



# Welcome to the *Your Health Lecture Series!*

## Tonight's Lecture: Exploring the Latest in Alzheimer's and Dementia Care

Event Begins @ 6:30pm

Moderator: Dr. Jean Nagelkerk  
Vice Provost for Health  
Grand Valley State University

# *Special Thanks!*

alzheimer's  association®

GREATER MICHIGAN CHAPTER



**Rethinking Dementia**

Accelerating Change



*The Source for Seniors*



**SPECTRUM HEALTH**  
**NEUROSCIENCES**

# Mary McPhail-Ciufo, DO

Section Chief Behavioral Neurology  
Division of Clinical Neuroscience  
MSU College of Human Medicine



## Tonight's focus areas:

- Alzheimer's disease overview
- The difference between dementia and healthy brain aging
- Treatment, prevention and research

# Nicholas Kanaan, PhD

Associate Professor

Department of Translational Neuroscience

MSU College of Human Medicine



## Tonight's focus areas:

- The latest Alzheimer's disease research
- Alzheimer's diagnosis and medical interventions



# Rebecca Davis, PhD, RN

Associate Dean for Research and Scholarship

Professor

Kirkhof College of Nursing

Grand Valley State University



## Tonight's focus areas:

- Caregiving and the impact on families/caregivers
- Interventions
- The future of Alzheimer's

# Alzheimer's Disease, Dementia, and Healthy Brain Aging

Mary McPhail-Ciufo, DO  
Section Chief Behavioral Neurology  
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# An overview for today's talk

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*The complicated 7 questions I'm asked all the time...*

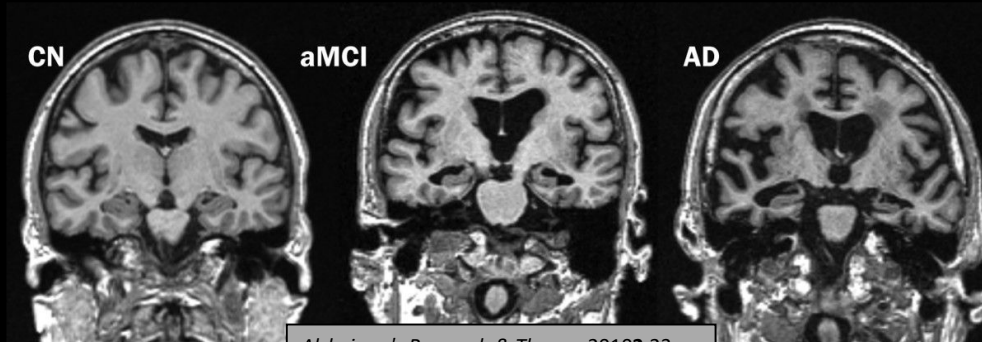
- ▶ What is Alzheimer's Disease?
- ▶ What's the difference between Alzheimer's Disease and Dementia?
- ▶ What is the difference between Alzheimer's Disease and Normal Aging?
- ▶ How do I know if my memory loss is Alzheimer's or Normal Aging?
- ▶ What are the current treatments?
- ▶ What can I do to prevent it?
- ▶ What about research?



Healthy Brain    Severe Alzheimer's



Images above from National Institute of Aging

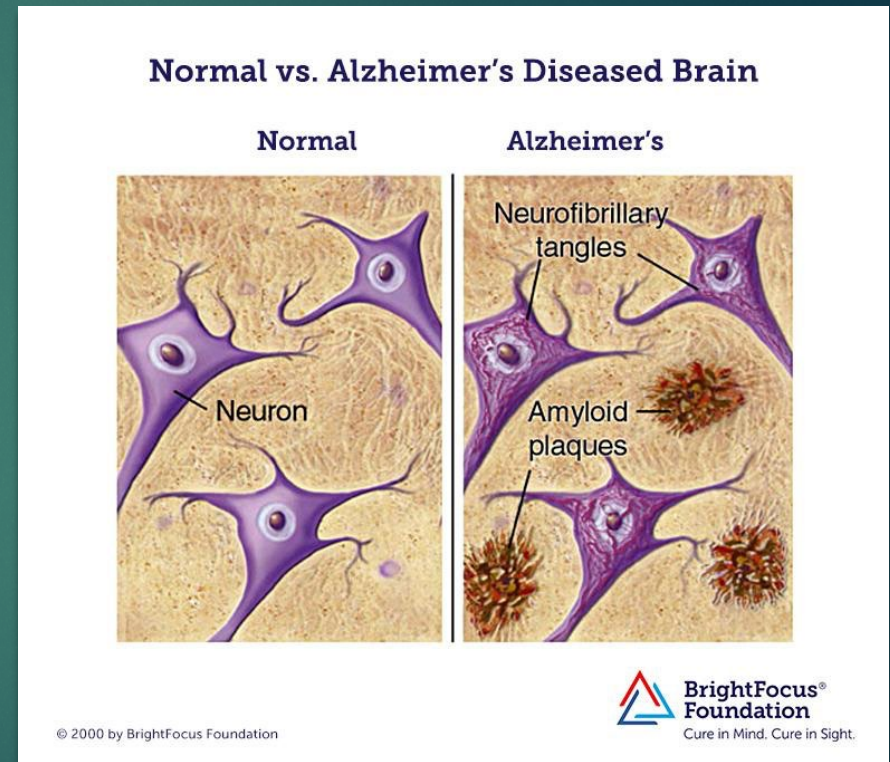


*Alzheimer's Research & Therapy* 2010;2:23  
Role of Structural MRI in Alzheimer's Disease  
Clifford Jack Jr et. al  
<https://doi.org/10.1186/alzrt47>  
© BioMed Central Ltd 2010

# What is Alzheimer's Disease?

# Plaques & Tangles

- ▶ Alzheimer's disease consist of abnormal proteins that are occurring inside and between the cells of the brain
- ▶ We call these abnormal proteins "Plaques and Tangles"
- ▶ So, what's the difference between Alzheimer's disease and Dementia?





# What's the difference?

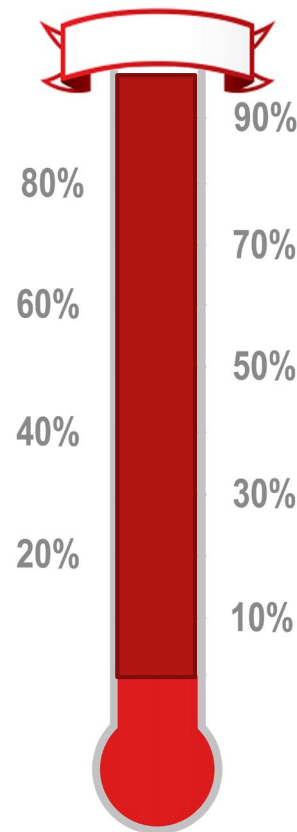
- ▶ Dementia is defined as the impairment of thinking along with the loss of independent everyday functioning.
- ▶ Tasks that we typically perform everyday independently are tasks like driving, balancing a checkbook, cooking a meal on the stove, and performing our jobs at work.
- ▶ Dementia only defines the STAGE of impairment a person has. It does not define the WHAT or WHY a person has Dementia.
- ▶ I like to think of the stages of brain functioning as being like the dollars in a piggy bank
- ▶ I consider Alzheimer's disease to be like a thief who takes \$10 dollars or more from your piggy bank every year



"I'll be needing one of your legs as well!"

# A Healthy Brain is a Healthy account

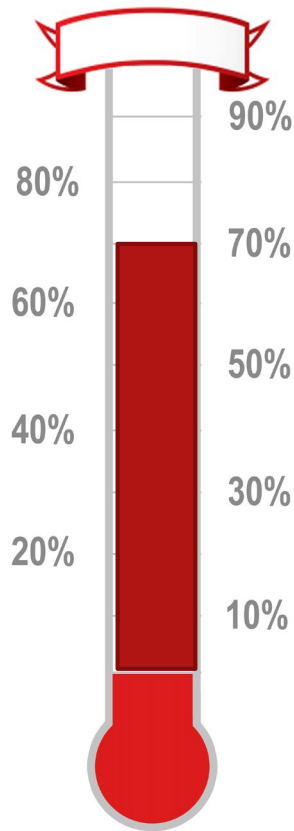
- ▶ We are functioning independently
- ▶ We have very few to no complaints about our thinking
- ▶ Those we live with and work with have not noticed any change in our personalities, mood, or ability to think



- Piggy bank is full
- \$100 is in your account.
- You have money to buy items you need

# Mild Cognitive Impairment

- ▶ Our piggy bank is less than what we had before but it is still enough for what we need everyday
- ▶ Our friends, family, and doctors may have noticed a change.
- ▶ Our piggy bank is at risk of being drained to zero if something should happen.
  - ▶ An example of something sudden to our brain account would be a stroke.
  - ▶ If this piggy bank has a thief stealing money, then it is very likely our piggy bank will continue to dwindle down.

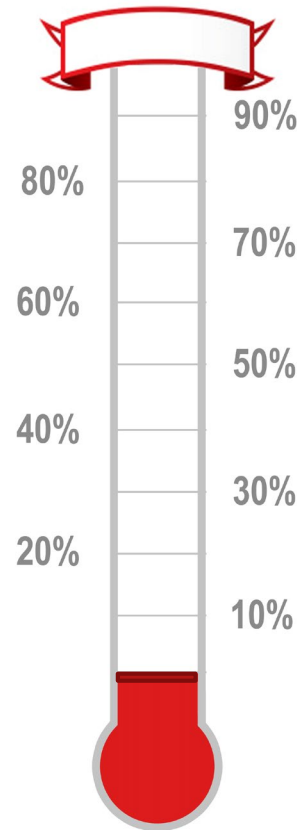


- \$70 is in your account.
- You still have money for buying items.
- **We are going to be more careful with our money now**
- We can't predict sudden purchases like having to buy a new car; but **we can try to prevent them**
- **Thieves, are tricky. We can't always know** for sure if they are there and how much they are taking each year.

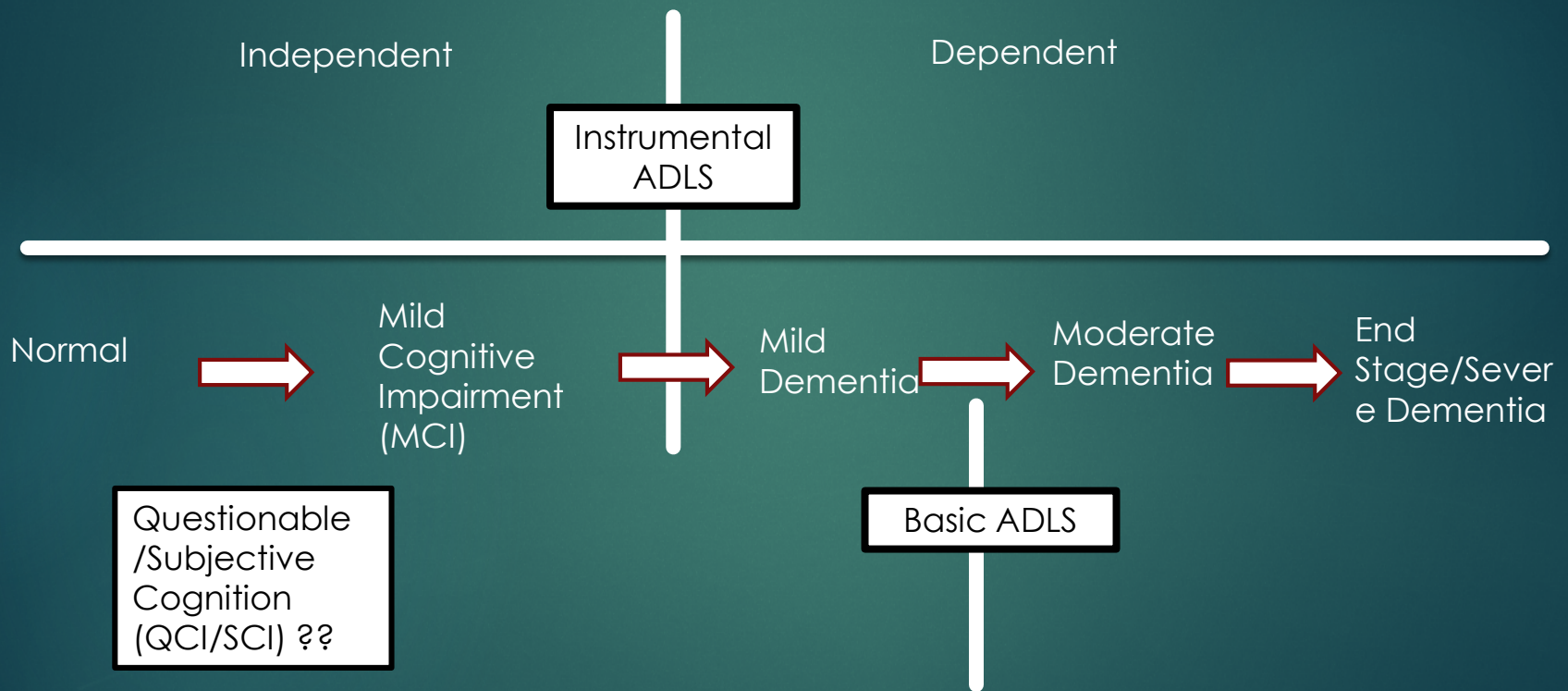


# Dementia

- We have no money left for our everyday needs in our piggybank
- **This is “brain failure”**
- There is hope however.
- **All dementias are treatable to a degree** although there is no cure for progressive reasons...yet
- Some treatments we have will be like adding money to our piggy bank



# The stages of cognition



# Causes of Dementia

- ▶ Alzheimer's disease is just ONE reason why a person might be impaired enough in their thinking to have loss of independence in these tasks.
- ▶ In other words, Alzheimer's disease is just ONE reason why a person may have Dementia.
- ▶ There are many other reasons why a person might be impaired enough to have Dementia.
- ▶ For example, they may have had several strokes or may have a progressive neurodegenerative diseases such as Lewy body disease.





# What is normal aging then?

Normal aging	vs	Alzheimer's
Making bad decisions once in a while	vs	Making poor judgements and decisions a lot of the time
Losing things from time to time	vs	Misplacing things often and being unable to find them
Missing a payment	vs	Problems taking care of monthly bills
Forgetting which day it is and remembering later	vs	Losing track of the date or year
Sometimes forgetting which words to use	vs	Trouble having a conversation

# How do I know what I have?

- ▶ Establish a relationship with a Primary Care Doctor (PCP) who will..
  - ▶ Help you and your family lead a healthier life
  - ▶ Help Identify Problems
  - ▶ Help manage chronic conditions
- ▶ Part of a memory evaluation from a PCP will include a basic gathering of history and may also include a bedside cognitive screener. Based on the history and the bedside testing. Your PCP may perform the following:
  - ▶ Refer to a Neurologist
  - ▶ Refer to Neuropsychology for more in-depth testing
  - ▶ Check labs that are important for our brain
  - ▶ Order imaging of the brain
  - ▶ Order a sleep study

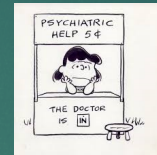
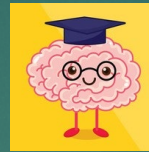
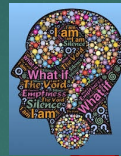
**SPECTRUM HEALTH**

Find a Doctor





# Your primary care doctor is the team captain of your healthcare!



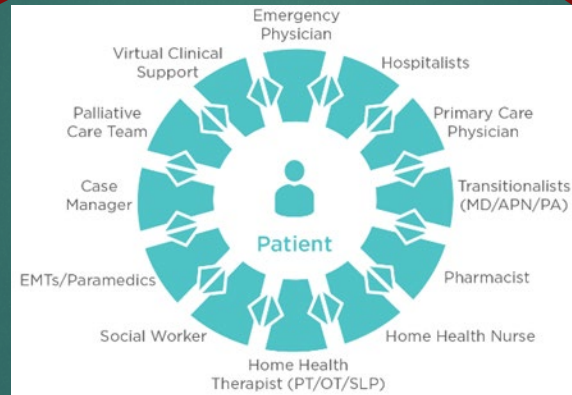
- Neurology
- Psychiatry
- Neuropsychology
- Psychology (talk therapy)

The "Brain Trust"



## Community Partners

- Education
- There for help to access social resources (e.g. caregiving)



- Primary Care Providers
- Will need regular follow up
- Incredibly important

# What are current treatments for Alzheimer's?

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- ▶ Medications that will help the chemical nature of the brain so that healthy cells may operate better to compensate for sick cells
  - ▶ Donepezil and Memantine are two common medications used
- ▶ Supportive care
- ▶ Unfortunately, there is no cure for Alzheimer's

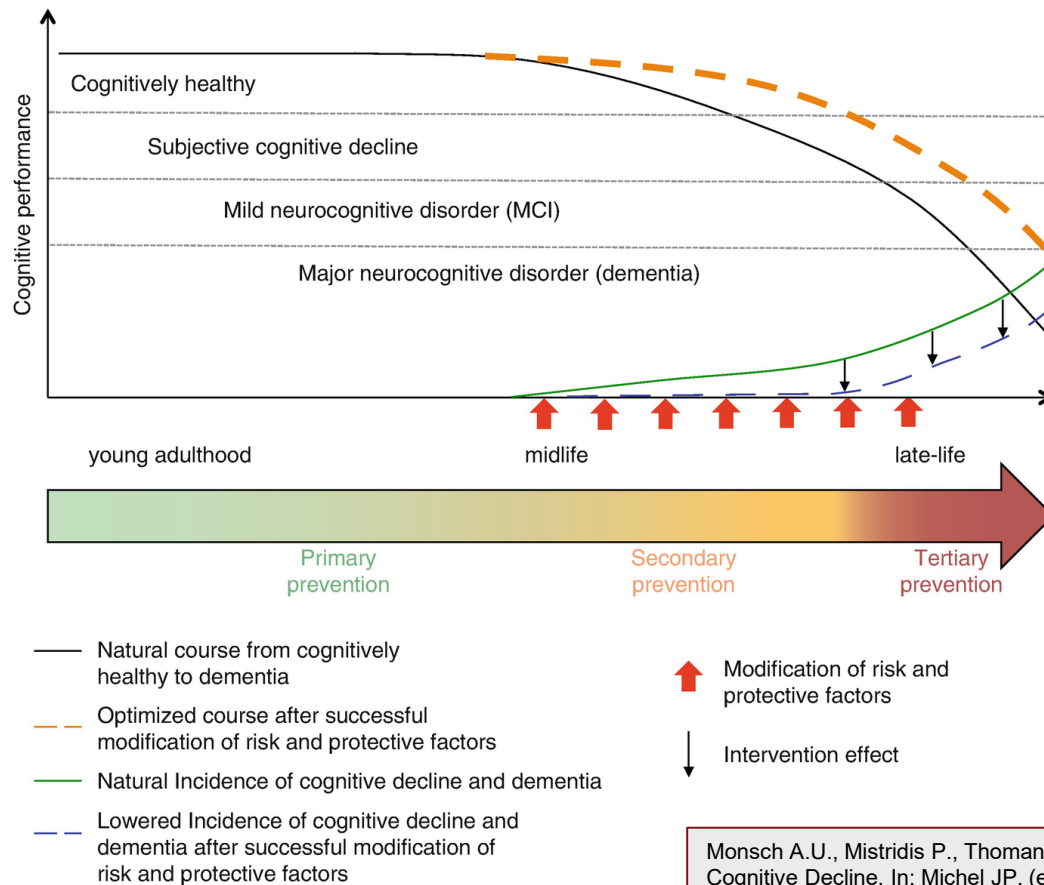


# So what's the big picture here?

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- ▶ Screen early
- ▶ Intervene earlier
- ▶ Whole person care
- ▶ Integrated multidisciplinary teams
- ▶ Integration into the community
- ▶ Hope





Monsch A.U., Mistrdis P., Thomann A. (2019) Postponing Cognitive Decline. In: Michel J.P. (eds) Prevention of Chronic Diseases and Age-Related Disability. Practical Issues in Geriatrics. Springer, Cham



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So what can I do to prevent it?



# Life's Simple 7

- ▶ Don't smoke
- ▶ Watch your weight
- ▶ Eat a healthy diet
- ▶ Exercise
- ▶ Control your blood pressure
- ▶ Control your blood sugar
- ▶ Control your cholesterol



# And an extra “7” I like to stress!

- ▶ Wear a helmet
- ▶ Reduce Falls (use your cane/walker/take a minute to stand up)
- ▶ Identify & Treat depression/anxiety
- ▶ Identify and treat Sleep problems such as Sleep Apnea
- ▶ Be a lifelong learner –Challenge yourself and seek novelty
- ▶ Stay social
- ▶ Love



Dr. Marian Diamond



# Social Needs and further Education

## ▶ Alzheimer's

- ▶ Alzheimer's Association: 24/7 Helpline [800.272.3900](tel:800.272.3900)
- ▶ For patients, families, and even your doctors!
- ▶ 24-7 Really? Yes Really!
  - ▶ (I called them at 3AM prepping for a conference once)

alzheimer's  association®

## ▶ Parkinson's Disease/Lewy Body Disease/atypical parkinsonism (PSP/CGBD/MSA)

- ▶ Parkinson's Disease Foundation: 1.800.4PD.INFO (1-800-473-4636)
- ▶ LBD Caregiver Link: 800.539.9767

## ▶ Stroke

- ▶ American Heart Association And American Stroke Association
- ▶ 1-800-AHA-USA-1

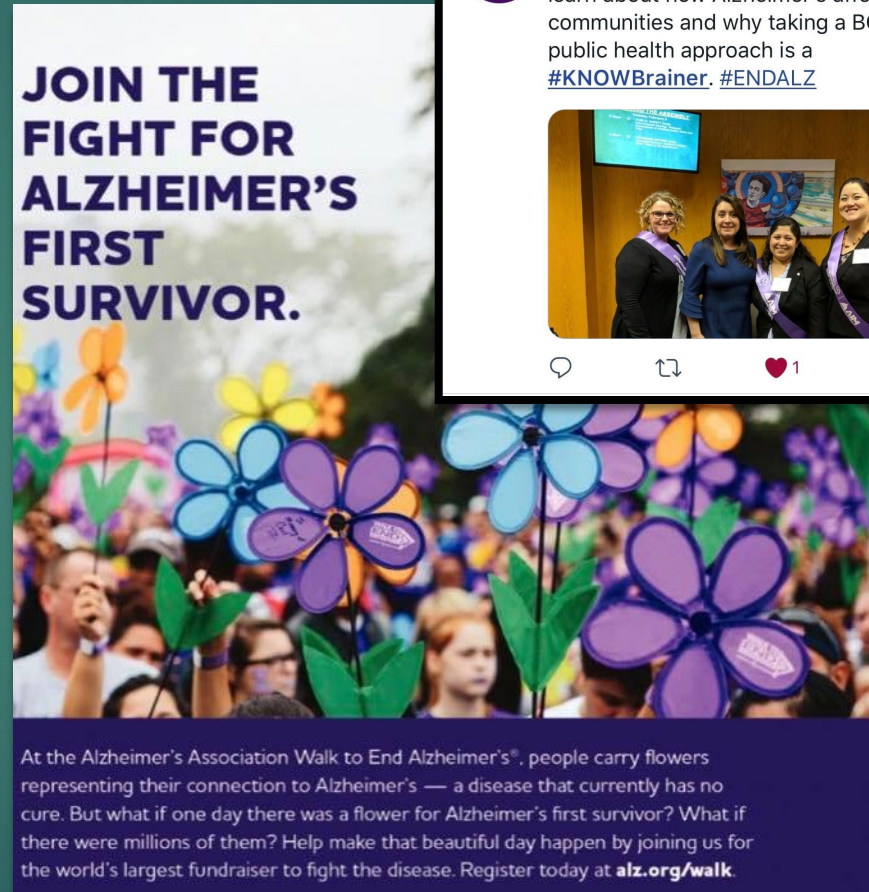
## ▶ Frontal temporal Disease: 1-866-507-7222



# Further questions?

- ▶ We are a team. You're the most important member on the team. You are not alone.
- ▶ If you want to advocate for the bigger picture (e.g. changing Laws, funding research). Let the Alzheimer's Association know.

Thank you for your time listening!



**JOIN THE FIGHT FOR ALZHEIMER'S FIRST SURVIVOR.**

At the Alzheimer's Association Walk to End Alzheimer's®, people carry flowers representing their connection to Alzheimer's — a disease that currently has no cure. But what if one day there was a flower for Alzheimer's first survivor? What if there were millions of them? Help make that beautiful day happen by joining us for the world's largest fundraiser to fight the disease. Register today at [alz.org/walk](https://alz.org/walk).







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MICHIGAN STATE UNIVERSITY

# Wrangling Tangled Tau: Recent Insights into Alzheimer's Disease

Nicholas M. Kanaan, PhD  
Associate Professor

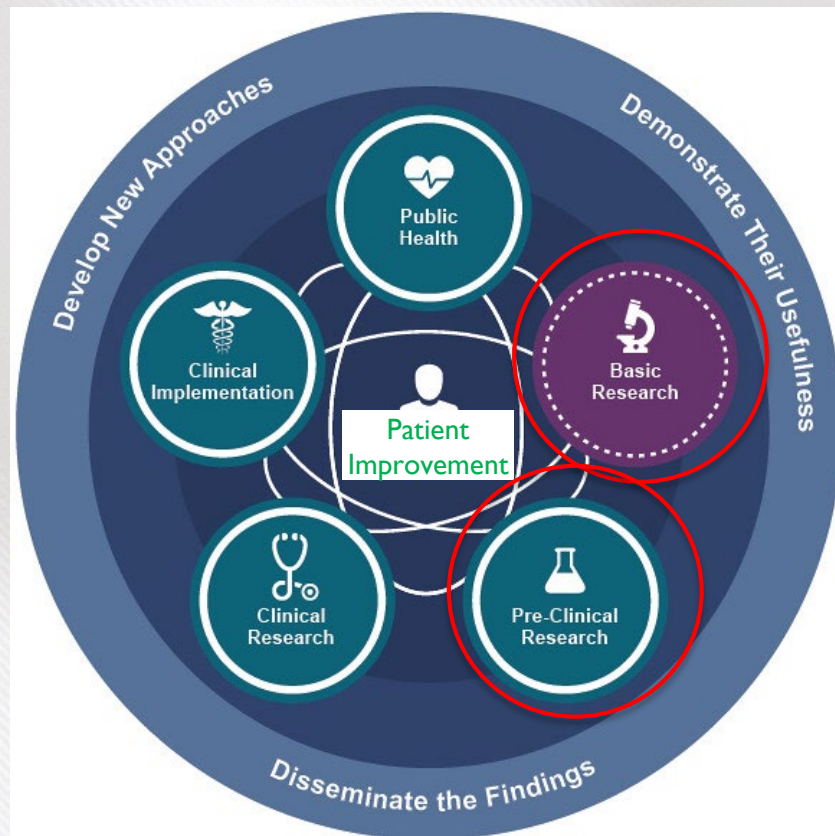
Michigan State University  
College of Human Medicine  
Department of Translational Neuroscience





# Research, The Bigger Picture and You

## Translational Science Spectrum



## How Can I Get Involved?

Participation in trials is key to advancing towards our goals



<https://clinicaltrials.gov>



**ALZHEIMER'S  
ALLIANCE**

<https://alzheimersalliance.msu.edu/index.html>



<https://alzheimers.med.umich.edu/research/>



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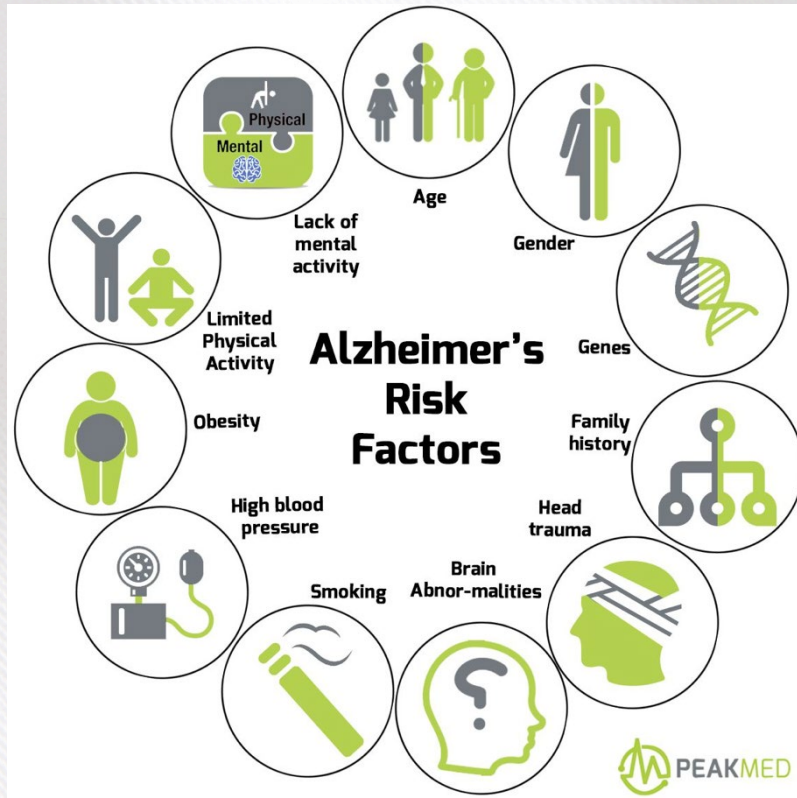


<https://www.alzforum.org>

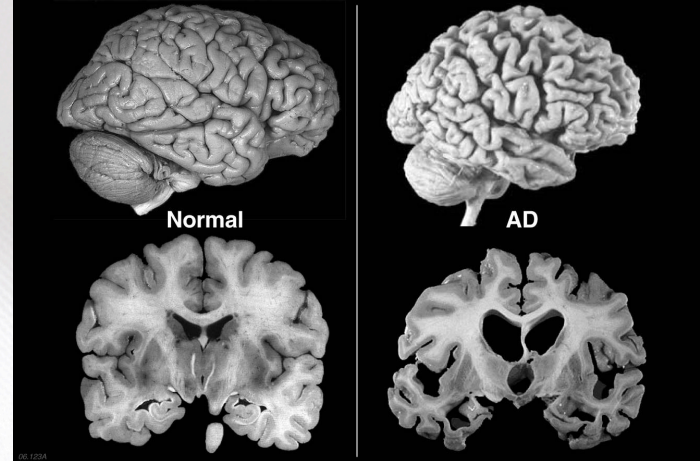


# What Has Research Taught Us About Alzheimer's?

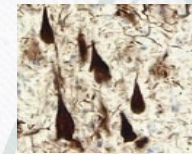
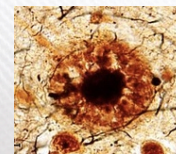
*IT'S COMPLICATED*, but this creates multiple opportunities...



## Brain Atrophy in Advanced Alzheimer's Disease



## Neuropathology



Plaques: Amyloid- $\beta$       Tangles: Tau

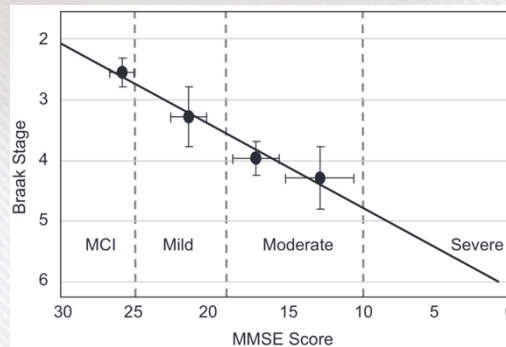
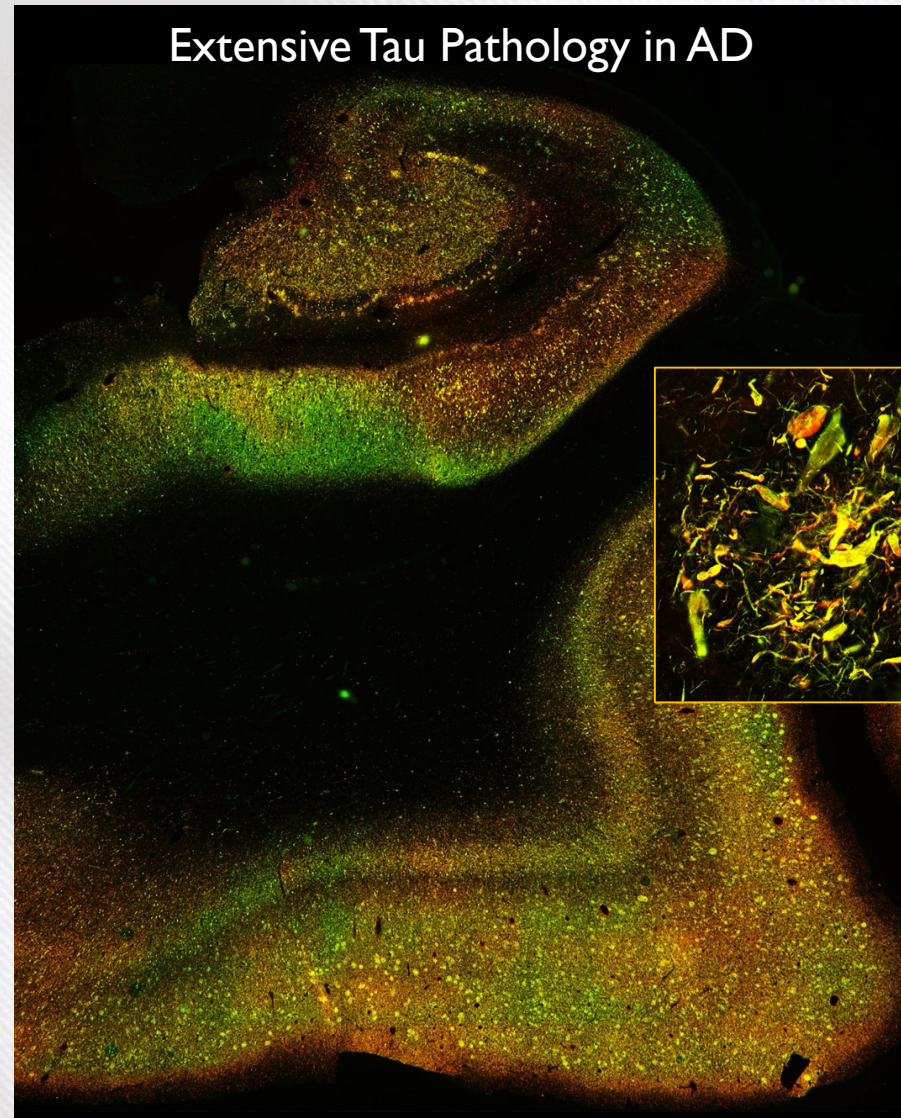
- Neuroinflammation
- Blood-Brain-Barrier Compromise
- Genetic Mutations – Inherited AD (genes related to amyloid)
- Several Other Potential Causes





# Tau as a Main Culprit in Alzheimer's Disease

- Tau is a normal protein that regulates microtubules
- A hallmark pathology and widespread
- Tau changes and aggregates in disease
- Tau pathology correlates with cognitive decline



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Wishick et al., Biochem Pharm, 88:259, 2014

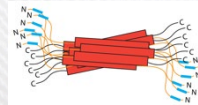
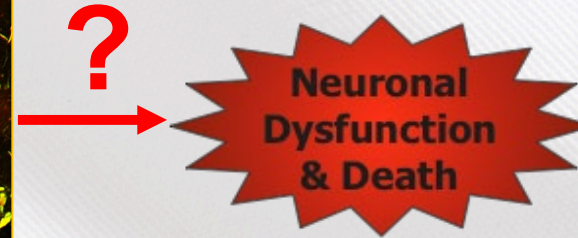
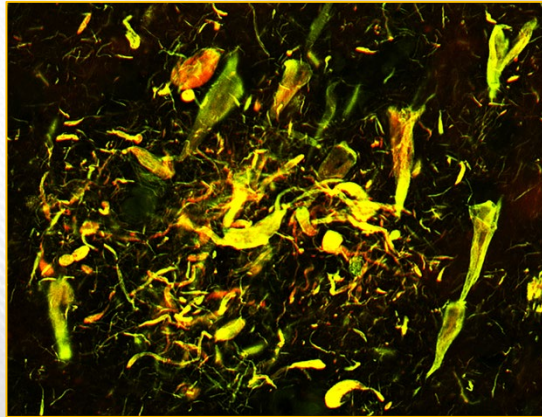
Schöll et al., Neuron 89:971, 2016

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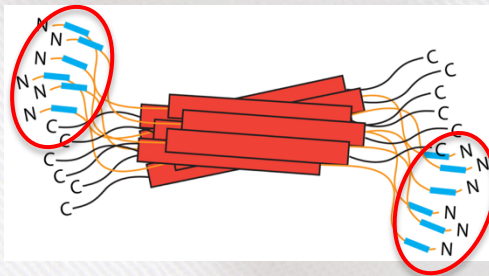


# Identifying Disease Mechanisms: Toxic Tau

## Tau Pathology



## Misfolding Creates A Problem



Triggers Axonal Toxicity Pathway



1. Discovering a specific pathway!
2. Identifying a potential target!

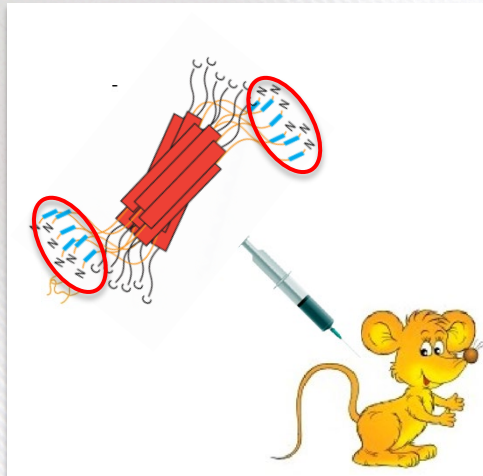




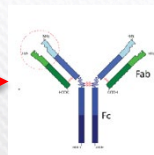
# The All Powerful Antibody: Bench to Bedside

## Immunization

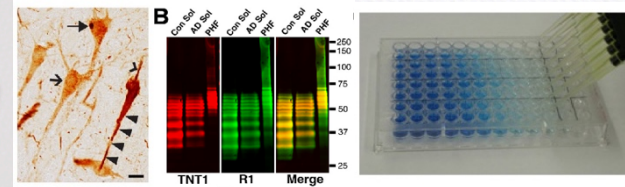
- Disease forms of tau



## Antibodies



## Basic Research Applications

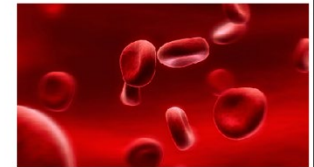


## Biomarker/Diagnostic Applications

### Cerebrospinal Fluid (CSF)



### Blood



## Humanization

## Therapeutic Applications

*Molecular Neurodegeneration* (2017) 12:33

**Humanized monoclonal antibody armanezumab specific to N-terminus of pathological tau: characterization and therapeutic potency**

Michael G. Agadjanyan<sup>1,2\*</sup>, Karen Zagorski<sup>1,5</sup>, Irina Petrushina<sup>2</sup>, Hayk Davtyan<sup>1</sup>, Konstantin Kazarian<sup>1</sup>, Maxim Antonenko<sup>1</sup>, Joy Davis<sup>3</sup>, Charles Bon<sup>4</sup>, Mathew Blurton-Jones<sup>2,3</sup>, David H. Cribbs<sup>2</sup> and Anahit Ghochikyan<sup>1\*</sup>



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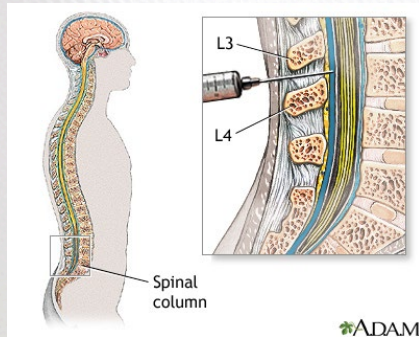
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# Developing Diagnostic Tools: Biomarkers

## Biofluids Hold Significant Promise

### Cerebrospinal Fluid (CSF)



#### Tau is detectable in CSF

- People who convert to AD display rapid annual *increases* in CSF tau
- Can Toxic Tau Be Useful?

#### Tau is detectable in plasma

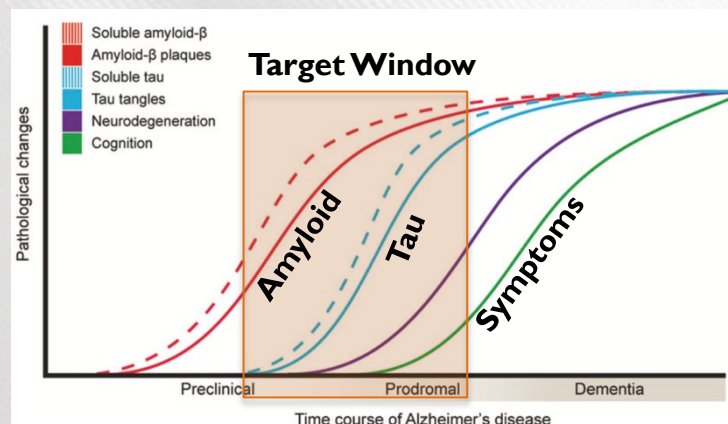
- Less invasive
- Larger volumes
- Repeated sampling
- Can Toxic Tau Be Useful?

### Blood/Plasma - Newer



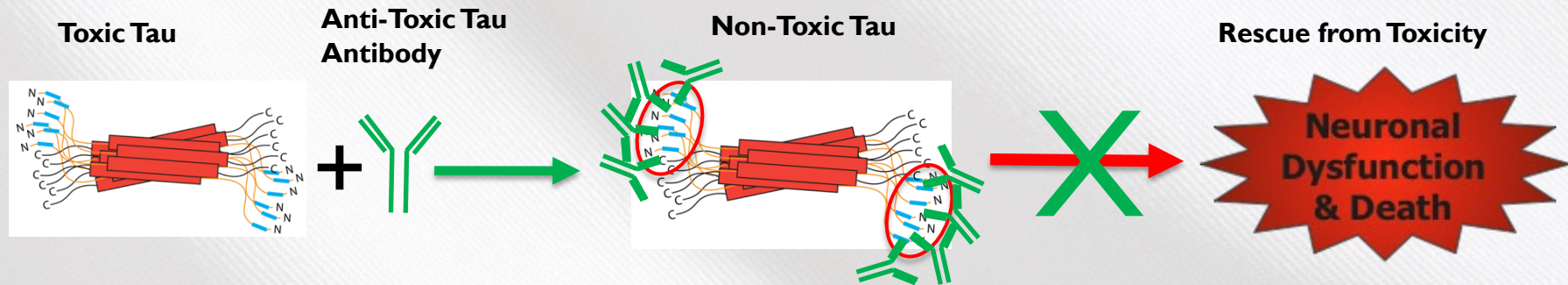
### Biomarker Goals

- Early detection
- Differential diagnosis
- Predictability
- Reproducible, safe, fast & cheap





# Targets of Intervention: Blocking Toxic Tau

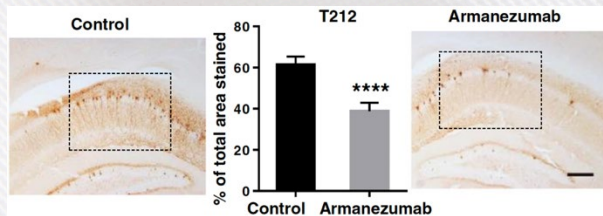


## Passive Immunotherapy

*Molecular Neurodegeneration* (2017) 12:33

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## Active Vaccination

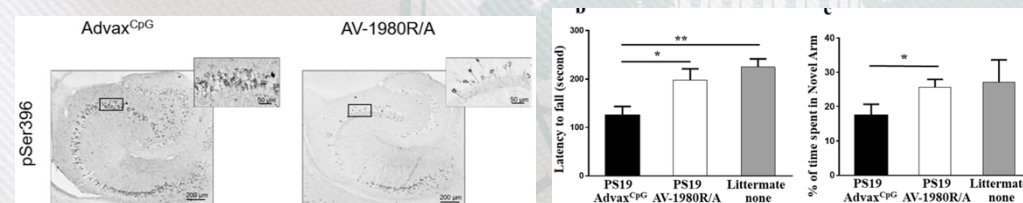
Active immunization with tau epitope in a mouse model of tauopathy induced strong antibody response together with improvement in short memory and pSer396-tau pathology

A. Joly-Amado<sup>a,\*</sup>, H. Davtyan<sup>b,c,1</sup>, K. Serraneau<sup>a</sup>, P. Jules<sup>a</sup>, A. Zitnyar<sup>a</sup>, E. Pressman<sup>a</sup>, K. Zagorski<sup>b</sup>, T. Antonyan<sup>b</sup>, A. Hovakimyan<sup>b</sup>, H.J. Paek<sup>e</sup>, M.N. Gordon<sup>a,2</sup>, D.H. Cribbs<sup>c</sup>, N. Petrovsky<sup>d</sup>, M.G. Agadjanyan<sup>b</sup>, A. Ghochikyan<sup>b,3</sup>, D. Morgan<sup>a,2,3</sup>

SCIENTIFIC REPORTS | (2019) 9:15455

### A MultiTEP platform-based epitope vaccine targeting the phosphatase activating domain (PAD) of tau: therapeutic efficacy in PS19 mice

Armine Hovakimyan<sup>1</sup>, Tatevik Antonyan<sup>1</sup>, Sepideh Kiani Shabestari<sup>2</sup>, Olga Svystun<sup>1</sup>, Gor Chailyan<sup>1</sup>, Morgan A. Coburn<sup>2,3</sup>, William Carlen-Jones<sup>2</sup>, Irina Petrushina<sup>4</sup>, Jean Paul Chadarevian<sup>4,5</sup>, Karen Zagorski<sup>1,7</sup>, Nikolai Petrovsky<sup>6,8</sup>, David H. Cribbs<sup>5</sup>, Michael G. Agadjanyan<sup>1</sup>, Anahit Ghochikyan<sup>1,8\*</sup> & Hayk Davtyan<sup>1,2,8\*</sup>



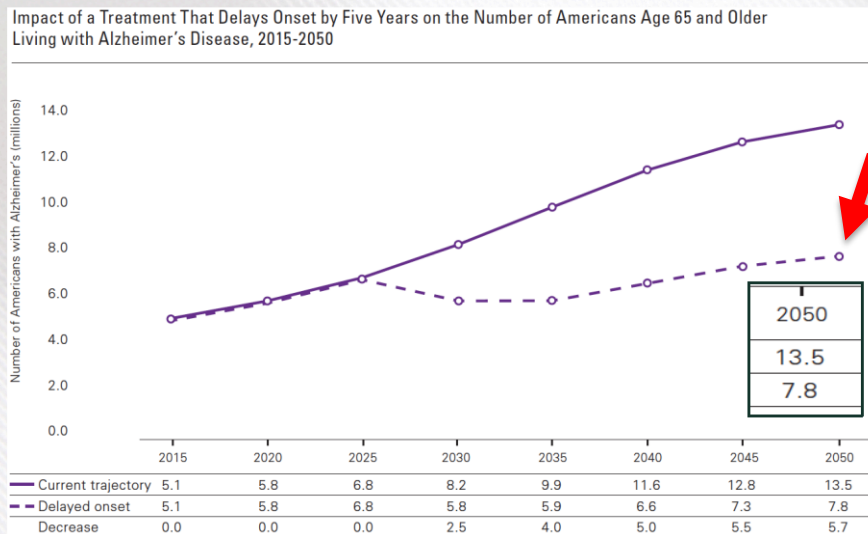
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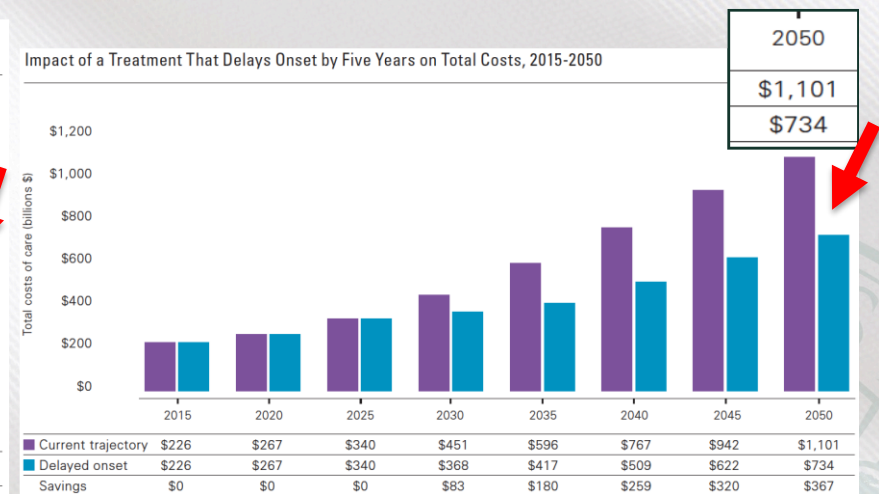
# Research Goals

Delaying disease onset by 5 years will have a huge impact!!!

## Projected # of People with AD



## Projected Total Costs for AD





# ➤ Alzheimer's Disease Research at MSU (in GR)

## *Department of Translational Neuroscience*



**Nicholas M. Kanaan, Ph.D.**

Associate Professor  
*Molecular Mechanisms of AD*



**Scott E. Counts, Ph.D.**

Associate Professor  
*Selective vulnerability in AD*



**Marcia Gordon, Ph.D.**

Professor  
*Role of brain inflammation in AD*



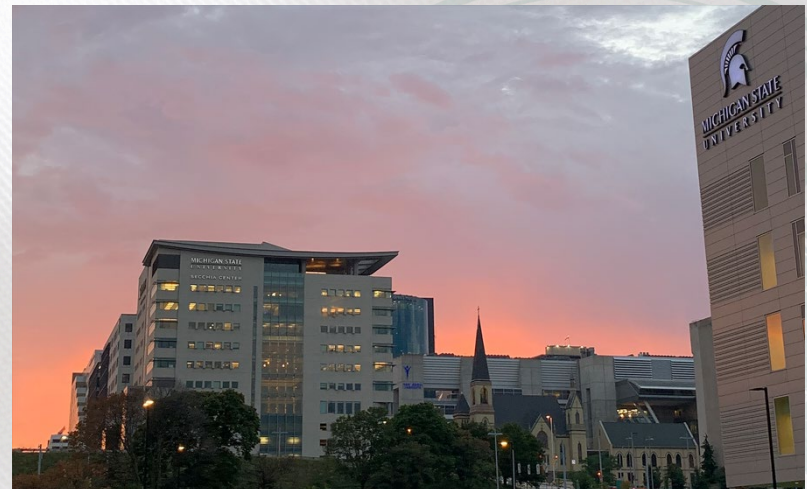
**Irving E. Vega, Ph.D.**

Associate Professor  
*Novel proteins associated with  
tau toxicity in AD*



**Dave Morgan, Ph.D.**

Professor  
*AD therapeutics and novel  
biomarkers for disease*



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Website: <http://translationalscience.msu.edu>

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# Alzheimer's Disease: A Look into the Future

## *Incidence and Impact*

Rebecca Davis, PhD, RN

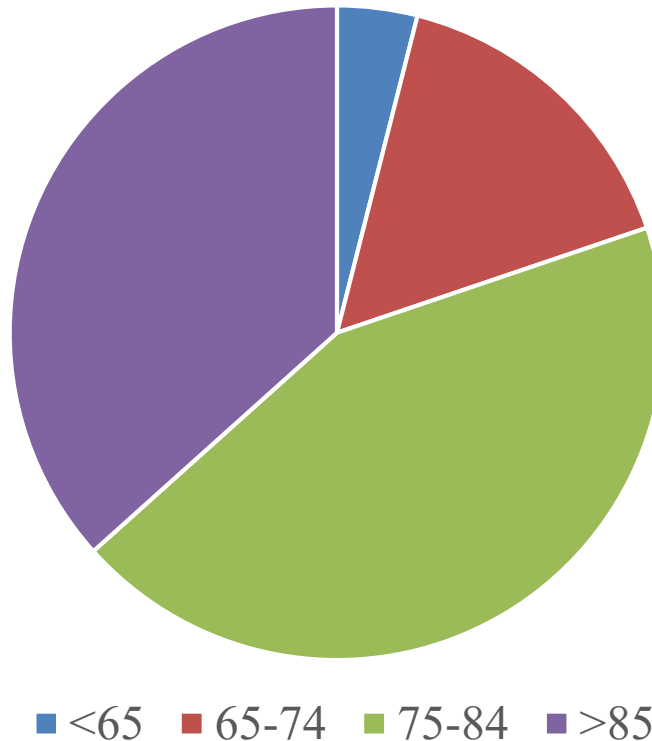
Professor, Associate Dean for Research and Practice

Kirkhof College of Nursing



# Who does Alzheimer's Disease Affect?

Ages of People with Alzheimer's Disease in the US, 2018

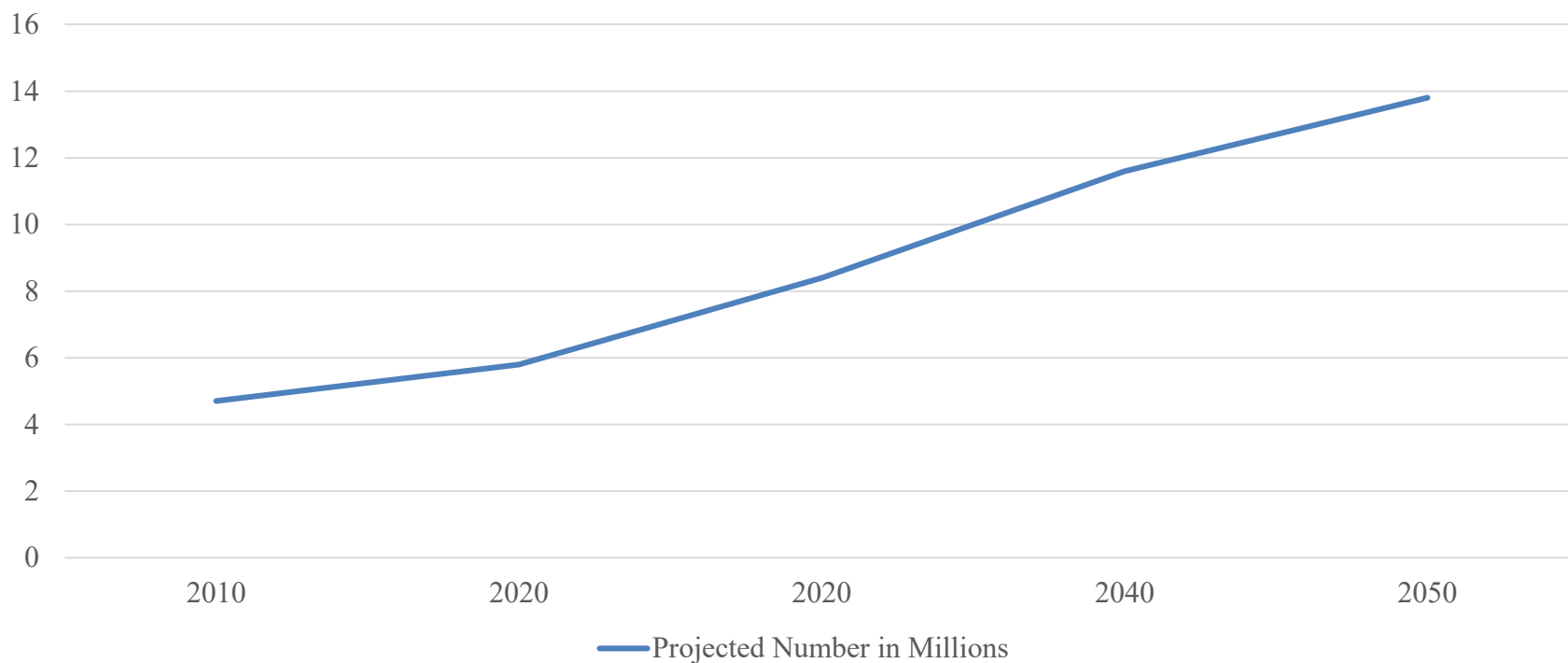


Alzheimer's Association, 2018



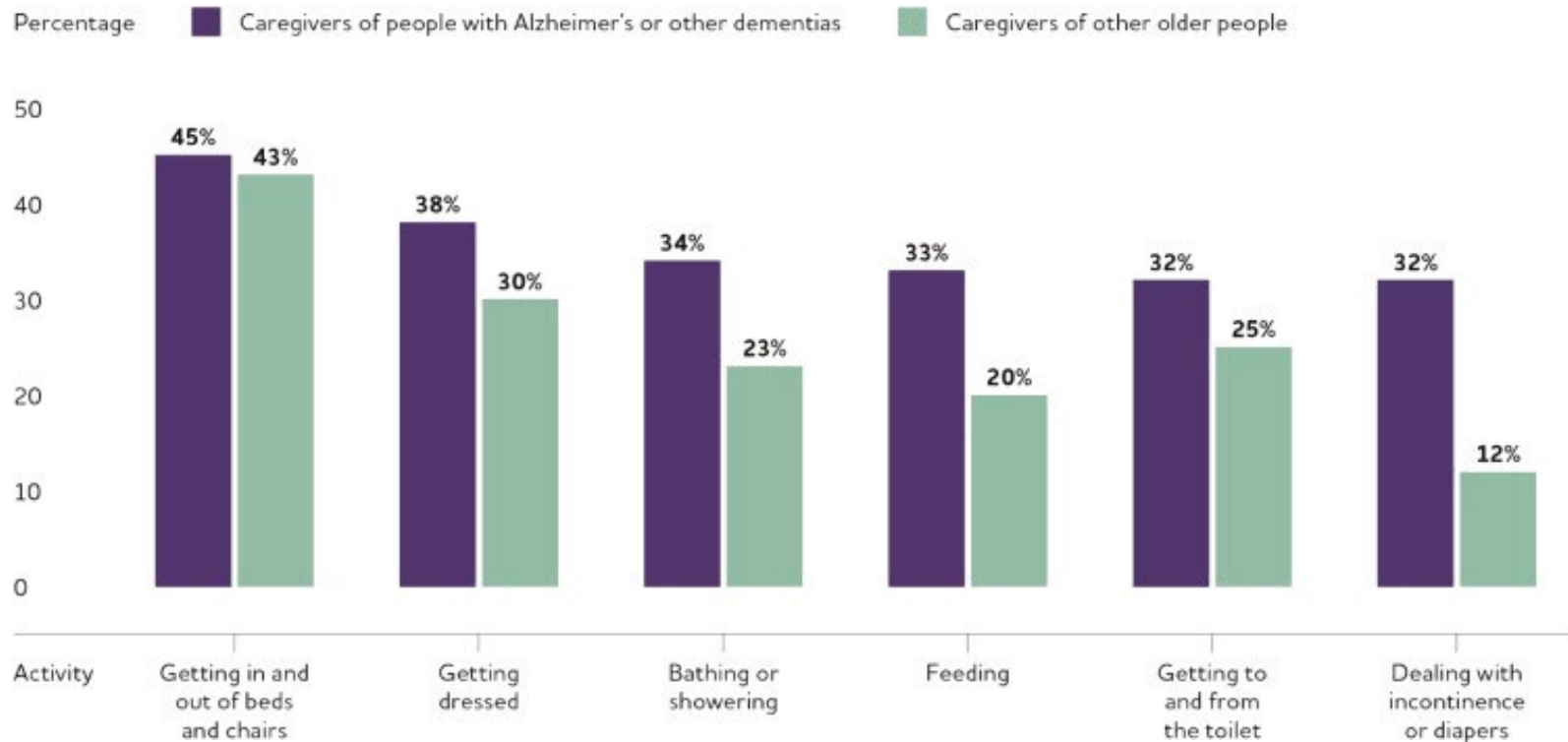
# Projection into the Future

Projected Number of People (over age 65) in US with  
Alzheimer's Disease



Alzheimer's Association, 2018

# Caregiving



*Alzheimer's Disease Fact and Figures 2019; Alzheimer's Association*



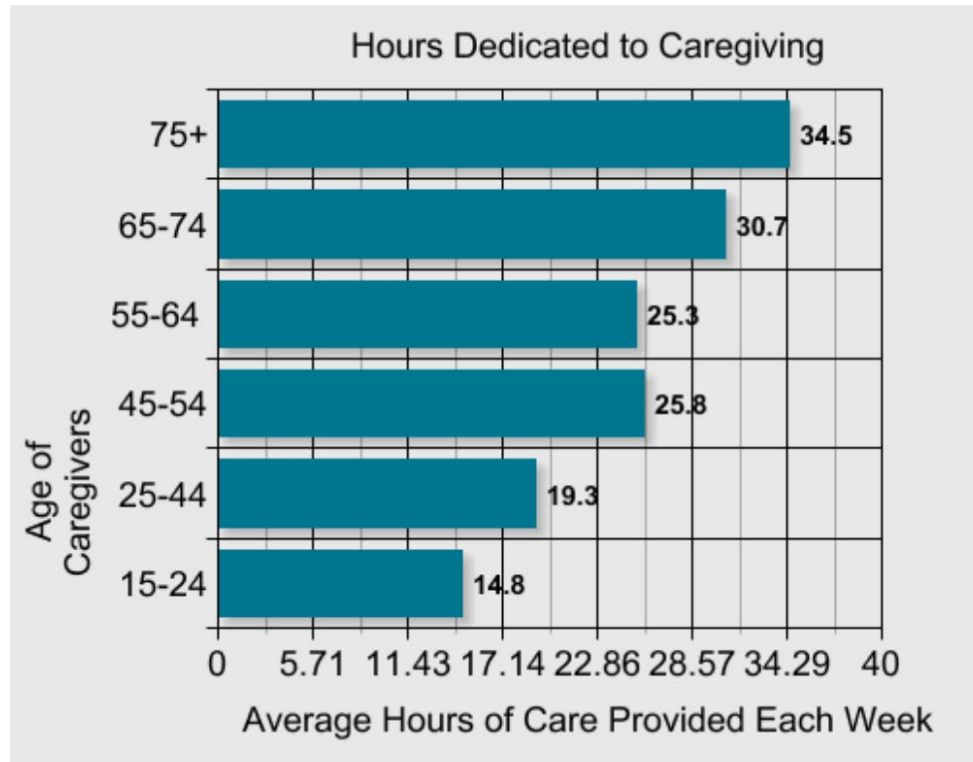
# Impact on Families

- 18.4 billion hours of care provided by unpaid/family caregivers
  - \$232 billion in care
- Average age of caregiver is almost 70 years
- Most persons with dementia live in the community

Family Caregiver Alliance (2016)

# Hours spent caregiving

Number of Hours Dedicated to Caregiving by Age of Family Caregiver



Family Caregiver Alliance (2016)



# Caregiving Challenges

Most Challenging Behaviors	Biggest Caregiving Challenges
Agitation/Aggression	Dealing with Memory loss and impact of disease on loved ones
Repetitive speech	Handling stress and emotional toll on self
Wandering	Having patience
Incontinence	Handling mood swings/behaviors
Late day confusion	Keeping loved one positive and motivated

*Source: Center to Advance Palliative Care–Gary and Mary West Health Institute National Online Survey: Adults who care for loved ones with Alzheimer’s/Dementia.*

# Decision Making

- Independence/Dependence?
- Driving?
- Living arrangements?
- Medication safety?
- Home safety?
- Health?
- Values?





# Research Based Interventions

- Non-pharmacological interventions
  - Functional Based (ABC's)
  - Music therapy
  - Reminiscence
  - Case Management
  - Support Groups
- Pharmacological Therapies

Dyer, S. M., Harrison, S. L., Laver, K., Whitehead, C., & Crotty, M. (2018).

# Help for Caregivers

- Acceptance of disease
- Reduce stigma (tell people)
- Seeking support and help
  - Alzheimer's Association
  - Support groups
  - Family/Friends
- Making a plan (i.e. SHARE intervention)



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Gillhooly et al., 2016; Whitlatch et al., 2016



# Into the Future

- Earlier, better diagnoses
- More comprehensive care planning
- More people with dementia living alone in the community
- More long-distance caregiving
- “Dementia friendly” communities
- More technological interventions
- Better long term care options

# Wayfinding Study



Funded by the National Institute on Aging, National Institutes of Health 1R01AG056384-01A1; *A Randomized Controlled Trial of Visual Cues, Signage, and Spaced-Retrieval Education within Long Term Care Communities to Assist with Wayfinding*



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Gilhooly, K. J., Gilhooly, M. L. M., Sullivan, M. P., McIntyre, A., Wilson, L., Harding, E., ... & Crutch, S. (2016). A meta-review of stress, coping and interventions in dementia and dementia caregiving. *BMC geriatrics*, 16(1), 106.

Whitlatch, Carol J., et al. "The Support, Health, Activities, Resources, and Education program for early stage dementia: Results from a randomized controlled trial." *Dementia* (2017): 1471301217743033.

The background features abstract, overlapping geometric shapes in various shades of blue, primarily on the right side, creating a modern, layered effect. The word "Questions?" is centered in a dark blue, sans-serif font.

# Questions?





Thank you for  
attending the  
*Your Health Lecture  
Series!*