Etiology of Alzheimer's Disease and What Puts Patients at Risk

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Breakout Session I

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Disclosures/Conflict of Interest

- I am site-principal investigator for Alzheimer's disease and related disorders studies sponsored by the Alzheimer's Association, Alector, Cognition Therapeutics, Eisai, and the National Institute on Aging.

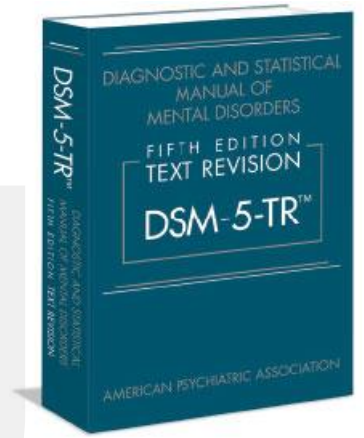
Session Objectives

1. Review the definitions of dementia, mild cognitive impairment, and Alzheimer's disease
2. Identify the common genetic and environmental risk factors for Alzheimer's disease
3. Develop a patient-centered prevention strategy

Outline

1. Importance and definition of Alzheimer's disease
2. Why is it difficult to determine the cause
3. What do we know
4. Moving towards prevention trials
5. What to tell patients

Groundwork for terminology



- Dementia = major neurocognitive disorder (DSM-5)
- Mild cognitive impairment = mild neurocognitive disorder (DSM-5)
- AD / ADRD = Alzheimer's Disease and Alzheimer's Disease Related Disorders (NIH)
  - ADRD = The most common forms of neurodegenerative and vascular dementias (FTD, DLB, vascular dementia, multiple-etiology dementia)
- Primary care, internal medicine, geriatrics, neurology, psychiatry, patients, and families may use or prefer different terminology

New Estimates of *Americans with Alzheimer's Disease and Related Dementias* Show Racial and Ethnic Disparities

Number of Americans with Alzheimer's Disease Expected to Increase

Percentage of Adults Aged 65 and Older with Alzheimer's Disease by Race and Ethnicity

296249A

www.cdc.gov/aging

Centers for Medicare and Medicaid Services, 2014

Alzheimer's Disease Projected to Nearly Triple by 2060

Census Population Projections Program, 2014 to 2060

2024 ALZHEIMER'S DISEASE FACTS AND FIGURES

NEARLY
7 MILLION
AMERICANS ARE LIVING WITH ALZHEIMER'S

1 IN 3
OLDER ADULTS DIES WITH ALZHEIMER'S OR ANOTHER DEMENTIA

IT KILLS MORE THAN
BREAST CANCER AND **PROSTATE CANCER**
+
COMBINED

OVER **11 MILLION**
AMERICANS PROVIDE
UNPAID CARE
FOR PEOPLE WITH ALZHEIMER'S OR OTHER DEMENTIAS

BETWEEN 2000 AND 2021, DEATHS
FROM HEART DISEASE HAVE
DECREASED 2.1%

WHILE DEATHS FROM ALZHEIMER'S DISEASE HAVE INCREASED 141%

IN 2024, ALZHEIMER'S AND OTHER DEMENTIAS WILL
COST THE NATION
$360 BILLION
$$$$$
BY 2050, THESE COSTS COULD RISE TO NEARLY
$1 TRILLION

THESE CAREGIVERS PROVIDED MORE THAN
18 BILLION HOURS
VALUED AT NEARLY
$347 BILLION

THE LIFETIME RISK FOR ALZHEIMER'S AT AGE 45 IS

1 in 5 FOR WOMEN

1 in 10 FOR MEN

70% OF DEMENTIA CAREGIVERS
FEEL STRESSED WHEN COORDINATING CARE

AND MORE THAN HALF OF CAREGIVERS SAID NAVIGATING HEALTH CARE IS **DIFFICULT**

3 IN 5 DEMENTIA CAREGIVERS
SAY LESS STRESS AND MORE PEACE OF MIND ARE POTENTIAL BENEFITS OF HAVING A **CARE NAVIGATOR**

56% SAY IT COULD HELP THEM BE **BETTER CAREGIVERS**

For more information, visit alz.org/facts

ALZHEIMER'S ASSOCIATION®

Does my patient have DEMENTIA?

- Patient has history (subjective) and testing (objective) consistent with decline in cognition, AND
- Decline in Day-to-Day abilities compared to previous level of functioning

  - **Higher level activities (instrumental)**
    Finances and other paperwork
    Medication management
    Managing medical appointments
    Driving
    Shopping
    Cooking
  - **Lower level activities (basic)**
    Dressing
    Bathing
    Toileting

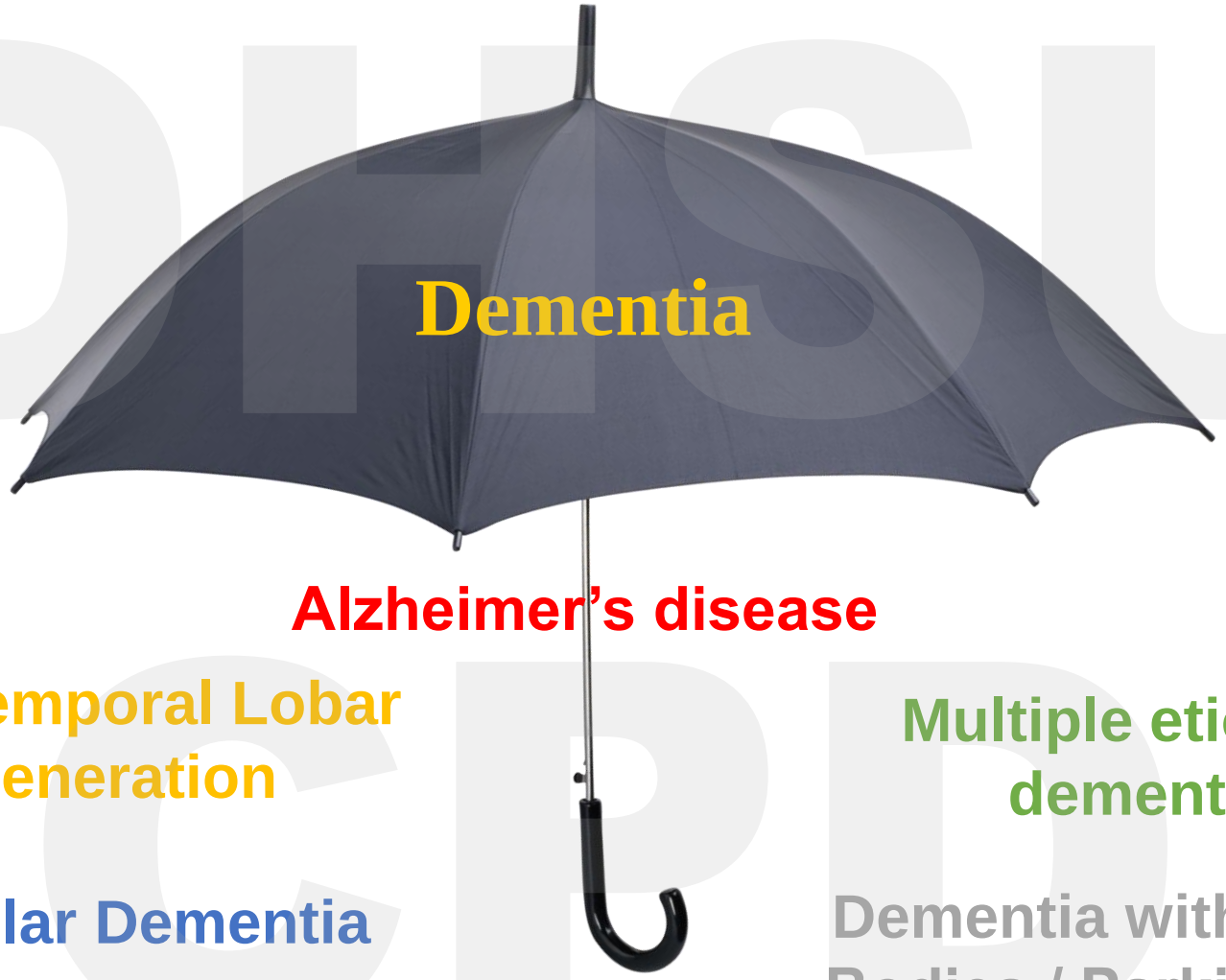
MILD COGNITIVE IMPAIRMENT

- Patient has history (subjective) and testing (objective) consistent with decline in cognition, AND

- NO DECLINE in day to day function

- Importance of MCI diagnosis?
  - Those with MCI are at higher risk of converting to dementia than others their same age without MCI
  - More careful follow up needed
  - Treatments and clinical trials may be appropriate

Dementia is a syndrome



Alzheimer's disease

Frontotemporal Lobar Degeneration

Multiple etiology dementia

Vascular Dementia

Dementia with Lewy Bodies / Parkinson's disease dementia

Other Treatable Causes

Work up

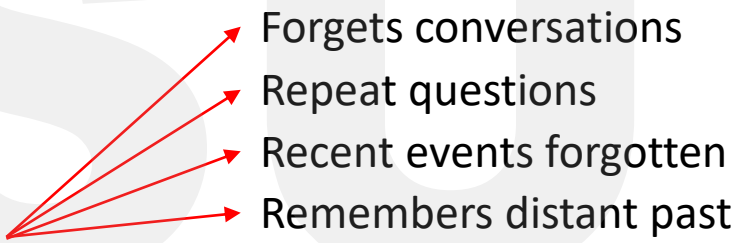
- Goal is to eliminate potentially treatable non-degenerative etiologies:

Drug/medication toxicity
Emotional illness (e.g., severe depression)
Metabolic/endocrine disorders (e.g., thyroid)
Eye/ear/environment (e.g. sleep)
Nutritional (e.g., B_{12} deficiency)
Tumors/structural (e.g., hydrocephalus, subdural hematoma)
Infection
Alcoholism

- CT or MRI brain: Tumor, hydrocephalus, vascular, atrophy pattern
- Labs:
  - B12, TSH, RPR (if indicated), CBC, Chem 7, liver function, vitamin D
  - Other tests as needed – blood test for Alzheimer's ?

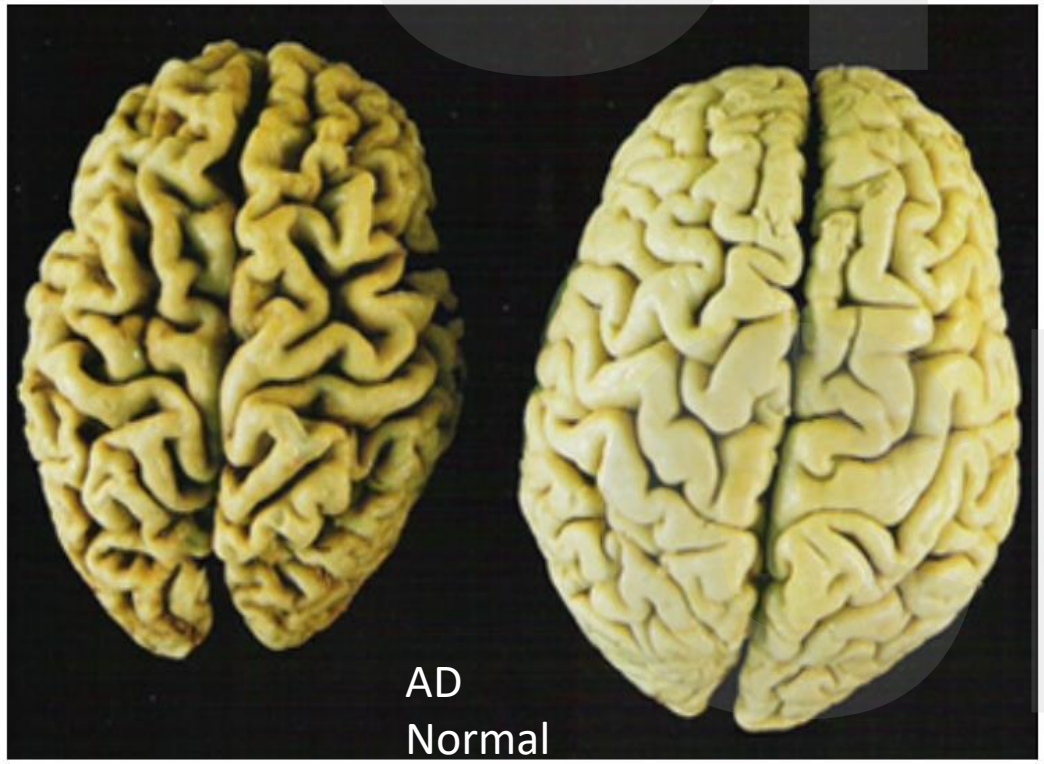
Key Elements for Diagnosis: ALZHEIMER'S DISEASE

- First Symptom(s)
  - SHORT TERM MEMORY LOSS
- Other symptoms/findings
  - Visual spatial skill problems
  - Orientation difficulties
  - Hippocampal atrophy on imaging
- Onset and progression
  - Insidious onset, slow progression of symptoms



Hallmarks of Alzheimer's Disease Pathology

- With the naked eye: shrinkage of the brain *(cerebral atrophy)*
- Under the microscope: amyloid plaques and neurofibrillary tangles



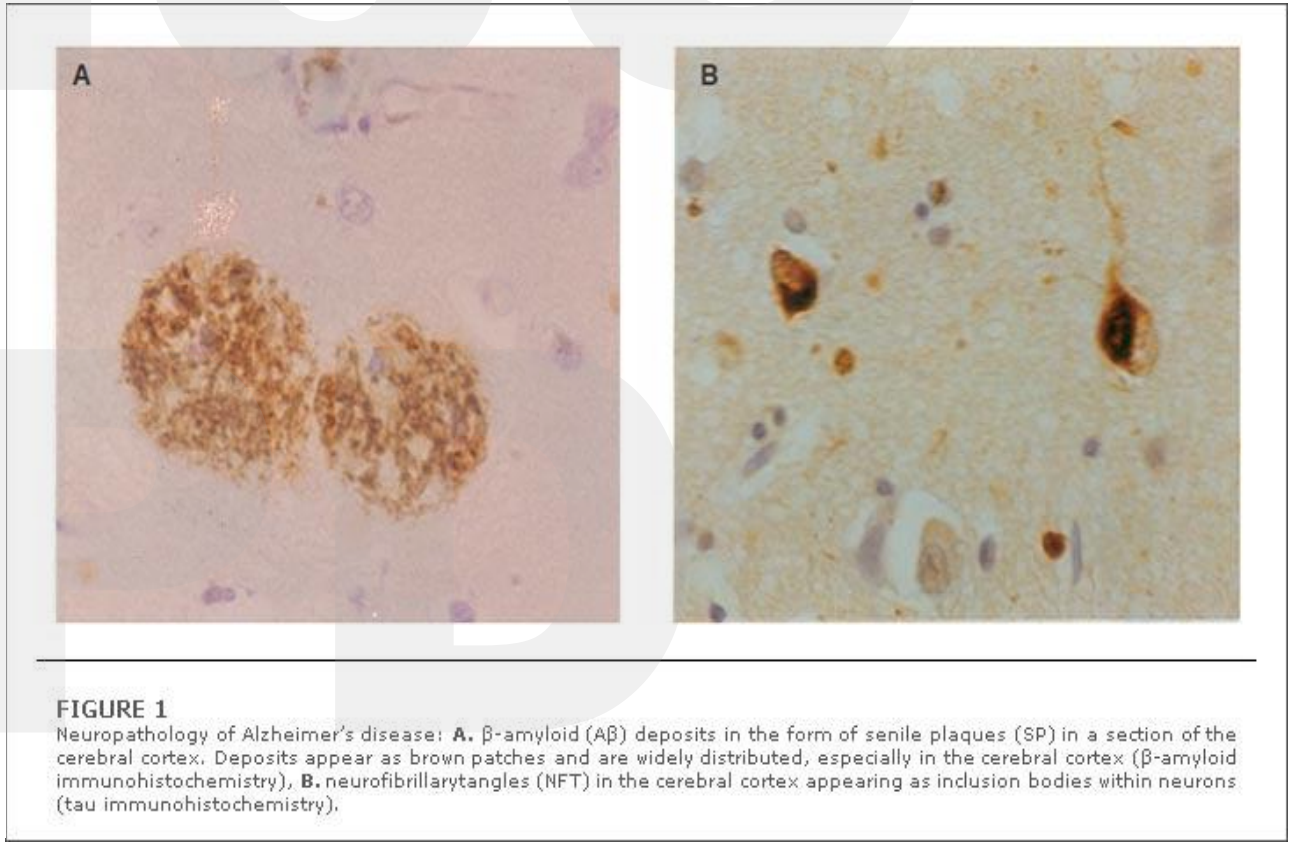
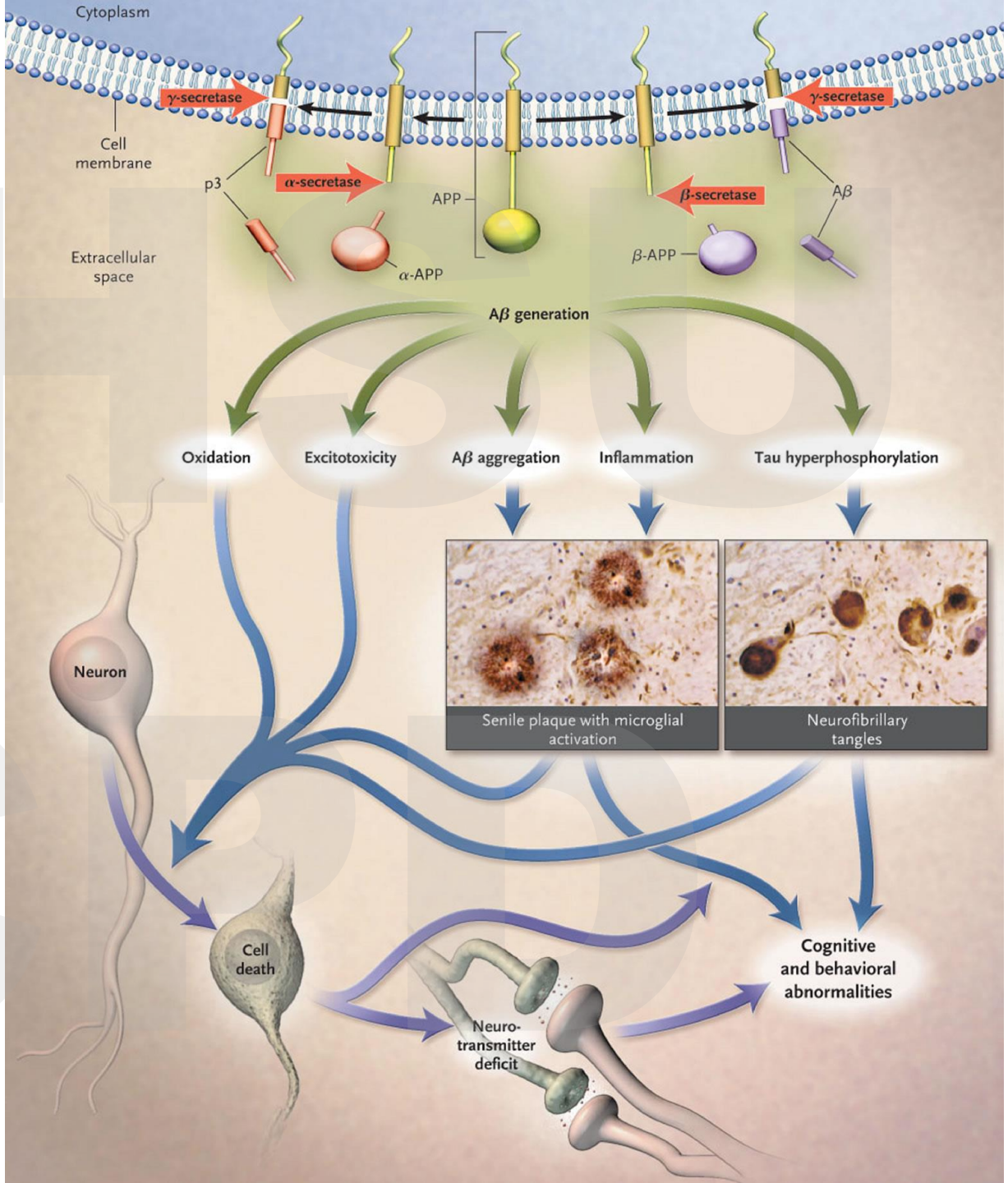


FIGURE 1
Neuropathology of Alzheimer's disease: **A.** β-amyloid (Aβ) deposits in the form of senile plaques (SP) in a section of the cerebral cortex. Deposits appear as brown patches and are widely distributed, especially in the cerebral cortex (β-amyloid immunohistochemistry), **B.** neurofibrillarytangles (NFT) in the cerebral cortex appearing as inclusion bodies within neurons (tau immunohistochemistry).

Amyloid Cascade Hypothesis:

Deposition of amyloid in the brain is
- early
and
- critical

in the development of Alzheimer's disease



Ghareeb, El-Sayed, *J Biomed Sci and Eng*, 2013

Alzheimer's markers can now be seen in patients

Brain imaging – PET scans

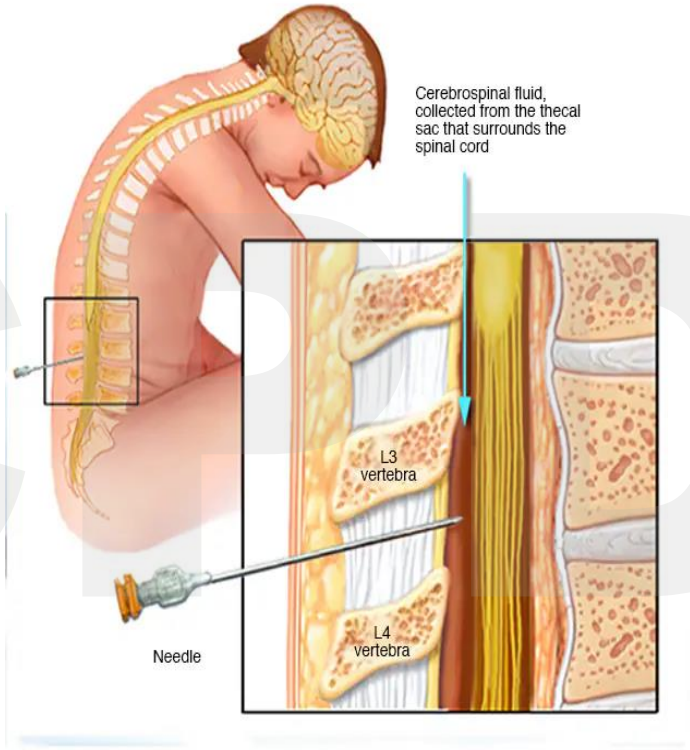
- Amyloid
- Tau

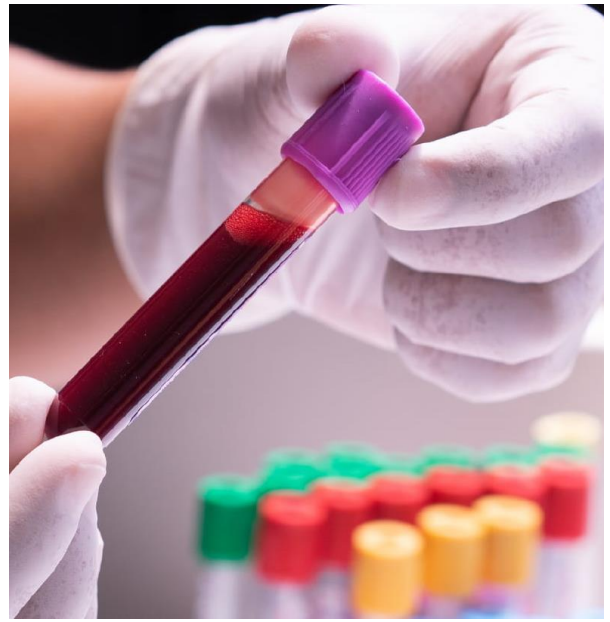
Cerebrospinal fluid (CSF)

- Amyloid
- Tau

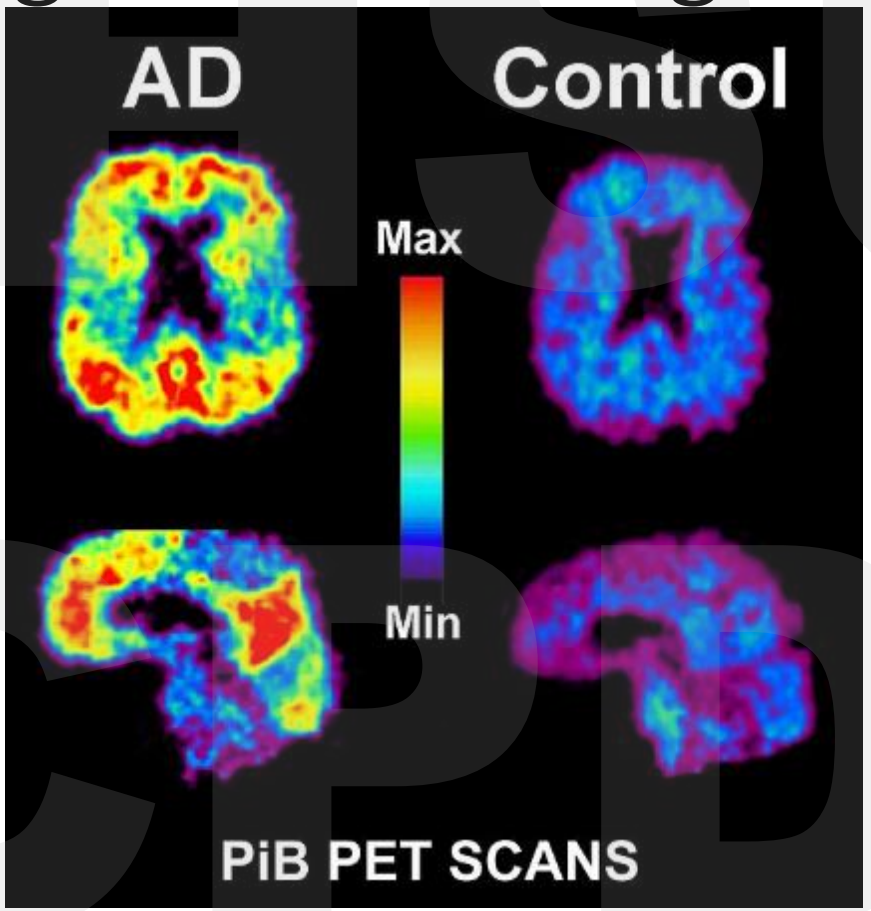
Blood

- Amyloid
- Tau



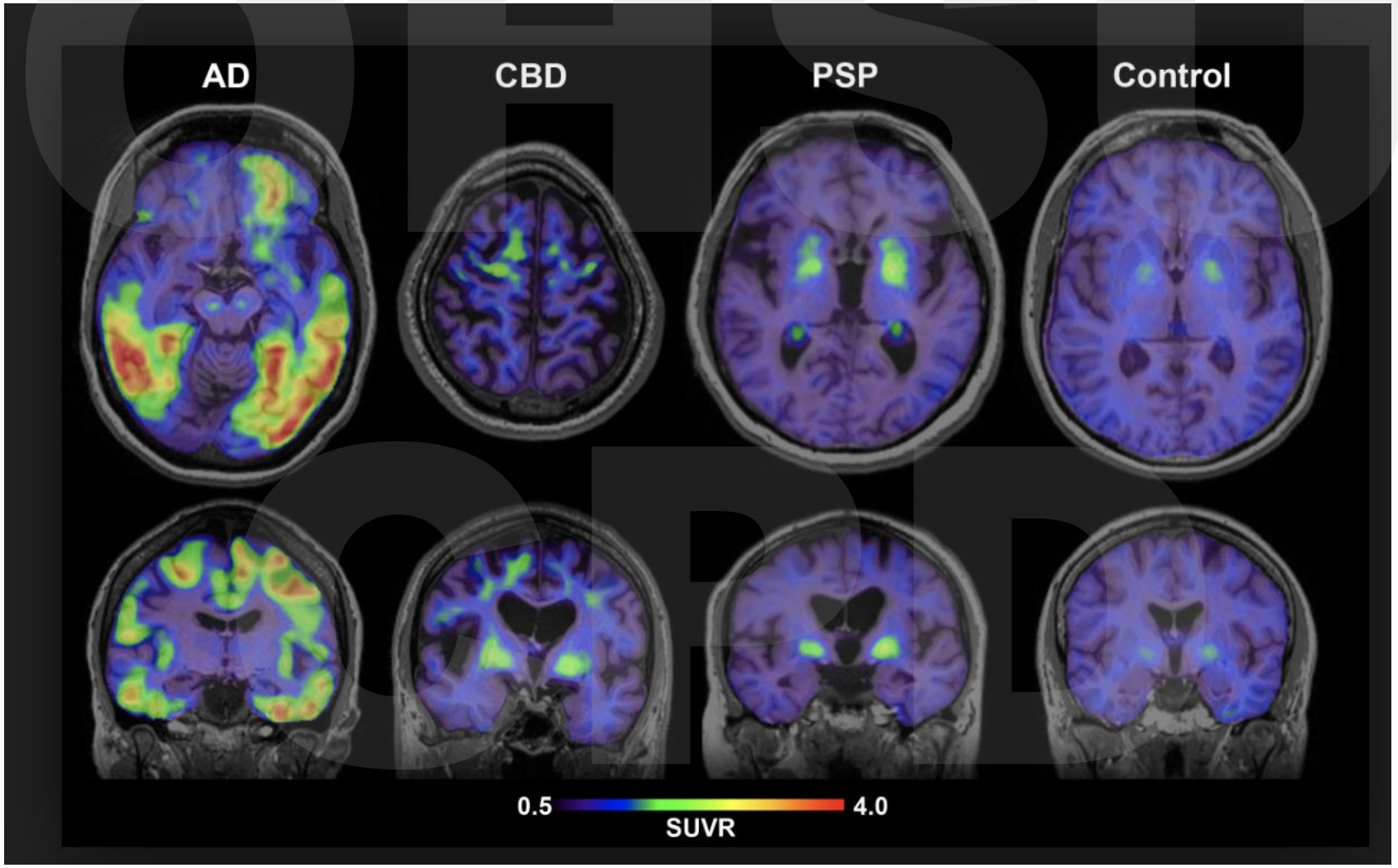


Amyloid PET scans - an advance for Alzheimer's diagnosis and targeted treatment



Sperling, Johnson, *NeuroMolecular Med,* 2010

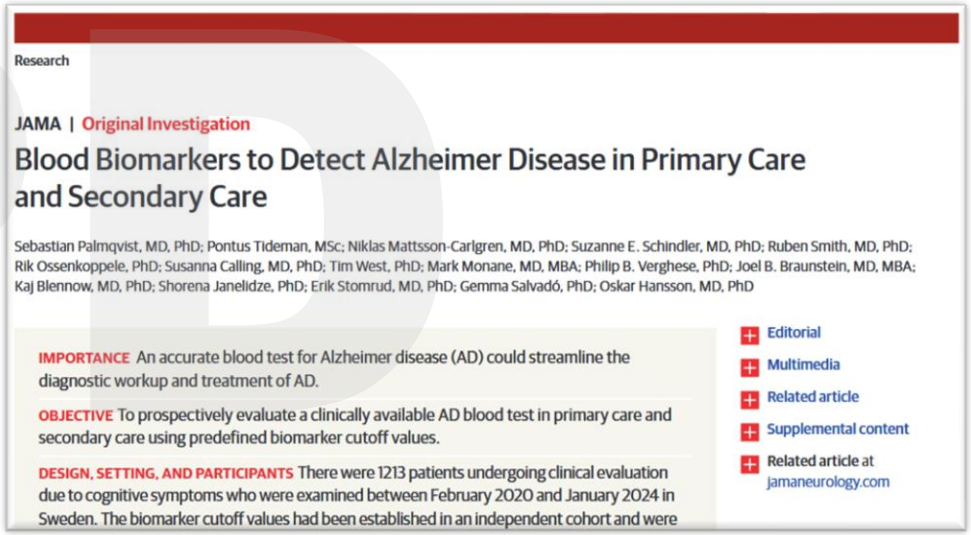
Tau PET Imaging



Ossenkoppele R,et al. *JAMA* 2018.

2021-present: New blood tests for Alzheimer's disease

- Utilize mass spectrometry to measure amyloid beta 42 / 40 ratio in the blood, +/- APOE4 genotype, +/- immunoassays for phospho-tau 217 and other isoforms to predict amyloid in the brain
- Diagnostic accuracy ~ 90% (compared to cerebrospinal fluid)
- Approved for use in MCI and dementia – not for predictive use
- Currently out-of-pocket, not yet covered by insurance, cost $500 - $1200



Research

JAMA | Original Investigation

Blood Biomarkers to Detect Alzheimer Disease in Primary Care and Secondary Care

Sebastian Palmqvist, MD, PhD; Pontus Tideman, MSc; Niklas Mattsson-Carlgren, MD, PhD; Suzanne E. Schindler, MD, PhD; Ruben Smith, MD, PhD; Rik Ossenkoppele, PhD; Susanna Calling, MD, PhD; Tim West, PhD; Mark Monane, MD, MBA; Philip B. Verghese, PhD; Joel B. Braunstein, MD, MBA; Kaj Blennow, MD, PhD; Shorena Janelidze, PhD; Erik Stomrud, MD, PhD; Gemma Salvadó, PhD; Oskar Hansson, MD, PhD

IMPORTANCE An accurate blood test for Alzheimer disease (AD) could streamline the diagnostic workup and treatment of AD.

OBJECTIVE To prospectively evaluate a clinically available AD blood test in primary care and secondary care using predefined biomarker cutoff values.

DESIGN, SETTING, AND PARTICIPANTS There were 1213 patients undergoing clinical evaluation due to cognitive symptoms who were examined between February 2020 and January 2024 in Sweden. The biomarker cutoff values had been established in an independent cohort and were

Editorial
Multimedia
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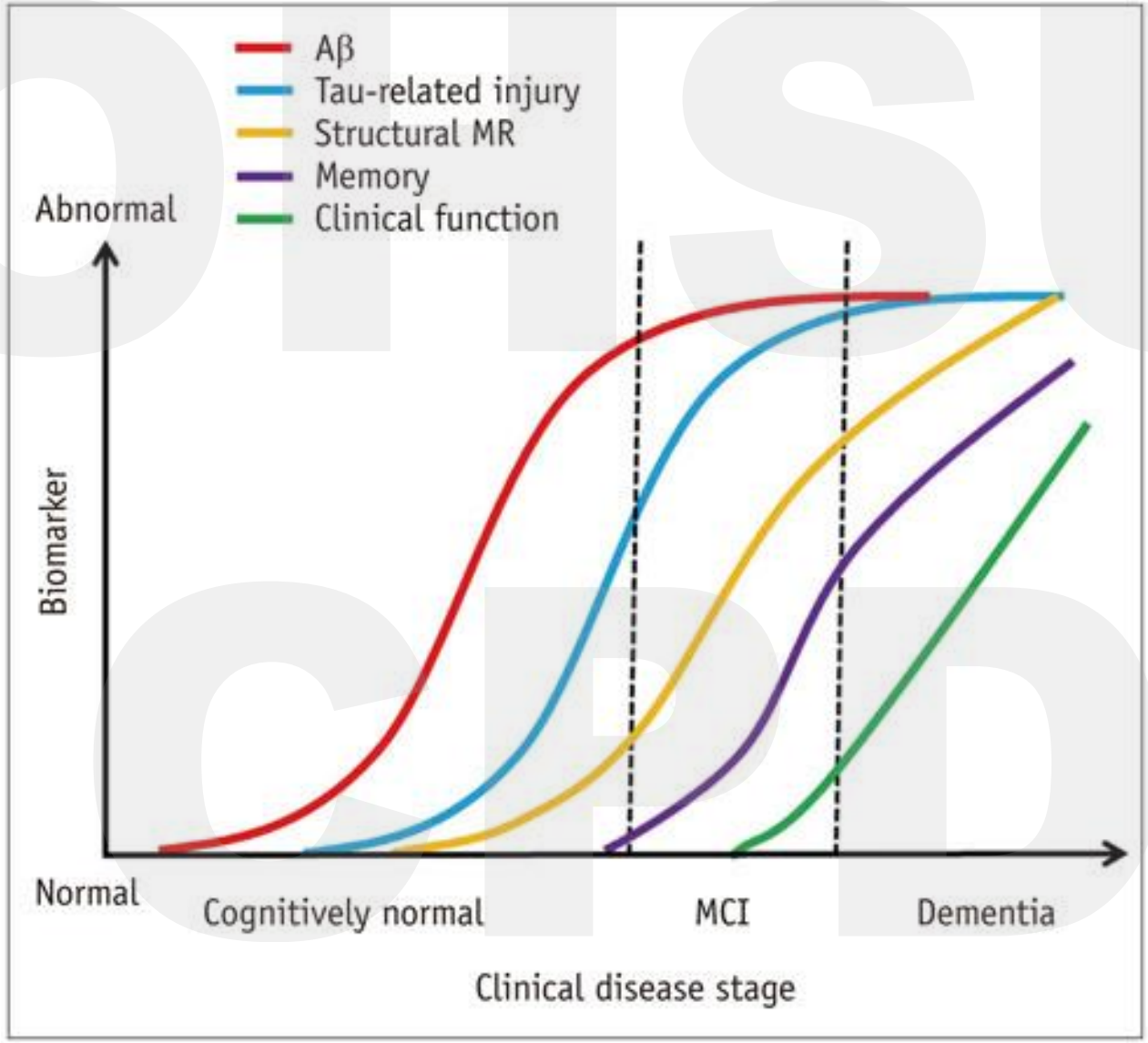
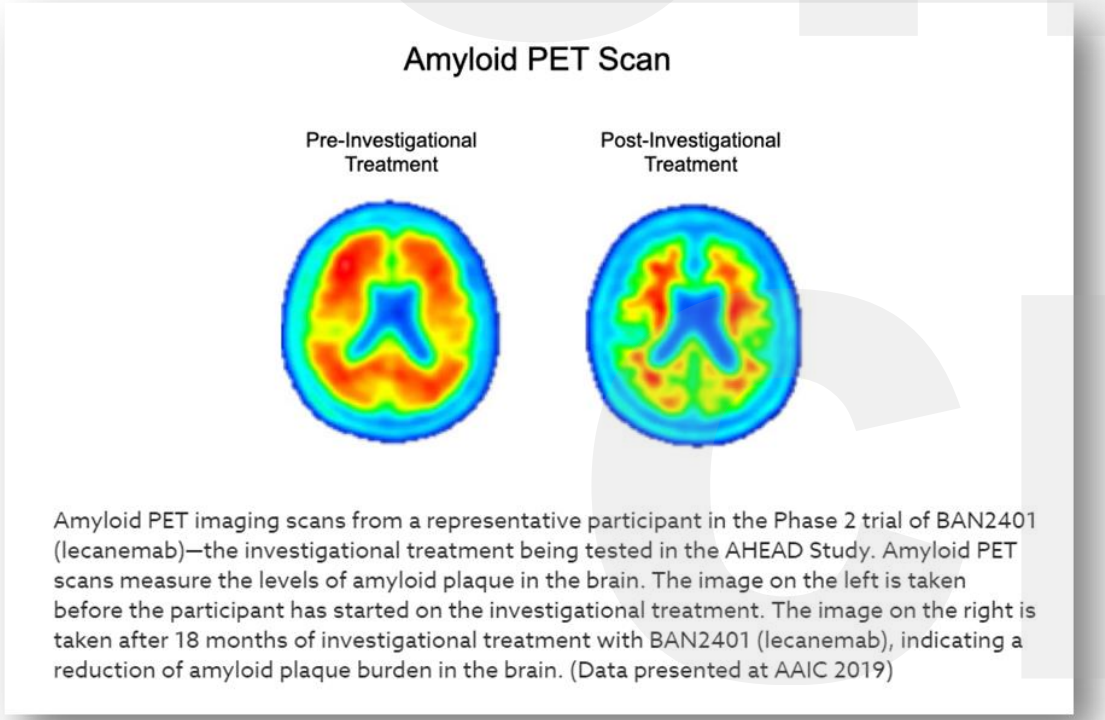
Biomarker Progression

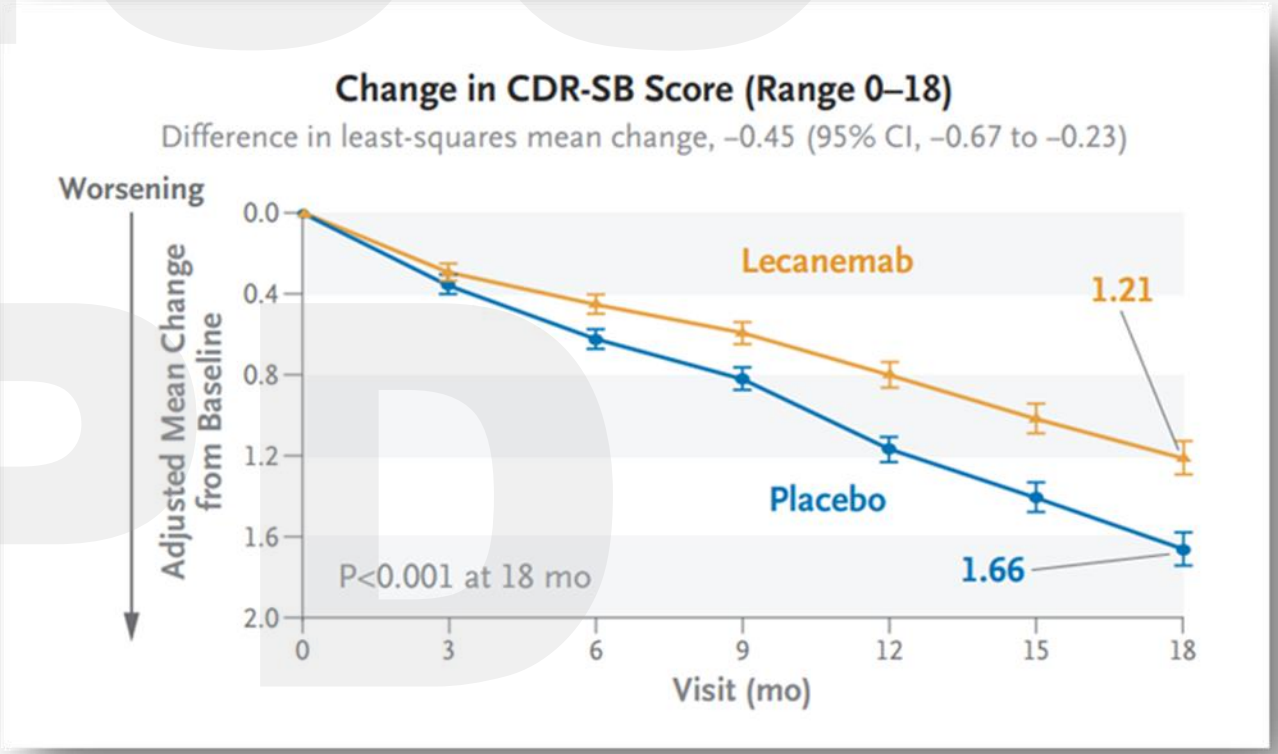


Jack CR, et al. *Lancet Neurol,* 2013.

Anti-amyloid treatment for mild Alzheimer's disease

- Lecanemab (2023) and donanemab (2024) are humanized monoclonal antibodies
- Reduce brain amyloid plaques and slow cognitive decline by ~ 30%
- Risks (brain edema and hemorrhage), burden, expense, access all limit use



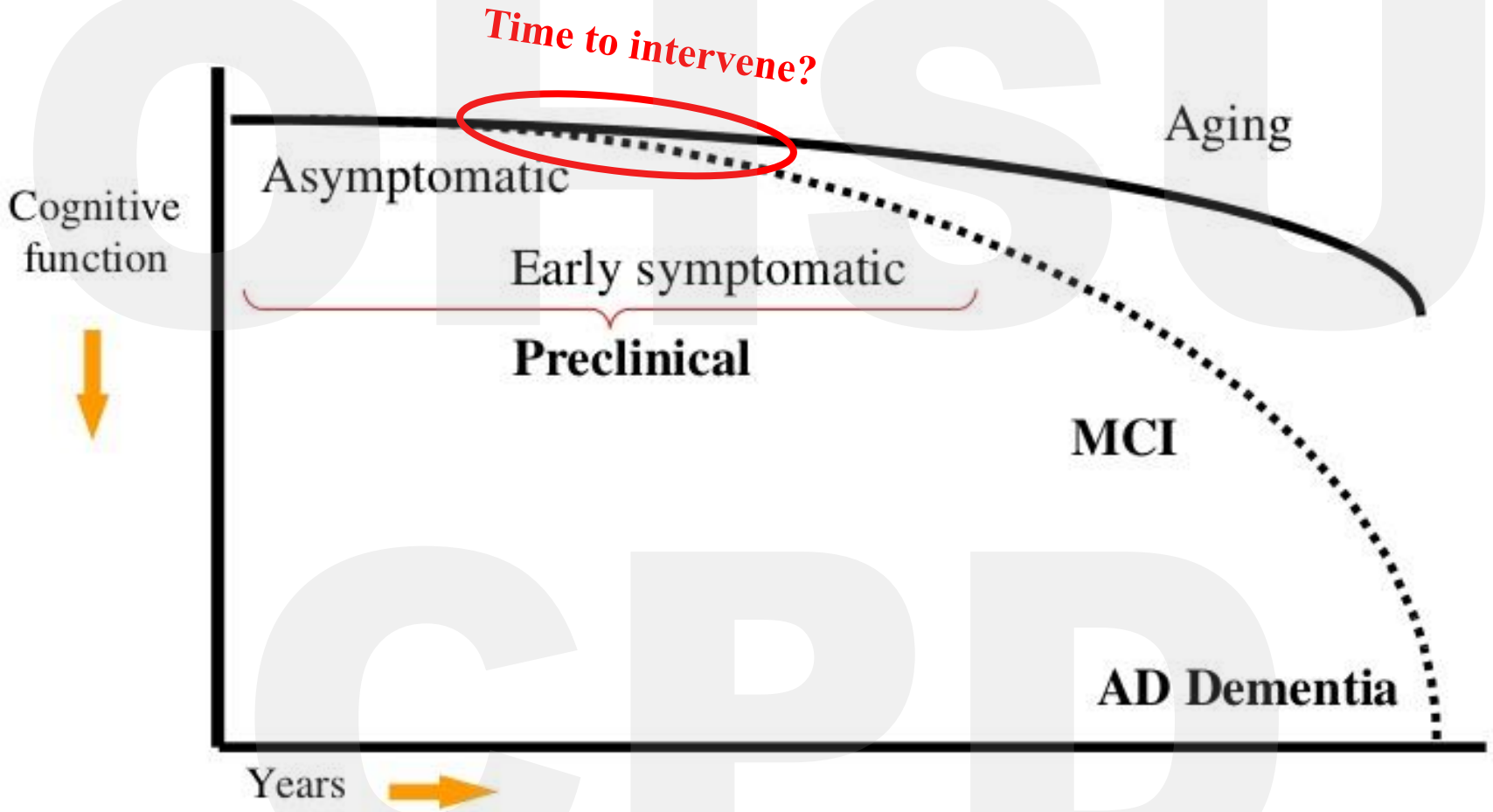


Van Dyck et al, *NEJM,* 2023.

Clinical versus pathologic diagnosis of AD

- For decades, clinical diagnosis of AD was based on typical presentation and ruling out of other causes = “Probable Alzheimer’s Disease”
- Pathologic diagnosis of AD was the gold standard = “Definite Alzheimer’s Disease”
- With advances in measuring AD markers in living patients, revised diagnostic criteria were proposed in 2024 that define AD *“to be a biological process that begins with the appearance of AD neuropathologic change while people are asymptomatic. Progression of the neuropathologic burden leads to the later appearance and progression of clinical symptoms.”*

The continuum of Alzheimer's disease



Sperling et al *Alzheimer & Dementia 2011*
NIA-AA Preclinical Workgroup

Challenges with epidemiologic studies of Alzheimer's disease

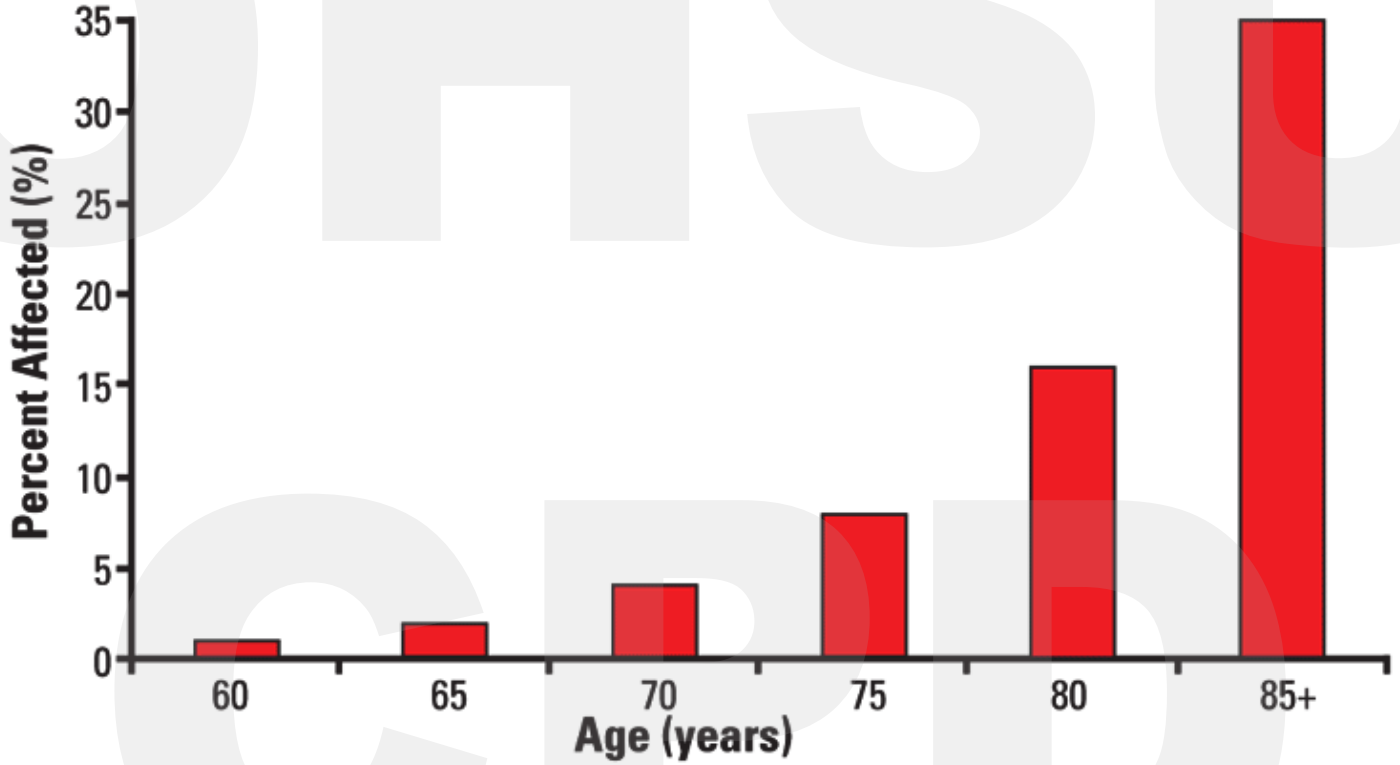
- Underdiagnosis
- Clinical versus pathologic diagnosis
- Novel, invasive, and not widely available biomarkers
- Early stages of AD may be indistinguishable from normal aging
- Lumping of all forms of MCI or dementia together

The major causes of Alzheimer's Disease

- Age
- Genetics
- Environment and Lifestyle

FIGURE 1

ALZHEIMER'S DISEASE DOUBLES IN FREQUENCY EVERY 5 YEARS AFTER 60 YEARS OF AGE



Cummings JL. *Primary Psychiatry*. Vol 15, No 2. 2008.

Cognitive changes with normal aging

Decline	Maintain or improve
Attention	Language
Word-finding	Visuospatial function
Short-term memory	Executive function
	Long-term memory

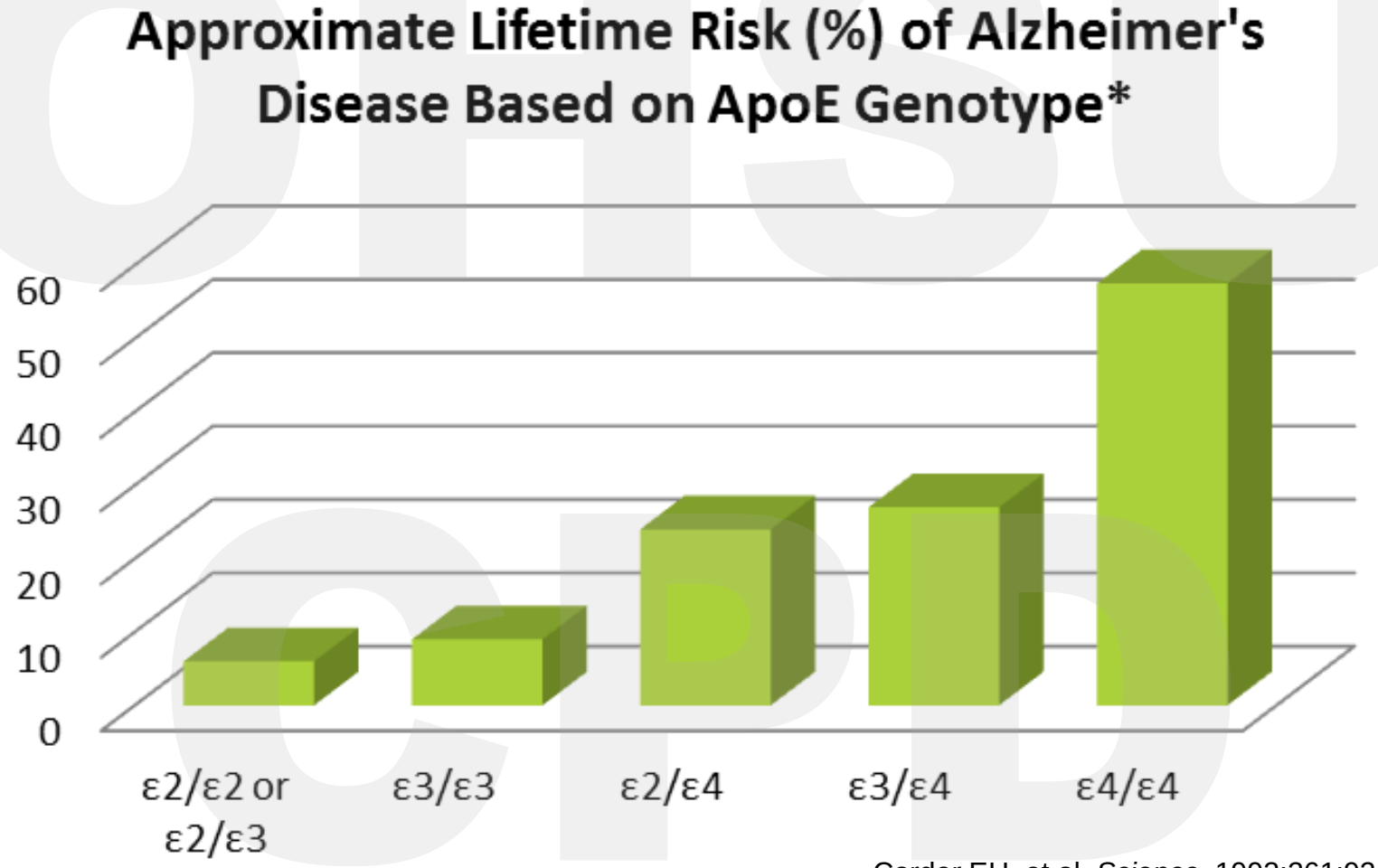
- Key is that activities of daily living remain unimpaired (people can compensate)
- Tip of the tongue phenomena, misplacing keys are common

Genes

- An inherited (purely genetic) form of AD exists
  - ~1% of all cases
  - Caused by mutations to one of 3 genes – APP, PS1, PS2
  - Autosomal dominant
  - Very early-onset 30s, 40s, 50s
- For the other 99% of AD cases
  - Risk is increased approximately 3 fold for having a parent with AD
  - Stronger effect for maternal than paternal family history
  - Later onset 60s +
  - Multiple genes are involved -

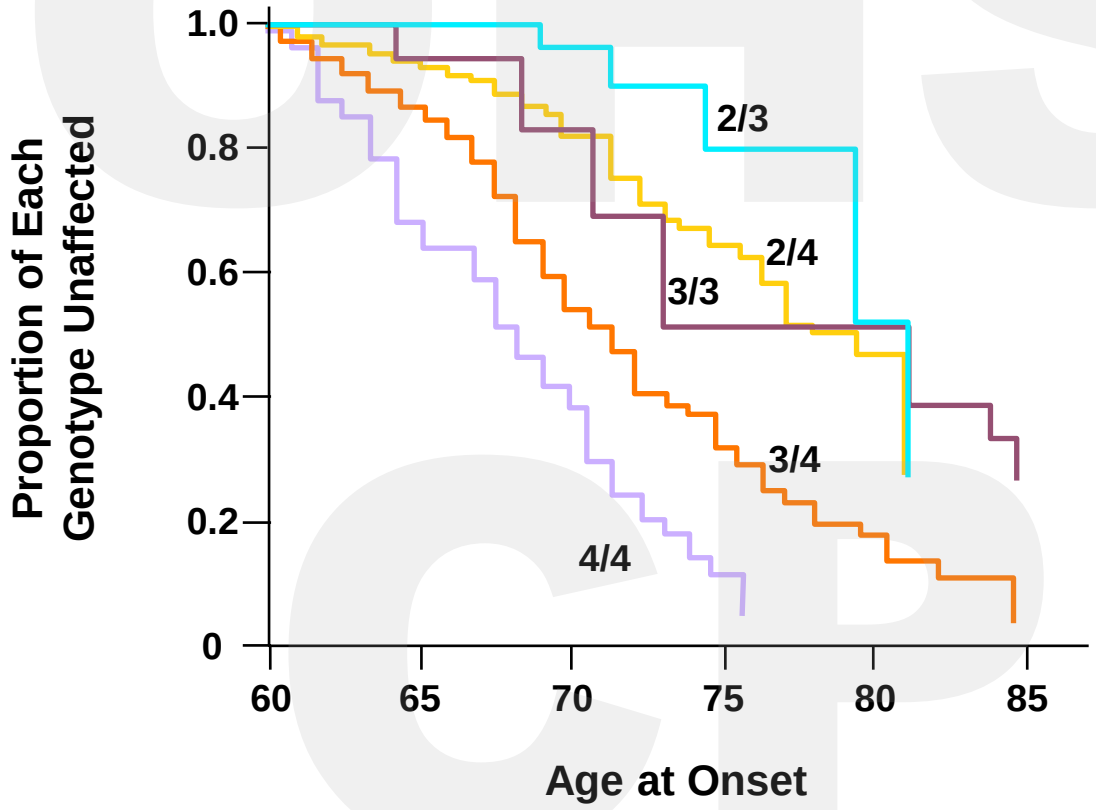
Alzheimer's disease *risk factor* genes

- Several have been identified, however the most common is APOE
- APOE is a lipid transport protein, why it affects AD risk is not fully known
- 3 versions of APOE: e2,e3,e4
- 1 copy from each parent
- APOE e4 is associated with risk of AD



Corder EH, et al. *Science.* 1993;261:921-923.

ApoE4: A Susceptibility Gene Variant for Common Forms of Alzheimer's Disease



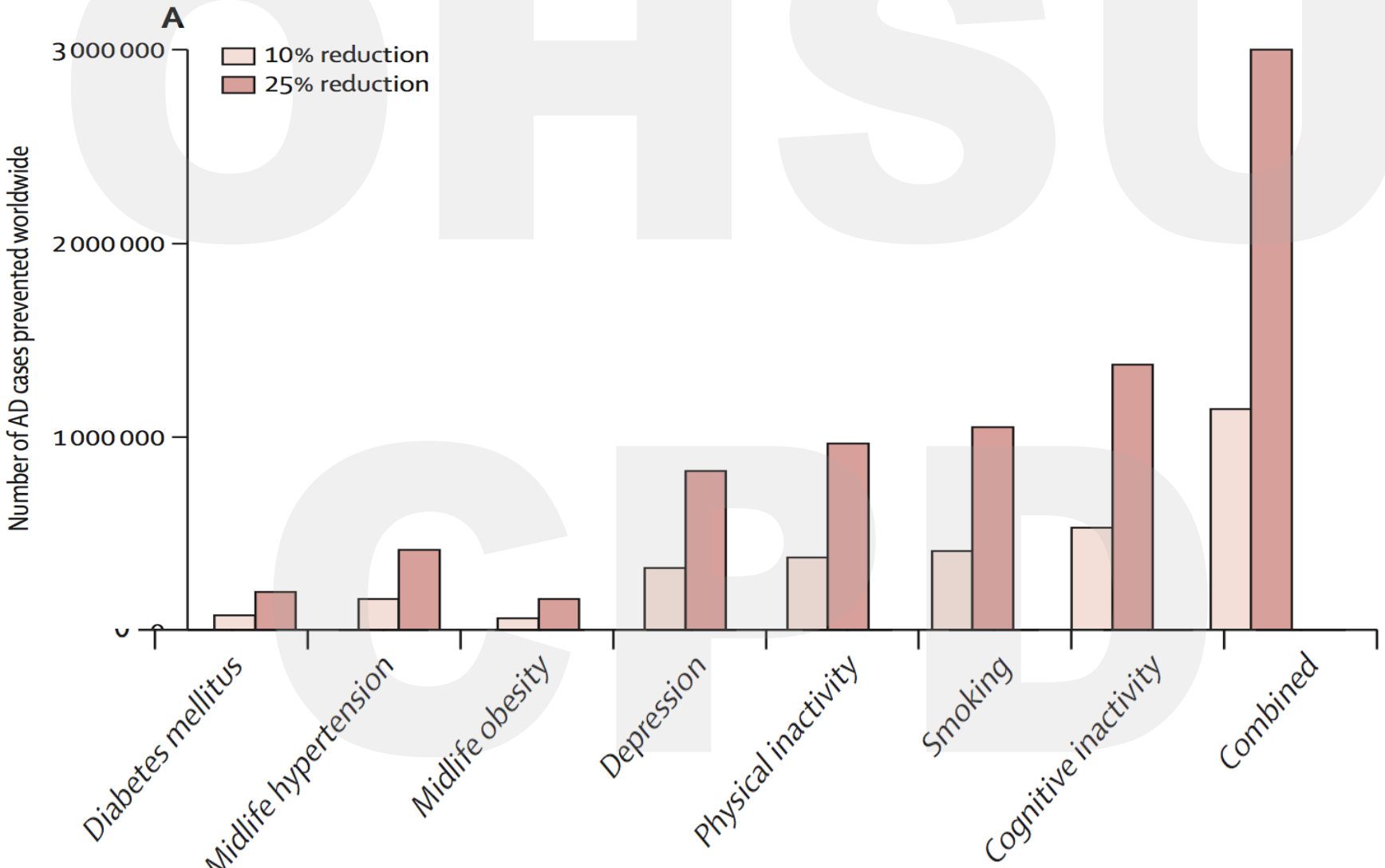
Mean age of onset of Alzheimer's disease as a function of the inheritance of the 5 common ApoE genotypes

Corder EH, et al. *Science.* 1993;261:921-923.

APOE and risk of Alzheimer's disease

- You can have APOE e4/e4 or e3/e4 and never get Alzheimer's disease
- You can get Alzheimer's disease and not carry any copies of APOE e4
- General AD prevention measures apply whether you are an APOE e4 carrier or not
- I do not generally recommend this genetic test in healthy adults, *except for research*

Environment and Lifestyle



Barnes and Yaffe, *Lancet Neurol,* 2011.

Keep a Healthy Brain

- Eat a healthy (Mediterranean) diet
- Control diabetes
- Control hypertension
- Get a good night’s sleep
- Protect your brain (wear a helmet)
- Keep your mind active
- Get regular exercise

Dieting Away from Dementia

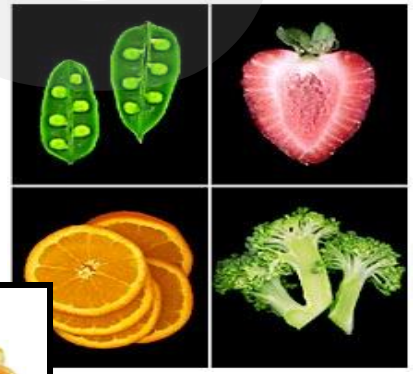
- Many suggestions of dietary methods to avoid dementia
  - Barberger-Gateau et al
    - Daily consumption fruits and vegetables reduced risk for all-cause dementia
    - Weekly consumption of fish associated with reduced risk for AD
- Epidemiologic, not randomized controlled studies

Barberger-Gateau, et al. Neurology 2007.

Diet

Diagnosis	Design	Number	Outcome	Intervention/Measure	Results
NUTRITION					
Barberger-Gateau et al. [43]	Healthy subjects	Prospective Cohort	8085	Dementia	Fruit and vegetable intake versus fish and omega-3 fat	Decreased risk for dementia with high fruit, vegetable, fish and omega-3 fat intake
Luchsinger et al. [44]	Healthy subjects	Prospective Cohort	980	AD	Daily intake of calories, carbohydrates, fats and proteins	Increased risk for AD with increased caloric and fat intake
Morris et al. [45]	Healthy subjects	Prospective Cohort	1718	Cognition	High versus low fruit and vegetable intake	Slower cognitive decline with high vegetable intake
Scarmeas et al. [46, 47]	Healthy subjects	Prospective Cohort	2258	AD	Adherence to Mediterranean diet versus no adherence	Decreased risk for AD with increased adherence to Mediterranean diet
Morris et al. [45]	Healthy subjects	Prospective Cohort	1041	AD	Nutritional folate, B12, B6 vitamins	No association

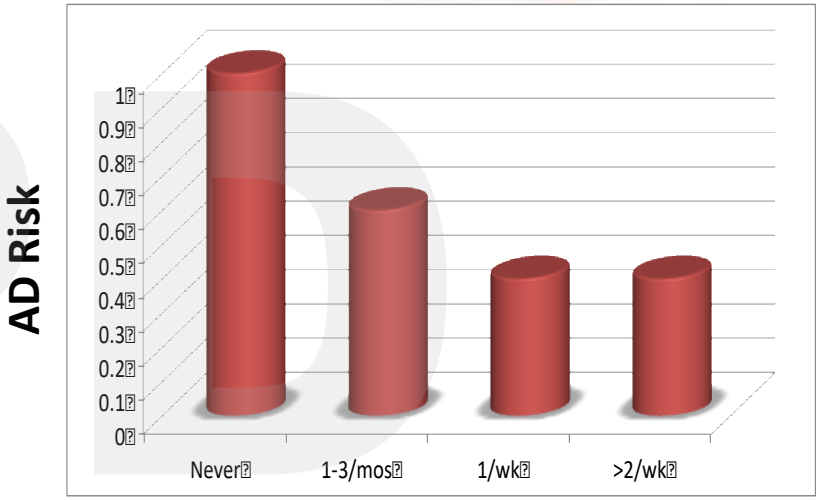
Polidori, et al. International J of AD 2010



Barberger-Gateau, et al. BMJ 2002
Luchsinger, et al. Archives of Neurology 2002
Morris, et al. Neurology 2006
Scarmeas, et al. Archives of Neurology 2006
Scarmeas, et al. Annals of Neurology 2006

Dieting Away from Dementia

- Healthy diet (**Mediterranean**, **DASH**, or "**Mind**" Diets) may reduce risk
- **Fish** (omega-3 fatty acids; salmon, herring, other cold-water fish)
- **Fruits and vegetables** (antioxidants and anti-inflammatories: leafy greens [kale, spinach, brussel sprouts, collard greens], deeply hued produce [eggplant, bell peppers, tomatoes, and berries)
- **Olive oil** (monounsaturated fat: extra virgin)
- **Nuts** (monounsaturated fat: walnuts, pine nuts, pistachios, almonds)
- **Beans** (red kidney, pinto)
- **Red wine** (resveratrol, flavonoids: moderate consumption)



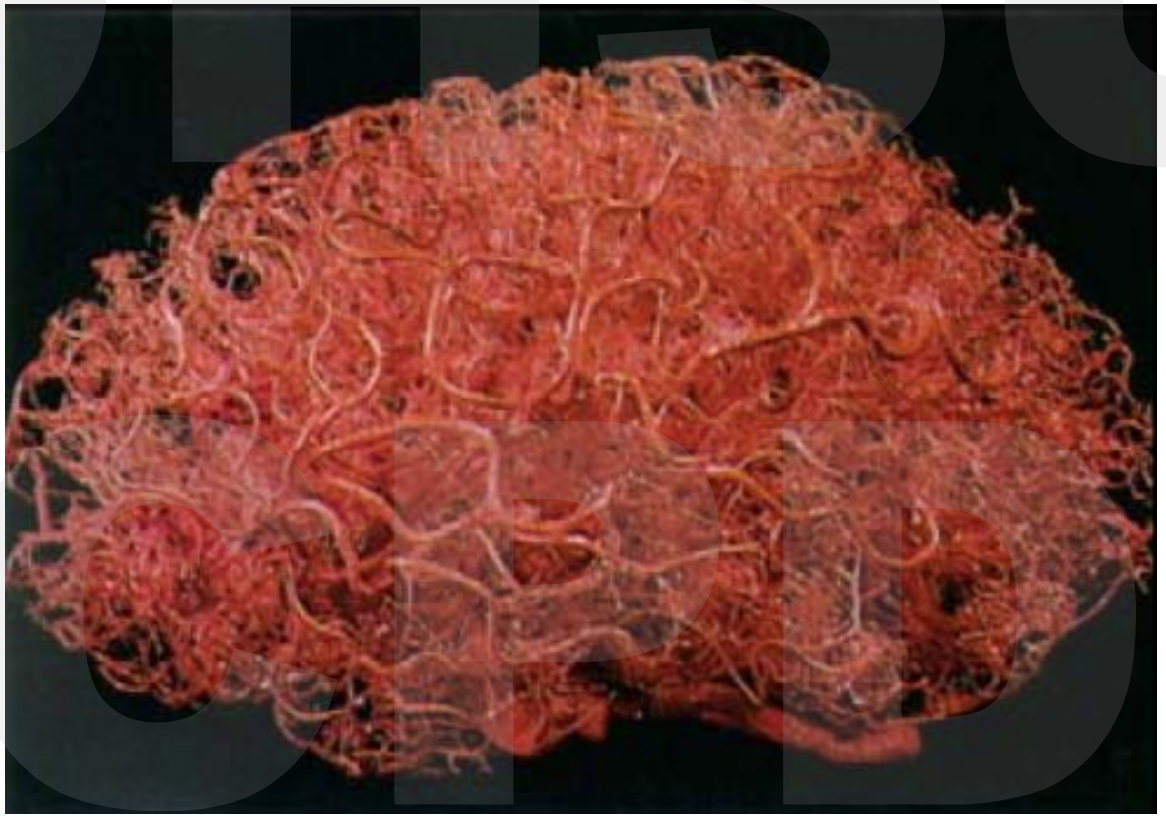
Morris et al. *Arch Neurol* 2003.

Maximize General Health: cerebrovascular health

- Treat hypertension
- Strict glucose control for diabetics
- Stop smoking

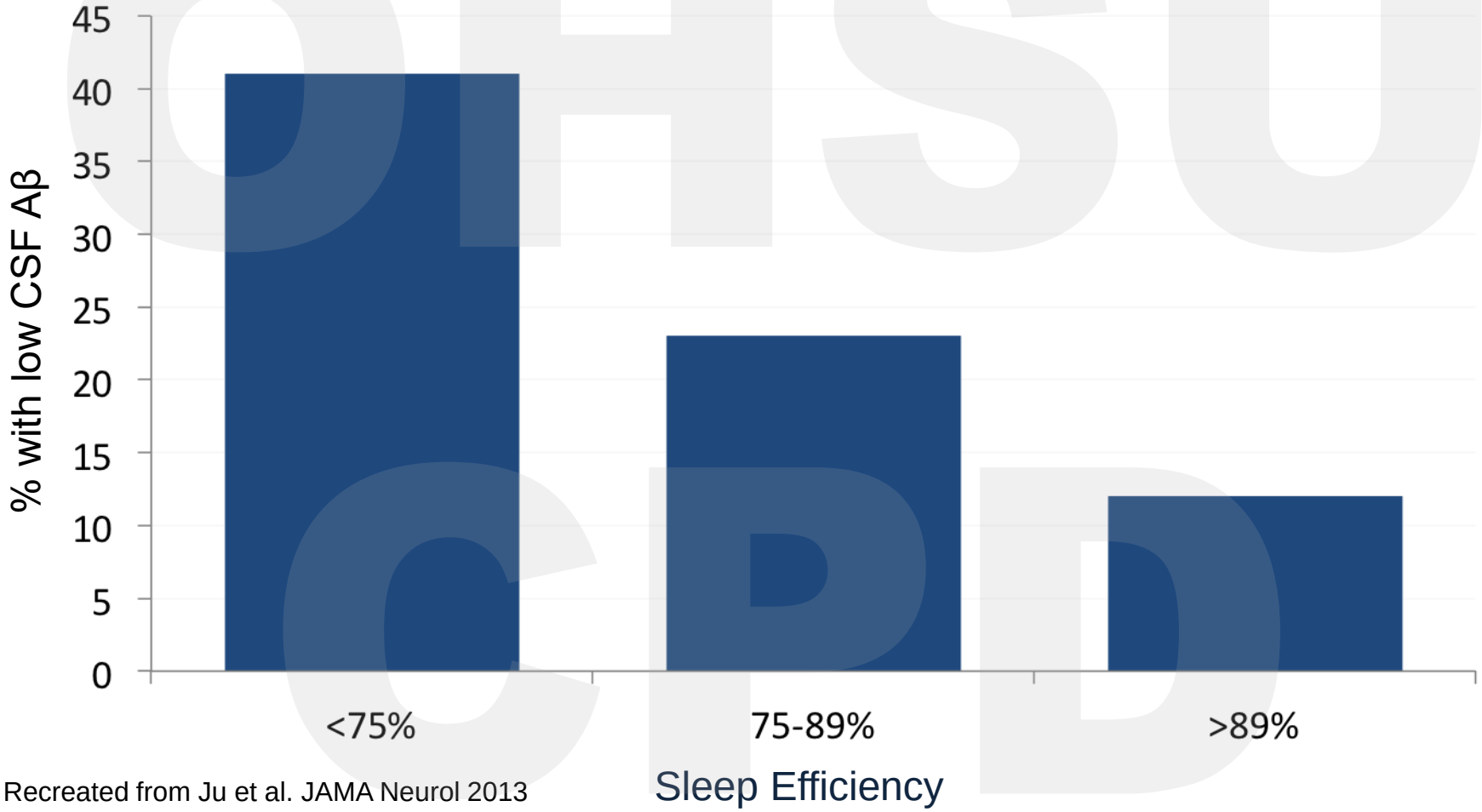
Hypertension

- The brain only weighs 2% of our body weight, but it uses 20% of our blood oxygen



Zlokovic and Apuzzo, Neurosurgery, 1998.

Sleep and Amyloid β



Recreated from Ju et al. JAMA Neurol 2013

Head Trauma (Traumatic Brain Injury)

- Persons who experience head trauma are more likely to develop AD later in life
  - May interact with genotype
  - Injury may increase Aβ production
  - Recovery may increase Aβ production

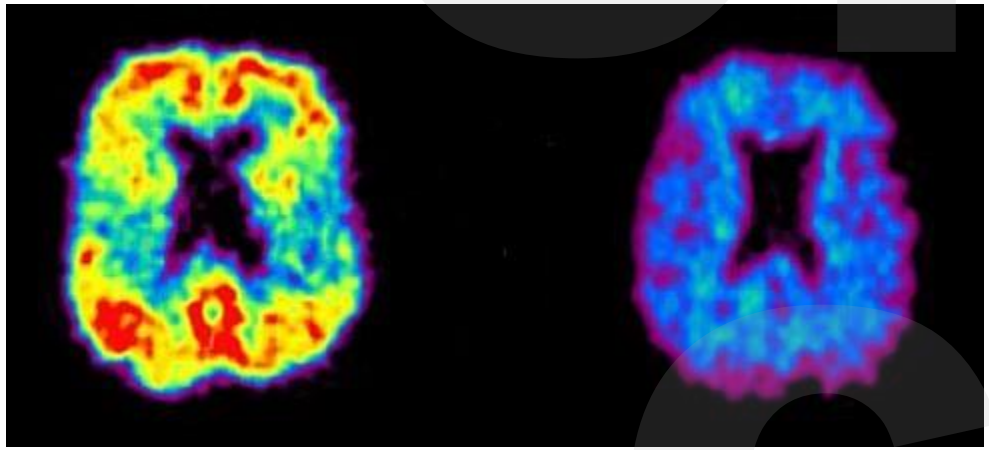
Heyman A, et al. Ann Neurol 15:335-341, 1984. Mayeux et al., 1991. Neurology. Brody et al., Science 2008.

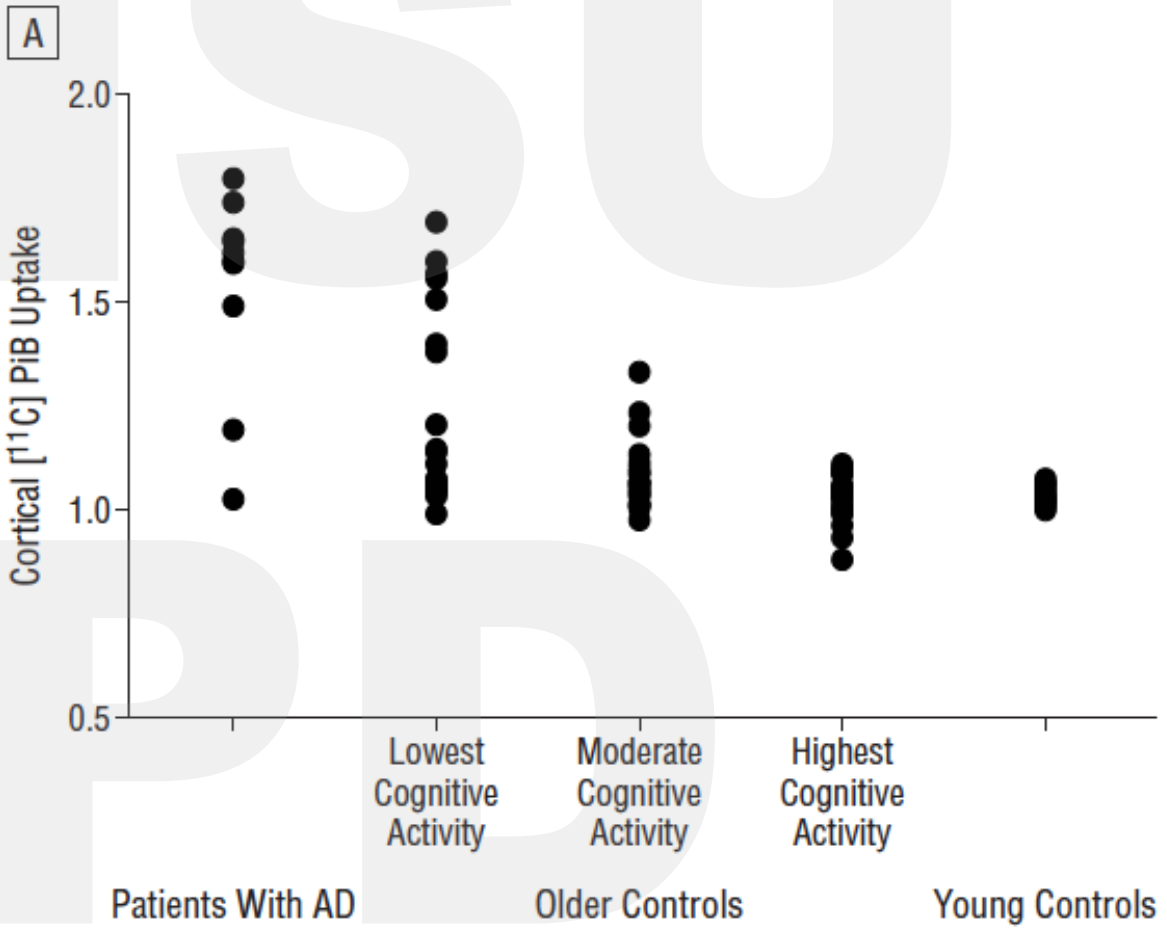
Cognitive Activity in Older Persons

- Cognitively inactive persons over the age of 65 are 2.6 times more likely to develop AD
- Social network size modifies the association between disease pathology and cognitive function
  - Assuming equal pathology, a person with a greater social network will have better cognitive function

Bennett D, et al., Lancet Neurol. 2006. Wilson RS, et al., Neurology. 2007;69:epub.

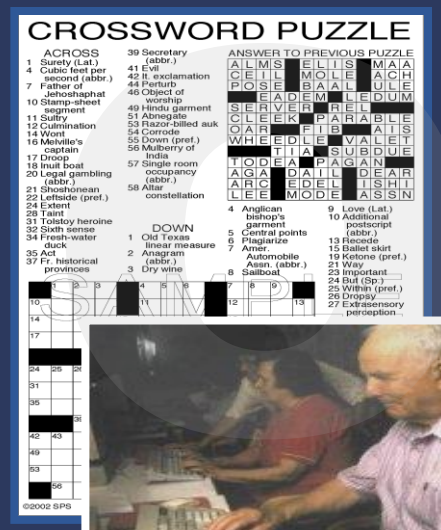
Lifetime Cognitive Activity is Associated with Reduced Levels of Aβ

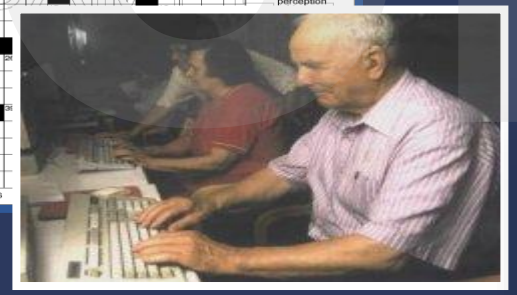


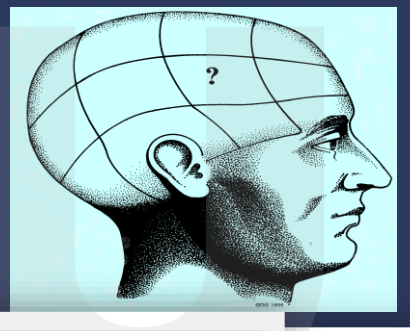


Landau et al. *Arch Neurol*. 2012.

Exercise - mental







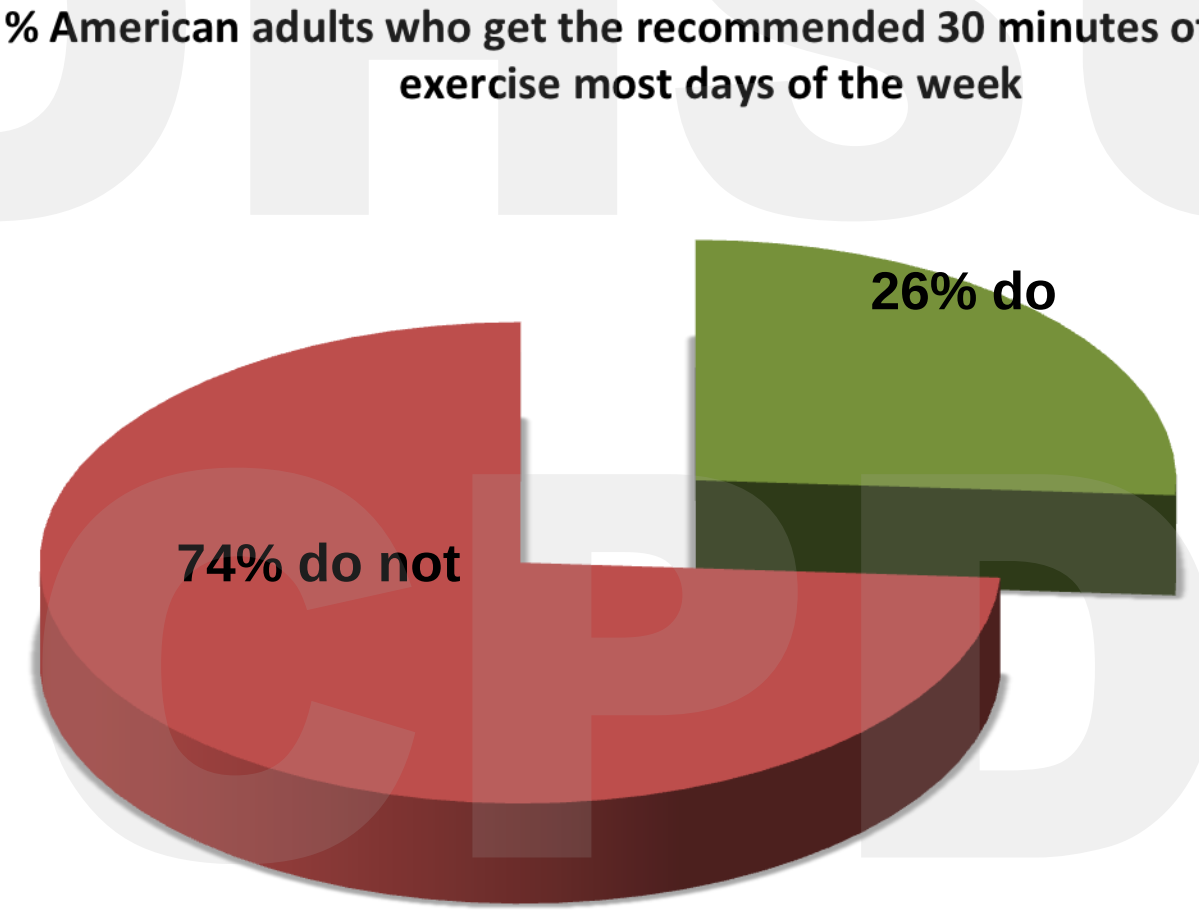
Diagnosis	Design	Number	Outcome	Intervention/Measure	Results
Scarmeas et al. [36]	Healthy subjects	Prospective cohort	1772	Dementia	Leisure activities	Decreased risk for dementia
Wang et al. [37]	Healthy subjects Kungsholmen project	Prospective cohort	152	Dementia	Intellectual and social stimulation	Decreased risk for dementia
Verghese et al. [29]	Healthy subjects	Prospective cohort	469	Dementia	Leisure activities	Decreased risk for dementia
Karp et al. [38]	Healthy subjects Kungsholmen project	Prospective cohort	776	Dementia	Mental, physical or social activity versus two or more	Decreased risk for dementia with increasing number of activities
Verghese et al. [35]	Healthy subjects of the Bronx Aging Study	Prospective cohort	437	Amnestic MCI	Leisure activities	Decreased risk for MCI with increasing number of activities
Willis et al. [39]	Healthy subjects	RCT	2832	Cognition	Verbal episodic memory training versus Inductive reasoning training versus visual search and identification training versus no training	Improved cognition with any training type
Helzner et al. [40]	AD	Prospective cohort	287	Cognition	Leisure activities	No association
Wilson et al. [41]	Healthy subjects from Rush Memory and Aging Project	Prospective cohort	770	MCI	Cognitive activities	Decreased risk for MCI with increased cognitive activity

Polidori, et al. International J of AD 2010

Mentally Stimulating/Leisure Activities

- Puzzles
  - Crossword
  - Sudoku
- Traveling
- Knitting
- Gardening
- Reading/Book clubs
- Movie clubs
- Board games
  - Chess
  - Checkers
- Musical instruments
- Visiting museums
- Attend plays

30 Minutes of Moderate Exercise is Recommended for Adults



Hillman CH, et al., Nat Neurosci. 2008;9:58-65. Colcombe S, Kramer AF. Psychol Sci. 2003:14:125-130.

Frequent Cardiovascular Exercise Lowers Risk for:

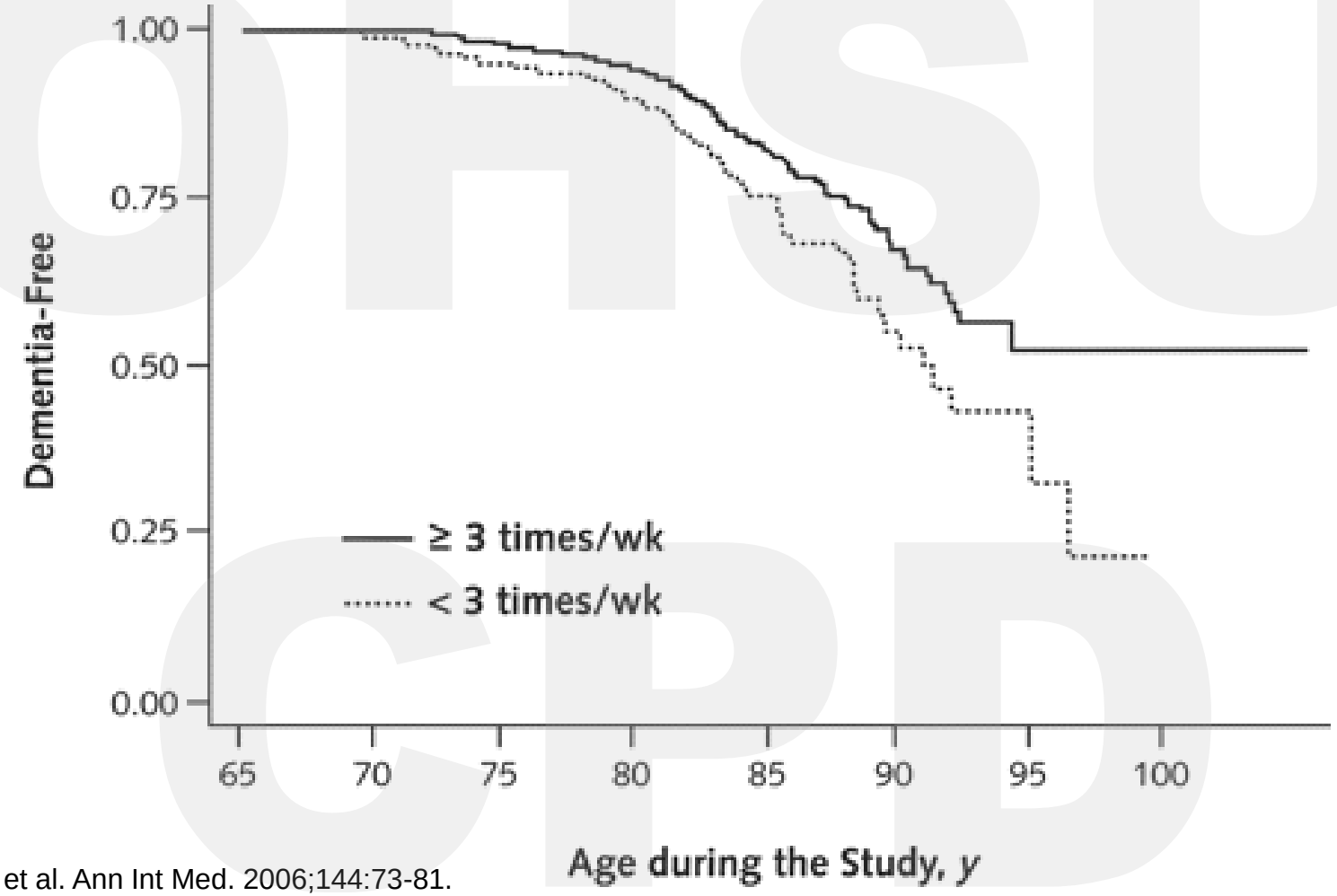
- Diabetes
- Hypertension
- Obesity

Cerebral Effects of Exercise

- Effects on neurogenesis
  - Proliferation
  - Neuronal fate
- Angiogenesis
- Blood flow
- Production of neurotrophic factors

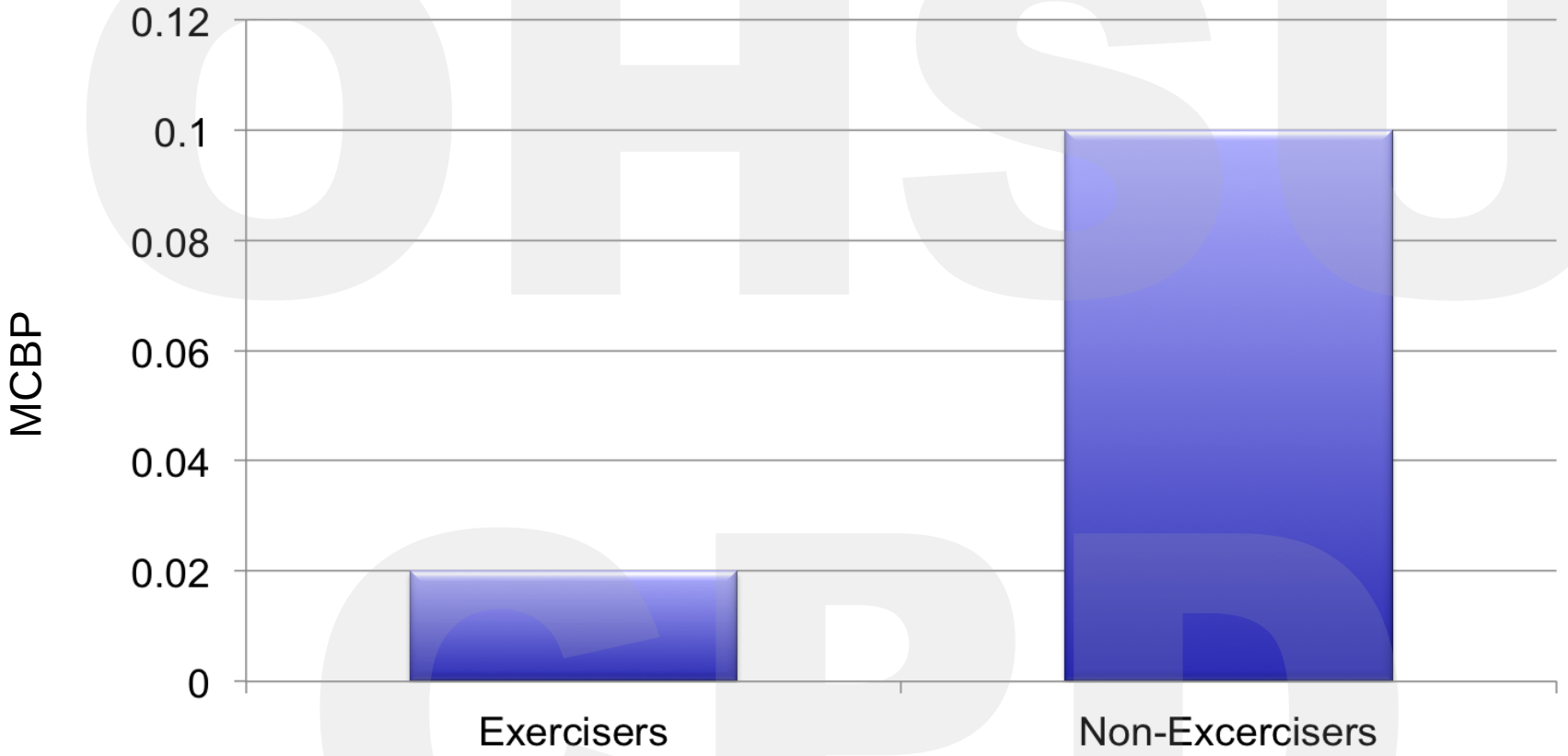
Kleim JA, et al. Brain Res. 2002;934:1-6. Van Praag H, et al. Nat Neurosci. 1999;2:266-270.

Exercise Decreases Risk for Dementia



Larson EB, et al. Ann Int Med. 2006;144:73-81.

Brain Amyloid Levels and Exercise

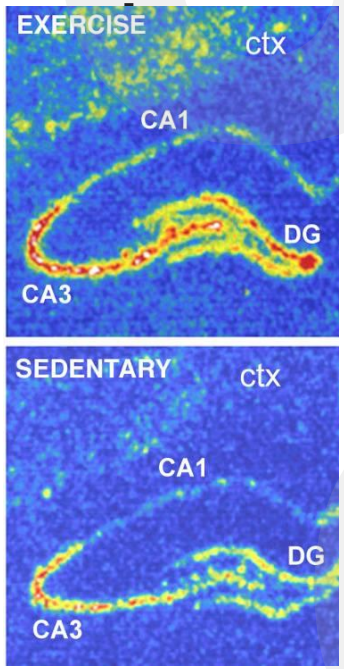


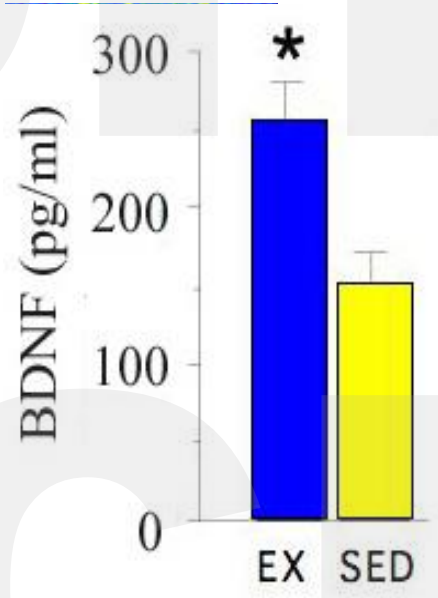
Do or do not follow the recommendation of the American Heart Association (AHA) for older adults: 30 minutes of moderate exercise 5 days/wk

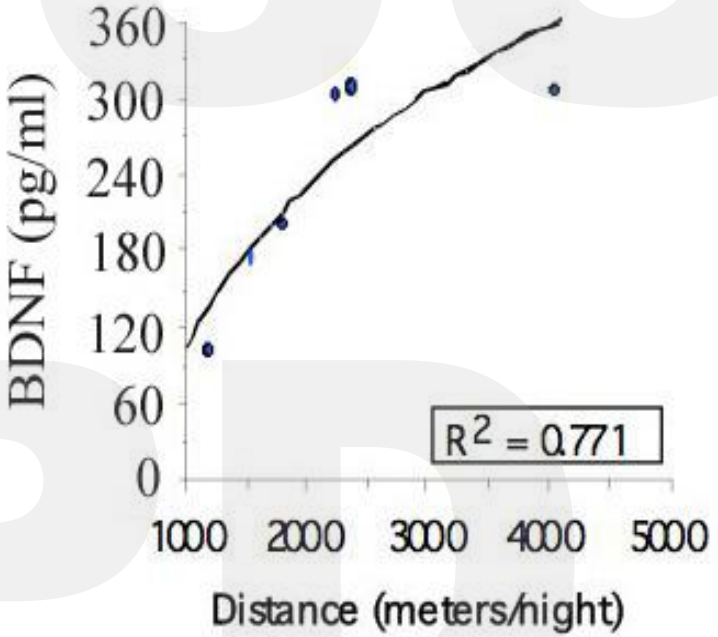
Liang et al. Ann Neurol, 2010

Exercise increases BDNF levels in the hippocampus

HIPPOCAMPUS



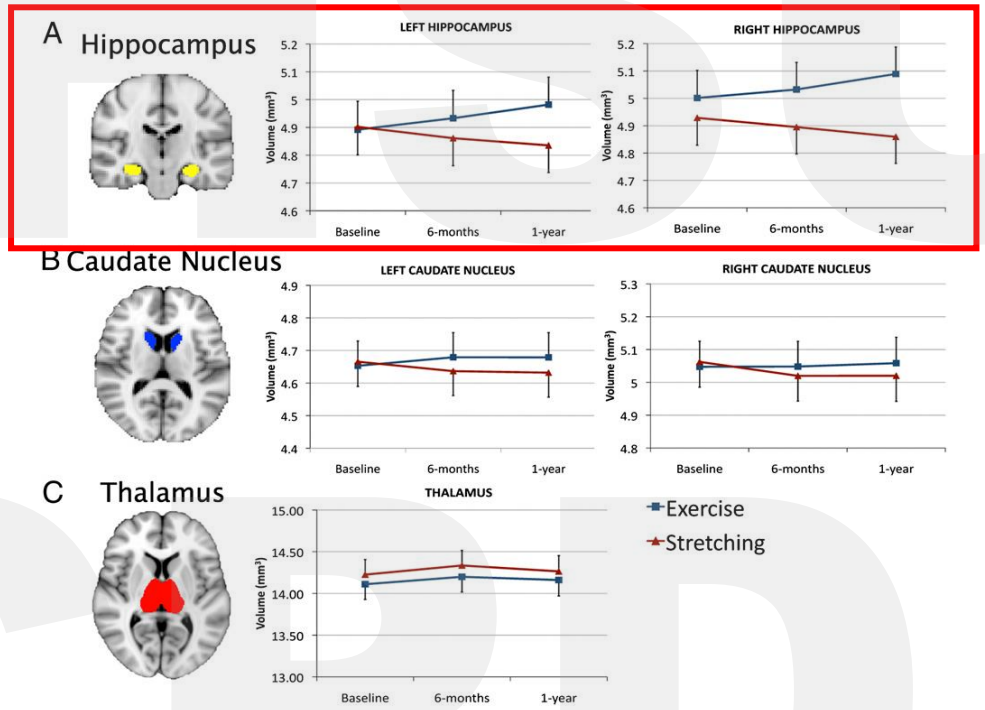




Rats: 1, 4 weeks wheel-running

Neeper, 1995; Berchtold et al., 2002, Adlard et al., 2005

RTC: Exercise and hippocampal volume



120 older adults randomized to:

1. Aerobic exercise group
   -moderate intensity 3 dys/wk
   (walking x 40 minutes)
2. Stretching control group

Mean age 67 yrs

Erikson, et al, Proc Nat Acd Sci USA vol 108, 3017-3022, 2012

Exercise - physical

	Diagnosis	Design	Number	Outcome	Intervention/Measure	Results
			PHYSICAL ACTIVITY			
Baum et al. [24]	Mild Dementia (mean MMSE 21/30)	RCT	20	Cognition	Strength training or recreational therapy 6 months	Improved MMSE with physical activity
Van de Winkel et al. [25]	Severe Dementia (mean MMSE 13/30)	RCT	15	Cognition	Physical activity + music or conversation 3 months	Improved MMSE with physical activity
Weuve et al. [33]	Healthy women	Prospective cohort Nerses' Health Study	766	Cognition	Physical activity and walking	Better cognitive function/less cognitive decline with physical activity and walking
Stevens and Killeen [26]	Mild and Severe Dementia (MMSE 9-23/30)	RCT	75	Clock drawing test	Physical activity or social visit or none	Slower cognitive decline with physical activity
Lautenschlager et al. [27]	Subjective memory impairment	RCT	308	Dementia	Education and usual care versus physical activity for 6 mos	(Modest) Cognitive improvement at 18 mos
Brown et al. [28]	Healthy subjects	RCT	134	Cognition	Balance versus general training	Cognitive improvement at 6 months
Verghese et al. [29]	Healthy subjects	Prospective Cohort	469	Dementia	Physical activity versus Leisure/Cognitive Activity	Decreased risk for dementia
Abbott et al. [30]	Healthy subjects	Prospective cohort Honolulu Asia Aging	2257	Dementia	Physical activity, walking	Decreased risk for dementia
Larson et al. [31]	Healthy subjects	Prospective cohort	1740	Dementia	Physical exercise	Decreased risk for dementia
Cassilhas et al. [32]	Healthy subjects	RCT	62	Cognition	Moderate or High-level resistance training	Improvement of cognition with both lev of resistance trainin

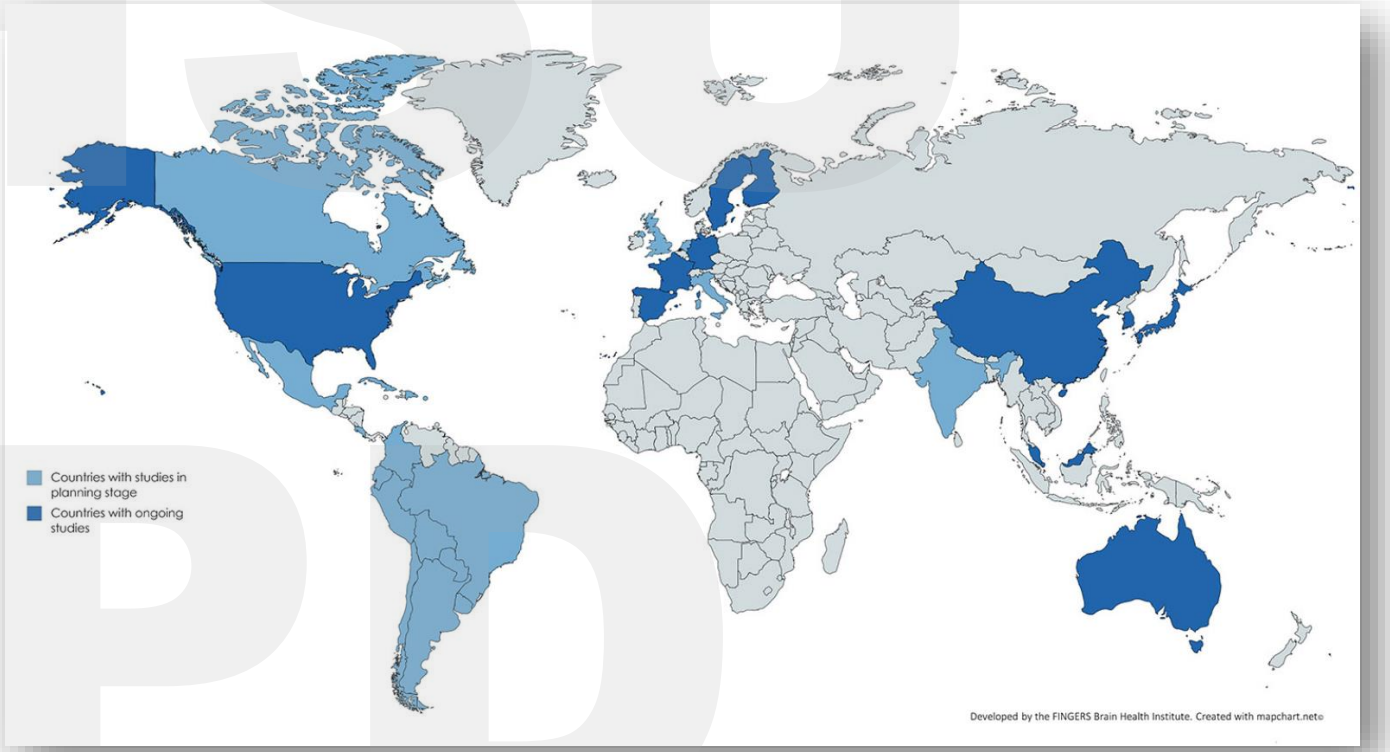
Polidori, et al. International J of AD 2010

Multidomain lifestyle interventions

- FINGER Study – Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability
- Enrolled 1260 seniors
- 2-year intervention:
  - Nutritional guidance
  - Physical exercise
  - Cognitive training
  - Social Activity
  - Intensive monitoring and management of metabolic and vascular risk factors
- Control group: general health advice
- Intervention group had beneficial effect on primary outcome – change in cognition on a neuropsychological test battery

International collaborative projects

- Different groups of elderly may benefit from different interventions
- US Study to Protect Brain Health Through Lifestyle Intervention to Reduce Risk (US POINTER) – a 2 year trial testing multidomain intervention in 2500 adults age 60-79.
- World Wide FINGERS network – adapting and testing the FINGER model in diverse geographic and cultural settings



Testing lifestyle interventions: SHARP study

- Principal investigator Raina Croff, Ph.D. (OHSU)

Triad
- Physical activity
- Social engagement
- Reminiscence

- In African American seniors with normal cognition or MCI

- Portland, Oregon's historically Black neighborhoods

- Upcoming collaborations in other cities

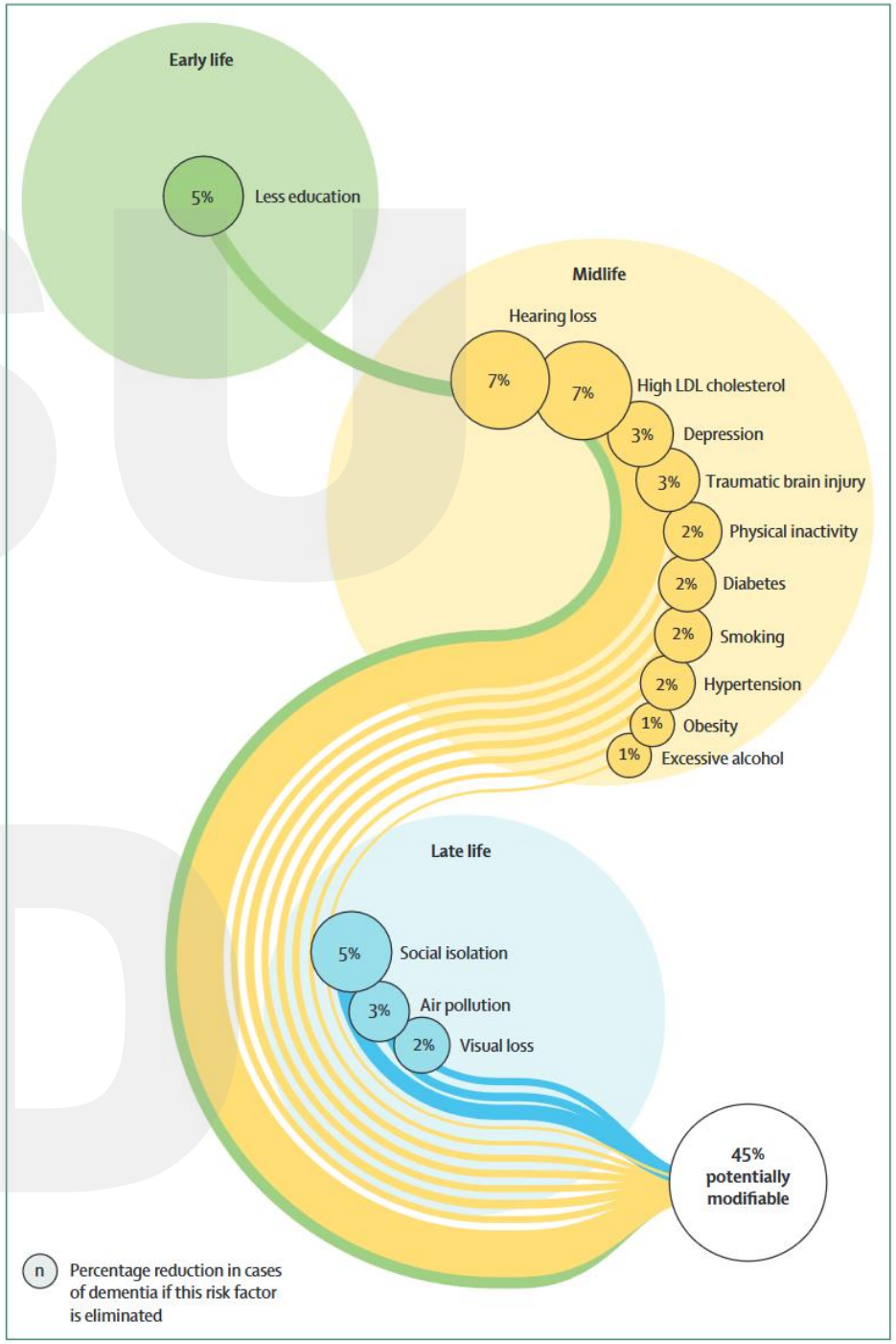
www.sharpwalkingstudy.org

Challenges of randomized clinical trials of lifestyle interventions

- Double blinding is not possible, however outcome assessors should be blinded
- In cognitive training, intervention should not be too similar to outcome measures
- Timing – early initiation of intervention may lead to better results, but may lead to a very long term trial
- Choice of target populations
- Dose and adherence – focus on culturally relevant interventions

Is prevention of dementia possible?

- Up to 45% of risk of dementia may be reduced
- Recent breakthroughs in biomarker research, allowing detection of Alzheimer's disease in living people before symptoms start, have us poised to test Alzheimer's prevention strategies in the populations at highest risk
- Alzheimer's prevention research is challenging and exciting, and must be inclusive
- Sharing the potential of Alzheimer's prevention in an equitable manner requires commitment on the part of individuals, communities, nations, and the world



The Lancet Commission, 2024

Keep a Healthy Brain

- Eat a healthy (Mediterranean) diet
- Control diabetes
- Control hypertension
- Get a good night’s sleep
- Protect your brain (wear a helmet)
- Keep your mind active
- Get regular exercise

Take home points

- Alzheimer's disease is the most common cause of dementia
- The major risk factors for Alzheimer's disease are "AGE"
  - Age
  - Genetics
  - Environment
- Risk may be reduced up to one-third
- Focus on brain health measures
  - Reduce cardiovascular risk
  - Cognitive, social, and physical exercise
  - Hearing and vision correction

Resources

The NIA-Layton Alzheimer's Disease Research Center (ADRC) at OHSU

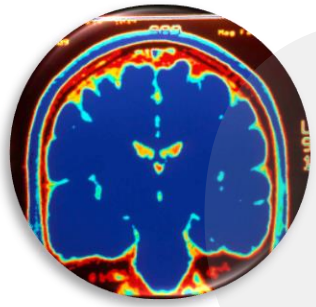
We are the only Federal designated and funded Alzheimer's disease institute in Oregon

Contact us
Phone: 503-494-7647

Email:
adoutreach@ohsu.edu

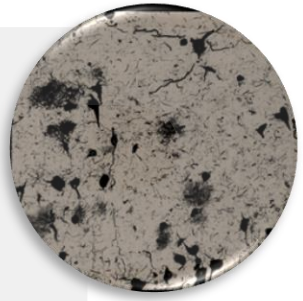
Registry:
alzactnow.org

Administrative Core



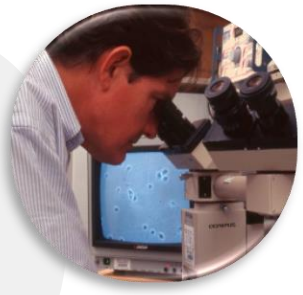
Clinical Core

Education Core



Neuropath Core

Data Core



Biomarker Core

Neuroimaging Core

Oregon ECHO Network: Community of Practice

Information and support for clinicians who care for those with dementia

Dementia Community of Practice

- Free, with free CME.
- **Audience:** Neurologists; primary care clinicians including MDs, DOs, NPs, and PAs; nurses; social workers; case managers; pharmacists; administrators; quality improvement specialists; and other interested team members
- **Schedule:** 9 sessions. Third Tuesday of each month, 12:00 - 1:00 p.m., PT, September 17, 2024 - June 17, 2025
- More info and registration at: https://www.oregonechonetwork.org/communities-of-practice

Thank you!

Any questions?