

AAPM 2022

JULY 10–14 | WASHINGTON, DC

64TH ANNUAL MEETING & EXHIBITION



CELEBRATING MEDICAL PHYSICS
TRANSFORMING HUMAN HEALTH

The Alzheimer's Epidemic: Implications for the Medical Physicist

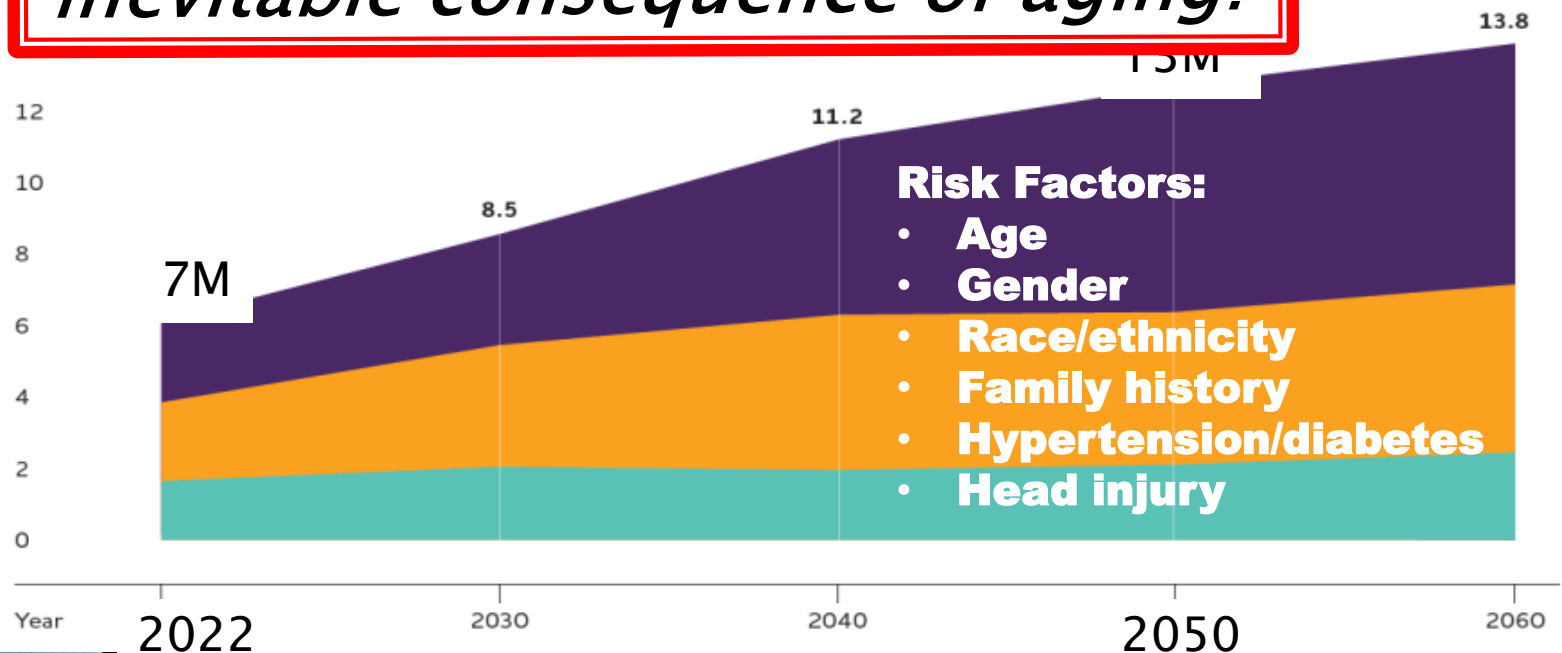
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July 11, 2022

The U.S. Alzheimer's epidemic

The number of Americans 65+ living with Alzheimer's disease is expected to nearly double by 2050.

Alzheimer's disease is not an inevitable consequence of aging!

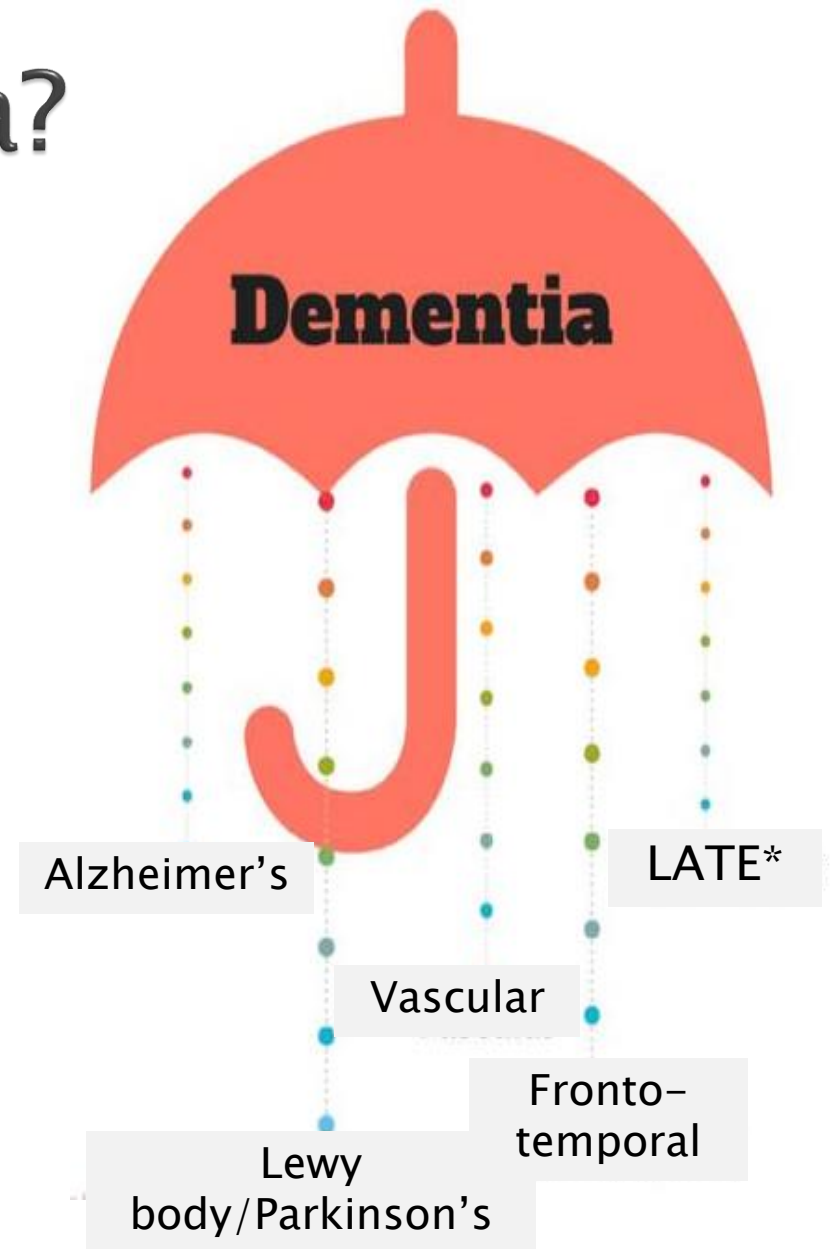


U.S. Alzheimer's facts and figures

- ▶ Nearly 7 million Americans are living with Alzheimer's disease or another dementia
- ▶ Since 2000, death from heart disease has decreased 7% while death from dementia has increased 145%
- ▶ 1 in 3 seniors dies from or with dementia
- ▶ Dementia accounts for more deaths than breast and prostate cancer deaths combined
 - Women are now more likely to die from dementia than breast cancer
- ▶ The cost of dementia care
 - The nation: 1 /3 billion dollars/year now, 1 trillion in 2050
 - Per person: average *annual* cost is \$65K (life expectancy for person with dementia is 8–10 years)

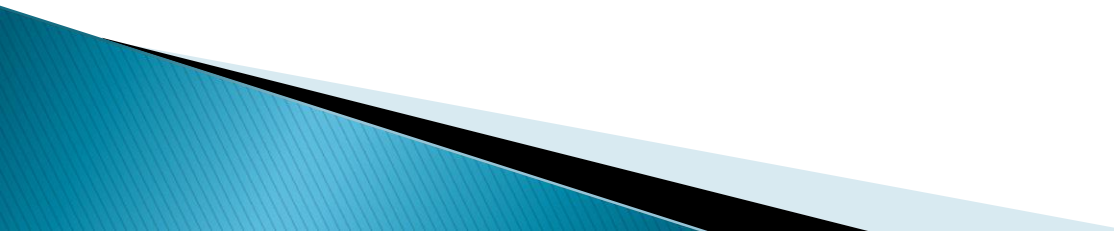
What is dementia?

- ▶ Dementia is the most common of the so-called neurodegenerative diseases
- ▶ The other common neurodegenerative diseases include:
 - Parkinson's disease
 - Amyotrophic lateral sclerosis (ALS/Lou Gehrig's disease)
 - Huntington's disease

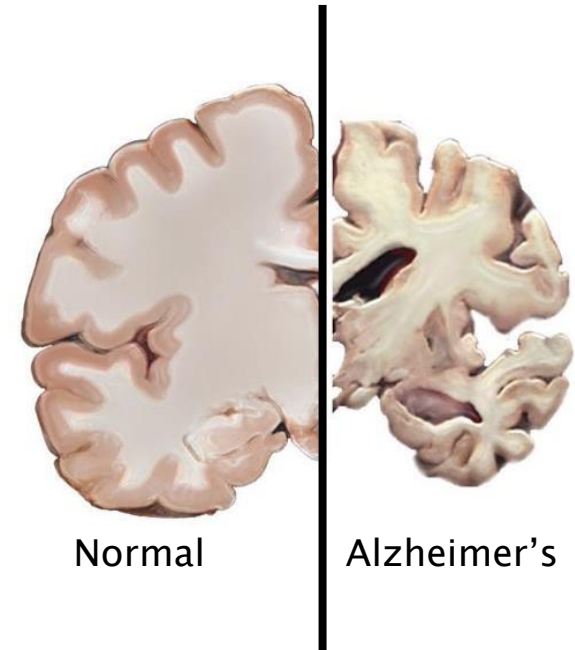
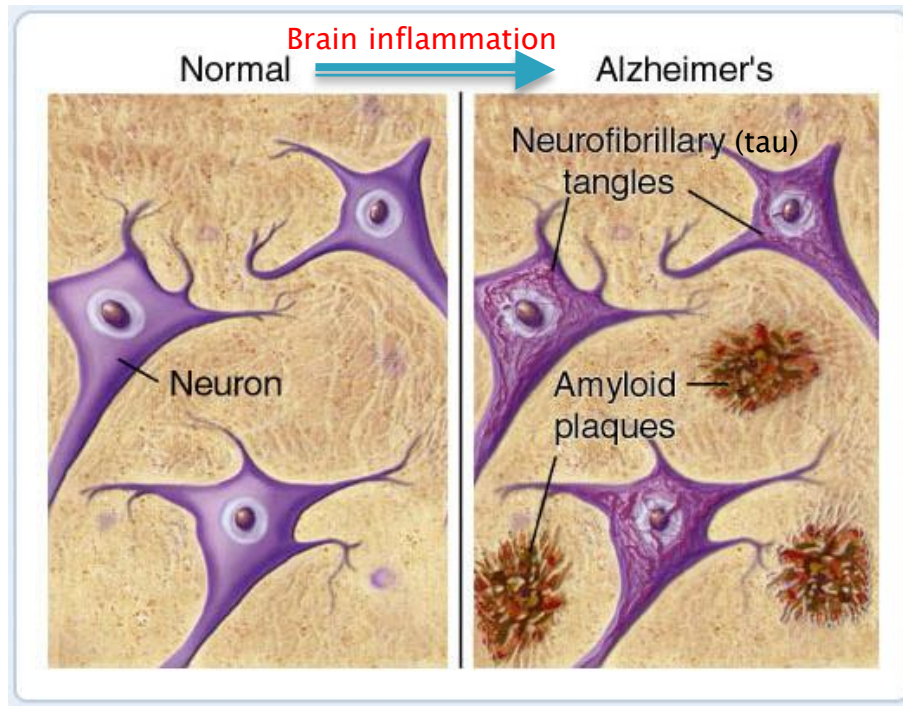


*Limbic-predominant age-related TDP-43 encephalopathy

Clinical symptoms of dementia

- ▶ Alzheimer's disease – short-term memory loss, executive dysfunction, and visuo-spatial challenges
 - LATE – primarily short-term memory loss
 - Vascular dementia – stroke sequelae plus Alzheimer's-like symptoms
 - ▶ Fronto-temporal dementia – behavioral disinhibition, language problems
 - ▶ Lewy body dementia and Parkinson's disease dementia – psychotic symptoms and nightmares, movement disorder/tremor, and autonomic dysfunction with variable cognitive loss
- 

What causes Alzheimer's disease?



What if we had a drug that could dissolve the amyloid plaques?

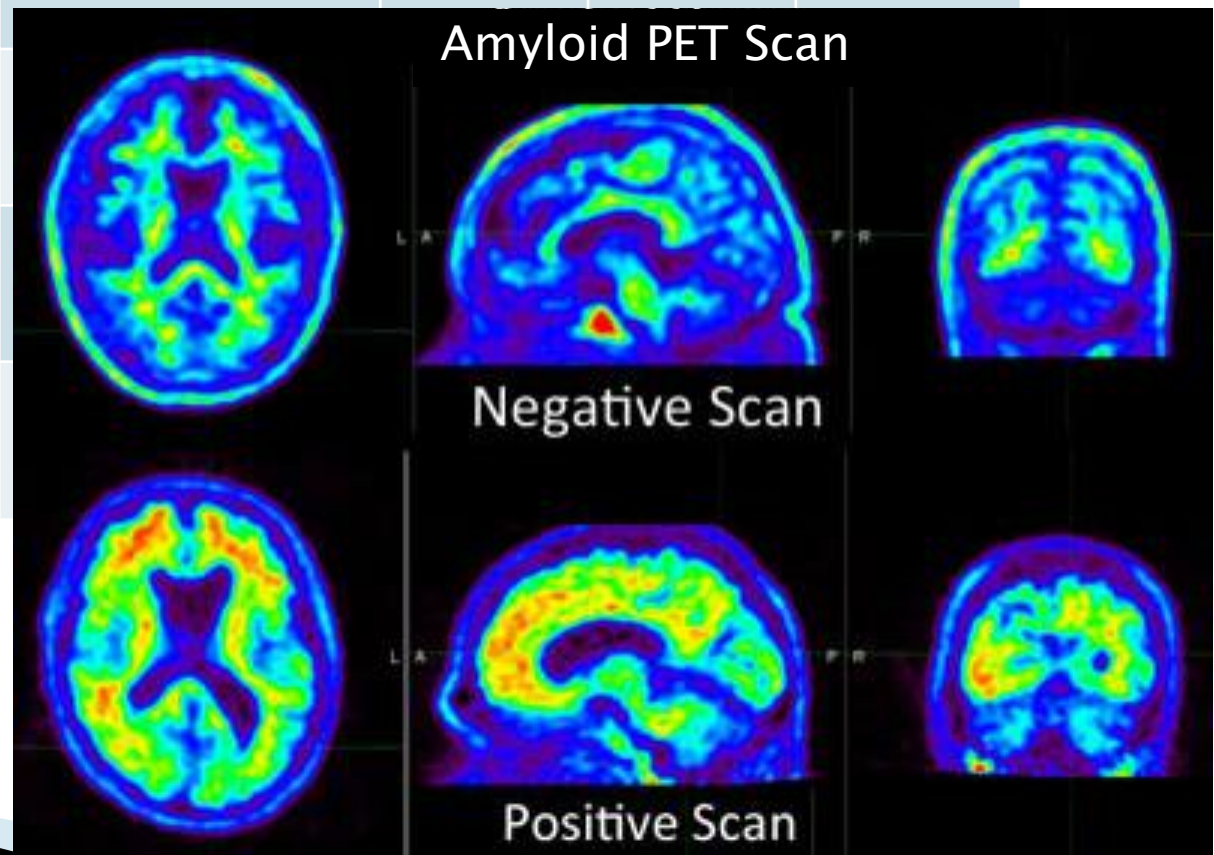
We do!



But ...

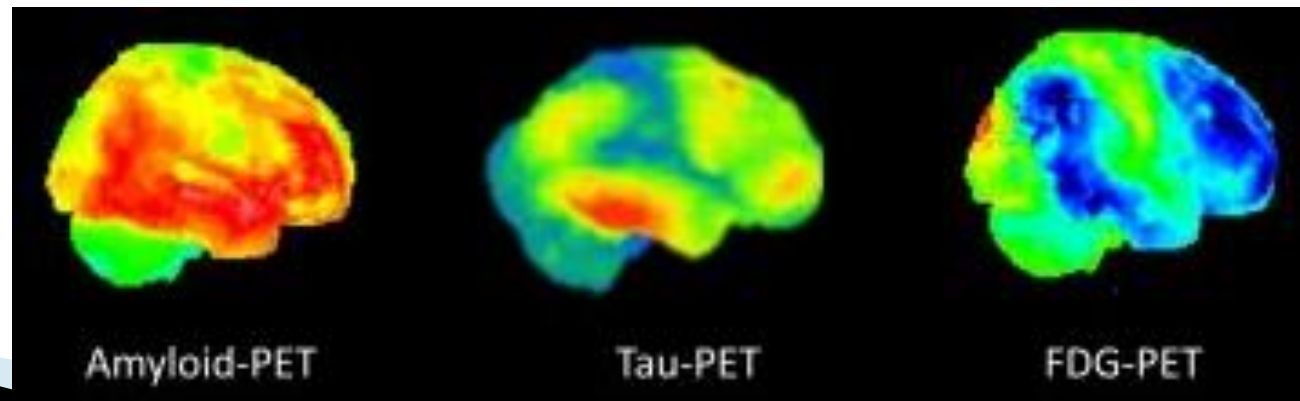
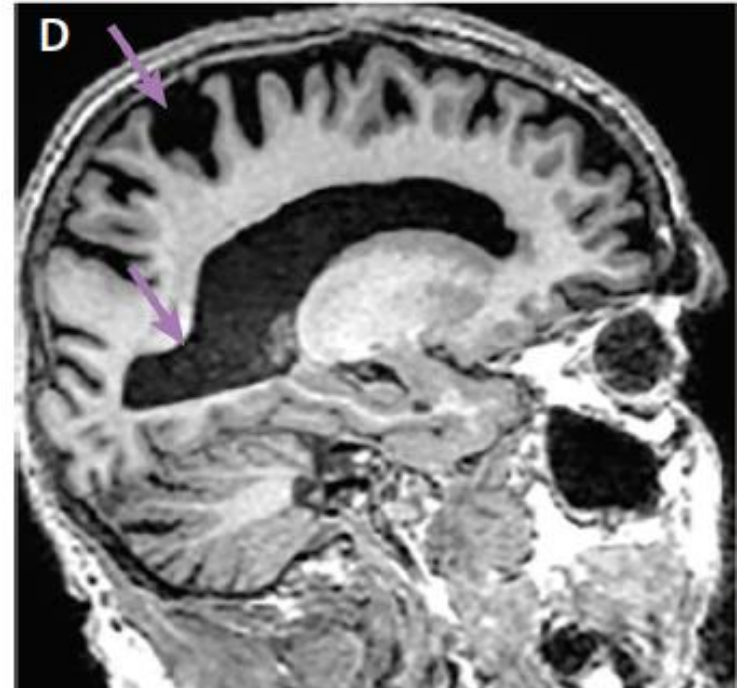
Pathologic proteins in dementia

Pathologic Protein	Alzheimer's	FTD	LBD/ PD	LATE
Amyloid	X			
Tau				
TDP-43				
Alpha synuclein				



Dementia Diagnosis

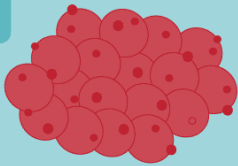
- ▶ History and physical exam
- ▶ Medication reconciliation
- ▶ Depression assessment
- ▶ Cognitive function evaluation
- ▶ Blood tests
- ▶ MRI scan of the brain
- ▶ PET scan of the brain
 - FDG PET
 - Amyloid PET
- ▶ Spinal tap



Cancer staging

TNM System for Staging Breast Cancer

T



Tumor size

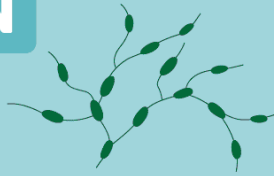
T-1: 0-2 centimeters

T-2: 2-5 centimeters

T-3: >5 centimeters

T-4: Tumor has broken through skin or attached to chest wall

N



Lymph Node Status

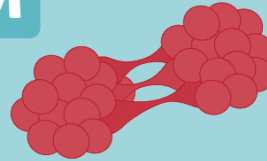
N-0: Surgeon can't feel any nodes

N-1: Surgeon can feel swollen nodes

N-2: Nodes feel swollen and lumpy

N-3: Swollen nodes located near collarbone

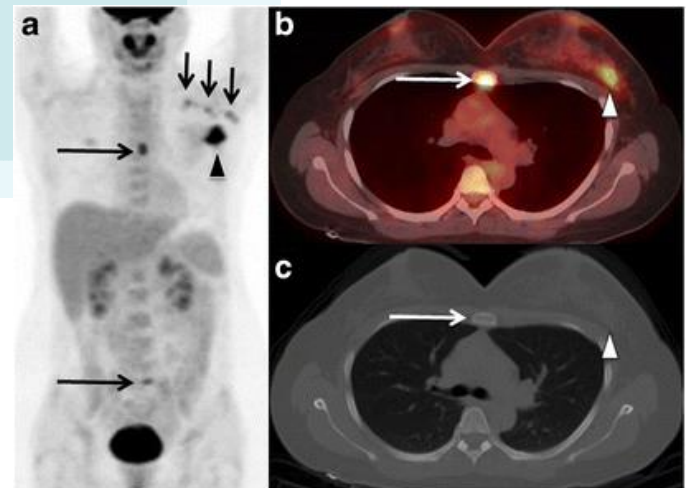
M



Metastasis

M-0: Tested nodes are cancer-free

M-1: Tested nodes show cancer cells or micrometastasis



Dementia staging is based solely on the cognitive and functional abilities of the affected individual



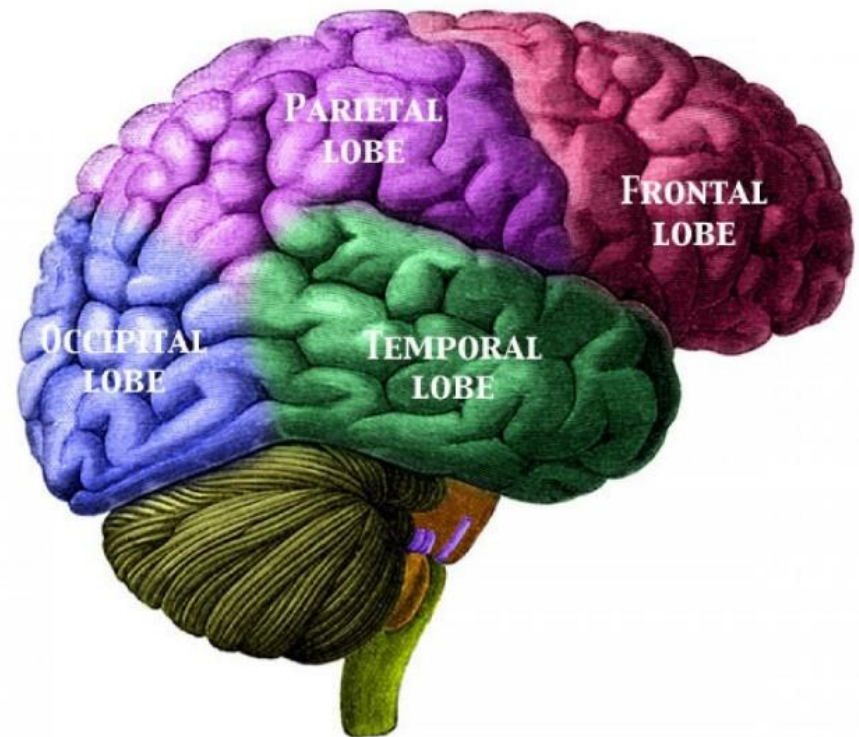
Domains of Cognitive Function: an overview

Cognitive functions

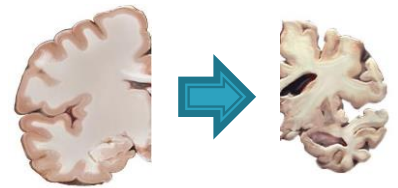
- ▶ Paying attention
- ▶ Multitasking
- ▶ Remembering
- ▶ Speaking/understanding language
- ▶ Spatial skills

Related functions

- ▶ Personality
- ▶ Emotions

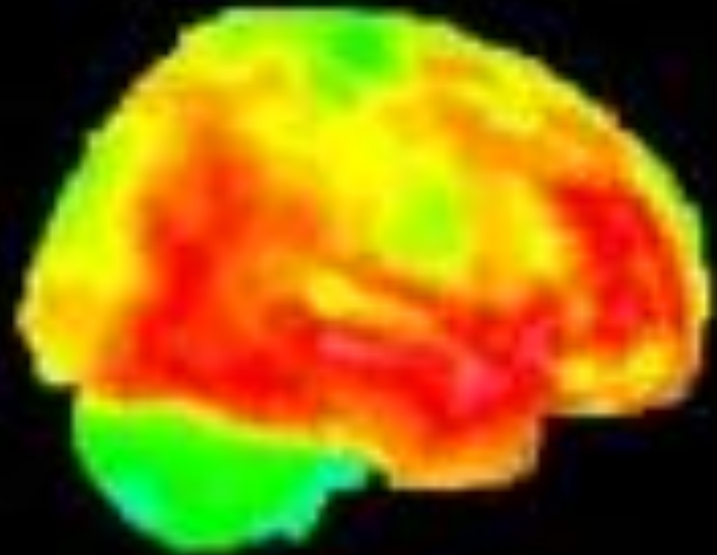
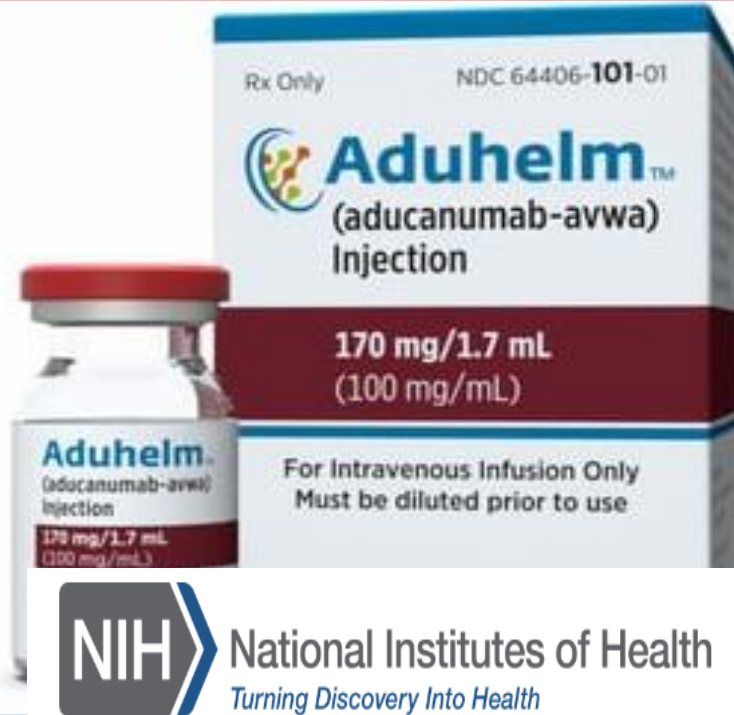


Stages of Dementia



Mild Cognitive
Impairment (MCI)

Early Stage
Dementia



Amyloid-PET

ADVANCED RESEARCH PROJECTS AGENCY FOR HEALTH (ARPA-H)

* Normal Mini-Mental Status (MMSE) score 27–30

Our family's journey



The timeline:

- Diagnosis 2007
- 2007–2008
Mild Cognitive Impairment (MCI)
- 2009–2012
Early Stage AD
- 2013–2014
Middle Stage AD
- 2015–2016
Late Stage AD
- Death 2016

Despite 25 years as a radiation oncologist,
I was not prepared for this ...

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Thank You!
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THE Dementia Care-Partner's Workbook

A Guide for Understanding,
Education, and Hope

A support-group workbook or self-study guide for
care partners of a loved one with Alzheimer's
disease or another form of dementia

Edward G. Shaw, M.D., M.A.

Foreword by Teepa Snow, M.S., O.T.

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KEEPING
LOVE ALIVE
AS
MEMORIES
FADE

*The 5 Love Languages® and
the Alzheimer's Journey*

Deborah Barr, MA • Edward G. Shaw, MD

GARY CHAPMAN, PhD

#1 New York Times bestselling author of *The 5 Love Languages®*

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