Cognitive Aging and Alzheimer’s Disease
Cognitive Aging Begins Early In Life

From: T. Salthouse, PhD

70% loss of function
Cognitive Aging Begins Early In Life

But is it inevitable?

From: T. Salthouse, PhD
Common Age-Related Memory Complaints

- Names and faces
- Location of household objects
- Meetings and appointments
- Word-finding difficulties
Cognitive Decline with Aging

- **Processing speed declines with aging**
  - Correlates with intelligence
  - *thought by some to be the fundamental change affecting all cognitive processes*

- **Working memory ("RAM") declines**
  - Impaired multitasking
Cognitive Decline with Aging

- “Hard drive” speed slows down but long term memory remains intact
  - “retrieving” words and names is slowed
  - Experience accumulates

- Decision making changes
  - Less reliance on “data,” more on “gist”
  - “Wisdom” increases

- Emotional IQ and resilience increase
With Aging, the Brain Shrinks

Figure 1. Cross-sectional plot of brain volume in nondemented adults over the adult life span.
What is the Structural/Biological Basis for Cognitive Aging?
The White Matter Matters!
Myelin Enables the Human Brain “Internet”
The Cause of Decline in Processing Speed? Myelin and the Aging Brain
Is *Myelin* Degradation the Structural Basis for Cognitive Aging?
Processing Speed Correlates with Frontal Lobe White Matter Density: “Executive Function”

Peak age: Tapping speed = 38.9, FLwm R² = 38.7
What is the Relationship Between Cognitive Aging and Alzheimer’s Disease

![Graph showing the relationship between age, cognitive function, and Alzheimer's Disease](image)

- **Cognitive Aging (AAMI)**
- **Mild Cognitive Impairment**
- **Alzheimer's Disease**

The graph indicates a decline in cognitive function with age, from 50 to 80 years old, illustrating the progression from cognitive aging to mild cognitive impairment and finally Alzheimer's Disease.
Facts About Alzheimer’s Disease

- A chronic, progressive, uniformly fatal disease
- Affects 1/3 persons by age 80
- Leading cause of disability and death in elderly
- Third most costly disease
- Most new cases will be in the developing world
Current Tests for Alzheimer’s Dementia: Memory Testing

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<th>DOG</th>
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<td>FENCE</td>
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What Dr. Alzheimer Saw in 1906

- Neurofibrillary tangles
- Amyloid plaques
MRI Brain Imaging, Cognitive Aging, and Alzheimer’s Disease

- Normal
- Normal
- Mild Cognitive Impairment
- Alzheimer’s Disease

25 Years
75 Years
75 Years
75 Years
PET Scans To Detect Early Alzheimer’s Disease

Normal | Early Alzheimer’s | Late Alzheimer’s

[Images of brain scans showing normal, early, and late Alzheimer’s disease patterns]
PET Brain Amyloid Imaging Can Detect Alzheimer’s Disease Years Before Dementia Begins
How Is Your Memory?

How many of the words can you recall?
The Unmet Medical Need: Current Approaches to Treatment
The Unmet Medical Need: Current Approaches to Treatment

Taking FOCUSfactor® is a smart decision.
Prevention of Alzheimer’s Disease

- **Lifestyle factors**
  - Stress
  - Physical exercise
  - Head trauma
  - Alcohol (red wine), smoking
  - Diet: omega-3 fatty acids,
  - Building and maintaining brain reserve
    - Education
    - Continuing social/occupational engagement

- **Medical factors**
  - Diabetes, heart disease, hypertension, obesity, depression

- **Disease-modifying drugs**
Drug Development takes 12-15 years, is very risky, and costs ~$1.2B
The Gap In Financing Innovation for Alzheimer’s Drug Discovery

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<th>Biomedical Venture Philanthropy and the Financing Gap in Drug Development</th>
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FINANCING GAP

High RISK

Low
# Disease Modifying Drugs in Clinical Trials for Alzheimer's Disease

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<td>LY450139 (gamma)</td>
<td>Eli Lilly</td>
<td>Phase III</td>
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<td>BMS-708163 (gamma) (Beta)</td>
<td>Britol Myers Squibb</td>
<td>Phase II/IIa/IIb</td>
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<td>CTS-2116 (beta)</td>
<td>CoMentis/Astellas</td>
<td>Phase II</td>
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<td><strong>Amyloid vaccine immunotherapy</strong></td>
<td>AAB-001 (Bapineuzumab)</td>
<td>Elan/Wyeth</td>
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<td>IVIg (Gammagard)</td>
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<td>LY2062430 (Solanezumab)</td>
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<td>ELND005 (AZD-103)</td>
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<td>Allon Therapeutics</td>
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<td>Dimebon</td>
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<td>CERE-110 (NGF Gene Therapy)</td>
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<td>MEM 1003 (ca channel antagonist)</td>
<td>Memory</td>
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<td>MK-0952 (PDE4)</td>
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Alzheimer’s Disease costs U.S. society over $100 billion annually, making it the 3rd most costly disease after heart disease and cancer.

Alzheimer’s Disease News
Latest Scientific News Coming Soon

How you can help
Drug discovery research defines ADDF and our mission. Accelerating new drugs to prevent, treat and ultimately cure the disease is our goal and we've been making great headway.

Latest News
4th Drug Discovery for Neurodegeneration

www.AlzDiscovery.org
"To live is to think"
Cicero, ~60 BC

**Carpe Diem for the 21st Century**

“We must get on with our lives, not only because death awaits us, but because we may lose our minds before death takes us”
Marcus Aurelius, ~160 AD