자의 연구자로서의 능력이나 저자로서의 능력에 대한 인상을 심어준다.
구조
1. 알고있는 사실(general topic) : 중요한 references만을 인용한다.
2. 알려지지 않은 부분(specific topic)
3. 중요한 점이나 문제점(question)제기
4. 논문의 새로운 점, 중요한 점을 강조한다.
5. 연구목적을 기술

유의사항
1. 역사적 배경 등을 너무 장황하게 설명하지 않는다.
2. 사람이름으로 문장을 시작하는 것은 좋지 않다.
3. 가정, 전제사항, 특수한 용어의 정의를 제시한다.
4. 연구의 디자인이 후향적인 경우는 꼭 언급한다.
5. 가능한 한 짧게 서술한다.

Materials and Methods(재료 및 방법)

기능 : What(How) did you do to answer the question?
내용 : 1. 연구대상(재료)-자세하게 기술한다.
2. 자료수집(실험조사)
3. 자료분석

실험 및 관찰을 수행하기 위해서는 다음의 일련의 과정을 거치게 되는데 이것을 서술하는 것이다. 잘 알려진 실험방법이나 통계분석 방법은 방법이름만 기술하면 충분하나 잘 알려지지 않았거나 방법이 변형될 경우에는 전체 부분을 자세히 기술하여야 한다.

약물실험의 경우 다음 내용이 포함되어야 한다.
1. Subject의 blind assignment
2. Exclusion criteria
3. Eligibility(or Inclusion) criteria

유의사항
1. 아무리 자세해도 지나치지 않다.
2. 장황한 서술형식을 피하고, 시간적 또는 연구 진행 순서에 따라 기술한다.
3. 다른 연구자가 그대로 재현할 수 있도록 기술한다.
4. 환자가 대상인 경우는 모집단의 특징을 기술하고 채택기준(inclusion criteria), 제외기준(exclusion criteria)을 명시한다.

Results(결과)

기능 : What did you find?
State the results.
Present the data supporting the evidence.
내용 : Numeric data는 주로 table이나 figure에 제시하고 text에는 중요한 data만을 기술
유의사항
1. 현상적인 결과, 요약만 제시한다.
2. 연구목표에 상응하는 성적만을 논리적 순서대로 제시한다.
(Methods의 순서와 results의 순서가 일치)
3. Figure나 table의 data는 가능한 한 본문의 문장에서 장황하게 반복되지 않도록 한다.
4. 대상의 분석(연령, 성별 분포)등을 결과에서 언급하지 않도록 한다.
5.“ --하는 경향이 있다”등은 피한다.

Discussion(고찰)

기능 : What do these findings mean?
What did you learn from them ?
서론에 제시된 question에 대한 해답을 제시하며 어떻게 결과가 해답을 유도하는가에 대한 설명을 한다.
구조
시작 : Answer to the question
중간 : Discuss the topic(중요한 순서대로)
종결 : Restate the answer : Importance of the work, Application, Implication, Suggestion
유의사항
1. 서론에 기술된 내용을 반복하지 않는다.
2. 결과의 data 수치를 반복하지 않는다.
3. 다른 연구자의 결과만 지나치게 나열하지 않는다.
4. 해석과 추론시 논리비약이 되지 않도록 한다.
5. 주장에 대해 너무 자신이 없어 하거나 너무 과장되지 않도록 한다.
6. 본인의 결과를 강조하기 위해 타인의 결과를 생략하지 않는다.
7. 반대되는 evidence가 있으면 이에 대한 평가를 한다.
8. 연구목적에 해당되는 내용만 고찰하고, 쓸데없이 길게 늘어쓰지 않도록 한다.

Title(제목)

유의사항
1. 주의를 끌 수 있도록 서술적이며 명료한 정보를 포함시킨다.
2. 상품명은 정확하고 구체적인 용어를 사용한다.
3. 약자의 사용를 피한다.
4. 연구목적과 부합되는 내용으로 만든다.
5. Study of ~, Investigation of ~등은 가급적 사용하지 않는다.
6. 중요단어를 먼저 쓴다.
독립변수와 종속변수는 어느것을 먼저 써도 좋다(독자의 부류에 따라 달라 질 수 있다).
Halothane anesthesia impairs pulmonary function in newborn lambs
(마취과 학술지)
Impaired pulmonary function in newborn lambs anesthtized with halothane.
(소아과 학술지)
7. Subtitle을 사용할 때는 main title과 subtitle 사이에 colon을 찍는다.
(main title = general topic, subtitle=specific topic)
이때 colon은 전치사 혹은 동사를 대신하게 된다.
Pulmonic valve endocarditis : A [of] serial two-demensional doppler echocardiographic study
Angiotension Ⅱ : [is] A potent regulator of acidification in the early proximal convoluted tubule of the rat
* Subtitile은 중요단어를 앞에 나오도록 할 다른 방법이 없을 때만 사용.
8. Series paper의 subtitle사용.
동일한 학술지의 같은 호(issue)에 나올 때는 사용할 수 있다.

* Running title : 논문을 명확히 구분시키기 위해 그 논문의 모든 page에 간략한 running title을 수록한다.

Conclusion(결론) 또는 Summary(요약)

유의사항
1. 연구목적(가설)의 달성 여부에 관해 저자의 생각을 포괄적으로 언급한다.
2. 구체적인 숫자나 지엽적인 사항의 나열은 배제한다.
3. 결과의 반복을 배제한다.
4. 연구결론에 입각하여 향후 연구방향, 활용, 기대효과 등을 부언하는 것은 가급적 피한다.

References(참고문헌)

유의사항

1. 각 학술지가 요구하는 형식에 따른다.
2. 최신문헌중 필요한 것만 인용한다.
3. 교과서나 학위논문은 가급적 인용하지 않는다.

Tables(표) and Figures(그림)

Tables

1. Format : 각 학술지의 투고 규정에 따른다.
2. Title : dependent variable, independent variable, species or population을 포함 시킨다.
3. Footnote : 연구방법, 결과, 의의, 통계적 유의성, 약어설명

Figure legend(그림설명)

다음 내용이 포함되어야 한다.

1. Title을 구(phrase)로 만든다.
2. Experimental details
3. Definition(symbol, line, bar, 약어)
4. Statistical information

의학논문 심사 평가서

논문제출자 :

논문제목 :

심사내용	평가			
1. 연구목적이나 가설은 명확하게 제시되었는가 ?	양호			불량
	4	3	2	1
2. 연구주제와 관련하여 참고문헌이나 기존의 지견에 대한 검색은 충분히 하였는가 ?				
	4	3	2	1
3. 관측(측정)방법(scoring:rating)이나 자료수집 방법이 객관적이고 신빙성이 있는가?				
	4	3	2	1
4. 수집자료의 처리 분석 또는 평가방법이 적절 하였는가?				
	4	3	2	1
5. 연구성적의 제시는 조리있게 구성되었는가?				
	4	3	2	1
6. 연구성적에 대한 해석, 고찰, 추론은 논리적인가?				
	4	3	2	1
7. 논문제목은 연구내용에 합당한가?				
	4	3	2	1

대한산업의학회 추계학술대회 233 ~ 235, 1999 ISSN 1225-7044

거부되는 원고

대한방사선의학회 편집위원회 간사

임 정 기

서 론

의학학술지의 기본적 기능은 과학적 방법의 연구를 통하여 얻어진 새로운 지식을 전파하고 확대 재생산을 북돋는데 있다. 이러한 기능을 발휘하기 위하여 각 학술지는 보다 가치 있는 논문을 출간하고자 노력을 경주하고 있다.

필자는 이 원고에서 어떠한 논문이 가치 있는 것인가? 즉, "어떠한 원고를 원하는가?", "왜 거부하는가?", "거부되는 원고의 특징은 무엇인가?", "거부된 원고의 운명은 어떠한가?" 등을 살펴봄으로써 거부되는 원고의 전반적인 특성을 정리하여 보고자 한다.

어떠한 원고를 원하는가?

원고의 성격에 따라 독창성을 중시하는 원저 및 증례보고나 알려진 지식을 정리하여 전달하고자 하는 종설 등 여러 가지가 있으나, 원저의 경우, 각 학술지에서 원하는 원고는 편집과정을 거쳐 논문으로 출간되었을 때 독자에게 새로운 정보나 지식을 효과적으로 전달할 수 있는 것이다. 따라서, 각 학술지에서 위촉한 심사위원으로 하여금 원고를 심사할 때 가장 중요시하는 항목은 과학성(scientific), 독창성(originality), 실제적 가치(practical value), 독자의 흥미(reader's interest) 등이다.[1-3]

왜 거부하는가?

독자는 다양한 학술지 중 선택의 자유가 있으며 이러한 선택 시 가장 중요한 점은 각 학술지의 명성(reputation)이다. 학술지가 독자로부터 신뢰와 명성을 쌓기 위해서는 독자에게 실제적 도움이 되는 최신의 정보 및 지식을 효과적으로 전달하여 독자로 하여금 신간호를 펼칠 때 새로운 정보에 대한 기대감을 줄 수 있어야 한다. 이러한 기대감은 곧 그 학술지에 대한 신뢰에서 출발하는 것이고 이러한 신뢰는 과거 좋은 논문을 많이 출간하였을 경우에만 얻게 될 것이다.

학술지가 원하는 명성을 유지하기 위하여서는 독자에게 유익한 정보를 제공하는 논문만을 선별하여 게재하여야 하는데 실제 제출되는 원고는 그렇지 않으므로 게재를 거부할 수밖에 없게 된다. 만약 어느 학술지에 출간된 10편의 논문 중 9편은 매우 유익한데 1편이 수준 미달 혹은 독자를 오도할 수 있는 논문이 게재되었다면 이로 인하여 그 학술지에 대한 평가는 현격하게 절하될 것이다. 학술지에 대한 평가의 절하는 더 이상 좋은 원고의 제출을 기대하기 어렵고 이는 곧 질적 하락으로 귀결될 것이다. 따라서, 경쟁력 있는 좋은 학술지를 출간하기 위하여서는 원고의 옥석을 가리는 과정이 가장 중요한 한 단계이고 이 과정에서 수준이하의 원고에 대한 거부는 필수불가결 하게 된다.

거부되는 원고의 특징은?

학술지에 게재 거부되는 원고의 일반적 및 구체적 특징을 기존에 출간된 학술지작성 및 평가에 관한 논문[1-5]과 대한방사선의학회지에 투고되어 1997년에 심사가 완료된 470편의 원고중 조건부 거부 혹은 거부처리 된 92편(20%)의 원고를 참고하여 기술하기로 한다.

1. 일반적 사항

학술지에 게재 거부되는 원고의 포괄적인 특징은 해당 학술지가 추구하는 목표를 규정하고 있는 투고규정에 크게 어긋나거나, 심사위원이 원고를 평가할 때 가장 중요시하는 원고 내용의 과학성(scientific), 독창성(originality), 실제적 가치(practical value), 독자의 흥미(reader's interest) 등의 면에서 심각한 결함이 있는 것이다.

독창성의 결여는 심사위원의 게재 거부 이유 중 가장 흔한 것으로서 "새로운 점이 없다", "기 출간된 논문의 답습이다", 등의 표현을 자주 사용한다. 과학성 부문에서 흔한 게재 거부의 이유는 방법의 부적절성, 연구 디자인, 분석 및 결론 도출 과정의 비틀림(bias) 등이다. 독자의 흥미는 곧 실제적 가치로부터 유발되는 것으로 양자를 동일시 할 수 있는데, 원저의 경우 독창성 및 과학성의 비중이 높은데 비하여 종설의 경우 독자의 흥미 항목의 비중이 상대적으로 높다고 할 수 있다.

그 이외의 게재 거부 이유 중 흔한 것은 논문 작성에 관한 기본적 훈련미비, 원고 작성상 투고규정 준수 여부, 탈오자, data 기술의 오류 등, 부주의(carelessness)가 있다. 이러한 사항은 만약 원고의 독창성이 뛰어나 논문으로 출간될 경우 혁신적인 공헌을 할 수 있다고 판단되는 상황이라면 심사위원, 편집위원 혹은 편집보조원의 노력으로 개선 가능한 상황이므로 게재를 결정할 수 있다. 그러나, 실

제 독창성 및 과학성이 뛰어난 원고가 훈련미비 및 부주의로 심각한 지적을 받는 경우는 거의 없는 반면, 이러한 지적을 받는 원고의 대다수는 독창성이나 과학성에서 경계수준(marginal level) 혹은 그 이하이다. 따라서, 이러한 원고는 훈련미비나 부주의가 거부에 결정적인 원인이 될 수 있다.

흔히 지적하는 일반적 사항중의 하나로 내용의 산만함, 장황함(redundency)이 있다. 이는 일관된 흐름을 유지하며 논리적 기술을 요구하는 논문 작성의 기본적 지침에 어긋나는 사항으로서, 여기에 관련된 요인은 연구 목적의 명확성, 방법의 과학성, 결과로부터의 결론 도출의 합리성 등에서부터 저자의 논문 작성의 숙달도 등까지 다수의 요인이 관여한다. 다시 말하면, 연구의 목적이 분명하면 일괄된 논리적 흐름을 유지하며 결론에 도달할 수 있는 반면, 그렇지 못할 경우 산만, 장황해 지기 쉽다. 반대로, 원고의 자료가 일관된 논리적 전개를 할 수 있는 경우에도 불구하고 저자의 원고작성 기술의 미숙으로 역시 산만한 원고를 작성하는 경우도 있다.

저자의 의도적인 조작이 관여할 경우 이는 사기성(fraudulant) 논문에 해당한다. 이러한 사기성 논문은 당연히 게재가 거부되어야 하지만, 실제 원고의 심사단계에서 사기성의 이유로 거부를 하는 경우는 찾아보기 어렵다. 그 이유는 모든 peer reviewer들은 저자의 학자적 양심을 신뢰할 수밖에 없기 때문이다. 그러나, 사기성이라는 단어는 사용하지 않으나 "원고의 진실성에 대한 신뢰감을 가질 수 없다"하는 표현은 게재 거부의 이유로 국내학술지에서도 기술되기도 한다. 논문이 출간된 후 사기성이 판명되어 이를 해당 학술지에서 공표하고 색인목록에서 제외함은 물론 저자들에 대한 책임추궁이 해외학술지의 경우 발표된 바 있다.[5,6]

2. 구체적 사항

원고의 각 부분별 심사위원의 흔한 지적사항은 다음과 같으며, 이는 대부분 개선을 요구하는 것이나, 경우에 따라 게재 거부의 이유로 지적하는 경우도 있다.[2]

1) 원고제목
원고 내용을 대표하지 못하거나 명료하게 표현하지 못함.

2) 초록
너무 장황하게 긴 초록.
내용이 없는 초록 : 간결하면서도 부분적으로 상세하여야 하는 초록 작성의 일반 원칙에서 벗어남. 흔히 결과에서 핵심적인 data의 구체적 기술 탈루.

3) 서론
장황한 배경 고찰
불분명한 연구의 목적

4) 대상 및 방법
불분명한 대상의 포함 및 제외 척도
적절한 대조군 설정 미비
결론 도출에 미흡한 대상의 수
결과 평가 방법의 객관성 상실: 척도 불명확, 정보누출, bias 등
사실확인의 근거 불명확
비교연구의 경우 부적절한 goldstandard 설정
분석의 비과학성, 통계적 처리 미비
후향적 연구와 전향적 연구 정의의 혼동
애매하고 비합리적인 유형 분류

5) 결과
구체적 data로 부터 제시되지 않은 결과: 신뢰할 수 없는 결과
목적으로부터 벗어난 내용의 결과
방법에서 기술된 내용의 결과 탈루
모든 data의 나열

6) 고찰
초점이 없고 장황한 고찰
서론 내용의 반복
결과에서 기술된 내용의 평면적 반복
실증적 자료를 기초로 하지 않는 주장
결과에서 기술되지 않은 결과의 인용

7) 결론
결과의 실증적 자료를 기초로 하지 않은 결론: 비약 혹은 비논리적인 결론

거부된 원고의 운명은?

게재 거부의 방식 및 거부율은 학술지에 따라 차이가 있으나 경쟁력 있는 유수 학술지의 경우 일차적으로 편집위원장이 원고를 일별 한 후 그 학술지가 원하는 내용과 거리가 멀거나 원고의 학술성이 현저히 낮다고 판단되는 경우 즉시 거부를 결정하고, 나머지의 원고를 심사위원에게 심사를 의뢰하여 게재여부를 결정하는 과정을 밟게된다.

특정학술지에서 거부된 원고는 논문으로서 영원히 빛을 보지 못하는 경우도 있고 동일 혹은 타 학술지에 게재되는 경우도 있다. 서양의 영문학술지의 경우 학술지 당 과거 거부된 적이 있는 원고의 출간율은 2%~32%이다.[7] 모든 원고는 저자의 많은 시간과 노력의 산물이므로 저자는 특정 학술지로부터 게재를 거부당하였을 지라도 이를 사장시키기 보다는 타 학술지에 게재하기를 원한다. 이때 게재 거부한 학술지의 심사위원의 비평은 저자로 하여금 타 학술지에 재투고를 위한 개정 시 60% 이상에서 건설적인 충고로 받아들이나 결론의 변화는 3% 이하로 보고된 바 있다.[8]

1996년 대한방사선의학회지에 투고된 원고의 총 편수는 253편 이었는데 이중 61편(24%) 이 조건부 불가(42편) 혹은 불가(19편) 판정을 받았다. 조건부 불가 판정을 받은

42편중 27편 (64%)은 재투고(20편) 혹은 투고 포기(7편)의 과정을 통하여 최종 거부되었다. 불가 판정을 받은 19편중 15편(79%)은 재투고 후 거부(9편) 혹은 투고포기(6편)의 과정을 통하여 거부되었고 나머지 4편은 재투고 된 후 출간되었다. 즉, 동기간에 일차 거부된 61편중 10편(16%)은 재투고의 과정을 거쳐 출간되었으나 나머지 51편(84%)은 대한방사선의학회지에 출간되지 못하였다. 51편의 게재 거부된 원고가 타 학술지에 얼마나 재투고 되었고 이 중 몇 편이 게재되었는가는 확인을 하지 못하였으나 그 리한 경우는 없거나 미미할 것으로 생각된다.[9]

방사선의학 분야의 대표적인 학술지인 American Journal of Roentgenology(AJR)에서 1986년도 5개월간 거부된 원고 254편에 대하여 45~54개월 후에 MEDLINE 검색으로 출간 여부를 조사한 결과 162편(64% : 원저 69%, 증례보고 62%)이 30개의 방사선의학 분야의 학술지 혹은 27개의 비방사선의학 분야의 학술지에 게재되었음을 보고하였다.[10] 이 학술지의 원저원고 수용율(accept rate) 43%, 증례보고 수용율 20%를 감안하면 AJR에 투고된 원고 중 적어도 원저는 82%, 증례보고는 70%가 AJR 혹은 타 학술에 게재된다는 것이다. 이때 타 학술지의 SCI mpact factor나 발행 부수는 AJR에 비하여 거의 다 낮은 것은 물론이다.

미국의 경우 방사선의학 혹은 유사분야의 학술지의 숫자가 우리 나라와는 비교가 되지 않게 많기 때문에 전술된 바와 같이 AJR의 경우 거부된 원고의 64%가 출간되었으나, 대한방사선의학회지에서 거부된 원고는 16% 정도만이 출간되었음을 지적할 수 있다.

결 론

의학분야의 학술지 편집에 있어서 투고된 원고를 심사과정을 통하여 게재 거부하는 것은 학술지의 질적 유지 및 향상을 위하여 필수 불가결하다. 그 이유는 투고된 원고 중에는 모든 학술지에서 공통적으로 추구하는 독창성 및 과학성의 결여 뿐 아니라, 해당학술지의 독자에게 실용적인 가치가 없는 원고도 있기 때문이다. 학술지에 따라 투고된 원고 중 게재 거부된 원고의 운명은 차이가 있으나, 동일 혹은 타 학술지에 재투고하여 출간하고자 하는 저자의 노력은 차이가 없다.

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편집인 및 편집위원의 역할

한양대학병원 진단방사선과

함 창 곡

의학논문의 심사는 의학 학술지에 투고된 원고를 전문가 또는 동료(expert or peer)가 평가하는 행위다. 심사의 근본적인 목적은 심사를 통하여 연구 결과를 감시하며, 옳고 새로운 지식을 독자에게 쉽게 전달시킴으로서 의학을 발전시키는 것이다. 그러나 학술지 자체로 보면 좋은 논문만을 게재하여 학술지의 질을 높이는데 있으며 이를 위하여 게재되는 논문들의 질적 수준을 유지시키려는 노력이다.

우리 나라 의학학술지의 대부분은 투고자와 독자가 제한되어 있고 투고되는 원고의 수가 적어 게재 거부률이 매우 낮다. 이에 반하여 외국의 저명 학술지는 채택률이 25% 전후인 학술지가 많으며, 한 전공 분야에도 수십 종의 잡지가 발간되고 있어 인용도(citation index)에서 우위를 차지하려는 끊임없는 경쟁 때문에 좋은 논문을 출간하려는 엄격한 심사과정이 필연적이다. 이런 학술지의 경우 편집인이 전임이고 훈련된 충분한 직원이 있으나 그렇지 못한 우리 나라의 편집업무가 그들과 동일할 수 없다.

심사위원, 편집위원, 편집인 등은 각 학술지의 편집 방침에 따라 구성되는 것이며, 투고되는 원고의 수와 학문의 세분화 정도에 따라 다르다. 편집위원의 기본적인 역할은 편집인에게는 원고의 질과 문제점에 관하여 조언을 하는 것이고 저자에게는 건설적인 비평을 주는 것이다. 편집위원도 저자와 같은 집단의 구성원이며 자신들도 저자의 입장이 되기 때문에 상호 심사(peer review)의 의미를 갖게 된다. 따라서 저자와 편집위원의 자질의 차이는 서로 뒤바뀔 수 있어 잘못된 심사는 논문에 결함을 만들어 줄 수 있고 나쁜 논문이 게재되도록 도와주는 경우도 있다.

A. 편집위원

1. 편집위원의 선정

편집인이 편집위원을 선정하는 것이 보통이며, 선정기준은 두 가지로 저술된 논문, 학술대회에서의 발표, 또는 각종 교육과정에서 담당했던 강의 실적 등을 근거로 하거나 주변의 인물들로부터의 추천이다.[1] 물론 편집위원은 모두 활동적으로 수련기관, 특히 대학에서 일하고 있는 전문가들이다. 논문을 많이 써본 사람이 보편적으로 논문 심사를 잘할 수 있기 때문에 경력이 중요하며 너무 젊은 편집위원은 열성적이기는 하지만 편견을 가질 가능성이 많고 원로급에 속하는 편집위원은 평균적으로 심사에 무관심하거나 소홀히 할 가능성이 많다. 또한 항상 업무에 바쁜 사람은 논문 심사에 충분한 시간을 할애할 수 없어 심사가 소홀해진다.

편집위원의 일은 매우 신경이 쓰이는, 시간이 소요되는 어려운 일이지만 일종의 명예직으로 생각하기 때문에 편집위원으로 위촉되는 경우 대부분은 수락하게 되며 미국에서는 대부분 보수가 없고, 국내에서는 우편료 등을 위한 약간의 수당을 지급하는 단체가 많다.

2. 편집위원의 역할

편집인을 돕는 일로서, 먼저 ① 논문의 질, 수준, 중요성, 활용성, 흥미 유무, ② 사회적 건전성, ③ 새로운 지식을 전달할 수 있는 독창성 및 창의성 여부, ④ 해당 잡지에의 적합성, ⑤ 권고사항을 일반적으로 적용할 때 위험성이 없는지, ⑥ 중복출간이나 표절의 가능성 여부를 검토하여 채택에 관한 추천의 방향을 정하고, ⑦ 원고 각 부분에 대한 심사(<참고1>로 첨부)를 하여 논문의 장점과 문제점을 기술하고, 때에 따라 ⑧ 현 상태 또는 "종설", "편집인에게 드리는 글"로 바꿀지의 여부를 검토하여야 한다. 원고에 대하여 ⑨ 독자가 읽기 쉽고 내용이 간결하고 명료한지, ⑩ 원고의 길이가 적당하고, 문법에 맞고, 약어가 최소화되고 인식할 수 있게 쓰였는지도 살펴보아야 하고, ⑪ 최종적으로 자료의 통일성, 참고문헌, 색인단어 등이 옳게 쓰였는지를 살펴보는 원고편집인의 역할 수행 등이다.[2-4]

저자에게는 좋은 점에 대하여 칭찬을 아끼지 않아야 하고 논문의 개선을 위한 의견을 구체적으로, 항목별로 제시하여야 한다.

<참고1>

원고 각 부분에 대한 심사(논문 작성법에 관한 내용이므로 자세한 설명을 안 했음)

① 제목과 초록이 논문을 대표할 수 있도록 분명한가?
② 색인단어가 논문을 대표할 수 있고 색인집에서의 검색이 가능한가?
③ 서론내의 연구 목적이 명확하게 기술되었는가?
④ 대상의 선정에서 포함 및 제외 기준이 명확하고 합리적인가?
⑤ 실험이나 관찰의 목적이 중요한 것인가? 쓰여진 실험 방법이 적절한 것인가?
실험과정이 독자로 하여금 재현할 수 있도록 충분히 설명되어 있는가?
⑥ 사실이나 해석에서의 오류는 없는가? 통계방법은 적합한가?
⑦ 결과에서 도출된 결론이며 저자의 주장이 명확하고 정당한가?
⑧ 고찰은 모두 정당한가? 과장, 축소된 부분, 기타 수정이 필요한 곳이 있는가?

⑨ 저자가 적절한 참고문헌을 인용하였는가? 추가, 삭제를 권할 것
⑩ 원고 중 어느 부분을 강조하거나, 늘리거나, 줄이거나, 삭제할 곳이 있는가?

3. 편집위원의 권한

심사중인 논문은 편집위원의 권한하에 있다. 물론 최종적인 결정은 편집인에게 있지만 대부분의 경우 편집위원의 의견이 결정적인 영향을 주는 경우가 많기 때문이다. 누구나 처음 편집위원으로 위촉되면 자신이 전문가가 된 것으로 생각하게 되고 자만심을 갖게 되기도 한다.[1] 심사의 공정성을 위하여 편집위원을 익명으로 하는 경우가 많으며, 그렇게 되면 막강한 권력을 행사할 위험이 있으므로 스스로 현명해지도록 노력해야 한다. 편집위원은 자기 이름이 공개된다고 할지라도 두려움이 없는 심사를 하여야 하며, 실제적으로 익명으로 심사할 때 거부율이 높아지는 경우가 많다.

편집위원으로서의 가장 큰 위험은 특정 연구에 대한 호감이나 적대감이며 다른 연구에 대한 질투심은 중요한 동료의 연구를 묵살시키는 경우도 생긴다. 과학의 발달과정에서 적이 됨으로서 실제 전문가가 되는 경우도 있다. 실제로 일어나고 있는 일에 매우 접근하게 되면 의외의 새로운 길이나 방향을 알게 되기 때문이다. 새로운 이론이나 착상은 비록 불완전하게 진행되었더라도 일종의 도전으로서 출간될 충분한 가치가 있다. 이러한 일들은 의학을 발전시키고, 저자와 편집위원 모두가 학문적으로 발전하는데 자극을 주는 교육적 효과가 크다. 그러나 대부분이 익명으로 심사하기 때문에 누가 그 논문을 향상시키는데 공헌하였는지 알려지지는 않는다. 그러나 반대로 욕설이나 개인적인 공격에서 피할 수 있다.

4. 편집위원이 가져야 할 태도

편집위원은 편집인이 해당분야 전문가로 인정하고 심사가 의뢰되는 것이기 때문에 항상 새로 출간되는 논문에 대한 올바른 지식을 갖고 있어야 한다. 편집위원은 같은 저자의 입장에서 자기 논문을 심사하는 태도를 가져야 하며 ① 저자의 지적소유권을 위하여 출간될 때까지 원고의 기밀을 유지해야 하고, ② 이해의 충돌(conflict of interest)을 표현해야 하고, ③ 편견을 없애고 객관적이 되어야 하며, ④ 저자와 편집인에게 명확한 언급을 해야 하고, ⑤ 가급적 빨리 결과를 회신해야 하고, ⑥ 저자와 직접 접촉하지 말고, ⑦ 원고를 읽고 원고 안에 답이 있는 질문을 하지 않아야 하며, ⑧ 저자가 자기 논문을 반복적으로 인용하였다고 좋게 평가하지 않아야 하고, ⑨ 트집을 잡거나 우스꽝스러운 질문을 피하고, ⑩ 가지고 있는 자료로 더 이상 수정 보완이 불가능한 경우가 아니면 추가의 실험이나 작업을 권하지 말고, ⑪ 수정 지시 사항을 재 검토하고, ⑫ 의심스러우면 채택을 권하여야 하고, ⑬ 저자에 대한 예의를 지켜 거부될 논문에도 "논문은 훌륭하지만 채택은 어렵다."라는 표현을 사용하여야 하며, ⑭ 원고가 완전히 새로운 개념에 관한 것이라면 소중히 하여야 하고 일반적인 배경에서 게재 거부되면 안 된다.[3,5,6]

논문의 전체적인 가치가 게재 가능한 경우에는 가능케 한 장점을 지적하는 것도 편집인의 판단에 도움을 준다. 두 명의 편집위원의 결과를 받으면 편집인은 대개 나쁘게 평가한 편집위원의 결과에 비중을 두게 된다. 그 편집위원은 작은 흠집을 많이 지적하여 자세한 심사를 한 것이 되고, 좋은 점수를 준 편집위원은 장점을 지적하지 않았기 때문에 심사를 소홀히 한 것으로 판단되어 게재 될만한 좋은 논문이 불행하게도 거부되는 경우가 있다. 따라서 편집위원은 항목별로 심사하면서 장점을 많이 지적함으로서 채택 여부에 관한 올바른 조언을 하도록 하여야 한다.

대개 편집인이 요구하고 있는 심사 회신 기간은 2주 이내이며, 통계적으로 심사에 소요되는 실제의 시간은 평균 2.4~2.7시간이라는 보고[1,7]가 있듯이 실제적으로 원고를 오래 가지고 있으면서도 실제 심사에 충분한 시간을 사용하지 않는 경우가 많다.

5. 편집위원을 어떻게 평가할 것인가?

Feuer등은[8] J Vasc Interv Radiol의 편집위원용 평가장치를 개발하였으며, ① 심사기간을 3주 이내부터 9주 이상까지, ② 등급 평가를 완결했는지, ③ 심사에 관한 예의, 즉 원고 위에 표시를 했는지, 편집위원이 누구인가를 표시했는지, 저자에게 약어를 사용하지 않고 전달 가능한 표현을 사용했는지, ④ 각 부분별로 심사했는지(section-by-section review), ⑤ 추가적인 참고문헌을 제공했는지, ⑥ 요약 및 타 학술지로의 추천이 있었는지, ⑦ 새로운 의견이나 전망을 제시했는지를 총점 14점으로 점수화 했다.

40세 이하의 젊은 편집위원이 보다 충분한 시간을 사용하며 성실하게 심사하기 때문에 심사의 질이 우수하다는 평가가 있고, 심사결과의 질이 학문적인 경력이나 성별의 차이와도 관계가 없었다는 보고가 있다. 그러나 명성이 높은 기관의 근무자가 심사의 질이 우수하다는 보고는 보다 활동적이며 새로운 지식을 항상 접할 수 있기 때문이 아닌가 생각된다.[1,9-11]

6. 논문 심사의 잘못

논문의 심사는 전횡적인 면, 주관적인 면 그리고 비밀스러운 면을 가지고 있기 때문에 완전할 수는 없다. 아무리 엄하게 심사를 하여도 흠이 있는 논문이 게재되는 것은 필연적이며 소홀한, 잘못된 심사는 조작된 논문의 출간을 도와주는 경우도 있다.[12] 가장 흔한 원인은 ① 편집위원의 자질이며 의학교육 과정에서 논문심사에 관한 교육을 받은 바 없고, 전문가라고 선택된 편집위원이 저자와 동등하게 정통하지 못한 경우가 많다. ② 편집인의 기대와 달리 편집위원은 학문적으로는 전문가이지만, 문장 실력이 좋지 못하고, 판단력이 나쁜 경우가 있고, ③ 상당수는 업무가 바빠 원고에 충분한 관심을 두지 못하는 경우가 있다. 가장 문제가 되는 것은 ④ 편집위원의 바이어스로 만약 논문의 주제가 편집위원의 연구와 유사하다면 두 사람은 경쟁자이거나 또는 팀 동료일 수밖에 없다. 자기 연구를 옳게 평가하거나

자기 주장을 손상시키는 논문, 동료나 선생 또는 제자가 저자인 논문을 객관적으로 대하기는 어렵다. 바이어스를 줄이기 위한 방법으로 편집위원, 저자를 익명으로 하고 있으나 연구의 내용, 기계명, 사진에 포함된 병원명 등에서 노출되는 경우가 많고 학술지에 따라서는 불가능한 경우도 있다.[13] 끝으로 주관적인 면에 관계되는 ⑤ 심사의 불 일치성으로 두 명의 편집위원이 심사를 하는 경우 채택여부에 관한 평가에서 의견 일치도가 40%정도에 불과하여 누가 심사하였는가에 따라 결과가 달라질 위험이 있다.[14,15]

7. 심사 및 과정을 향상시킬 수 있는 방법

팩스, 전자우편 등 통신 수단이 빠르게 발전하고 있다. 사진을 많이 취급하는 전공 분야에서는 전자 심사가 물리적으로 어려운 실정이지만 문자로만 구성된 원고의 경우에는 심사기간을 매우 단축시킬 수 있다.

심사의 질을 향상시키기 위하여 저자와 편집위원을 서로 모르게 진행시키는 것이 좋고, 주제에 적합한 편집위원을 지정하는 것이 필수적이다. 그러기 위하여 편집위원을 지속적으로 평가하여 우수한 능력의 편집위원을 찾아내는 것이며, 가장 빠른 방법은 자질이 나쁜 편집위원을 편집위원에서 제외시키는 것이다. 심사의 질을 향상시키고 평가의 평준화를 위하여 자세한 심사지침서의 활용과 웍숍 등의 교육을 자주 시행하는 것이 좋은 방법이며,[1] 편집인이 편집위원들의 심사상황을 살펴 부족한 부분을 개별적으로 지적하는 것도 좋다.

3. 편집인의 역할

편집인은 우수한 편집위원을 선정 위촉할 의무가 있다. 또한 원고가 접수된 후 가장 적절한 편집위원을 선정하는 것 역시 편집인의 역할이다.

편집인은 한 명 또는 여러 편집위원의 심사결과를 토대로 2차 심사의 역할을 하며, 채택 여부에 대한 결정권을 가지므로 사명감을 가져야 한다. 논문의 가치는 독자가 판단해야 하는 것이므로 편집위원의 의견을 존중해야 하지만, 편집위원의 심사 결과가 불충분하거나 부적절한 경우 이를 무시하고 새로운 방향을 설정하여 새로 쓰게 함으로서 논문을 살리고, 논문의 질을 높이고, 때로는 저자의 명예를 지켜줄 수 있다.[16]

각 학술지가 지향하고 있는 원칙의 문제이지만, 많은 원고 중에서 좋은 논문만을 선택하고자 하는 경우에는 비록 좋은 논문이 거부되어도 문제가 안되고 편집인은 채택되는 논문에 대한 책임감을 가져야 한다. 그러나 우리 나라와 같이 한 분야에 학술지가 한 두 개밖에 없고 원고가 불충분한 경우에는 좋은 논문이 부당하게 거부되는 경우가 없도록 편집인이 주의를 기울여야 한다.

논문의 심사를 익명으로 하는 경우에는 편집위원이 저자를 알 수 없기 때문에 편집인이 마지막으로 저자됨을 감시할 수밖에 없다. 편집인이 무자격 공저자를 가려내어 시정시킬 수는 없지만 저자됨의 원칙을 만들어 저자들에게 알려주는 것도 중요한 역할이며, 저자의 수가 너무 많은 경우 또는 포함된 저자 중 저자됨에 의문이 있는 경우 저자에게 의문점을 지적하여 재고하도록 촉구할 수 있다 <참고2>.

또한 편집인은 논문의 투고와 심사에 관계되는 각종 규정과 서류를 제작 사용토록 할 책임이 있다. 규정 및 서류로서 ① 논문 투고규정, ② 저자 체크리스트, ③ 저작권 동의서, ④ 심사 지침서, ⑤ 심사 결과표(등급표), ⑥ 편집위원 의견서, ⑦ 편집인 편지 서식, ⑧ 저자 회신서 등이 있다.

<참고2>

의학의 연구는 개인적인 욕구와 열의로 이루어져야 하지만, 개인의 업적으로 간주되는 논문의 수가 취업, 승진, 급여인상, 연구비 수혜 등 각종 자격 요건에 가장 중요한 요소로 작용하기 때문에 대부분의 의학자들은 논문을 만들어야 한다는 압박 속에 생활하게 된다. 따라서 좀 더 많은 수의 논문, 질 좋은 논문을 만들려는 욕심에서 여러 가지 부적정한 사례들이 발생된다. 다른 논문의 표절, 연구자료의 조작, 거짓 논문의 작성, 중복출간, 저자 수 늘리기 등이 허다하며 이 역시 편집위원이 저지하도록 노력하여야 한다.

1) 이중 또는 중복출간(Duplicate or Multiple Publication), 표절

이중 또는 중복출간은 같은 또는 유사한 논문을 다른 학술지에 출간하는 것을 말하며, 본문의 일부, 표, 그림의 중복 사용, 같은 대조군이 사용된 연구도 중복출간에 해당된다. 다른 연구자의 논문 자체를 전체 또는 부분적으로 논문 작성에 사용하면 표절이 되며 이는 학문적 사기가 된다. 직접적인 중복출간은 아니지만 일련의 연구를 수행하고 최소출간 단위(Least Publishable Unit)로 나누어 두 편 이상으로 출간하는 분할출간(Divided or Salami publication)이나 출간된 논문에 증예 수를 늘려 같은 결론의 논문으로 출간하는 덧부치기출간(Redundant or Imalas publication)도 중복출간에 포함된다.[17-19] 중복 출간된 논문은 발견되면 해당 학술지는 공식적으로 논문이 취소됨을 게재하고 책임 저자들에게는 투고의 권한을 일시적으로 제한하는 등의 처벌이 뒤따른다.

2) 저자됨과 잘못된 저자됨(Irresponsible Authorship)

저자 수 늘이기도 최근 수십 년간 기하급수적으로 늘고 있으며 이 중에는 무자격 공저자들이 많이 포함된다. 과장이나 자기 분야의 원로를 항상 포함시키는 등 예우를 위한 경우가 가장 많고, 친지나 동료 등에게 선물의 의미로서 포함 시켜주는 경우, 또는 한 팀이라는 이유로서 연구에 참가하지 않은 동료 전원을 공저자에 포함시키는 경우 등이 있다. 무자격 공저자가 포함되는 것도 일종의 사기로서 저자됨의 권위를 손상시키며 아울러 지적인 정직성에 의문을 갖게 한다.[20] 이를 개선하려는 노력이 오래 전부터 지속되어 오고 있으며 영화나 TV에서와 같이 각종 역할을 표지에 표시하는 것이 좋겠다는 의견이 제시된 바 있다. 이는 편집인이 바뀌면서 발간된 RADIOLOGY 1998년 1월호부터 저자의 역할을 표시함으로서 현실로 나타나고 있다.

저자 또는 공저자는 ① 연구의 기본 개념, ② 연구 고안, ③ 문헌 조사 및 지적내용의 관여, ④ 임상 또는 실험적 연구, ⑤ 자료의 수집과 분석, ⑥ 통계적 분석, ⑦ 원고 작성, ⑧ 원고의 검토와 수정. ⑨ 최종 원고의 승인 등에 참여하여야 한다. 한편 그 논문의 제작 과정 또는 대상과 관계가 있으나 저자의 자격이 없는 경우는 연구자와 같은 팀의 구성원, 소속 과장, 연구실 또는 실험실의 책임자, 증예를 제공해준 사람, 일상적인 일과로서 해당 증예의 각종 기록을 작성한 사람이나 담당의 등이다. 이들은 필요에 따라 "감사의 말씀(Acknowledgement)"에 표기함으로서 충분히 알리고 감사의 표시를 할 수 있다. 일반적으로 저자의 표기 순서는 논문의 작성에 가장 역할이 컸던 사람이 제1저자가 되는 경우가 많으나 원고의 초안을 작성한 사람이 제1저자가 될 수도 있다. 연구 감독자(supervisor)는 제1저자가 안되는 경우 끝저자가 된다. 이들 중 한사람이 통신저자(corresponding author)가 되며 나머지 저자들은 기여도에 따라 제2, 제3저자가 된다.[21]

C. 원고편집인의 역할

우리 나라에서는 편집위원, 편집인 또는 영문 교정인이 함께 하여야 할 내용으로 정확한 잡지를 만드는, 잡지를 일관성 있는 스타일로 유지시키는 일을 담당한다. 논문의 형태를 일관성이 있는 형태로 유지시키는 것은 독자들에게 혼동을 주지 않기 위함이다. 채택된 원고는 학문적으로 가치가 인정된 것이지만 자료나 논리적인 면에서 많은 흠을 가지고 있는 경우가 있다. 모든 데이터가 표, 그림, 본문에서 통일성이 있는지 검토하며, 원고에 쓰인 글을 논리적인 글로 수정하는 노력을 한다. 가장 중점을 두는 곳은 참고문헌과 색인단어의 수정이다. 저자명, 제목, 페이지 숫자가 옳은 지를 점검하고 저자에게 확인한다. Evans등은[22] 3편의 외과계 잡지에서 참고문헌의 오류를 조사한 결과 48%의 오류율이 발견되었고, 저자명의 오타나 제목 또는 저자명의 일부 빠뜨린 것이 가장 많았다. 기타 출판사에 사진의 배열 등 어떻게 인쇄할 것인지를 알려준다.[23,24]

D. 논문심사의 질에 대한 저자 및 독자의 만족도

심사결과에 대한 저자 만족도 조사에서도 대체적으로 거부된 원고의 저자가 설문조사에서의 반응률은 낮았으나 심사에 대한 만족도에 대한 차이는 없었다.[25] 조사항목은 심사기간, 심사의 질, 원고의 질이 향상되었는지, 심사가 교육적이었는지, 심사 후 원고를 수정했는지, 편집위원의 언급이 명확했는지 등이며 저자가 제시한 좋은 심사의 예는 ① 자세한 심사, ② 가치 있는 지적, ③ 편집위원이 원고를 읽고 이해한 것 같다. ④ 편집위원이 충분한 지식이 있다. ⑤ 지적사항이 명확하다. ⑥ 적당한 심사기간과 ⑦ 행정처리의 만족 등이며, 나쁜 심사의 예는 ① 불명확한 지적사항, ② 심사자의 고자세, ③ 심사기간의 지체, ④ 편집위원의 지식 부족, ⑤ 원고를 자세히 보지 않은 것 같음, ⑥ 편집위원의 편견과 ⑦ 행정처리의 불만족 등이었다.

거부된 논문의 심사에 대하여 불만을 표시한 저자의 경우에도 대부분이 편집위원의 의견에 따라 수정된 원고를 다른 잡지에 출간한 것으로 보고되어 논문심사가 원고의 개선에 도움이 되는 것이 분명하다. 또한 저자들은 심사 결과에 대하여 반론할 권리를 주장하지만 반론은 주의를 끄는데는 성공적이지만 결정을 뒤집기에는 역부족이라고 보고되고 있다.[26]

Justice등은[27] 무작위 추출한 Ann Int Med의 독자와 편집위원, 또 편집진에서 선발한 전문가 등을 대상으로 이미 출간된 논문 113편에 대하여 논문의 질에 대한 평가를 실시해본 결과 각각 84%, 79%, 61%의 논문이 채택 가능하다고 하여 전문가일수록 채택된 논문에 대하여도 부정적인 평가를 하고 있다.

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이 학회지는 1999년도 한국학술진흥재단의 지원에 의하여 출판되었음.
이 학회지는 한국과학기술단체총연합회의 일부 재정지원에 의하여 발간되었음.

인쇄 : 최신의학사

대한신경과학회 기관지(비매품)

투 고 규 정 (단순)

1999년 4월 1일 개정

1. 원고의 종류는 원저, 증례 보고, 단신 보고, 종설 및 간행위원회에서 위촉한 논문으로 한다.
2. 원고의 게재 여부 및 게재 순서는 간행위원회에서 결정한다.
3. 타지에 게재된 같은 내용의 원고는 게재하지 않으며, 본지에 게재된 것을 타지에 임의로 재투고하거나 전재할 수 없다.
4. 필요시 원문에 영향을 미치지 않는 범위내에서 간행위원회가 원고를 수정할 수 있다.
5. 원저, 증례 보고 및 단신 보고 등을 제출할 때에는 소정의 논문 심사료를 납부하여야 한다. 인쇄 후에는 소정의 게재료를 납부하고, 별책대와 특수 인쇄를 필요로 하는 경우 그 비용은 저자가 부담하여야 한다.
6. 본 규정에 맞지 않는 원고는 수정을 권유하거나 게재를 보류할 수 있다. 원고의 게재 여부는 소정의 사독 과정을 거친 후 간행위원회에서 결정 한다.
7. 학술 용어는 대한의사협회 발행 학술 용어집(최신판)을 사용한다.
8. 인명, 지명 등의 고유 명사는 원어를 사용한다.
9. 숫자는 아라비아 숫자를, 도량형의 표현은 미터법 단위를 사용한다.

투 고 요 령

1. 원고는 한글이나 MS word를 사용, 맞춤법, 띄어쓰기를 정확하게 하여 A_4 용지에 두줄 간격(double space)으로 작성하며 1면에 22줄을 넘지 않아야 한다.
2. 원고 제출시에는 원본 1부, 복사본 2부, 디스켓 1장 및 저자 점검표를 제출하며 사진 및 그림 등은 원본에 부착하여 제출하되 복사본에도 사진 및 그림의 복사본이 포함되어야 한다.
3. 원저는 1) 표지, 2) 내표지(제목만 있는 표지), 3) 초록, 4) 서론, 5) 대상 및 방법, 6) 결과, 7) 고찰, 8) 감사의 글(필요시), 9) 참고 문헌, 10) 표(Table), 11) 그림 및 그림 설명문의 순으로 각각 면을 바꿔서 작성한다.
   영문 초록은 Backgrounds, Methods, Results, Conclusions, Key Words의 순서로 작성하되 250단어가 넘지 않도록 한다. 초록의 하단에는 3-6개의 Key Words를 첨부하며 가능한 한 MeSH (Medical Subject Headings)에 수록된 어휘를 사용한다.
4. 증례 보고는 영문 초록은 150단어 이내로 하되 서론, 대상 및 방법, 결과, 결론을 분리하지 않고 서론이라는 제목없이 증례와 연관된 일반적 배경 및 의의를 간략하게 기술한다. 총 분량은 A_4용지 10쪽 이내로 제한한다.
5. 단신 보고는 특이한 사항, 예시적 가치가 있는 내용을 간략히 보고하는 것으로 증례 보고 형식에 따르되 영문 초록은 150 단어 이내, 참고문헌은 10개 이내, 그림은 2개 이내로 제한하며 원칙적으로 표나 감사의 글은 포함될 수 없다. 총 분량은 A_4 용지 6쪽 이내로 제한한다.
6. 본문 중 인용하는 참고 문헌은 인용한 부분에 순서대로 어깨 번호를 사용한다.
   본문에 참고 문헌 인용시 저자가 1인 혹은 2인인 경우 전부 기술하고 3인 이상인 경우 제1저자만 쓰고 '등' 혹 은 'et al'로 표기한다. 국내 저자인 경우 성과 이름을 모두 쓰고, 외국 저자인 경우 성만 쓰도록 한다.

예) 1. 1989년 Purves-Stewart[1]가 다리에 근긴장이상이 생긴 다음 증상이 나타난 환자를 보고한 이후 현재까지 약 36명의 유사한 증상을 가진 환자들이 보고되었다.[2,3,10-12]
   2. 홍길동과 김철수[13] 및 Fraser et al[14]의 보고에 의하면…

7. 참고 문헌 표기란에는 본문에 인용한 순서대로 붙인 번호 순으로 기재하고, 참고 문헌의 저자가 6인 이하인 경우 모두 쓰고 7인 이상인 경우는 최초 3인만 쓰고 다음에 '등' 혹은 'et al 로 표시한다. 영문 잡지의 약자명은 Index Medicus의 표기에 따른다.

잡©지-저자명. 논문제목. 잡지명 연도;권수:면수.
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예) 1. 이××, 최××. 뇌결핵종 20예에 대한 임상적 고찰. *대한신경과학회지* 1985; 3:241-253.
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8. 표와 그림은 영문으로 명료하게 본문의 내용을 읽지 않고도 그 자체로서 설명이 가능해야 한다(단 표는 Excel file로 작성하여야 한다).
9. 기타 자세한 사항은 대한신경과학회지 매년 제1호에 실리는 투고 규정(상세)을 참조한다.
10. 저자 점검표를 확인하고 작성하여 원고와 함께 아래 주소로 보낸다.
    저자 점검표는 매호 인쇄되어 나오며 이를 복사해서 사용한다.

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