# 한국판 CERAD 평가집 (CERAD-K)의 개발과정 및 의의

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# Increased Life Expectancy

- A new epidemic of age-related disorders, particularly dementia, have been unmasked.
- As our life expectancy increases and the aging popu-lation constitutes larger proportion, the question is:
- *What merit is there in lengthening life if quality is not preserved?*

# Dementia

- *Definition* : An acquired and sustained deterioration of memory and other intellectual functions in an alert patient
  : Conducts everyday activities less well, relative to past performance
- Result from brain dysfunction and is a Sx of many disease

*** 2 Basic Questions in the evaluation of suspected dementia pt.**

**(1) Is the patient truly demented?**

**(2) If so, what is the cause?**

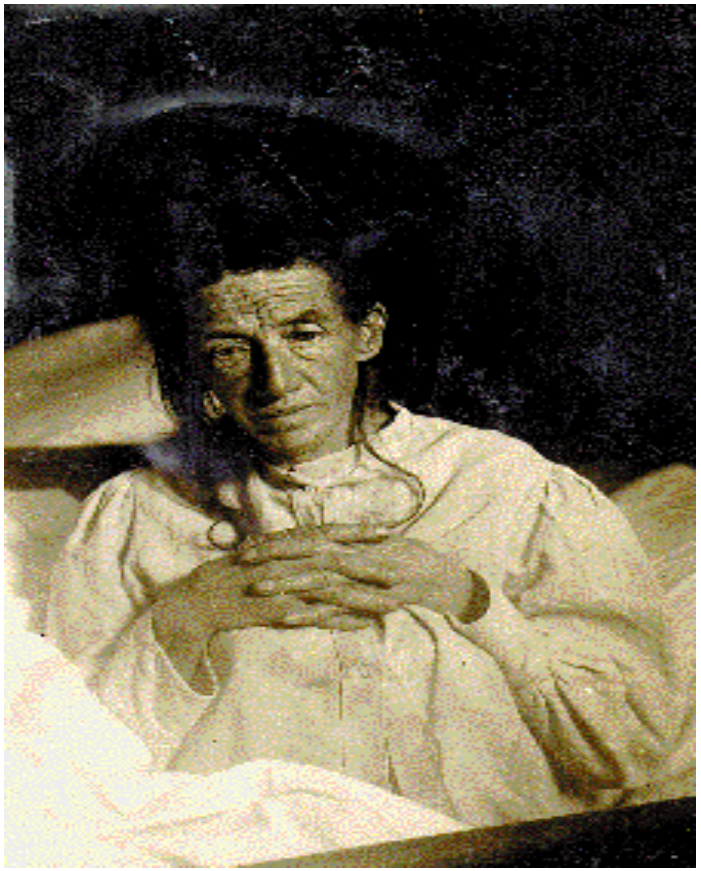
# Cause of Dementia

I. Cerebral neurodegenerative disorders
   - Alzheimer's disease (~50%)
   - Pick's disease (FTD)
   - Parkinosn's disease / Diffuse Lewy Body dementia
   - Huntington's disease ----

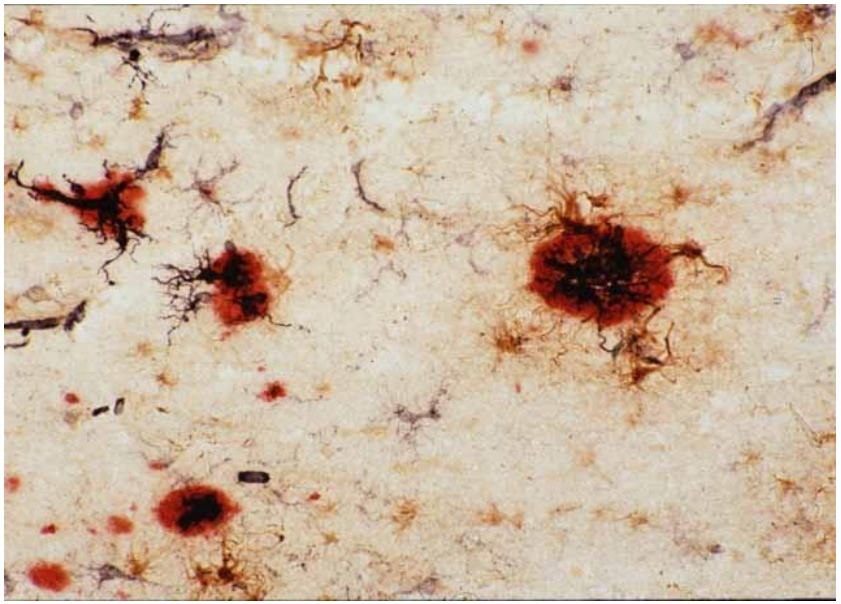
II. Other disorders causing cerebral dysfunction (some potentially are reversible)
   - Vascular dementia (20~30%)
   - Intracranial neoplasm
   - Trauma
   - NPH
   - Hypothyroidism
   - Vit B12/ folate deficiency
   - AIDS ----

Dr. Alois Alzheimer

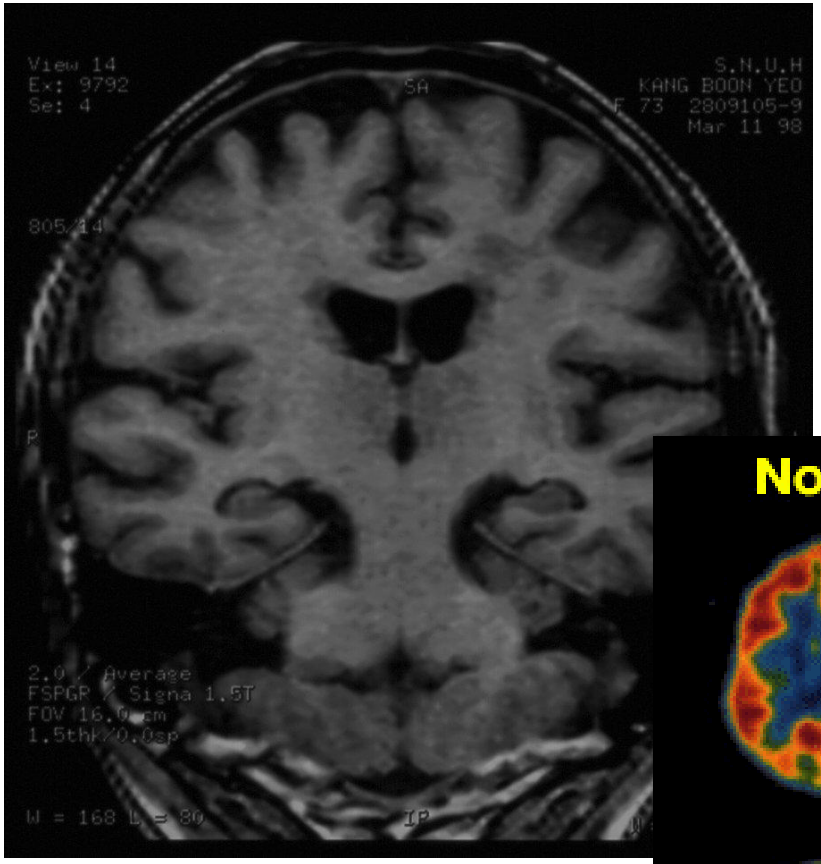
Auguste D



**Neurofibrillary tangles**
from Auguste D, drawn by Alzheimer



**Senile plaque**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FSPGR / Signa 1.5T
FOV 16.0 cm
1.5thk/0.0sp
W = 168 L = 80
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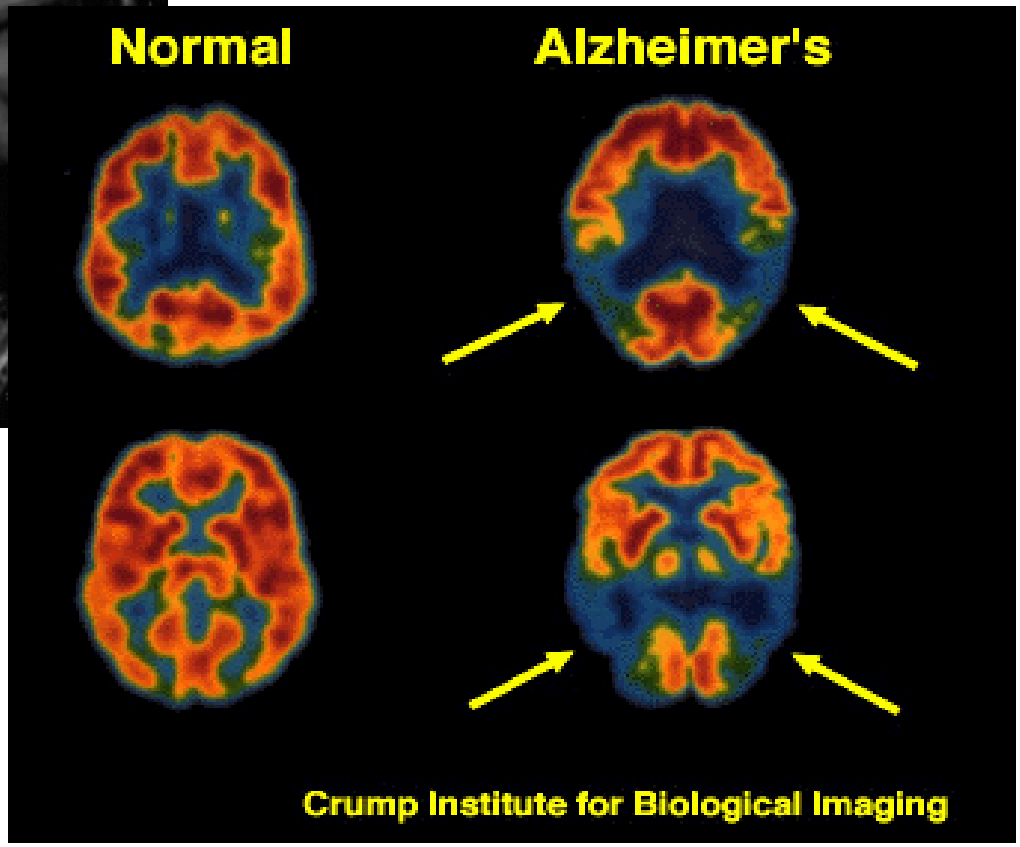
Normal
Alzheimer's
Crump Institute for Biological Imaging

# Problems in Dementia Research

A broad variety of

1. Diagnostic criteria
2. Testing methods
3. Classifications of disease severity

# Diagnostic criteria for AD

- DSM-III-R
- DSM-IV
- ICD-10
- NINCDS-ADRDA
  (National Institute of Neurological and Communicative Disorders and Stroke - Alzheimer's Disease and Related Disorders Association)

# Diagnostic Criteria for VD

- DSM-III-R
- DSM-IV
- ICD-10
- Hachinski ischemic score
- ADDTC
  (California AD Diagnostic and Treatment Center)
- NINDS-AIREN
  (National Institute of Neurological Disorders and Stroke - Association Internationale pour la Recherhe et l'Enseignement en Neurosciences)

***Many investigators believed that <u>lack of consistency had created confusion</u>, which affected clinical, neuropathological, and epidemiological research***

***<u>Comparison of research findings from individual research centers was not possible</u> because of the variety of approaches to testing***

**Requirement of Standardized diagnostic & evaluation instrument**

# CERAD

## Consortium to Establish a Registry for Alzheimer's Disease

# CERAD – Background

- Health Research Extension Act (1985, US Congress)

  National Institute on Aging (NIA) as authorized organization

- CERAD was funded by NIA in 1986 to develop a battery of standardized instruments with AD.

**1. Create uniformity in enrollment criteria**

**2. Permitting the pooling of information across sites**

**3. Making comparison of research findings possible**

# CERAD – Sites & translations

- **16 university medical centers throughout the US joined to form CERAD (initially)**

- Translation languages (12 languages)
  - Bulgarian, Czech, French, Spanish, Italian, German, Portuguese, Dutch
  - Korean, Japanese, Chinese, Hebrew

- Have promoted to form an international network of investigators

# CERAD – Components

- Three major components of CERAD battery
  - **Clinical assessment**
  - **Neuropsychological assessment**
  - Neuropathological assessment
- Several other Assessments in CERAD
  - Neuroimaging
  - **Behavioral Rating Scale for Dementia (BRSD)**
  - Extrapyramidal dysfunction in AD (EPDAD)
  - Family history of AD
  - the use of community services in the care of patients with AD

# CERAD neuropsychological assessment battery

*Very popular in many clinical and research settings because of its* ***brevity, portability, and usefulness in evaluating elderly patients with dementia****, including those with very mild cognitive symptoms*

J1. Verbal Fluency
J2. Boston Naming Test
J3. Mini-Mental State Exam
J4. Word List Memory
J5. Constructional Praxis
J6. Word List Recall
J7. Word List Recognition
J8. Constructional Recall
J9. Trail Making A & B

# Korean version of CERAD assessment packet (CERAD-K):

## Clinical & neuropsychological batteries

1. Translation
2. Reliability & Validity of Cognitive tests

# Key issue in development of CERAD-K

- Tried to ensure the equivalence to the original CERAD batteries for comparability in the international study

1. Semantic equivalence

2. Technical equivalence

3. Construct equivalence

# Translation of CERAD packet into Korean

## 1. Basic translation Process

1) Translated into Korean by a psychiatrist
2) Psychiatrists and neurologists reviewed the translated material
3) preliminarily applied to normal controls (N=43), and dementia patients (N=55)
4) several items were modified to improve comprehensibility and applicability.

# Translation of CERAD packet into Korean

## 2. Specific considerations for each NP test

1) 15-item Boston Naming Test

- Chose 15 items from K-BNT
- Considering the word frequency

⇒ high, medium and low frequency groups

2) Word List Memory / Recall / Recognition

- Considering the word frequency, mental imagery, primarily
- Considering semantic category, number of syllables, secondarily

# Translation of CERAD into Korean

3) MMSE

- adapt some items of MMSE-K (MMSE-KC)

4) Verbal Fluency, Constructional Praxis & Recall

- keep the test format of the original version

## 3. Back Translation

Discussed with the CERAD headquarter in Duke University
(Dr. Heyman and Dr. Fillenbaum)

# Reliability of CERAD-K

- Standardization of administration
  - Instruction manual
  - Training with video-taped material
  - Consensus diagnostic conference (every week)
- Inter-rater reliability
  - Simultaneous rating by tester and scorer
  - 21 subject ( 14 dementia / 7 control )
- Test-retest reliability : 1 month interval
  - 20 subject ( 10 dementia / 10 control )

# Inter-rater reliability

| Test Items | Pearson's correlation coeffecient | p-value |
|---|---|---|
| Blessed Dementia Rating Scale | 0.970 | < 0.001 |
| Short Blessed Test | 0.998 | < 0.001 |
| Verbal Fluency | 0.999 | <0.001 |
| Boston Naming Test (K) | 0.991 | < 0.001 |
| MMSE | 0.999 | < 0.001 |
| Word list Memory | 0.999 | < 0.001 |
| Construction Praxis | 0.969 | < 0.001 |
| Word List Recall | 0.999 | < 0.001 |
| Word List Recognition | 0.999 | < 0.001 |
| Constructional Recall | 0.994 | < 0.001 |

# Test-retest reliability

| Test Items | Pearson's correlation coeffecient | p-value |
|---|---|---|
| Verbal Fluency | 0.704 | < 0.01 |
| Boston Naming Test (K) | 0.879 | < 0.01 |
| MMSE | 0.578 | < 0.05 |
| Word list Memory | 0.652 | < 0.01 |
| Construction Praxis | 0.544 | < 0.05 |
| Word List Recall | 0.653 | < 0.01 |
| Word List Recognition | 0.741 | < 0.01 |
| Constructional Recall | 0.612 | < 0.01 |

# Validity of cognitive tests in CERAD-K

- Subjects
  - 106 patients with clinically diagnosed dementia
    - Alzheimer's disease : 78 cases
    - Non Alzheimer's disease : 46 cases
  - 186 non-demented elderly subjects

- Discriminant validity
- Construct validity

Table 3. Comparisons of the Scores on the CERAD-K Cognitive Tests in the Control Group With Those of the Dementia and Alzheimer's Disease (AD) Groups

| Test | Control ($n$ = 186) | Dementia ($n$ = 106) | AD ($n$ = 78) |
|---|---|---|---|
| Blessed Dementia Scale[a] | | | |
| *M* (*SD*) | 0.0 (0.0) | 5.5 (3.5)* | 5.2 (3.4)* |
| Range | 0.0–0.5 | 0.5–17.0 | 0.5–17.0 |
| Short Blessed Test[a] | | | |
| *M* (*SD*) | 1.3 (1.8) | 20.7 (8.2)* | 20.6 (8.2)* |
| Range | 0–8 | 0–28 | 0–28 |
| J1. Verbal Fluency | | | |
| *M* (*SD*) | 15.3 (3.5) | 7.2 (4.8)* | 7.8 (5.1)* |
| Range | 9–26 | 0–21 | 0–21 |
| J2. Boston Naming Test [15] | | | |
| *M* (*SD*) | 10.4 (2.5) | 6.2 (3.5)* | 6.3 (3.6)* |
| Range | 4–15 | 0–15 | 0–15 |
| J3. Mini-Mental State [30] | | | |
| *M* (*SD*) | 28.0 (1.7) | 16.5 (6.5)* | 16.4 (6.9)* |
| Range | 20–30 | 3–28 | 3–28 |
| J4. Word List Memory [30] | | | |
| *M* (*SD*) | 17.9 (4.2) | 8.0 (4.6)* | 8.0 (4.9)* |
| Range | 7–25 | 0–19 | 0–19 |
| J5. Constructional Praxis [11] | | | |
| *M* (*SD*) | 10.2 (1.2) | 6.8 (2.8)* | 6.9 (2.8)* |
| Range | 6–11 | 0–11 | 0–11 |
| J6. Word List Recall [10] | | | |
| *M* (*SD*) | 6.4 (1.8) | 1.2 (1.5)* | 1.1 (1.5)* |
| Range | 1–10 | 0–6 | 0–6 |
| J7. Word List Recognition [10] | | | |
| *M* (*SD*) | 9.4 (1.1) | 5.7 (11.2)* | 4.5 (3.3)* |
| Range | 4–10 | 0–10 | 0–10 |
| J8. Constructional Praxis Recall [11] | | | |
| *M* (*SD*) | 6.4 (2.6) | 1.6 (1.8)* | 1.6 (1.8)* |
| Range | 1–11 | 0–7 | 0–7 |

Table 4. Factor Loading for Three Factors in a Factor Analysis of the Neuropsychological Battery in Dementia Patients ($n = 106$)

| Test | Factor 1 | Factor 2 | Factor 3 |
|---|---|---|---|
| Verbal Fluency | 0.22 | 0.84 | 0.15 |
| Boston Naming Test | 0.10 | 0.80 | 0.23 |
| Mini-Mental State | 0.47 | 0.68 | 0.43 |
| Word List Memory | 0.68 | 0.52 | 0.15 |
| Constructional Praxis | 0.05 | 0.25 | 0.89 |
| Word List Recall | 0.90 | 0.18 | 0.07 |
| Word List Recognition | 0.85 | 0.14 | 0.25 |
| Constructional Recall | 0.46 | 0.18 | 0.66 |
| Percentage of variance explained | 31 | 28 | 20 |

# Summary

1. CERAD-K is a considerably reliable and valid equivalent to the English-American version of the CERAD clinical & neuropsychological assessment batteries

2. CERAD-K is certified by CERAD headquarter.

3. We have been establishing a consortium for the efficient registry and systematic multicenter study on dementia.

Journal of Gerontology: PSYCHOLOGICAL SCIENCES
2002, Vol. 57B, No. 1, P47–P53



# Development of the Korean Version of the Consortium to Establish a Registry for Alzheimer's Disease Assessment Packet (CERAD-K): Clinical and Neuropsychological Assessment Batteries

Jung H. Lee,[1] Kang U. Lee,[2,3] Dong Y. Lee,[2,4] Ki W. Kim,[2,3] Jin H. Jhoo,[2,4] Ju H. Kim,[5] Kun H. Lee,[6] Sung Y. Kim,[7] Sul H. Han,[8] and Jong I. Woo[2,4]

치매 진단평가를 위한 한국판 CERAD 평가집 제1판

# CERAD-K



he Korean Version of
nsortium to Establish
r Alzheimer's Disease
Packet, the 1st Edition

*Journal of the International Neuropsychological Society* (2004), **10**, 72–81.

DOI: 10.1017/S1355617704101094

# A normative study of the CERAD neuropsychological assessment battery in the Korean elderly

DONG Y. LEE,[1] KANG U. LEE,[2] JUNG H. LEE,[2] KI W. KIM,[3] JIN H. JHOO,[4] SUNG Y. KIM,[5] JONG C. YOON,[6] SUNG I. WOO,[7] JIN HA,[8] AND JONG I. WOO,[8,9]

INTERNATIONAL JOURNAL OF GERIATRIC PSYCHIATRY
*Int J Geriatr Psychiatry* 2008; **23**: 677–684.
Published online 19 December 2007 in Wiley InterScience
(www.interscience.wiley.com) **DOI**: 10.1002/gps.1960

# Development of a Korean version of the behavior rating scale for dementia (BRSD-K)

Jong Chul Youn[1], Dong Young Lee[2*], Jung Hie Lee[3], Ki Woong Kim[4], Jin Hyeong Jhoo[3], Il Han Choo[2], Yong Su Paek[5], Yong Ho Jeon[5], Kwan Woo Seo[6] and Jong Inn Woo[2]

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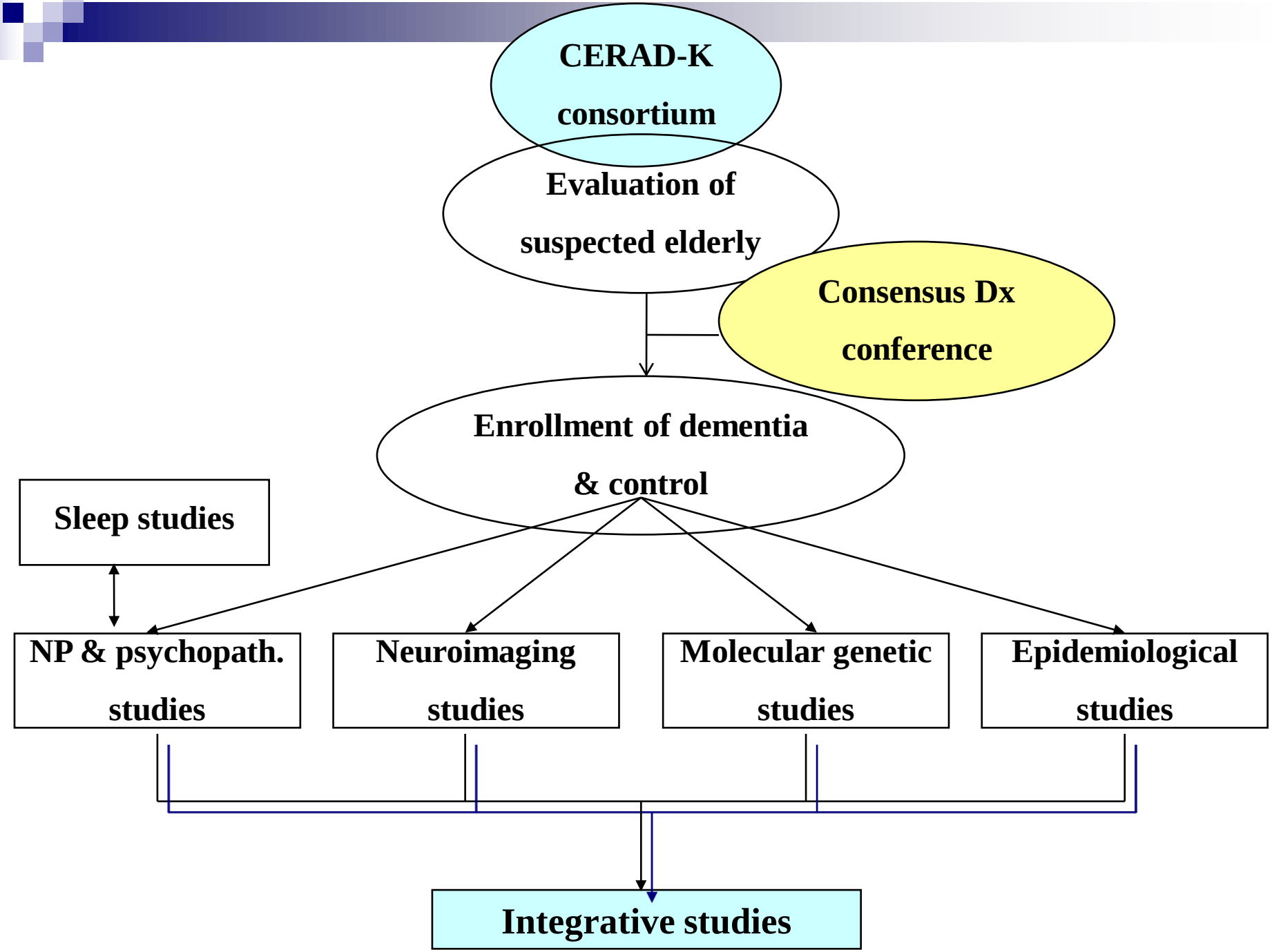
CERAD-K consortium
Evaluation of suspected elderly
Consensus Dx conference
Enrollment of dementia & control
Sleep studies
NP & psychopath. studies
Neuroimaging studies
Molecular genetic studies
Epidemiological studies
Integrative studies

# Hospitals using CERAD-K

- 서울
  서울대학교병원 / 서울아산병원 / 건국대학교병원 / 인제대학교백병원
  순천향대학교병원 / 대림성모병원
- 경기
  분당서울대학교병원 / 고대안산병원 / 경기도립노인전문병원
- 강원
  강원대학교병원
- 충청
  충남대학교병원 / 단국대학교병원 / 건국대학교충주병원
- 경상
  경북대학교병원 / 동국대학교경주병원 / 경상대학교병원
- 전라
  전주노인복지병원
- 제주
  제주대학교병원

*- 2009년 현재 18 Sites -*
*(2003년 당시 6 Sites)*

# Future Plans

- **CERAD Center 인증**
  - 현재 CERAD-K 사용 병원의 표준화 및 등록시스템 수립
  - CERAD Headquarter를 중심으로 Network 구성
- **국내 대단위 연구 수행 본격화**
- **국제공동연구 기획, 참여**

# Thank You !