Fundamentals of Alzheimer's Disease: Prevention

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ALZHEIMER'S DISEASE

Alzheimer's disease (AD) is the most common cause of dementia.

"Dementia" describes the progressive loss of thinking, memory, and other cognitive abilities impairing daily function.

In people over the age of 65, Alzheimer's disease accounts for over two-thirds of dementia cases.

Alzheimer's Association. 2020 Alzheimer's Disease Facts and Figures. Alzheimers Dement 2020;16(3):391+.

MORE ON AD:

The most common symptom of AD - related dementia is a gradual worsening of memory
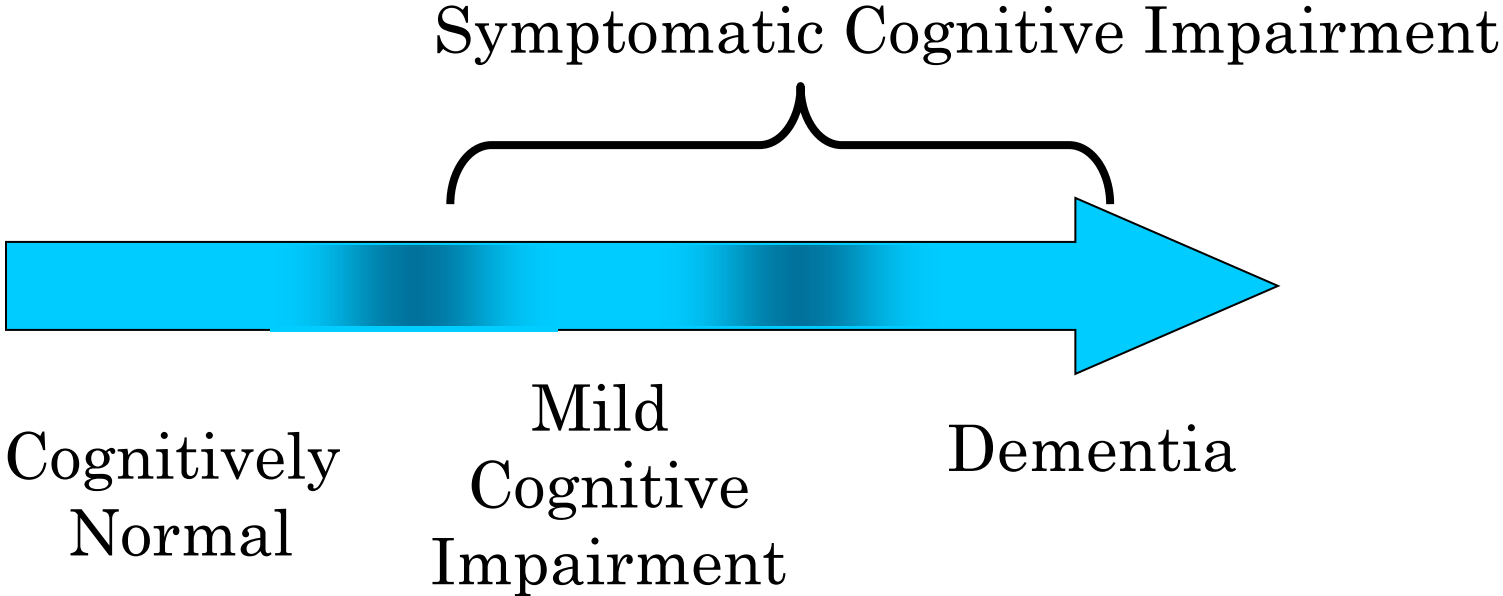
Other cognitive abilities such as orientation and use of language also worsen over time.

We know that characteristic changes occur in the brain many years before a person shows the symptoms of AD dementia.

Alzheimer's Disease – a Continuum

- Pre-clinical stage
- Mild cognitive impairment/mild behavioral impairment
- Clinical stage

Jack CR Jr et al. *Alzheimers Dement.* 2011;7:257-262.

Categories in Cognitive Disorders Spectrum

Symptomatic Cognitive Impairment

Cognitively Normal

Mild Cognitive Impairment

Dementia
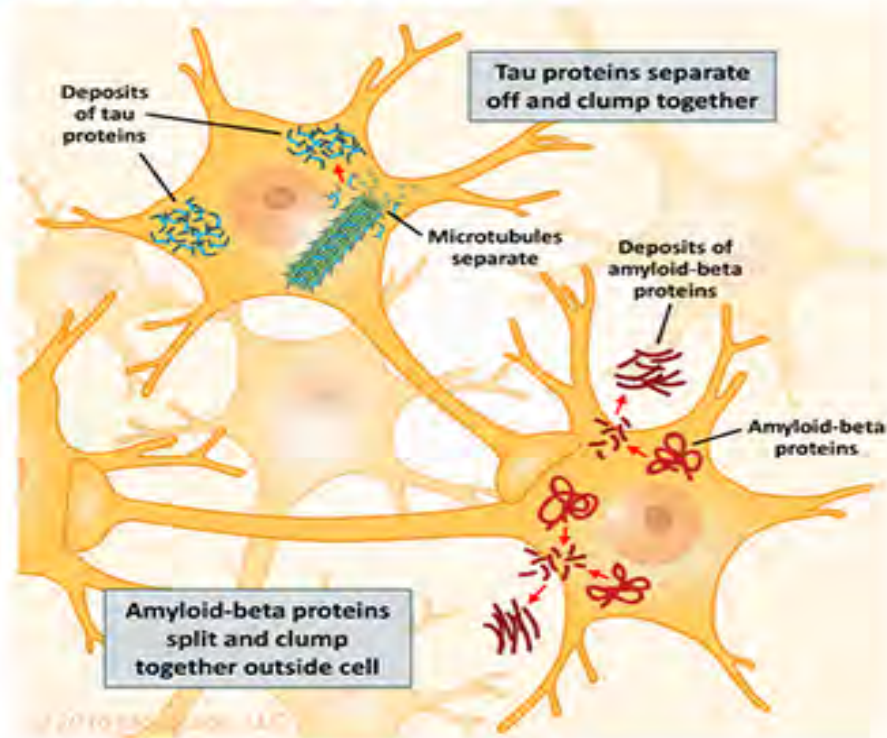
Distinctions are based on history and exam

Alzheimer's Disease

- 5.8 million Americans currently live with Alzheimer's and other related dementias
- 1 in 9 people over the age of 65
- 1 in 3 people over the age of 85
- 500,000 new cases will be diagnosed in 2020
- Lifetime risk at age 45: 10% for men and nearly 20% for women
- Health care costs exceed $305 Billion (2020)

Alzheimer's Association. 2020 Alzheimer's Disease Facts and Figures. Alzheimers Dement 2020;16(3):391+.

Pathological hallmarks of AD

Pathological Features of AD

- AD accounts for 50% to 70% of all dementia cases
- Individuals with AD typically experience brain inflammation

Deposits of tau proteins

Tau proteins separate off and clump together

Microtubules separate

Deposits of amyloid-beta proteins

Amyloid-beta proteins

Amyloid-beta proteins split and clump together outside cell

Alzheimer's Association website.

ALZHEIMER'S DISEASE

Biomarkers are the best window on the biology of Alzheimer's pathological changes as the brain itself is inaccessible.

Widespread use will be facilitated by the development of less-expensive and less-invasive biomarkers.

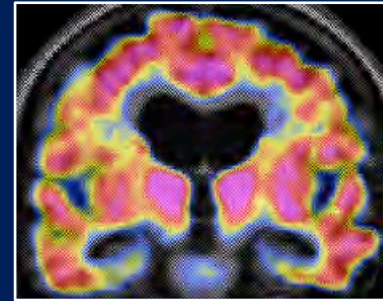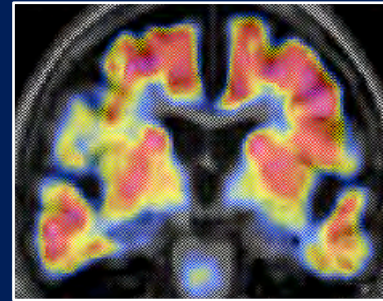An unbiased descriptive classification scheme for biomarkers will be useful.
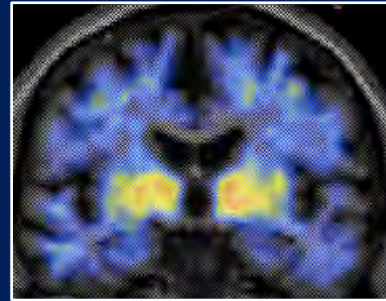
Biomarkers and Imaging
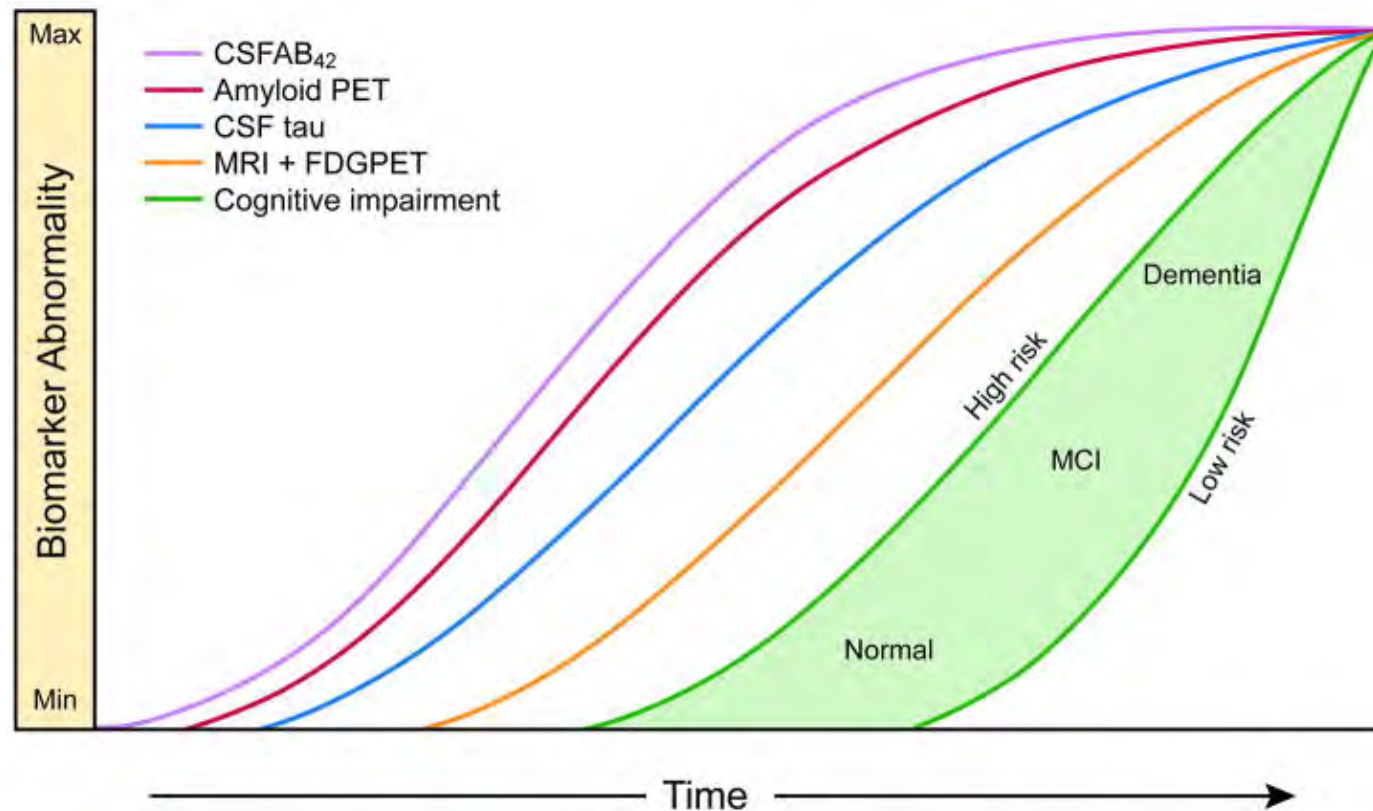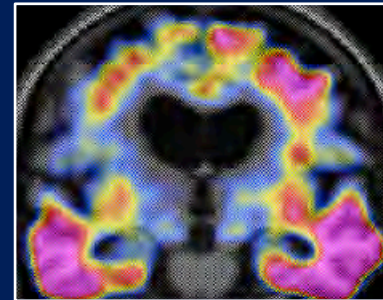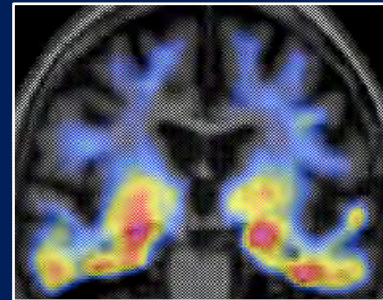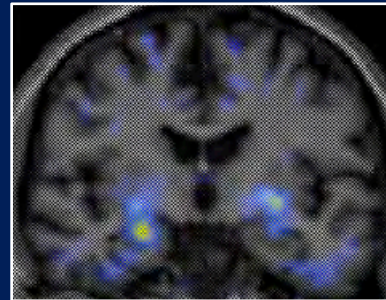

Jack et al. *Lancet Neurology* 2013

CSF: cerebrospinal fluid; AB42: amyloid beta 42-residue; PET: Positron Emission Topography; FDG: fluorodeoxyglucose;

PET Amyloid and Tau Imaging

Amyloid-b (PiB)

Tau (T807)

Clinically Normal

Clinically Normal

Alzheimer's Dementia

Biomarkers for AD: Blood

A blood-based biomarker represents the best avenue for preclinical AD

- Inexpensive
- Specialized equipment not required
- Readily obtained
- Minimal risk involved
- Suitable for large scale screening

Bateman RJ, Blennow K, Doody R et al: J Prev Alz Dis 2019

Why Prevention?

- Inadequacies of current treatments
- Considerable data on risk markers
- Recognition of sub-disorder conditions
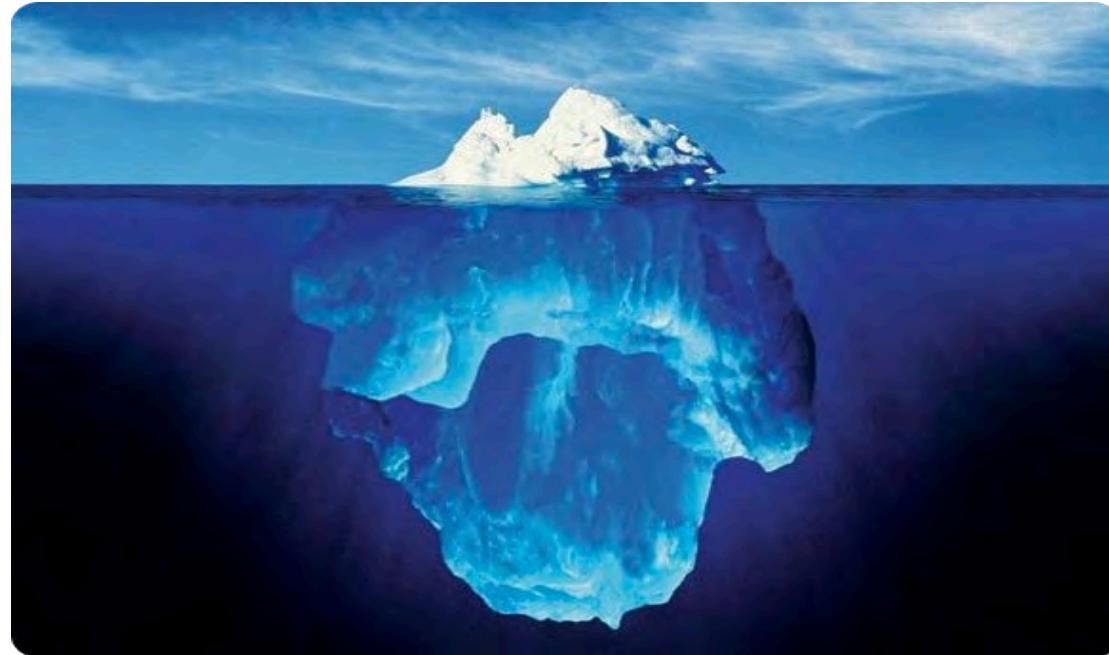
Rationale for Prevention Strategies

- Protecting intact neurons will be more feasible than repairing damaged ones
- Estimated 1/3 of risk for accelerated brain aging stems from genetic factors
- Minimal risk and general value of healthy lifestyle changes argue for initiating strategies prior to results from randomized clinical trials

Kahn RL, Rowe JW. *Successful Aging*. New York: Pantheon; 1998; Small GW. *BMJ*. 2002;324:1502-1505; Thoenen E. Prevention of Dementia. *An Overview of Dementia: The Growing Crisis in West Virginia*. West Virginia Department of Health and Human Resources; 2005.

Why Participate?

- Contribute to groundbreaking research

- Work closely with world-renowned researchers

- Help scientists find a treatment for Alzheimer's disease that works for everyone

- Help your community

Alzheimer's Disease: Modifiable Risk Factors

- Low education level
- Physical inactivity
- Smoking
- Midlife hypertension
- Midlife obesity
- Elevated blood lipids
- Diabetes mellitus
- Impaired sleep
- Social isolation
- Untreated depression
- Hearing and vision loss

Lancet Commission on Dementia Prevention, Intervention and Care

Brain Fitness Strategies

- Physical aerobic exercise
- Manage vascular risk factors
- Dietary antioxidants
- Low-fat, low carb diet
- Modest alcohol use
- Cognitive and social engagement
- Good sleep
- Correct hearing and vision impairment
- Dental health
- Stress reduction

Lancet Commission on Dementia Prevention, Intervention and Care

Helpful Habits

- Walk and talk
- Protect your head
- Vary your routine
- Be a lifelong learner
- Train your brain

The **AD-CARE** program thanks you for attending this presentation!

If you are interested in learning more about our research opportunities with our program, please feel free to contact us:

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urmc.rochester.edu/ADCARE