

DNA AND ALZHEIMER'S

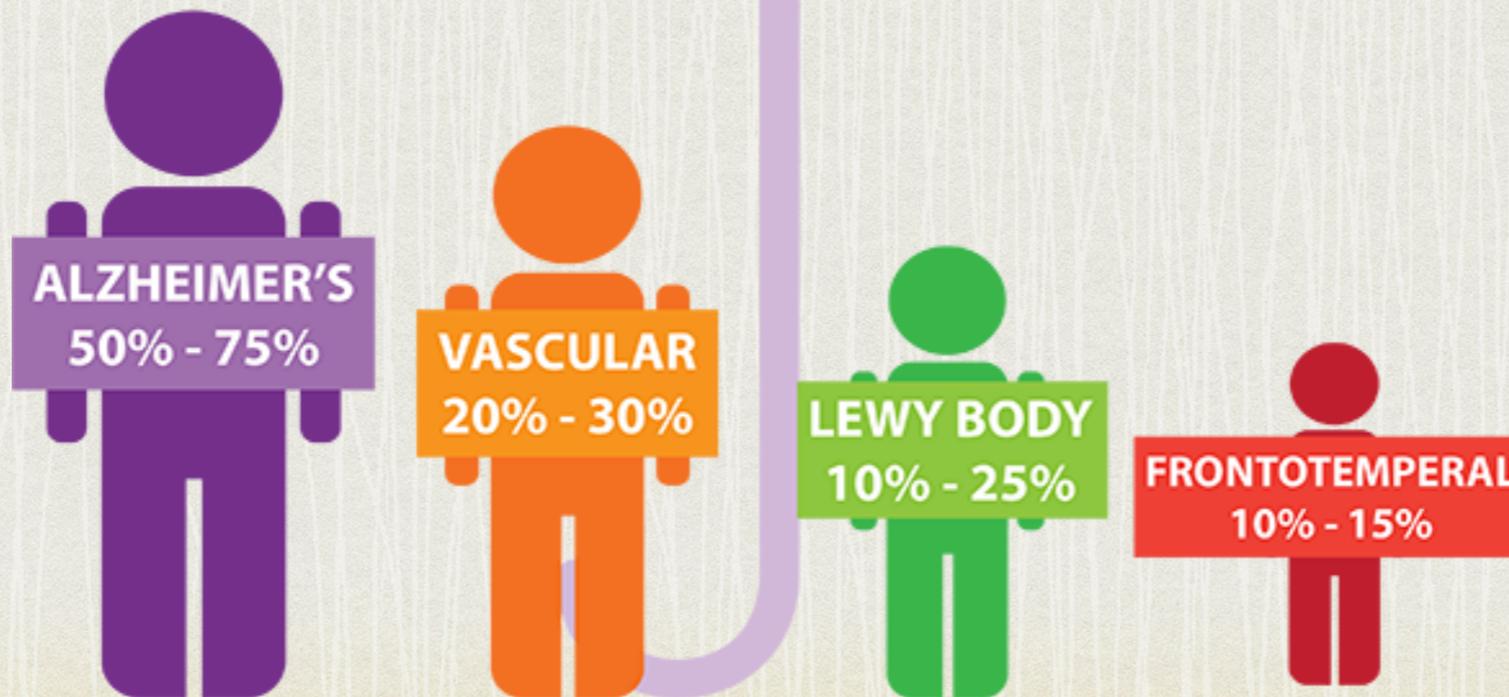
by Lee Macklin

Citrus Heights, California

2019 AHSGR National Convention

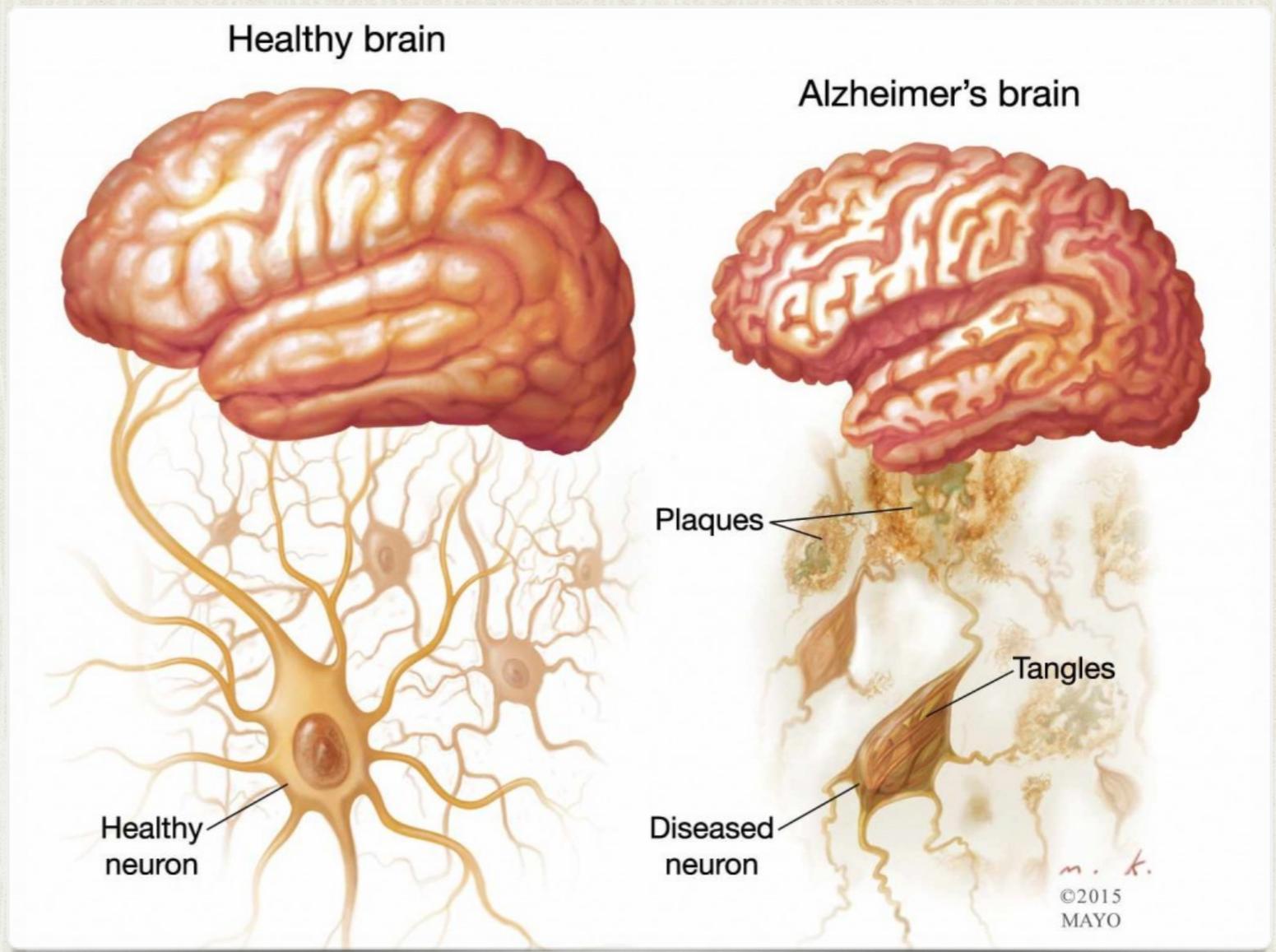
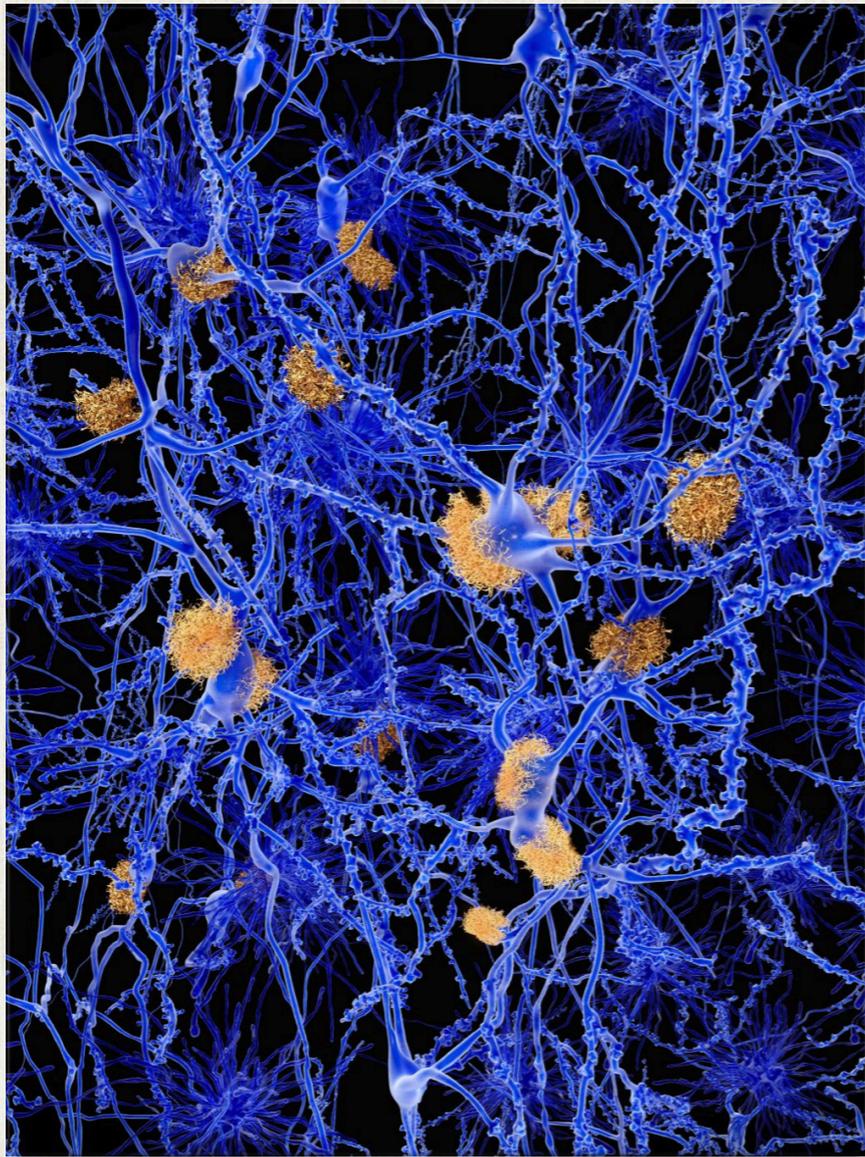
DEMENTIA

An "umbrella" term used to describe a range of symptoms associated with cognitive impairment.



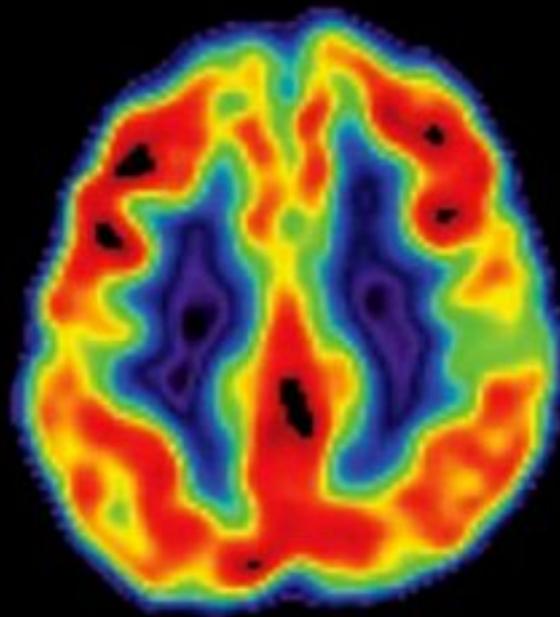
BRAIN FUNCTION DECLINE

Broad Category

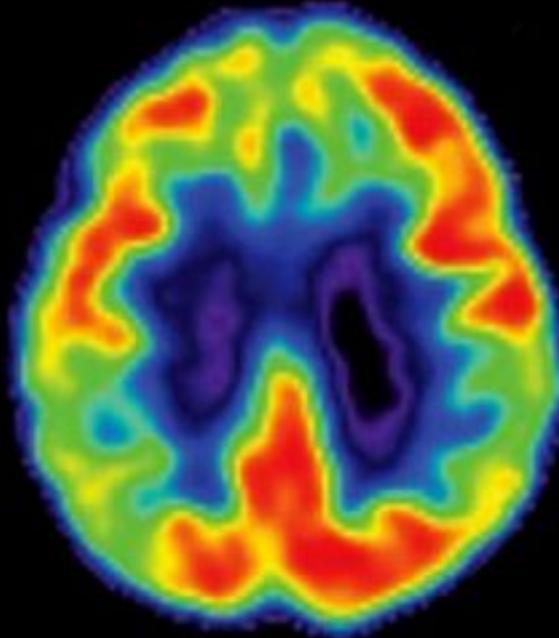


PLACQUES & TANGLES

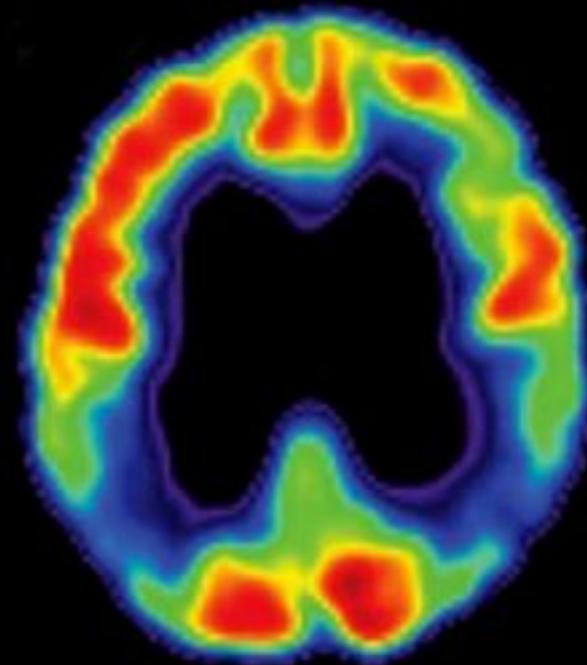
Alzheimer's Key Signature



Normal



Mild cognitive
impairment



Alzheimer's
disease

ALZHEIMER'S PHASES

Cognitive Decline

Mild Cognitive Impairment

Duration: 7 years

Disease begins in Medial Temporal Lobe



*Symptom:
Short-term
memory loss*

Mild Alzheimer's

Duration: 2 years

Disease spreads to Lateral Temporal and Parietal Lobes



*Symptoms include:
Reading problems
Poor object recognition
Poor direction sense*

Moderate Alzheimer's

Duration: 2 years

Disease spreads to Frontal Lobe

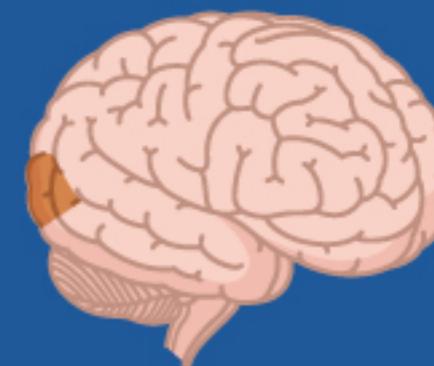


*Symptoms include:
Poor judgment
Impulsivity
Short attention*

Severe Alzheimer's

Duration: 3 years

Disease spreads to Occipital Lobe

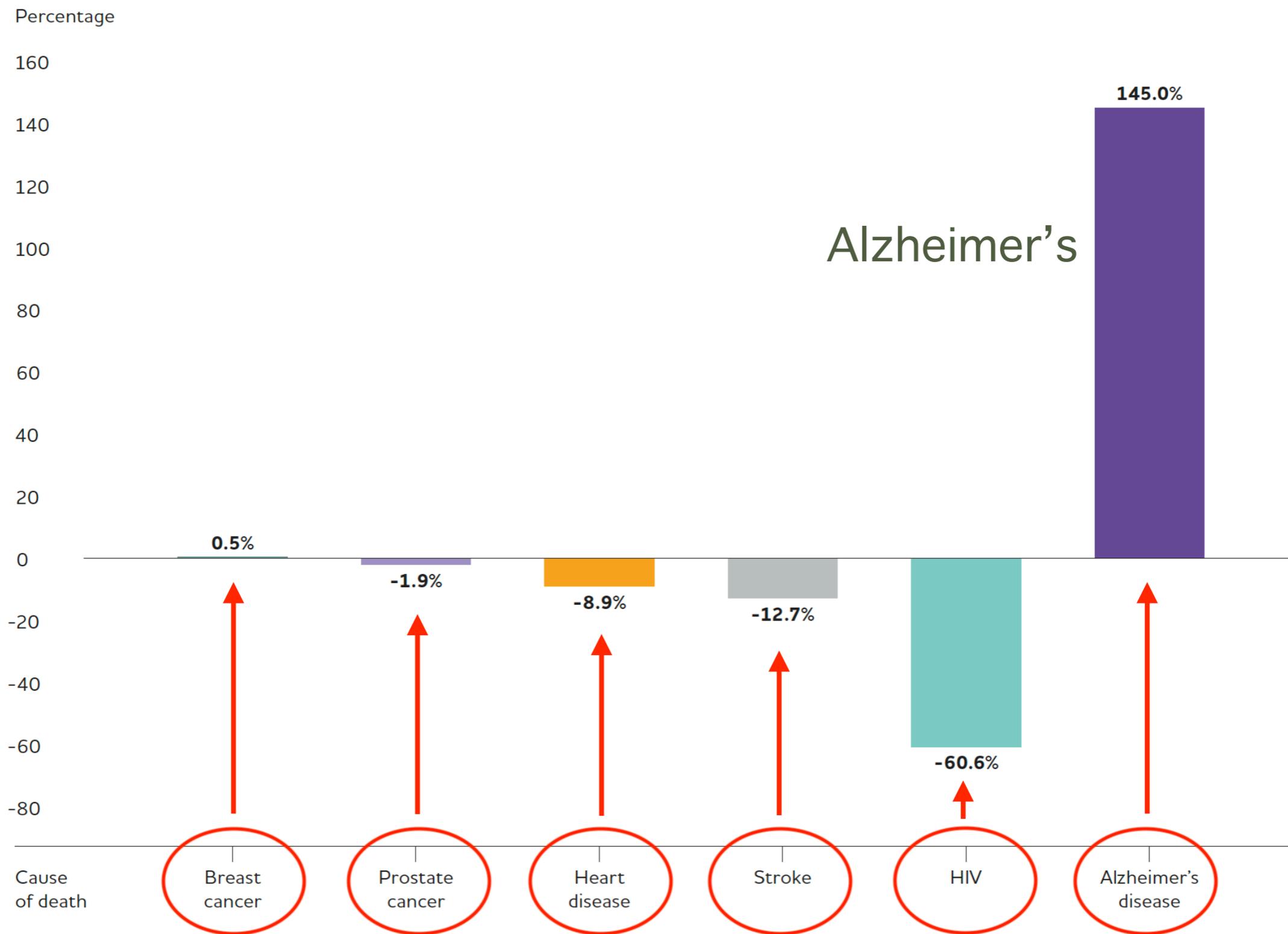


*Symptoms include:
Visual problems*

FIFTH LEADING CAUSE OF DEATH

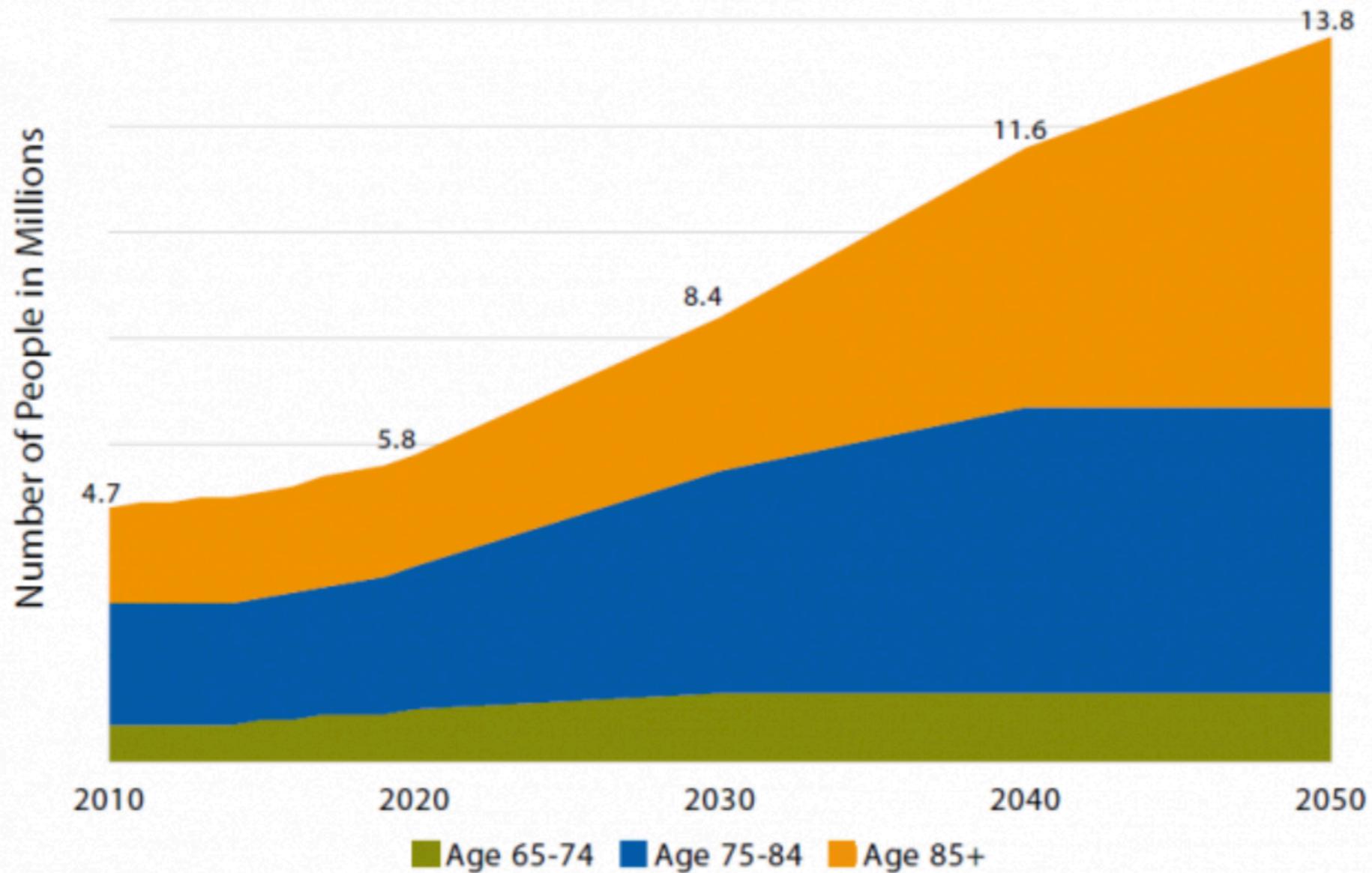
Alzheimer's disease, a type of dementia, is an irreversible progressive brain disease that effects 5.7 million Americans. It is the sixth leading cause of death among all adults and the fifth leading cause for those aged 65 and older. - *Centers for Disease Control*

Percentage Changes in Selected Causes of Death (All Ages) Between 2000 and 2017



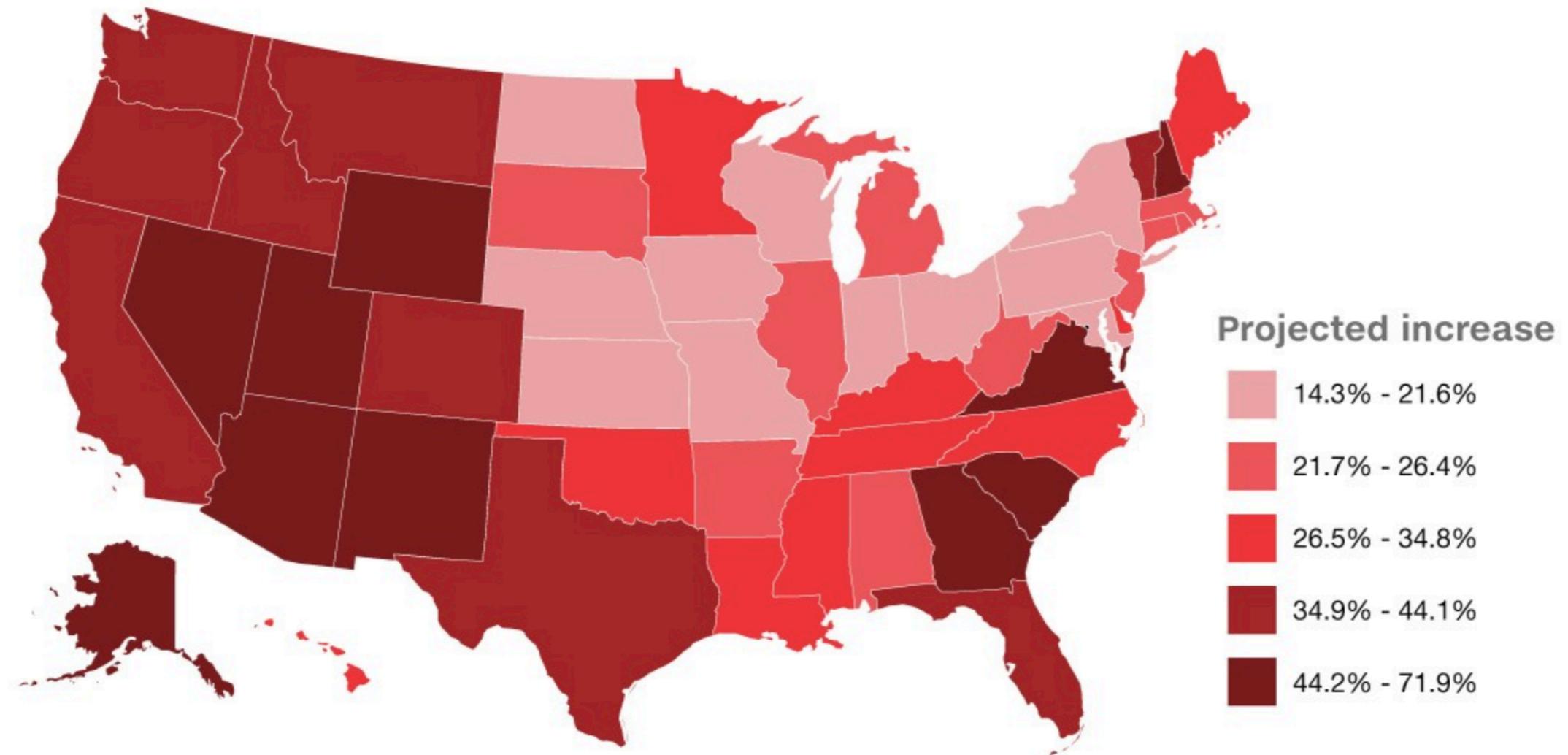
Created from data from the National Center for Health Statistics.^{248,259}

Projected Number of People Aged 65 or Older With Alzheimer's Disease, by Age Group, United States, 2010–2050



Source: Created from data in Hebert LE, Weuve J, Scherr PA, Evans DA. Alzheimer disease in the United States (2010–2050) estimated using the 2010 Census. *Neurology*. 2013;80(19):1778–1783.

PROJECTED RISE IN ALZHEIMER'S CASES BY 2025



SOURCE: Alzheimer's Association

ALZHEIMER'S INCREASING

Growth 14% - 72%

AGE AND RISK FACTORS

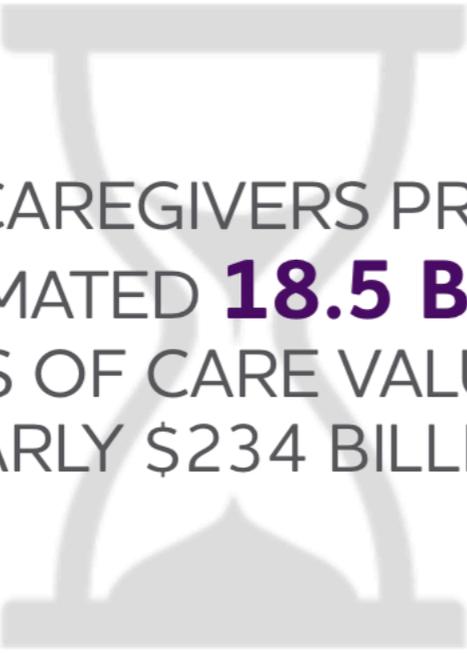
- The **causes of Alzheimer's** disease and other dementias are not completely understood, but researchers believe they include a combination of **genetic, environmental, and lifestyle** factors.
- In more than 90% of people with Alzheimer's, symptoms do not appear until after age 60.
- This risk doubles every 5 years beyond age 65.

ALZHEIMER'S OUTCOMES

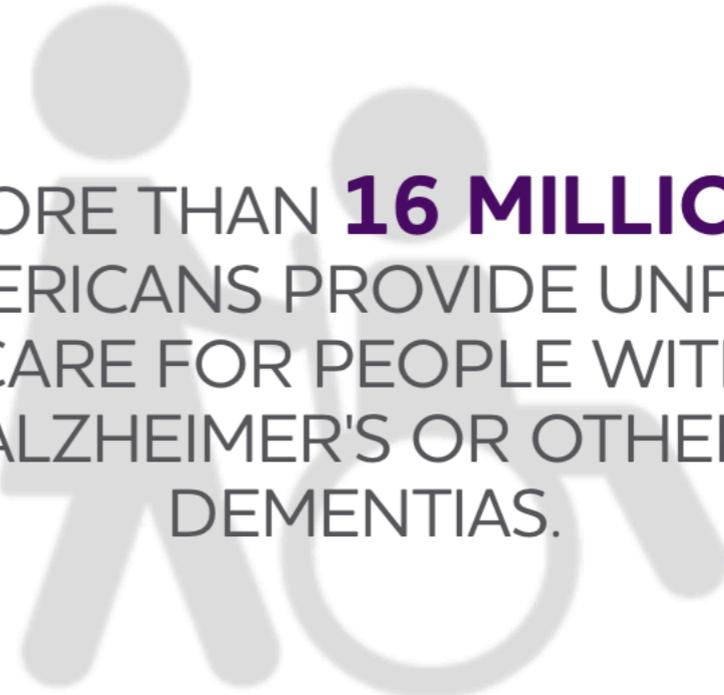
- Alzheimer's disease slowly destroys brain function, leading to cognitive decline(e.g. memory loss, language difficulty, poor executive function), behavioral and psychiatric disorders (e.g. depression, delusions, agitation), and declines in functional status (e.g. ability to engage in activities of daily living and self-care for themselves and to remain independent).

CAREGIVERS HEALTH AND QUALITY OF LIFE

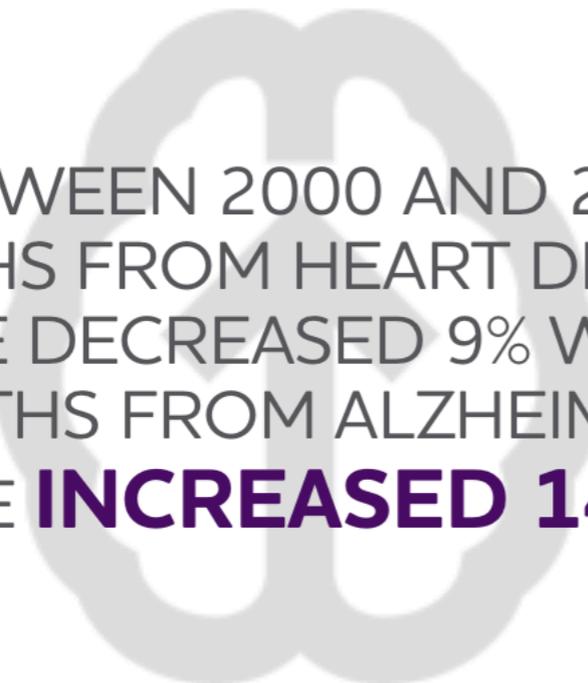
- Given longer life spans and the growing prevalence of conditions like Alzheimer's, the need for caregivers, both informal (i.e. family and friends) and formal (paid professionals), will likely increase significantly as the U.S. population ages.
- Although caregiving may be rewarding, **caregivers are at an increased risk of high stress, depression, unhealthy behaviors, and poor attention to their own health.**



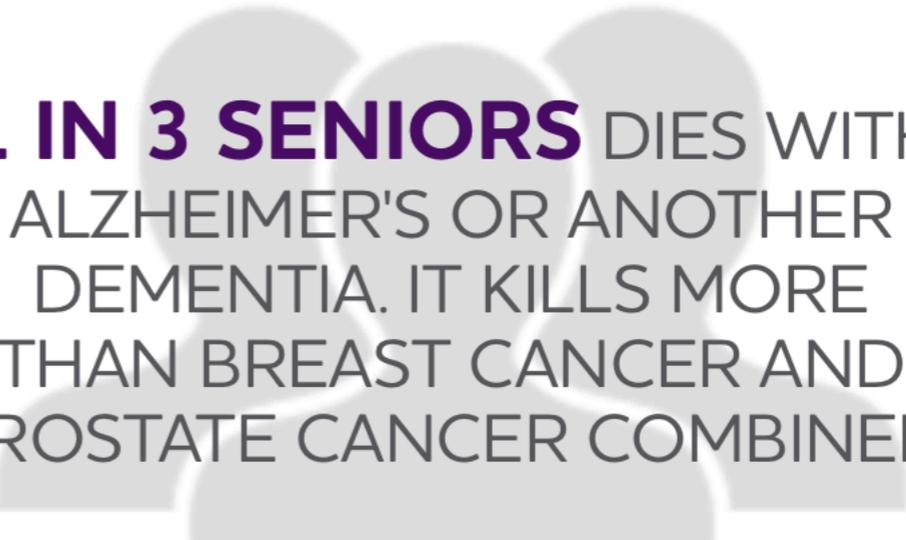
THESE CAREGIVERS PROVIDED AN ESTIMATED **18.5 BILLION** HOURS OF CARE VALUED AT NEARLY \$234 BILLION.



MORE THAN **16 MILLION** AMERICANS PROVIDE UNPAID CARE FOR PEOPLE WITH ALZHEIMER'S OR OTHER DEMENTIAS.



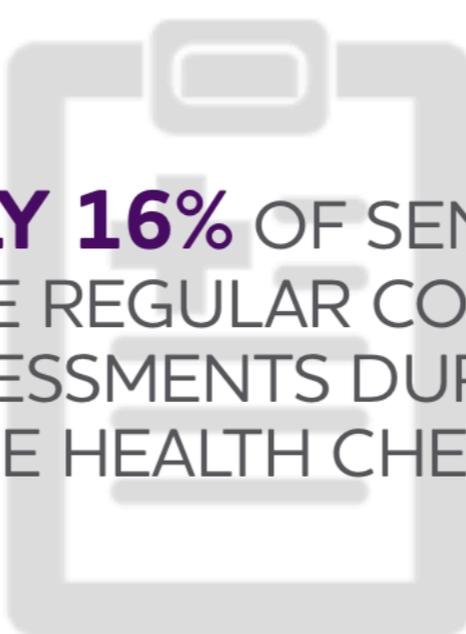
BETWEEN 2000 AND 2017 DEATHS FROM HEART DISEASE HAVE DECREASED 9% WHILE DEATHS FROM ALZHEIMER'S HAVE **INCREASED 145%**.



1 IN 3 SENIORS DIES WITH ALZHEIMER'S OR ANOTHER DEMENTIA. IT KILLS MORE THAN BREAST CANCER AND PROSTATE CANCER COMBINED.

\$350,174

Approximate lifetime cost of care for an individual living with dementia in 2018.



ONLY 16% OF SENIORS
RECEIVE REGULAR COGNITIVE
ASSESSMENTS DURING
ROUTINE HEALTH CHECK-UPS.

THE GREATEST RISKS FACTORS FOR ALZHEIMER'S

- **Age** - people over 65. Women are more at risk (21% vs 12%)
- **Family history**
- **Genetic** scientists have mapped about 23,000 DNA genes. The APOE gene is the primary gene associated with Alzheimer's.
- **Unhealthy lifestyle** and other medical conditions.

FAMILY HISTORY RISK

- Individuals who have a **parent, brother or sister** with Alzheimer's are more likely to develop the disease than those that do not have a first-degree relative with Alzheimer's.
- If more than one **close family member** has Alzheimers, then the risk is even higher.

GENETIC RISK

APOE GENE E₄ VARIANT

- The APOE gene provides the blueprint for the creation a protein that transports cholesterol in the bloodstream. Everyone inherits one of three variants, e2, e3, or e4 from **EACH** parent (so six possible combinations).
- Those inheriting one copy of the APOE e4 have a three times greater risk of developing Alzheimers. While **those with two copies have a 8 - 12 times the risk.** (e.g. you inherited an e4 copy from **both** parents)

BIOMARKERS

- Biomarkers for Alzheimer's are the amounts of **beta-amyloid** and abnormal **tau** in the brain as shown in PET scan, or particular groups of proteins in blood.
- **Beta-Amyloid proteins** are believed to cause “**plaques**” which choke brain neurons.
- “**tangles**” are **tau proteins** that go awry inside the neurons.

CARDIOVASCULAR RISK FACTORS

- Many factors that increase the risk of cardiovascular disease are also associated with a higher risk of dementia.
- Main risk factors are: smoking, diabetes, obesity, high blood pressure, and high cholesterol.

CARDIOVASCULAR DISEASE RISK

- **Brain health is affected by the health of the heart and blood vessels.** Although it makes up only 2% of body weight, the brain consumes 20% of the body's oxygen and energy supplies.
- A healthy heart ensures that enough blood is pumped to the brain, while healthy blood vessels enable the oxygen- and nutrients-rich blood to reach the brain so it can function normally.

SO, WHAT CAN WE DO?

- Age, Family History, DNA/Genetics (we can't do anything about these things)
- Medical treatment to **lower blood pressure** also significantly reduces the occurrence of MCI (Mild Cognitive Impairment).
- Increased **physical activity** and eating a **healthy diet** are major factors in reducing dementia risk.

A HEALTHY DIET

- A **heart-healthy diet** emphasizes fruits, vegetables, whole grains, fish, chicken, nuts, and legumes while limiting saturated fats, red meat, and sugar.
- **Avoid processed foods**, sodas, and reduce salt intake.

LEWY BODY DISEASE

- Lewy Bodies are abnormal aggregations of the protein alpha-synuclein in neurons. When they develop in the cortex area of the brain, dementia can result.
- Symptoms are sleep disturbances, well-formed hallucinations, slowness, gait imbalance, and other Parkinson movement issues.
- Most people with Lewy Body Disease also have Alzheimer's.

PARKINSON'S DISEASE

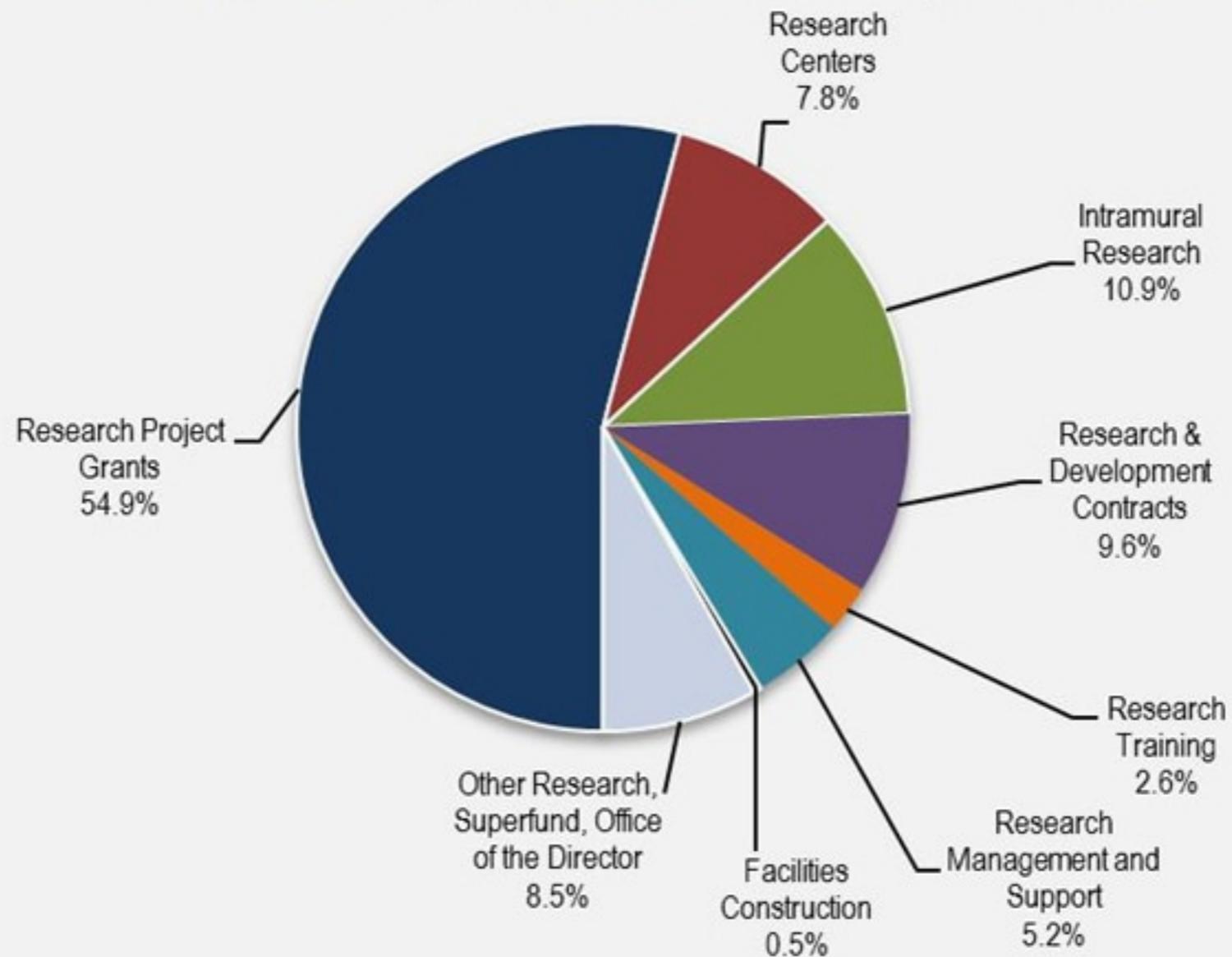
- Problems with movement (slowness, rigidity, tremors, and changes in gait) are common symptoms of Parkinson's.
- In Parkinson's, alpha-synuclein protein clusters appear deep in the brain and are thought to cause degeneration of the nerve cells that produce dopamine.
- As Parkinson's progresses, the accumulation of Alzheimer's beta-amyloid clumps and tau tangles appear.

DOWN SYNDROME

- In Down Syndrome, a person is born with 3 copies of chromosome 21 instead of two (one from each parent).
- People with Down Syndrome are at much higher risk of developing Alzheimer's at an early age - usually by age 40.
- The extra copy of chromosome 21 is believed to increase the production of the beta-amyloid fragments (plaques).

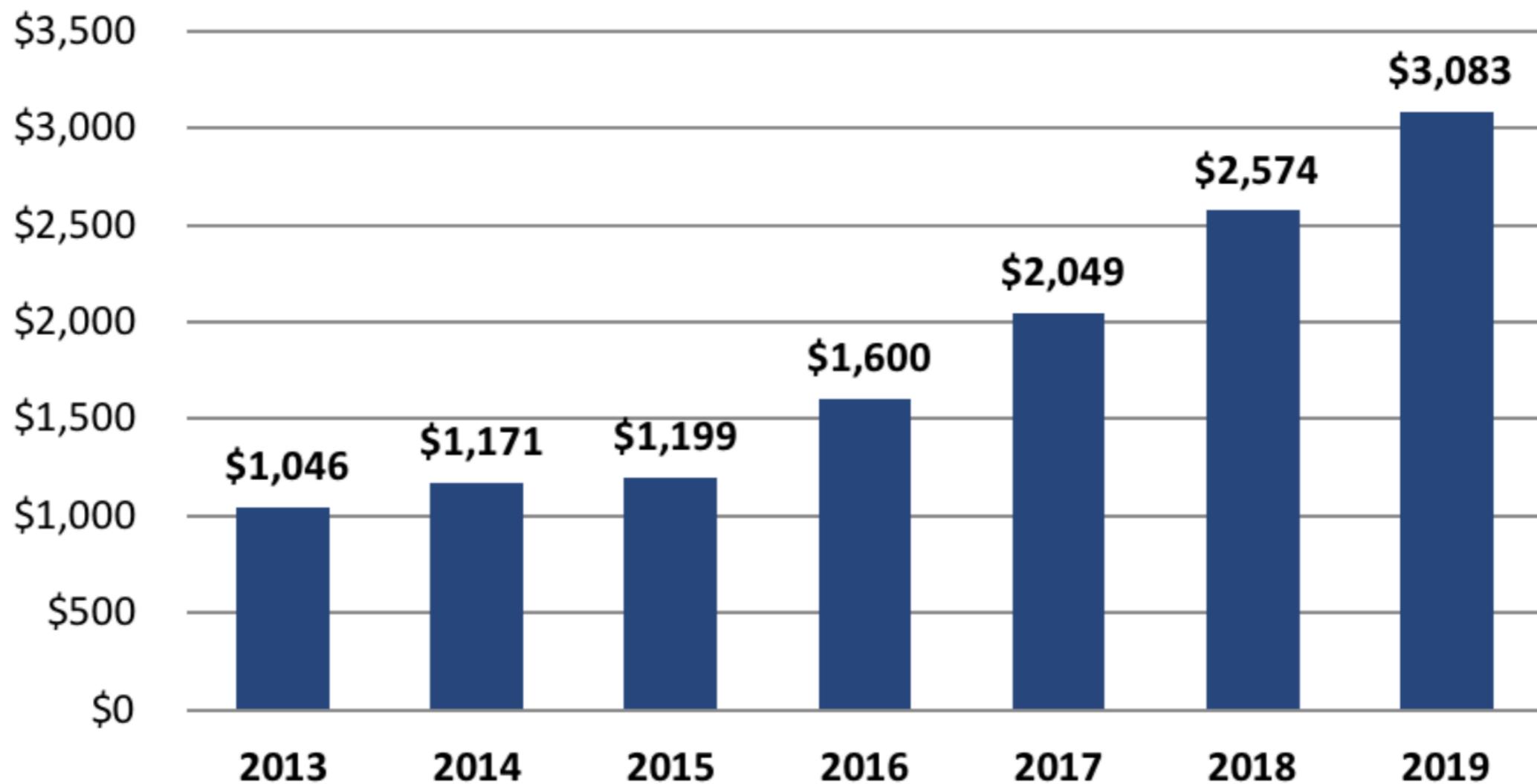
NIH RESEARCH FUNDING

FY 2017 NIH Budget
\$33.1 Billion – Estimated Percent Total by Mechanism



NIH ALZHEIMER'S FUNDING INCREASING

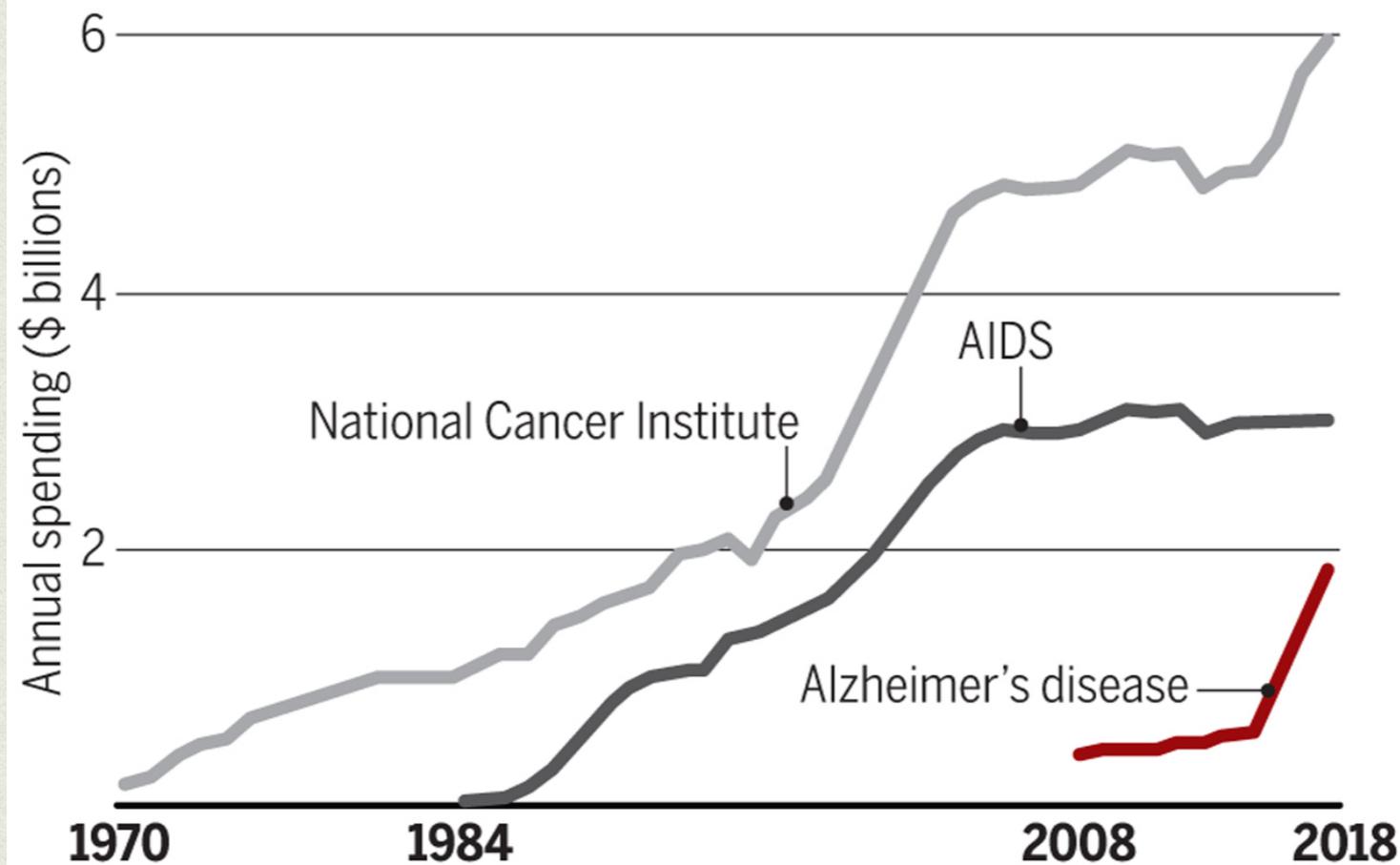
**NIA Appropriations
Fiscal Years 2013-2019
(Dollars in millions)**



NIH FUNDING TOP THREE

Catching up

The National Institutes of Health (NIH) has dramatically ramped up funding for only three specific disease priorities: cancer, AIDS, and, most recently, Alzheimer's.



*Alzheimer's disease funding, which NIH began to track in 2008, does not include related dementias.

PRIVATE FUNDING BILL GATES - \$100M/YR



ALZHEIMER'S TREATMENTS PHARMACOLOGY (DRUGS)

- **None of today's medications will stop** the damage and destruction of neurons that make Alzheimer's fatal.
- However, many research projects are underway: [Ongoing Alzheimer's and Related Clinical Trials and Studies](#)
- From 1998 - 2017 there have been **146 unsuccessful attempts** at developing drugs stop or cure Alzheimer's.
- This includes Pfizer, Johnson & Johnson, Eli Lilly, Merck, Roche, Biogen, and many others.

BIOGEN HALTS CLINICAL TRIAL

MARCH 23, 2019

CNBC SIGN IN PRO WATCHLIST MAKE IT ↗ SEARCH QUOTES 🔍

MARKETS BUSINESS INVESTING TECH POLITICS CNBC TV USA · INTL

Up met with Google CEO Sundar Pichai about 'political...'
Elon Musk just sent another email to employees about Tesla's...
The big interest rate slide is likely not over
Lululemon shares soar 9% as strong holiday sales fuel earnings...
DOT's watchdog safety oversight

Department for International Trade
invest.great.gov.uk
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HEALTH AND SCIENCE

Failed Alzheimer's trial leaves families and patients heartbroken. Medical community reels

PUBLISHED SAT, MAR 23 2019 • 12:24 PM EDT | UPDATED SAT, MAR 23 2019 • 3:38 PM EDT

Angelica LaVito @ANGELICALAVITO
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SHARE     

NEW BIOMARKER

- <https://www.alzinfo.org/articles/research/scientists-get-a-total-surprise-and-a-promising-new-clue-for-how-to-cure-alzheimers/>
- **Fisher Center for Alzheimer's** has recently discovered a new biomarker "**C99**" which is the precursor to beta-amyloid. In the DNA-to-protein process, **C99 is created first and then becomes beta-amyloid.**
- This is very significant as scientist and pharmacology companies can now focus their efforts on targeting C99 instead of beta-amyloid directly.

NEW BIOMARKER

“The hippocampus is one of the first areas to degenerate in Alzheimer’s disease, and we observed an early accumulation of C99 in the hippocampus.

Later, after the hippocampus has degenerated, the frontal cortex starts to degenerate. We observed the same pattern. There was secondary accumulation of C99 in the frontal cortex.”

- *Fisher Center for Alzheimers*

ALZHEIMER'S TREATMENTS PHARMACOLOGY

- The FDA has approved 4 Alzheimer's drugs: 3 temporally improve symptoms by increasing the number of neurotransmitters in the brain. The 4th drug blocks receptors from excessive stimulation and nerve cell damage.
- The effectiveness of these drugs varies and all are limited in duration.

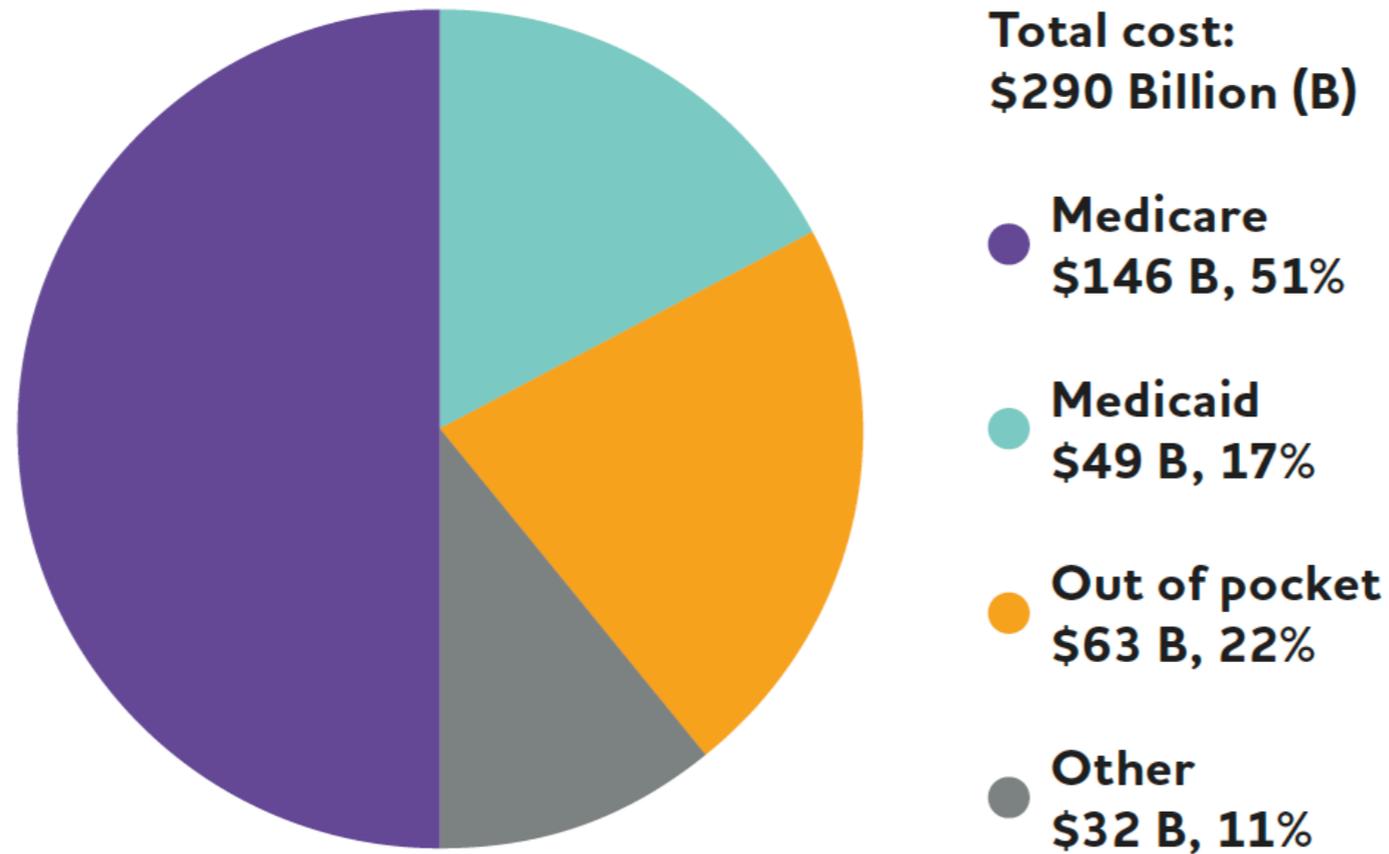
ALZHEIMER'S TREATMENTS

NON-PHARMACOLOGY THERAPY

- **These therapies do not involve medications.** They have the goal of maintaining and improving cognitive function, and the ability to perform activities of daily living or overall quality of life.
- They may also be used to reduce behavioral symptoms such as depression, apathy, wandering, sleep disturbances, agitation and aggression.

WHO PAYS THE EST. 2019 COST OF ALZHEIMER'S?

Distribution of Aggregate Costs of Care by Payment Source for Americans Age 65 and Older with Alzheimer's or Other Dementias, 2019*



*Data are in 2019 dollars.

ALZHEIMER'S LINKS

National Institutes of Health - <https://www.nih.gov>

NIH - National Institute on Aging - <https://www.nia.nih.gov>

Alzheimer's Association - **Facts and Figures** (90 page PDF)

<https://www.alz.org/media/Documents/alzheimers-facts-and-figures-2019-r.pdf>

Alzheimer's Association - **Milestones**

https://www.alz.org/alzheimers-dementia/research_progress/milestones

Fisher Center for Alzheimer's - <https://www.alzinfo.org/articles/research/scientists-get-a-total-surprise-and-a-promising-new-clue-for-how-to-cure-alzheimers/>

OTHER ALZHEIMER'S LINKS

Harvard University- Alzheimer's

<https://www.health.harvard.edu/topics/alzheimers-and-dementia>

Stanford University - Alzheimer's Research Center

<http://med.stanford.edu/adrc.html>

Mayo Clinic

<https://www.mayoclinic.org/diseases-conditions/alzheimers-disease/symptoms-causes/syc-20350447>

“The first Alzheimer’s survivor is out there.”

-Alzheimer’s Association

Presentation by Lee Macklin

Citrus Heights, California

lmacklin@comcast.net

You can view, print, or download this presentation at:

<https://svcgr.org> (scroll down to the National Convention Presentations section on the Home page)

A DIFFERENT APPROACH

This company is taking a new, different approach to attacking Alzheimers. This 10 minute YouTube video explains the details.

[Brain Chemistry Labs](#)