



# NEUROSCIENCE

*Lilly*



# SAFE HARBOR PROVISION



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For additional information about the factors that affect the company's business, please see the company's latest Forms 10-K, 10-Q, and any 8-Ks filed with the Securities and Exchange Commission. In addition, certain financial information in this presentation is presented on a non-GAAP basis. Investors should refer to the reconciliations included in these presentations and should consider the company's non-GAAP measures in addition to, not as a substitute for or superior to, measures prepared in accordance with GAAP.

**The company undertakes no duty to update forward-looking statements  
except as required by applicable law**



**MARK MINTUN, M.D.**

President of Neuroscience Research and Development,  
and President of Avid Radiopharmaceuticals



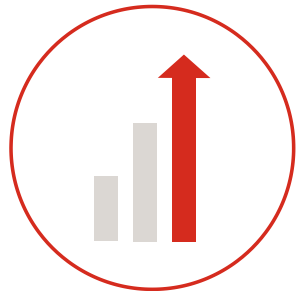
# NEURODEGENERATION UNMET NEED

## THE URGENT PROBLEM OF ALZHEIMER'S AND OTHER DEMENTIA



**EVERY  
65  
SECONDS**

**NEW CASES:** Someone in the United States develops Alzheimer's disease (AD) every 65 seconds. Alzheimer's disease is the sixth-leading cause of death in the United States.



**5.8 MILLION  
AMERICANS  
IN 2019**

**HEALTH:** Today, 5.8 million Americans are living with Alzheimer's disease, including an estimated 200,000 under the age of 65. By 2050, up to 14 million may have the disease.



**\$234  
BILLION**

**ECONOMICS:** In 2019, 16 million Americans provided 18.5 billion hours of unpaid care for a person living with Alzheimer's disease or other dementia – an economic value of \$234 billion.

### **Non-AD Dementias:**

There are no current disease modifying treatments for PD, HD, FTD, ALS and other diseases impacting millions of patients. These diseases have similar types of protein misfolding and could respond to the same approaches being developed against AD.

2019 Alzheimer's Disease Facts and Figures – Alzheimer's Association; PD = Parkinson's Disease; HD = Huntington's Disease; FTD = Frontotemporal Dementia; ALS = Amyotrophic lateral sclerosis

# NEURODEGENERATION FOCUS AND STRATEGY



*Create diagnostics to enable effective treatment*



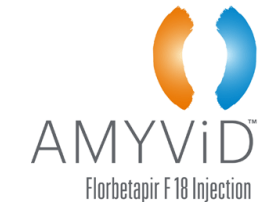
*Intervene earlier*



*Multiple therapies to attack disease pathologies*



*New platforms for genetic medicine delivery*



First radioactive diagnostic agent approved by the FDA for PET imaging of the brain to estimate beta-amyloid neuritic plaque density



Only approved diagnostic to image tau neurofibrillary tangles in the brain

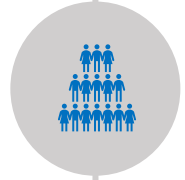
## Plasma Phospho-tau217

Blood-based assay being developed as potential Early Diagnostic Biomarker of Alzheimer's Disease

# NEURODEGENERATION FOCUS AND STRATEGY



*Create diagnostics to enable effective treatment*



**Intervene earlier**

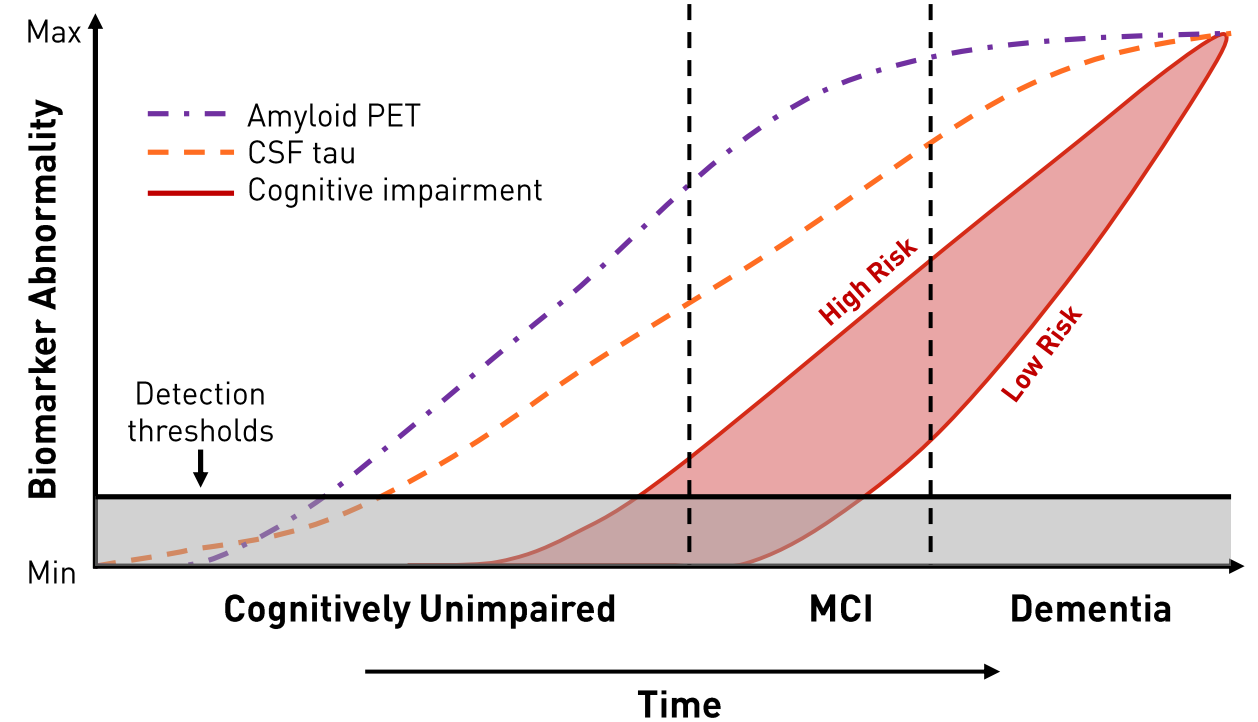


*Multiple therapies to attack disease pathologies*



*New platforms for genetic medicine delivery*

### Stages of AD & Biomarker Abnormality Levels



Adapted from Selkoe & Hardy EMBO, 2016

**Can we turn back the clock on amyloid accumulation BEFORE brain damage and symptoms?**

AD = Alzheimer's disease; CSF = Cerebrospinal Fluid; MCI = Mild Cognitive Impairment

Not for promotional use

2021 INVESTMENT COMMUNITY MEETING

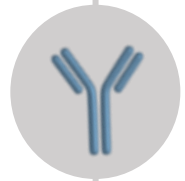
# NEURODEGENERATION FOCUS AND STRATEGY



*Create diagnostics to enable effective treatment*



*Intervene earlier*

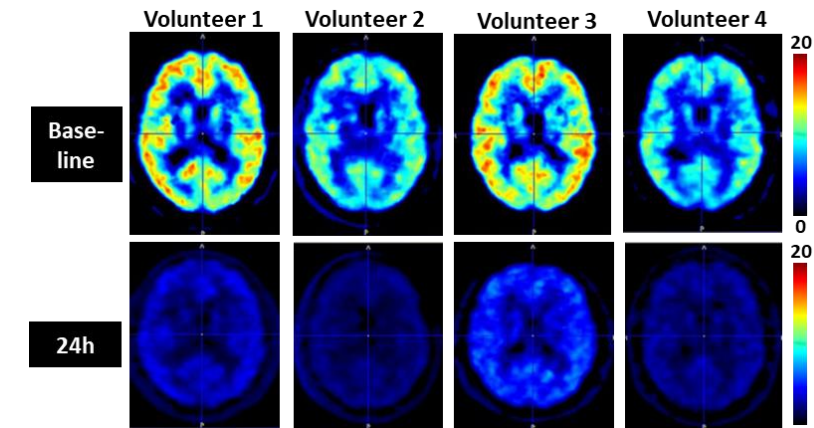


**Multiple therapies to attack disease pathologies**

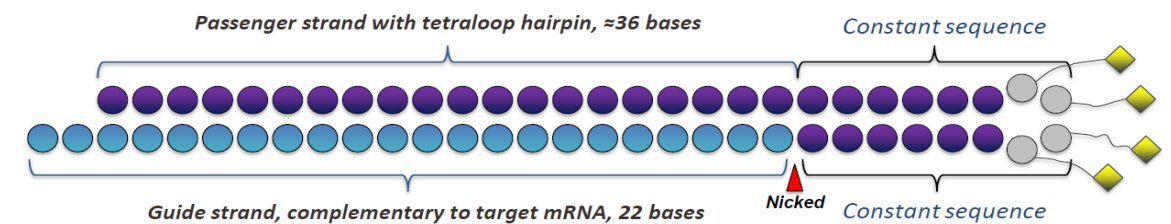


*New platforms for genetic medicine delivery*

## Next frontier to target tau pathology beyond anti-amyloid therapy



**OGA II**



**siRNA**

# NEURODEGENERATION FOCUS AND STRATEGY



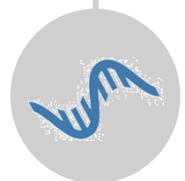
*Create diagnostics to enable effective treatment*



*Intervene earlier*



*Multiple therapies to attack disease pathologies*

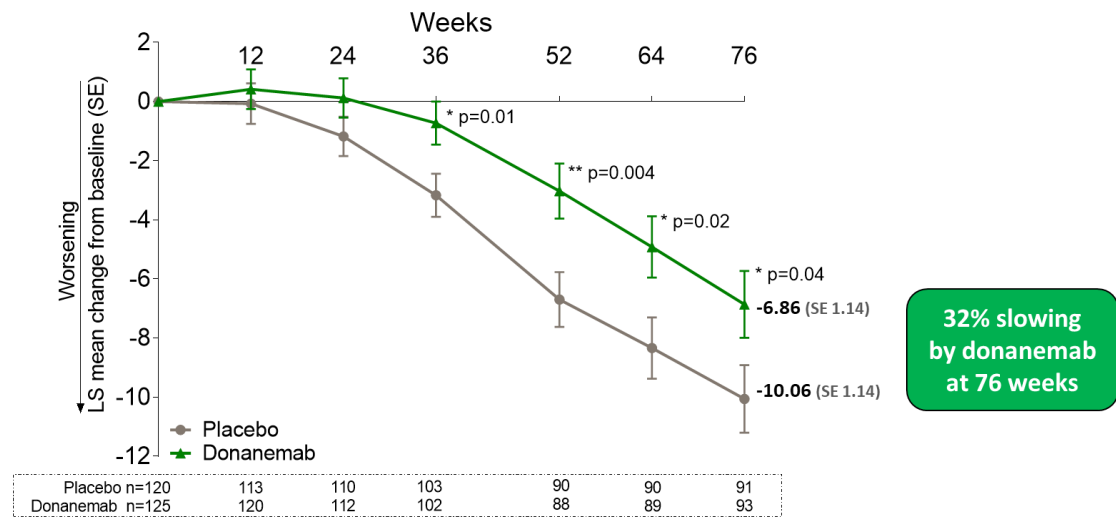


*New platforms for genetic medicine delivery*



**Focus on monogenic diseases and broaden into polygenic diseases**

# DONANEMAB OVERVIEW



Donanemab is an immunoglobulin G1 antibody **specific for** an N-terminal pyroglutamate amyloid- $\beta$  epitope that is present only in **mature brain amyloid plaques**

Phase 2 primary outcome showed **donanemab significantly slowed clinical progression by 32% on iADRS** at 76 weeks, compared with placebo

## Taking on the Challenges Ahead



### Advance the Science

Advance scientific understanding of **plaque lowering** and of **ARIA**



### Find and Treat Pathology; Develop AD Ecosystem

Advance accurate AD **diagnosis**; Establish diagnostic & infusion **infrastructure**



### Demonstrate the Value of Anti-Amyloid Therapy

Confirmatory trial; National Coverage Analysis (NCA) Leadership; Pilot **innovative models**

# TRAILBLAZER-ALZ SAFETY PROFILE

AS DEMONSTRATED IN TRAILBLAZER-ALZ, SAFETY REMAINS OF UTMOST IMPORTANCE ACROSS ALL PROGRAMS



## SAFETY & TOLERABILITY

Overview of Adverse Events, n (%)			
	Placebo (n=125)	Donanemab (n=131)	p-value
Deaths	2 (1.6)	1 (0.8)	0.62
SAEs	22 (17.6)	23 (17.6)	>1.00
Treatment discontinuations due to AE*	9 (7.2)	40 (30.5)	<0.001
Study discontinuations due to AE*	6 (4.8)	20 (15.3)	0.007
TEAEs	113 (90.4)	119 (90.8)	>1.00
Treatment Emergent Adverse Events ≥5% Incidence, n (%)			
ARIA-E	1 (0.8)	35 (26.7)	<0.001
Fall	19 (15.2)	17 (13.0)	0.72
Dizziness	15 (12.0)	11 (8.4)	0.41
Headache	15 (12.0)	10 (7.6)	0.29
Superficial siderosis of central nervous system	4 (3.2)	18 (13.7)	0.003
Arthralgia	10 (8.0)	10 (7.6)	>1.00
Nausea	4 (3.2)	14 (10.7)	0.03
Upper respiratory tract infection	9 (7.2)	9 (6.9)	>1.00
Urinary tract infection	5 (4.0)	13 (9.9)	0.09
Diarrhea	5 (4.0)	11 (8.4)	0.20
ARIA-H	4 (3.2)	11 (8.4)	0.11
Cerebral microhemorrhage	3 (2.4)	10 (7.6)	0.09
Infusion-Related Reaction	0 (0)	10 (7.6)	0.002
Pneumonia	5 (4.0)	7 (5.3)	0.77
Depression	8 (6.4)	6 (4.6)	0.59
Contusion	10 (8.0)	0 (0)	<0.001
Vomiting	3 (2.4)	7 (5.3)	0.34
Anxiety	2 (1.6)	7 (5.3)	0.17

## FINDINGS

- Safety profile in line with Phase 1 results; no new safety signals observed
- Rate of symptomatic ARIA-E was 6% in the treatment arm (with 27% showing any ARIA-E), similar to other plaque-clearing agents
- Treatment discontinuation due to ARIA was driven by strict protocol criteria
- We remain confident in the risk/benefit profile of donanemab, though note an outstanding issue for the field is the development of strategies for avoidance and management of ARIA
- We look forward to contributing to solutions for managing symptomatic ARIA risk and continue to work closely with stakeholders in the Alzheimer's field

SAE = Serious Adverse Event; TEAE = Treatment-Emergent Adverse Event; ARIA-E = Amyloid-Related Imaging Abnormalities with Edema/Effusions; ARIA-H = Amyloid-Related Imaging Abnormalities with hemosiderin deposits

\*Discontinued treatment due to protocol-defined criteria and patient/principal investigator-cited reasons for discontinuation

# DONANEMAB

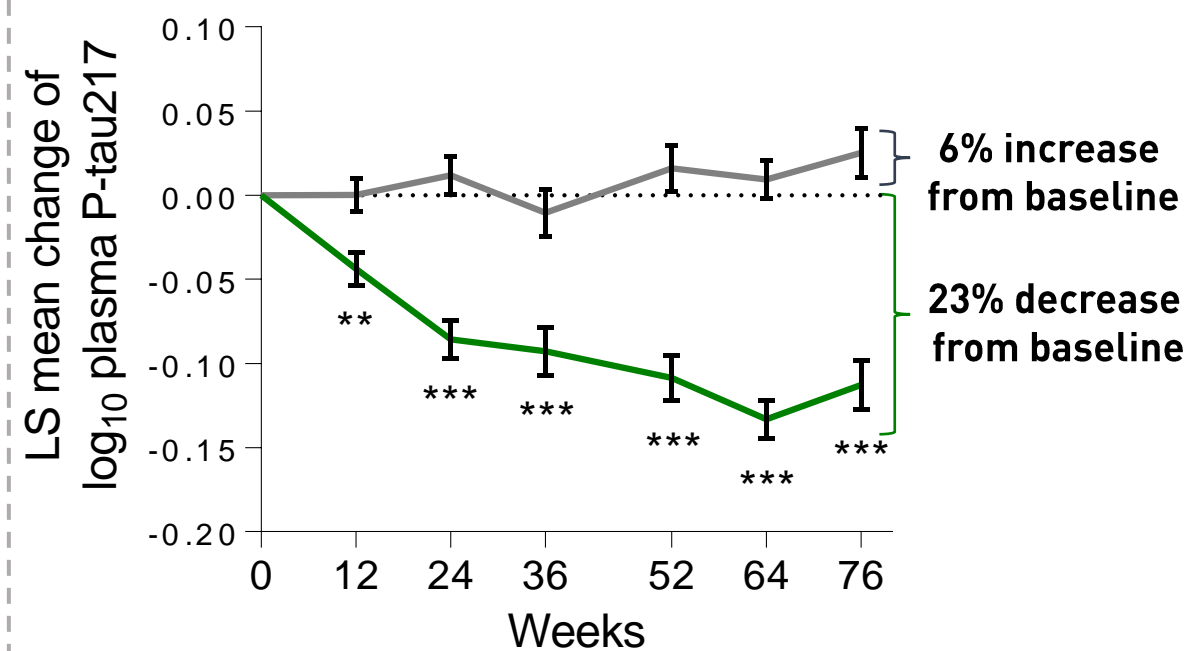
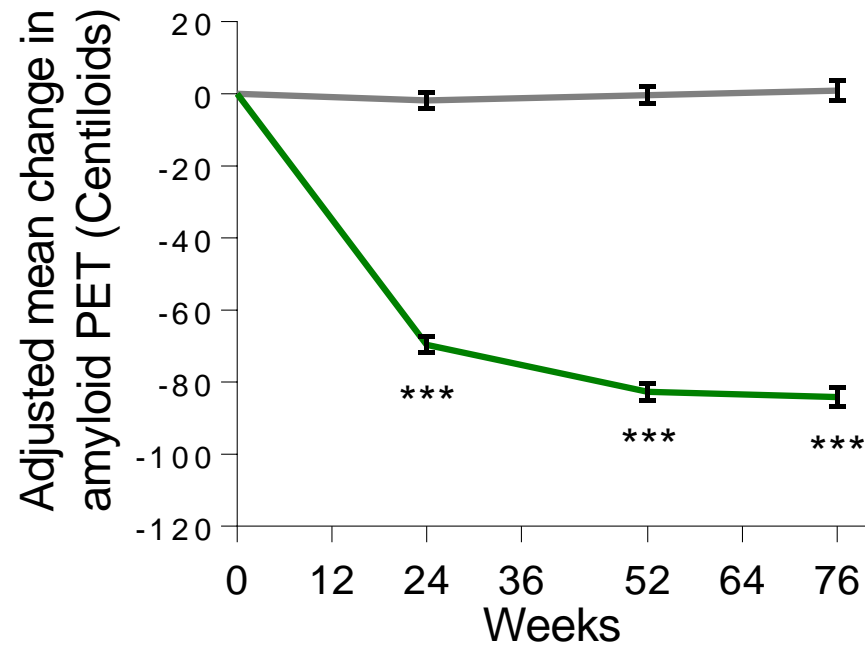
BOTH AMYLOID PLAQUE AND PLASMA P-TAU217 WERE SIGNIFICANTLY LOWERED WITH DONANEMAB



**Amyloid plaque significantly lowered with donanemab treatment<sup>1</sup>**

**Plasma P-tau217 significantly lowered with donanemab treatment<sup>2</sup>**

**Key Findings**



- Previously showed evidence for slowing regional tau tangles by PET
- Now with additional evidence that donanemab reduced the tau pathological cascade

— Placebo  
— Donanemab

— Placebo  
— Donanemab

\* p<0.05; \*\* p<0.01; \*\*\* p<0.001 vs placebo; <sup>1</sup>secondary endpoint; <sup>2</sup>exploratory objective

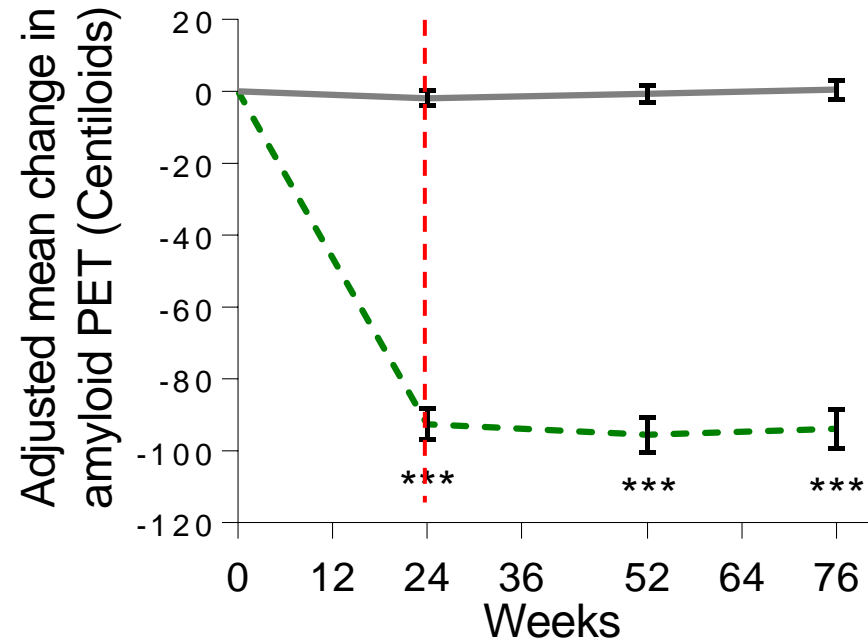
TRAILBLAZER-ALZ Mixed Model Repeated Measures (MMRM) analysis; Data points show mean +/- standard error; LS = Least Square; PET = Positron Emission Tomography; p = p-value

# DONANEMAB

BOTH AMYLOID PLAQUE AND PLASMA P-TAU217 REDUCTION CONTINUED FOR ONE YEAR AFTER DOSING STOPPED

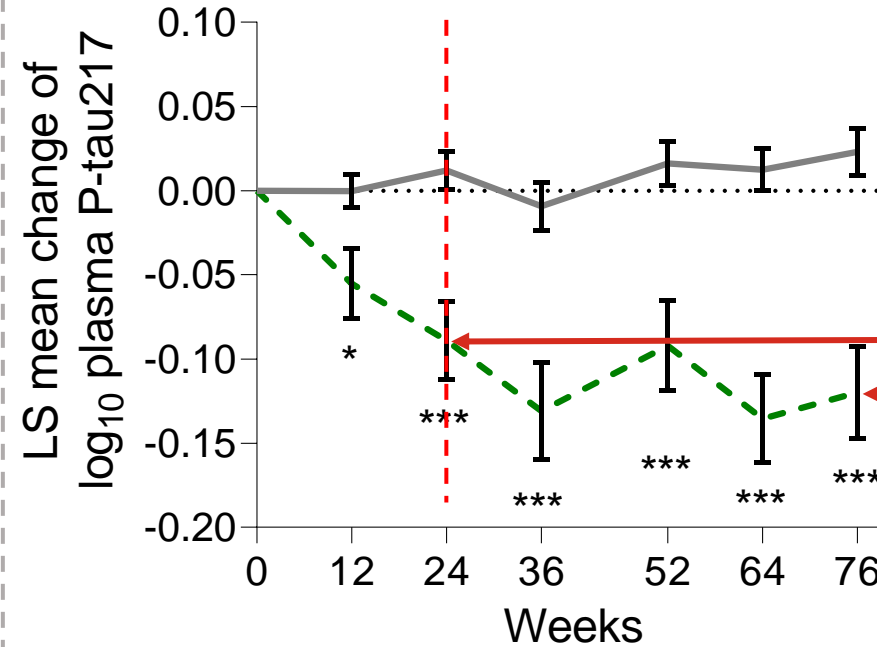


Amyloid plaque significantly lowered with donanemab treatment<sup>1</sup>



— Placebo  
 ■ Donanemab – stopped at 24 weeks due to complete amyloid clearance

Plasma P-tau217 significantly lowered with donanemab treatment<sup>2</sup>



— Placebo  
 ■ Donanemab – stopped at 24 weeks due to complete amyloid clearance

Drop in P-tau217 was still present one year after clearing plaques and stopping donanemab treatment

\* p<0.05; \*\* p<0.01; \*\*\* p<0.001 vs placebo; <sup>1</sup>exploratory objective; <sup>2</sup>exploratory objective

TRAILBLAZER-ALZ Mixed Model Repeated Measures (MMRM) analysis; Data points show mean +/- standard error; LS = Least Square; p = p-value

# DONANEMAB

IN TRAILBLAZER-ALZ, AMYLOID PLAQUE, PLASMA P-TAU217 & NOW GFAP WERE SIGNIFICANTLY LOWERED WITH DONANEMAB

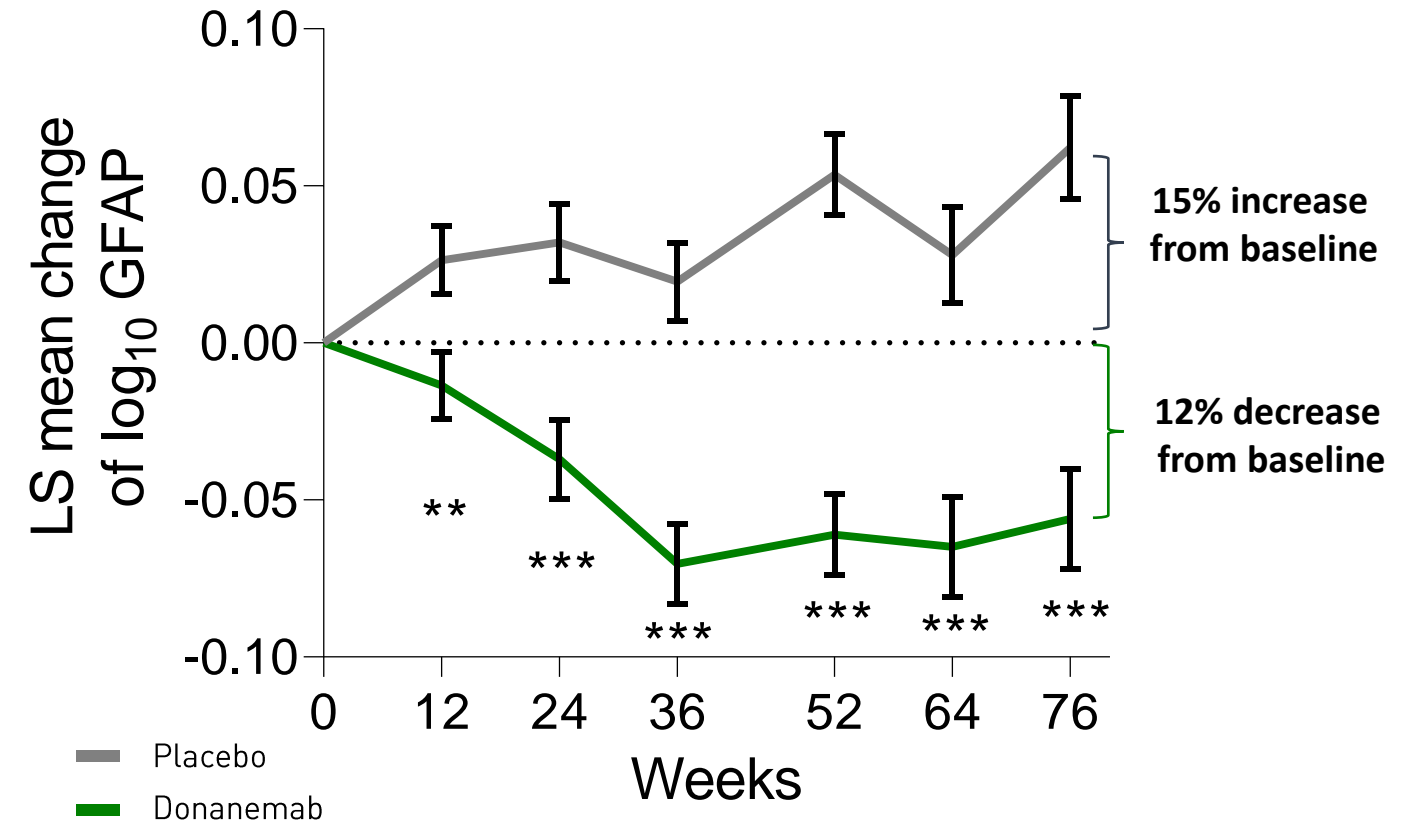


## GLIAL FIBRILLARY ACIDIC PROTEIN

- Elevated GFAP is a highly specific inflammatory biomarker of astrogliosis in the brain
- Donanemab lowered plasma GFAP similar to the reductions seen in amyloid and P-tau
- Strengthens the evidence that donanemab treatment is associated with reducing multiple pathological processes of Alzheimer's disease

## REDUCED INFLAMMATORY MARKER

Glial Fibrillary Acidic Protein (GFAP) significantly lowered with donanemab treatment<sup>1</sup>



\* p<0.05; \*\* p<0.01; \*\*\* p<0.001 vs placebo; <sup>1</sup>exploratory objective

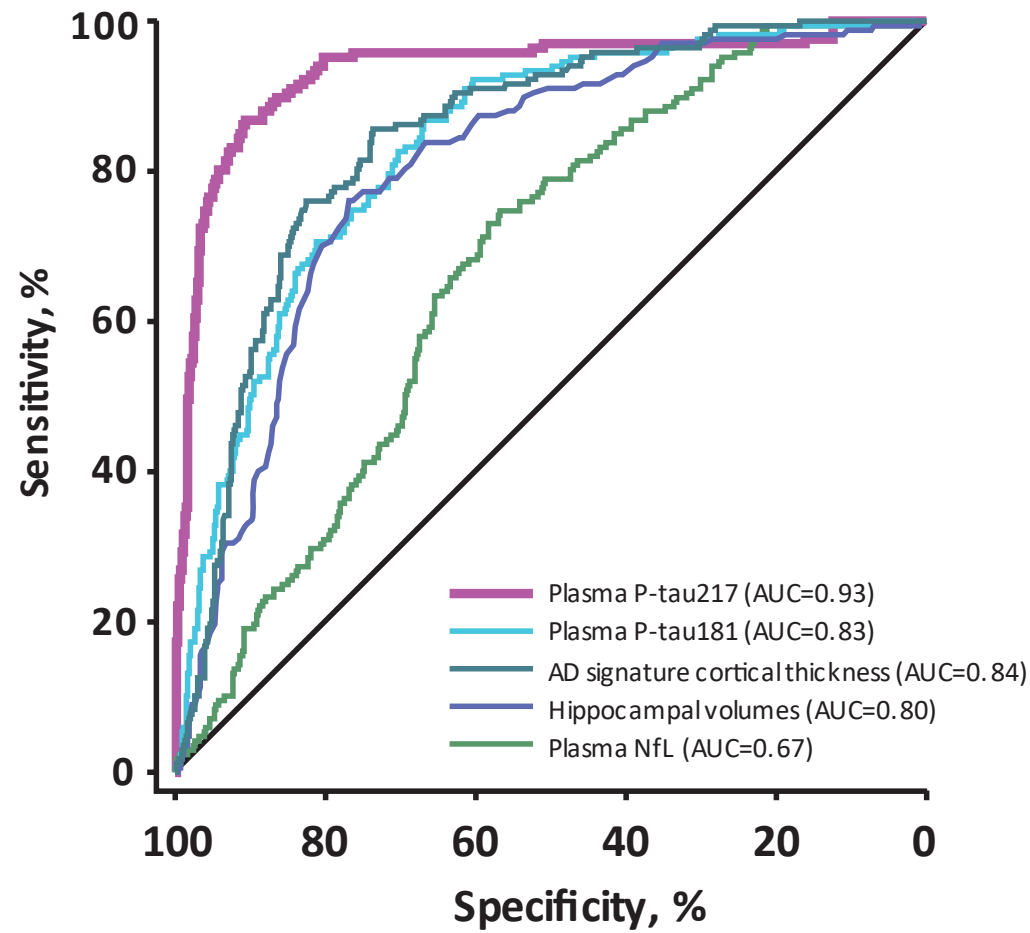
TRAILBLAZER-ALZ Mixed Model Repeated Measures (MMRM) analysis; Data points show mean +/- standard error; LS = Least Square; p = p-value

# P-TAU 217 PLASMA ASSAY MAY TRANSFORM AD DIAGNOSIS

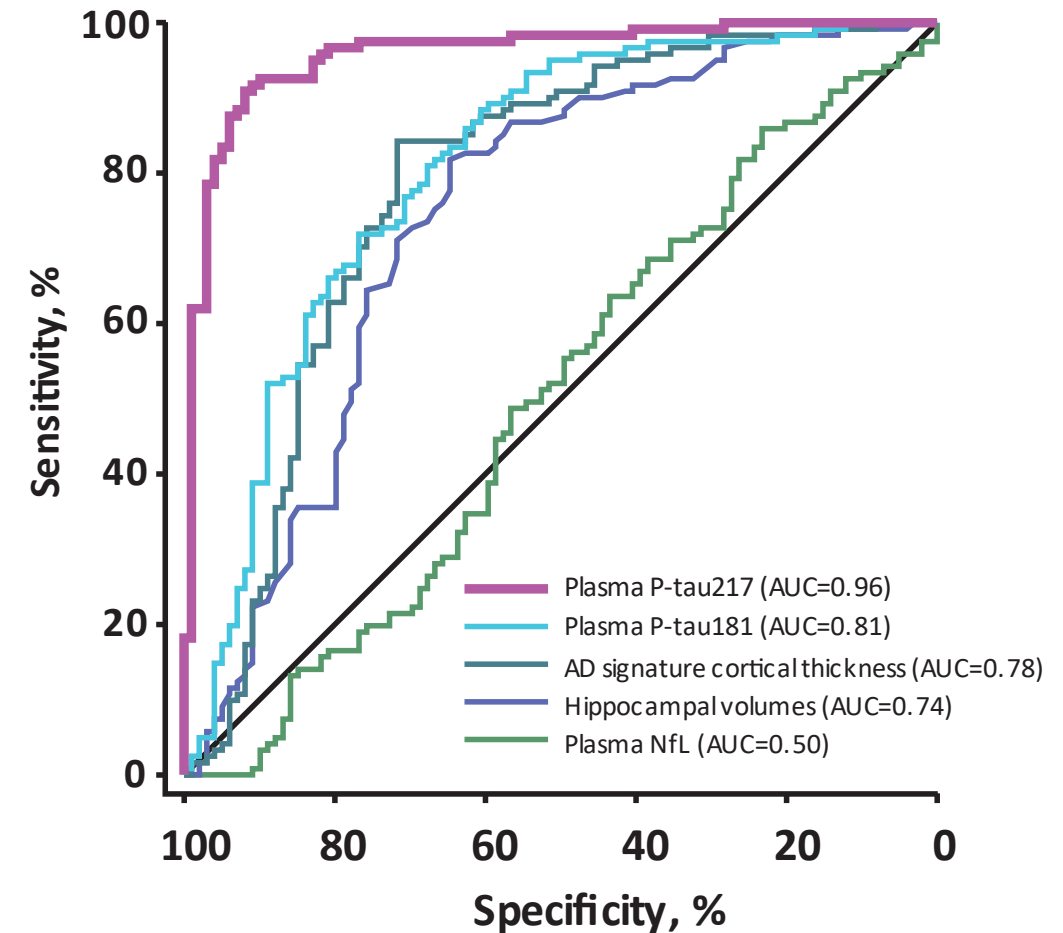
P-TAU217 PREDICTED AD PATHOLOGY IN A RESEARCH SETTING



*Predicted tau-PET with an AUC of 0.93*



*Discriminated AD from other neurodegenerative diseases with an AUC of 0.96*



**P-tau217 also predicted amyloid-PET with an AUC of 0.87**

Data from Palmqvist et al, JAMA 2020; AD = Alzheimer's disease; PET = Positron Emission Tomography; p = p-value; AUC = Area Under the Curve; NfL = Neurofilament Light Chain

# P-TAU 217 PLASMA ASSAY MAY TRANSFORM AD DIAGNOSIS

## LEVERAGING PLASMA P-TAU217 FOR FUTURE CLINICAL CARE



Potential to speed up diagnosis, decrease biomarker testing cost and provide more convenient access to patients



- Represents evolution towards less invasive diagnostics for patients
- Accessibility should lower the barrier for AD biomarker testing
- Investigating how to best transition our research experience into clinical practice
- Will look to combine Lilly's expertise with established diagnostic partners

# TRAILBLAZER ALZ-3

## PREVENTION STUDY IN COGNITIVELY UNIMPAIRED



### TRIAL DESIGN

- Preclinical AD event-driven prevention study
  - 3300 participant randomized trial measuring the Global Scale for Clinical Dementia Rating as primary endpoint
  - Target individuals 55-80 years of age who are cognitively unimpaired but with evidence of AD disease pathology
- P-tau217 assay used as part of inclusion criteria
  - New paradigm for clinical trial recruitment
  - Increased flexibility for screening activities, e.g., mobile units
- Decentralized trial with central services
  - Decentralized sites, including those in under-represented communities, to enable recruitment of diverse populations
  - Central safety monitoring including MRIs for detecting ARIA
- Informed by learnings from solanezumab A4 study

AD = Alzheimer's disease  
Not for promotional use

### GOALS

- To assess whether a short course of donanemab treatment (9 infusions) at the start of the trial can slow or prevent progression to the clinical stages of AD
- Plan to complete enrollment by the end of 2022
- Anticipate 3-4 years after last patient enrolled for events to accrue for primary endpoint

# TRAILBLAZER ALZ-4

HEAD-TO-HEAD PHASE 3 STUDY COMPARING DONANEMAB TO ADUCANUMAB



## TRIAL DESIGN & TIMELINE

- 200 patient, 18-month treatment study measuring change in amyloid at three time points (6, 12 & 18 months)
- Enrollment to be completed 1Q 2022
- Primary readout at 6-month time point; expected in the second half of 2022

## GOALS & RATIONALE

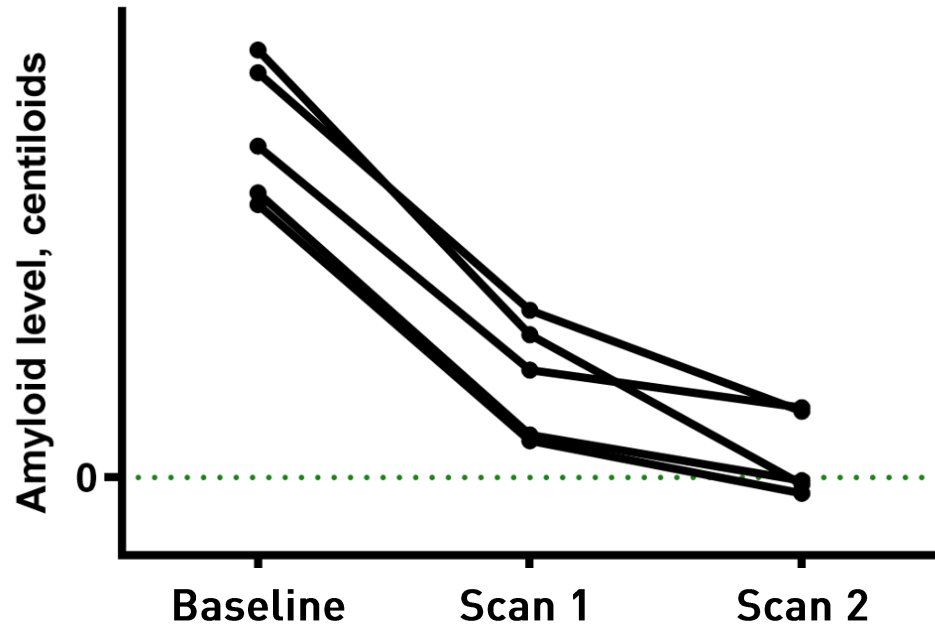
- To assess superiority of brain amyloid plaque clearance in early symptomatic population
- First trial to provide direct comparison between amyloid-lowering agents for biomarker efficacy
- Given plaque lowering is FDA-approved surrogate biomarker for efficacy, the magnitude and speed of plaque lowering should be critical basis of comparison

# N3PG4 (LY3372993)

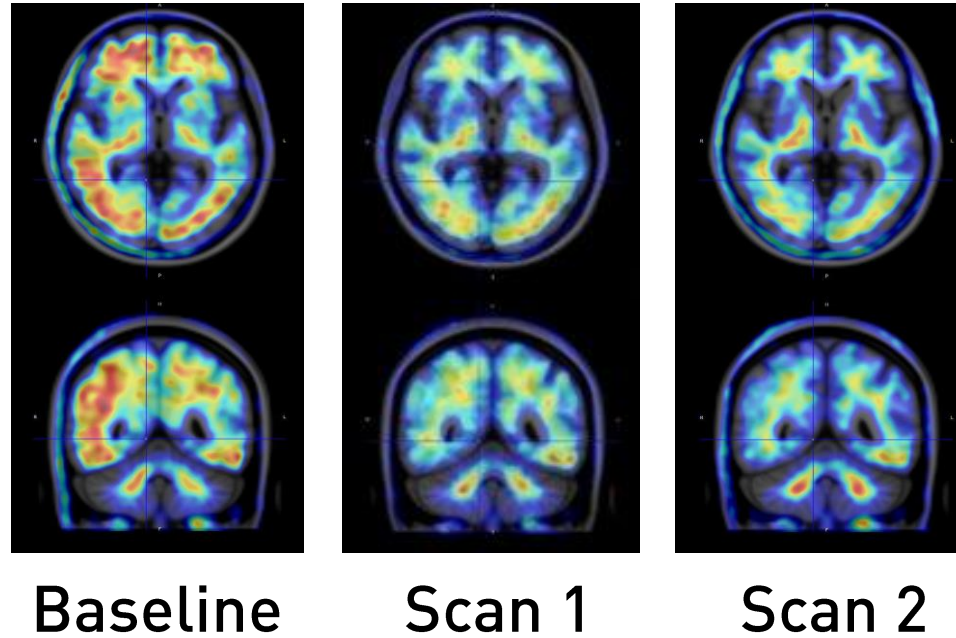
ONGOING PHASE 1B SHOWS DEEP PLAQUE CLEARANCE AND SAFETY PROFILE CONSISTENT WITH AMYLOID-LOWERING CLASS



## Phase 1 Data



### Amyloid PET Scans for a Patient



- Aiming for next generation N3pG **amyloid lowering agent** with flexible dosing regimens, including subcutaneous, to address the different needs of the Alzheimer's disease population
- **Prioritizing** safety and more-convenient patient experience

Note: Figures in parenthesis indicate standard deviation; CL level of zero indicates average amyloid level of a cognitively normal young control subject

Based on Phase 1 results, potential start of pivotal studies are expected in 2022

# TARGETING TAU FOR ALZHEIMER'S DISEASE

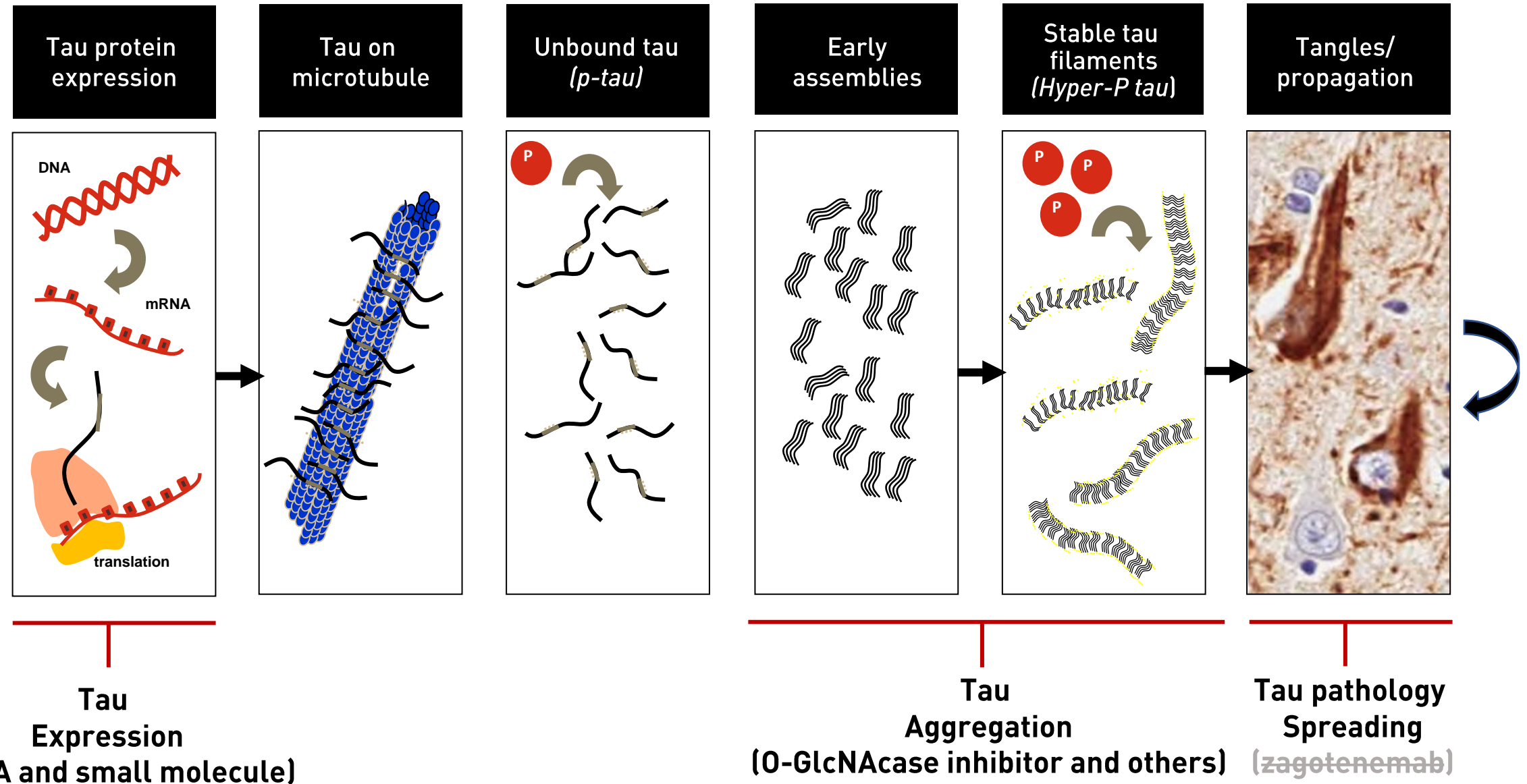


## Addressing various phases of tau pathology

**Suppress Tau expression** using multiple approaches

**Block Tau aggregation** with small molecule approaches, such as OGA inhibitor

**Stop Transneuronal Tau pathology spreading**



Note: zaganemab development was discontinued

Not for promotional use

# O-GlcNAcase (OGA) INHIBITOR (LY3372689)

AN ORAL ANTI-TAU SMALL MOLECULE WITH THE POTENTIAL TO MODIFY ALZHEIMER'S DISEASE



## PRE-CLINICAL DATA

### Hit the target

- ✓ Demonstrated >80% enzyme occupancy (EO)

### Reduced AD pathology

- ↓ 50% reduction of tau pathology

### Slowed neurodegeneration

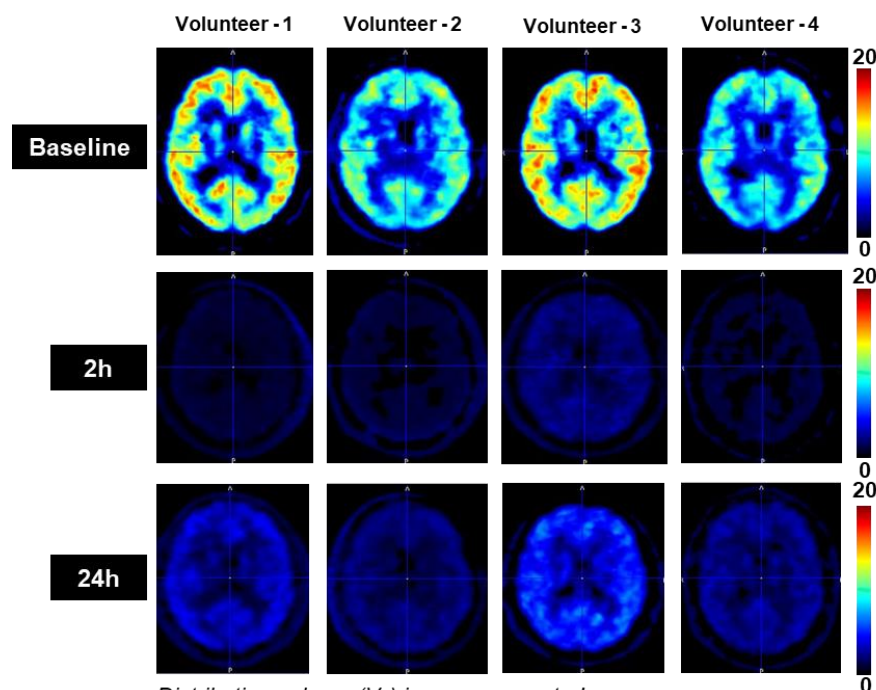
- ↓ 40% reduction of brain atrophy

### Improved memory decline in mouse models

## PHASE 1 DATA

- No dose limiting Adverse Events
- >80% EO achieved at 1mg dose
- Robust EO and manageable safety profile confidently inform Phase 2 dosing

### OGA Inhibitor Demonstrates Strong Enzyme Occupancy After a Single Dose of 1mg



Distribution volume ( $V_T$ ) images generated using Logan graphical analysis and arterial input function

## PHASE 2 DESIGN

### Target population

- Early symptomatic Alzheimer's disease
- Evidence of tau pathology by PET scan

### Trial Design

- Three arms (placebo, high dose, low dose)
- Randomized, 110 patients/arm
- Estimated enrollment completion: 2H 2022

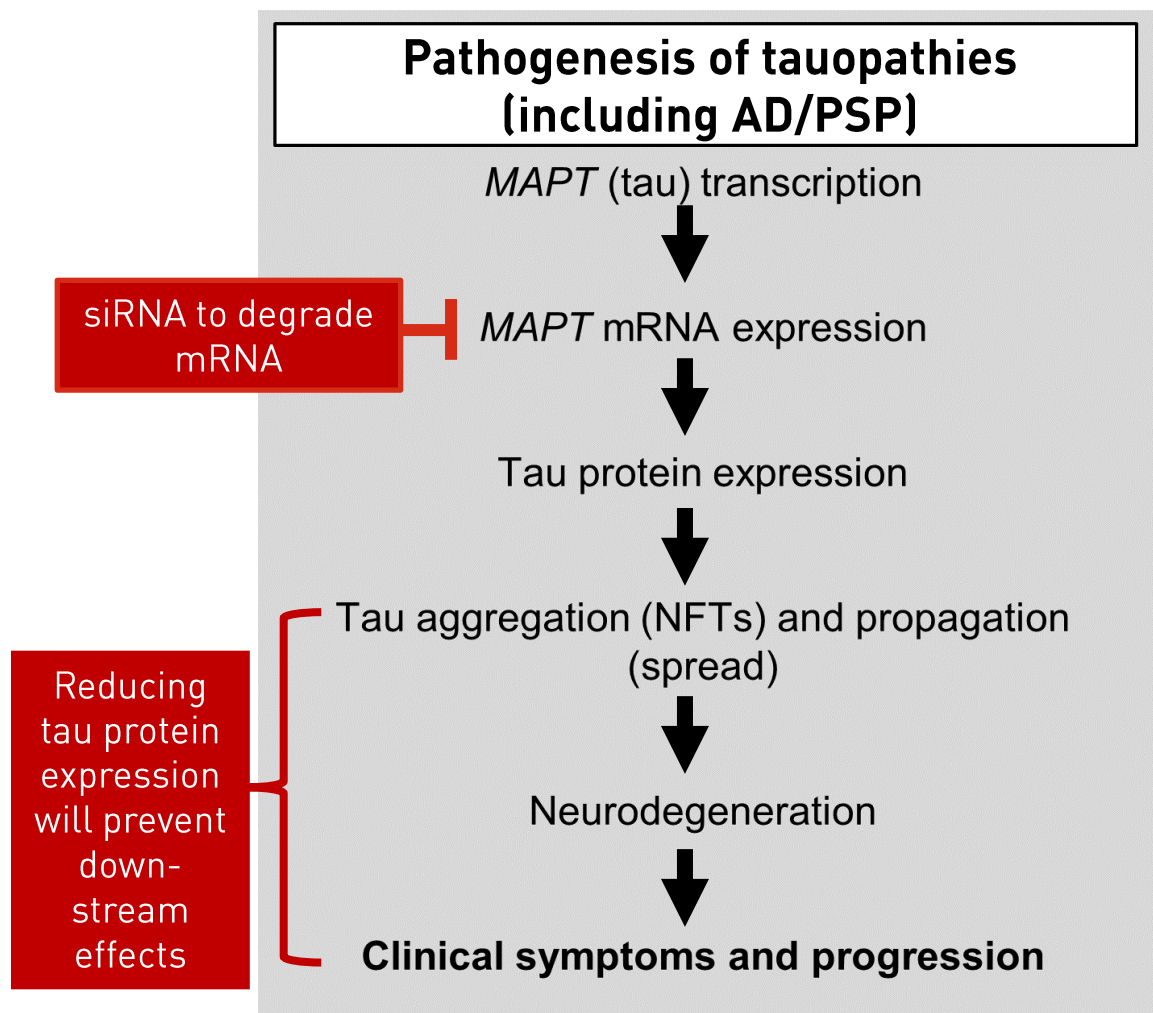
### Primary endpoint

- Integrated Alzheimer's Disease Rating Scale (iADRS) at 76-124 weeks with common close design in those with intermediate levels of brain tau

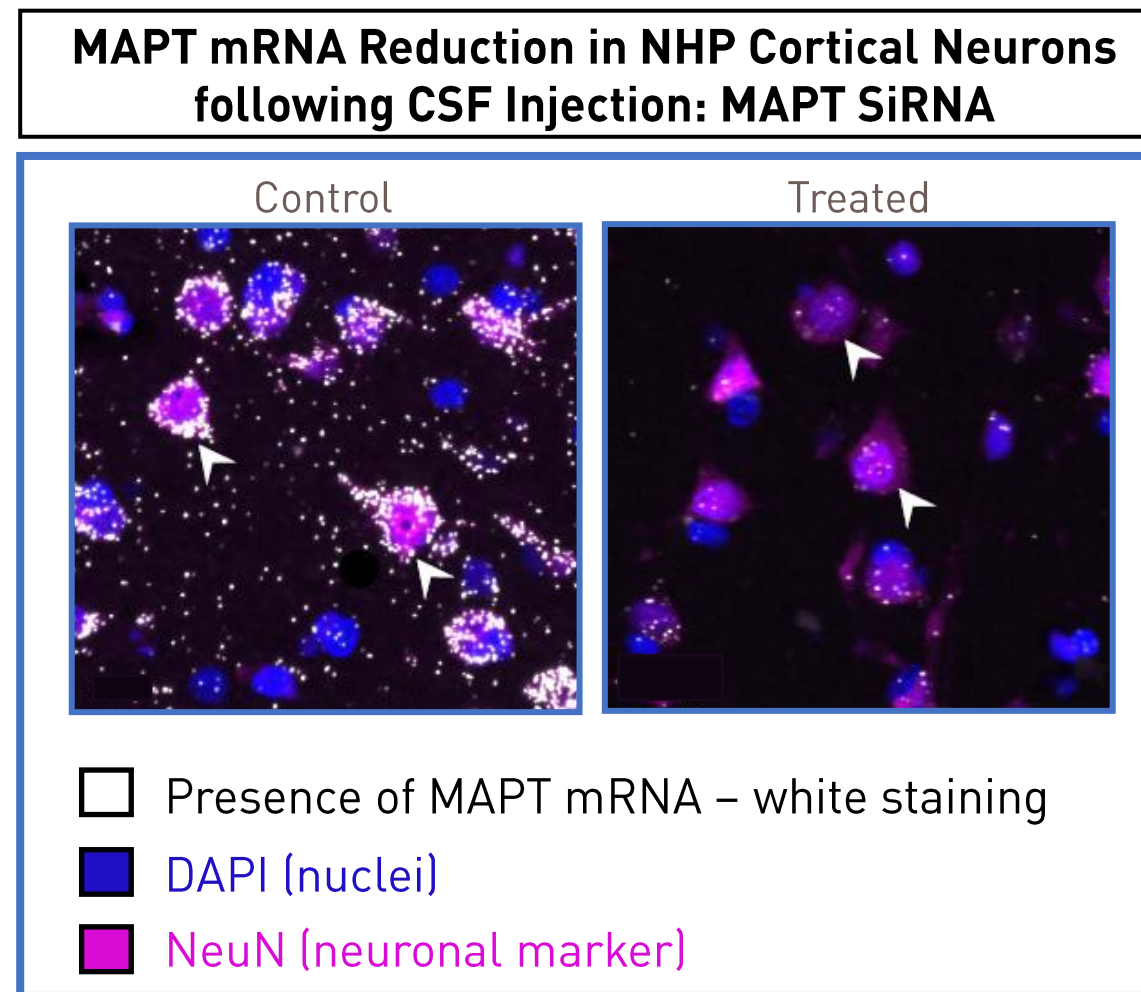
### Independent Data Safety Monitoring reviews

# ANTI-TAU siRNA DEVELOPMENT

## Tau therapeutic hypothesis...



## MAPT (Tau) mRNA Reduction...



# PREVAIL THERAPEUTICS: FOCUS ON GENE THERAPY

THREE ON-GOING PHASE 1/2 CLINICAL TRIALS (OPEN-LABEL, DOSE-ESCALATING)



## REPLACE GBA1 ENZYME

**PD-GBA  
Patients**

**PR001**



**Type 2 Gaucher  
Patients**

**PR001**



**FTD-GRN  
Patients**

**PR006**



Moderate to severe Parkinson's disease

Single or biallelic GBA1 mutations

Anticipated LPE: Mid-2022

Neurological signs & symptoms consistent with Type 2 Gaucher disease

Biallelic GBA1 mutations

Anticipated LPE: 2023

Single pathogenic GRN mutation

30-80 years old

Symptomatic disease stage

Anticipated LPE: 2023

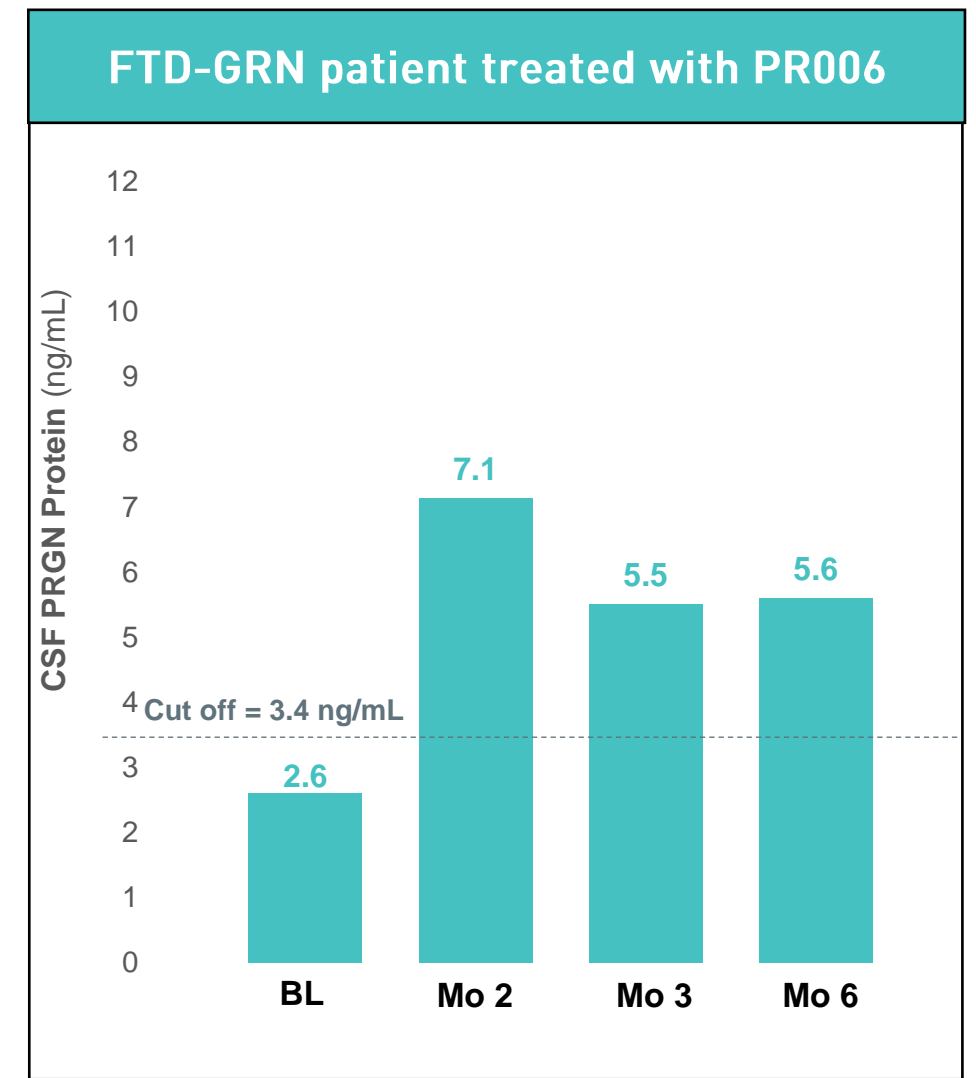
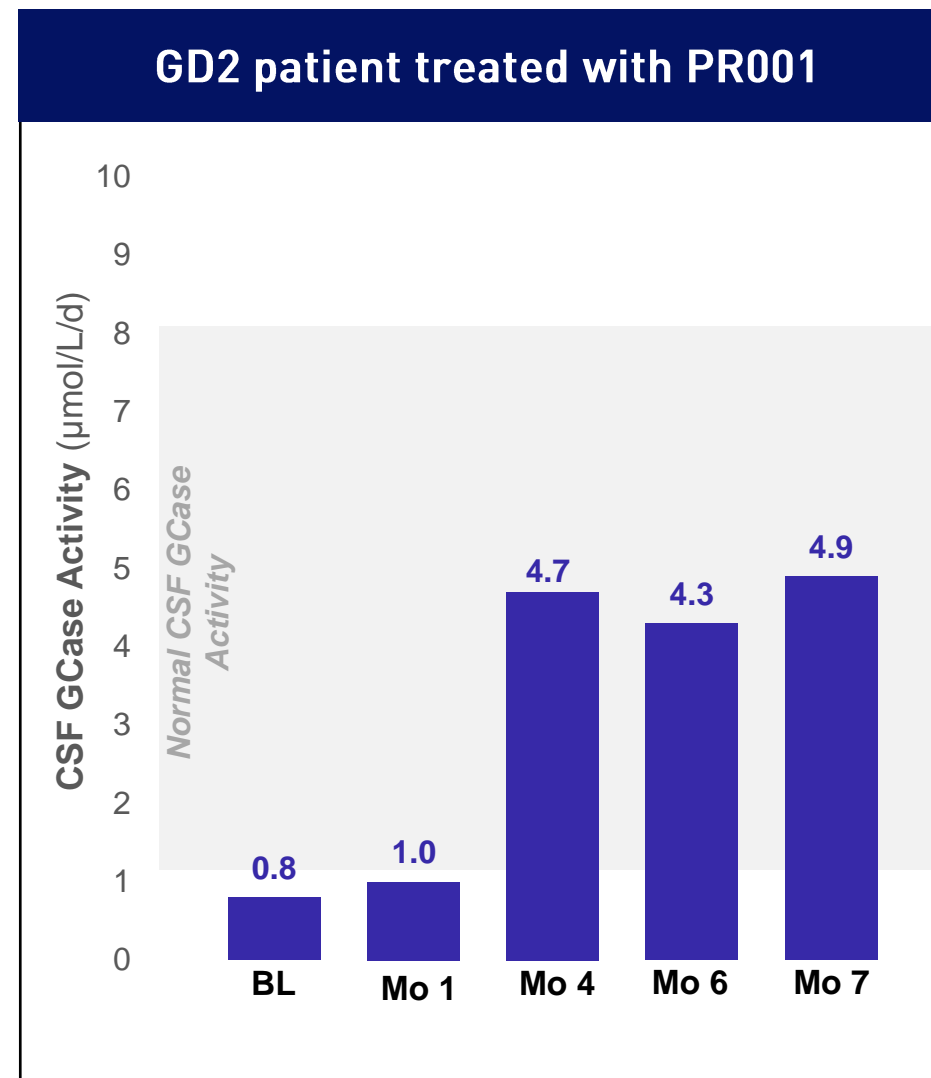
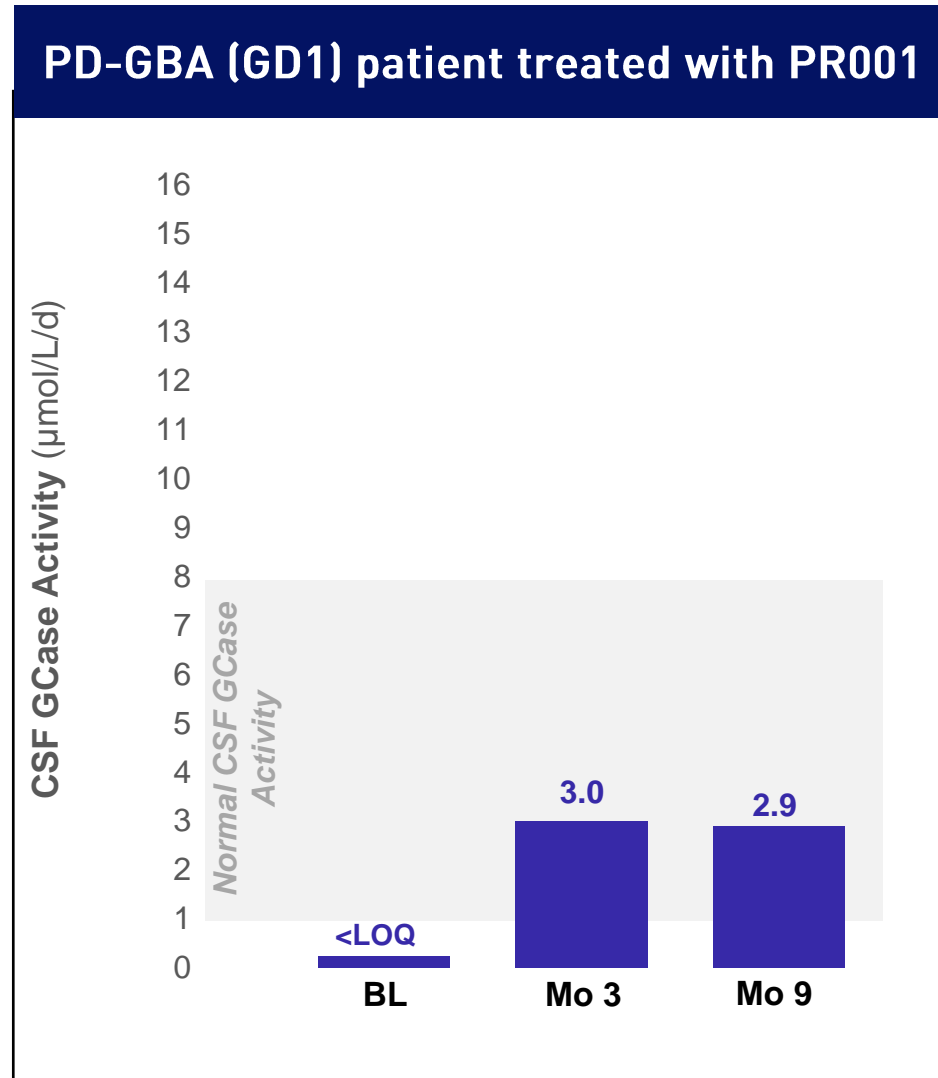
PD-GBA = Parkinson's disease glucosylceramidase beta; FTD GRN = Frontotemporal dementia progranulin; LPE = Last Patient Enrolled

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2021 **INVESTMENT COMMUNITY MEETING**

# PREVAIL THERAPEUTICS: PRELIMINARY BIOMARKER DATA

## KEY CSF BIOMARKER GOAL ACHIEVED ACROSS ALL THREE TRIALS



CSF = Cerebrospinal fluid; GBA1 = mutation associated with Parkinson's disease subtype; T2 = type 2; GRN = mutation associated with frontotemporal dementia subtype; LOQ = Limit of Quantification; BL = Baseline; Mo = Month; GCCase = Glucocerebrosidase; PRGN = Progranulin

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# CHRONIC PAIN IS A PUBLIC HEALTH CRISIS

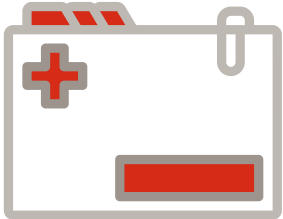


**1.7B**



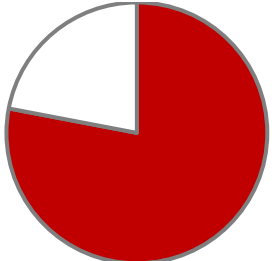
**1 in 5 people suffer from chronic pain globally <sup>1</sup>**

**#1**



**Most common cause of long-term disability<sup>2, 3</sup>**

**78%**



**Of chronic pain patients are unsatisfied with treatment<sup>4</sup>**

**> \$1T**



**Annual cost of chronic pain<sup>5,6</sup> – more than cancer, heart disease and diabetes combined<sup>7</sup>**

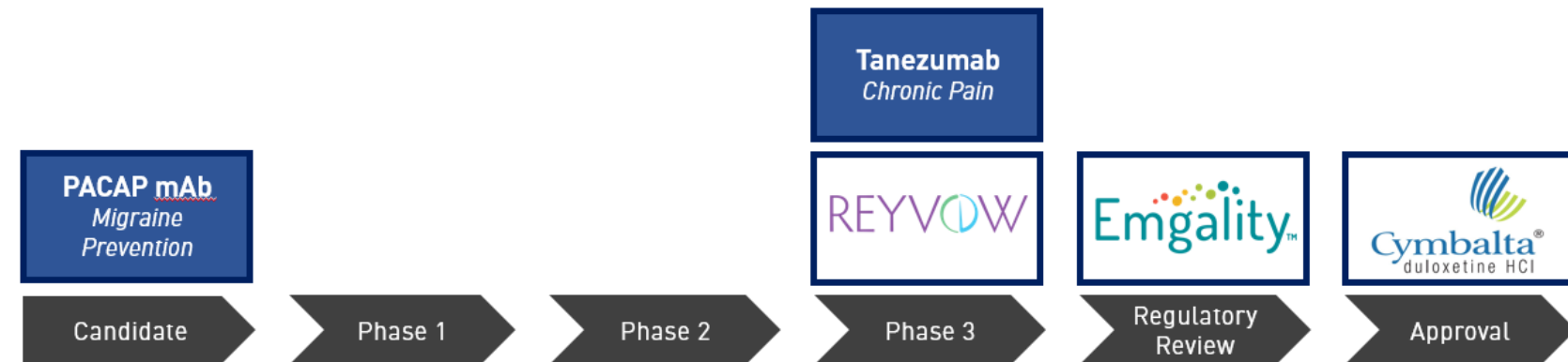
<sup>1</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3201926/>  
<sup>2</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6676152/#bib5>  
<sup>3</sup> <https://www.painresearchforum.org/news/114659-worldwide-scientific-and-policy-response-problem-chronic-pain>  
<sup>4</sup> <https://pae-eu.eu/wp-content/uploads/2017/07/PAE-Survey-2017-poster-for-web.pdf>  
<sup>5</sup> Combined estimates from US, EU, JP  
<sup>6</sup> <https://www.ncbi.nlm.nih.gov/books/NBK92521/>; <https://www.businesswire.com/news/home/20170519005141/en/Societal-Impact-of-Pain-Costs-the-EU-up-to-441-Billion-Euros-Annually>  
<sup>7</sup> <https://www.sciencedirect.com/science/article/pii/S1526590012005597>

# WHERE WE WERE...



## PAIN PIPELINE (DECEMBER 2018)

Gap existed between late phase and discovery pipeline



# DEVELOPING INNOVATIVE SOLUTIONS FOR PAIN



## STRATEGIC APPROACH

### Challenges for Pain Research

- Animal models do not identify responsive populations
- Many credible targets but few with POC in patients

### Rapid Clinical POCs

- Lilly launched the first Pain Master Protocol (PMP)
- Three assets entered PMP to date.
- Expected to have 13 new POC readouts by 2023-end (including 12 from PMP)

### Building Neuronal Health Platform

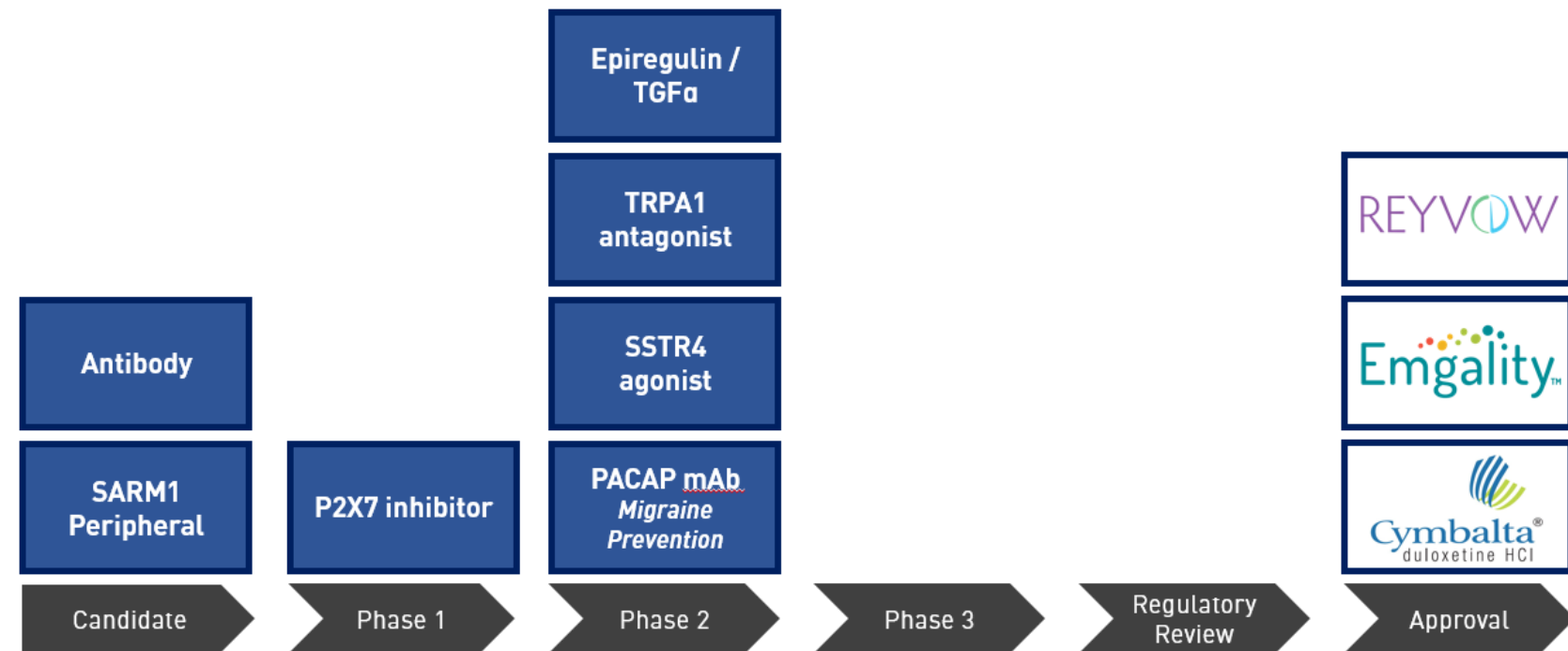
- IND-ready programs for neuronal degeneration
- Evaluating targets to repair damage

### Business Development

- Four Pain deals in 3 years (SSTR4 agonist, TRPA1 antagonist, P2X7 inhibitor, and SARM1 inhibitor)

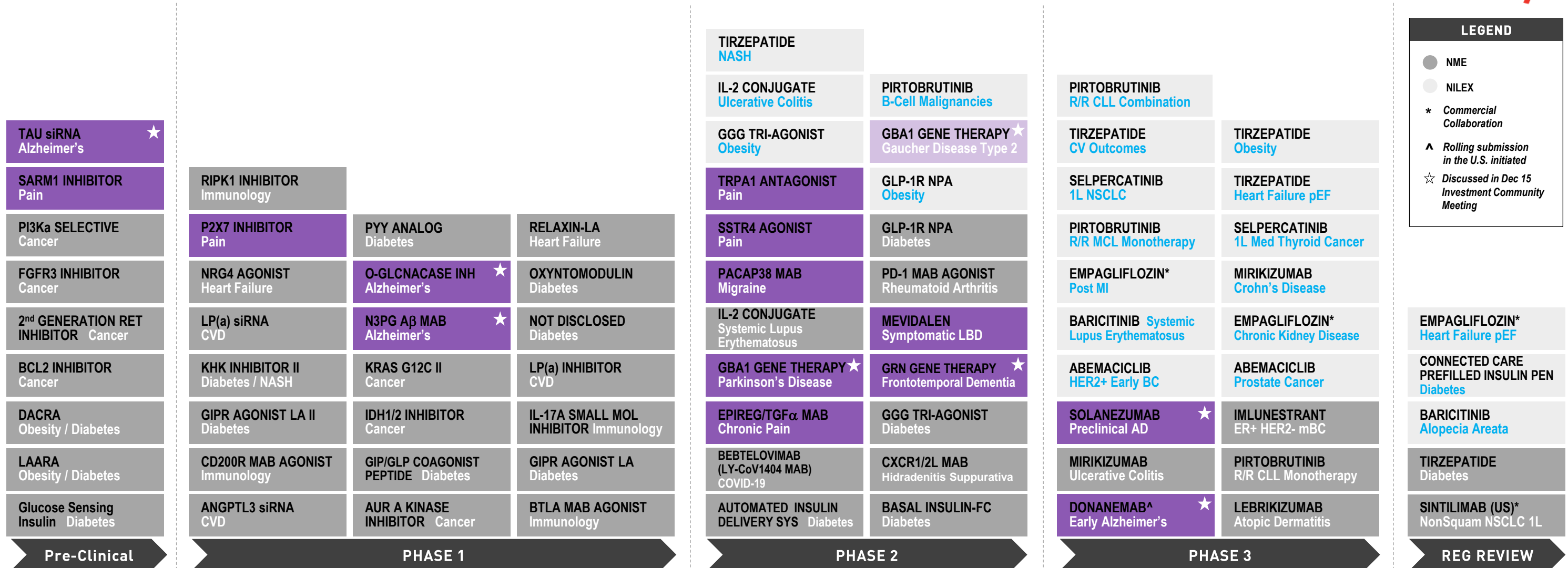
## PAIN PIPELINE (DECEMBER 2021)

Lilly has significantly grown early pipeline (seven molecules between CS and Ph2 today)



# LILLY NEUROSCIENCE PIPELINE

SELECT NME AND NILEX PIPELINE AS OF OCTOBER 22, 2021



Note: select pre-clinical assets listed, most of which were discussed at the Lilly Investment Community meeting on December 15, 2021; NME = new molecular entity; NILEX = new indication or line extension

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2021 INVESTMENT COMMUNITY MEETING

# NEUROSCIENCE SUMMARY



- Lilly is an established leader with a deep commitment to advance AD research
  - Our work on amyloid imaging transformed the field and enabled the current generation of plaque-clearing antibodies
  - Our work on tau imaging raised the bar on staging AD pathology and supported our successful results in TRAILBLAZER-ALZ
  - Our ongoing work on plasma biomarkers, particularly pTau217, may enable new advances in diagnosis and disease monitoring for next generation of drug development
- Donanemab is well positioned to be a differentiated solution for patients, if approved
  - Deep and rapid amyloid removal associated with statistically significant slowing in primary endpoint
  - Multiple pathology-related biomarkers support limited dosing regimen
- Lilly is rapidly moving beyond anti-amyloid medicines for AD with novel targets using next generation platform modalities, both for neurodegeneration and pain



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