Corporate Presentation

August 2024

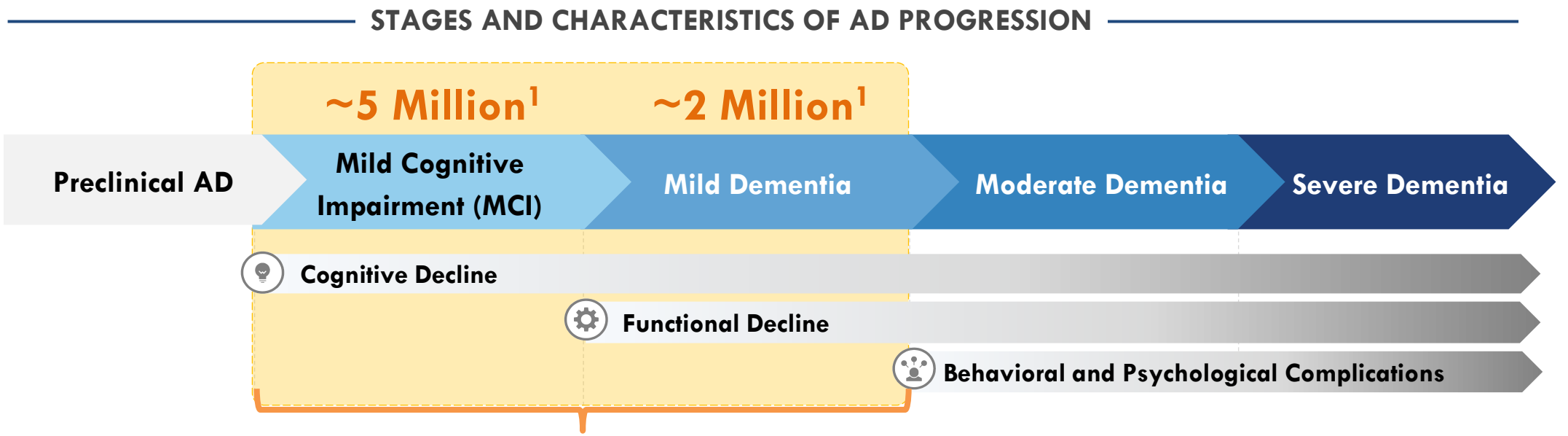
Forward-Looking Statements

This presentation contains forward-looking statements within the meaning of The Private Securities Litigation Reform Act of 1995. Any statement describing Acumen's goals, expectations, financial or other projections, intentions or beliefs is a forward-looking statement and should be considered an at-risk statement. Words such as "believes," "expects," "anticipates," "could," "would," "seeks," "aims," "plans," "potential," "will" and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Forward-looking statements include statements concerning Acumen's business, and Acumen's ability to achieve its strategic and financial goals, including its projected use of cash, cash equivalents and marketable securities and the expected sufficiency of its cash resources into the first half of 2027, the therapeutic potential of Acumen's product candidate, sabirnetug (ACU193), including against other antibodies, and the anticipated timeline for announcing the top-line results from our Phase 1 trial of a subcutaneous dosing option of ACU193. These statements are based upon the current beliefs and expectations of Acumen management, and are subject to certain factors, risks and uncertainties, particularly those inherent in the process of discovering, developing and commercializing safe and effective human therapeutics. Such risks may be amplified by the impacts of the COVID-19 pandemic. These and other risks concerning Acumen's programs are described in additional detail in Acumen's filings with the Securities and Exchange Commission ("SEC"), including in Acumen's most recent Annual Report Form 10-K and future filings and reports by Acumen. Copies of these and other documents are available from Acumen. Additional information will be made available in other filings that Acumen makes from time to time with the SEC. These forward-looking statements speak only as of the date hereof, and Acumen expressly disclaims any obligation to update or revise any forward-looking statement, except as otherwise required by law, whether, as a result of new information, future events or otherwise. In this presentation, references to cash also include cash equivalents.

Advancing a Next Generation Antibody Targeting Toxic Amyloid Beta Oligomers (AβOs) for Early Alzheimer's Disease (AD)

- Large market in need of additional treatment options
- Sabirnetug (ACU193): monoclonal antibody (mAb) highly selective for toxic AβOs
- Positive Phase 1 clinical trial results presented in 2H 2023
- Experienced leadership team with extensive AD drug development experience
- Strong balance sheet supporting clinical development plans for sabirnetug
- Phase 2 (IV) initiated in May 2024; Phase 1 (subcutaneous) TLR expected in 1Q25

Early AD Patient Population Represents Significant Market Opportunity



Early Alzheimer's Disease in the U.S.

Acumen's commercial priority

Uptake of first-generation, disease modifying, anti-amyloid beta treatment options is expected to increase, while significant unmet need and room for improvement will persist

1. 2021 Alzheimer's Association

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AD, Amyloid & Abeta Oligomers

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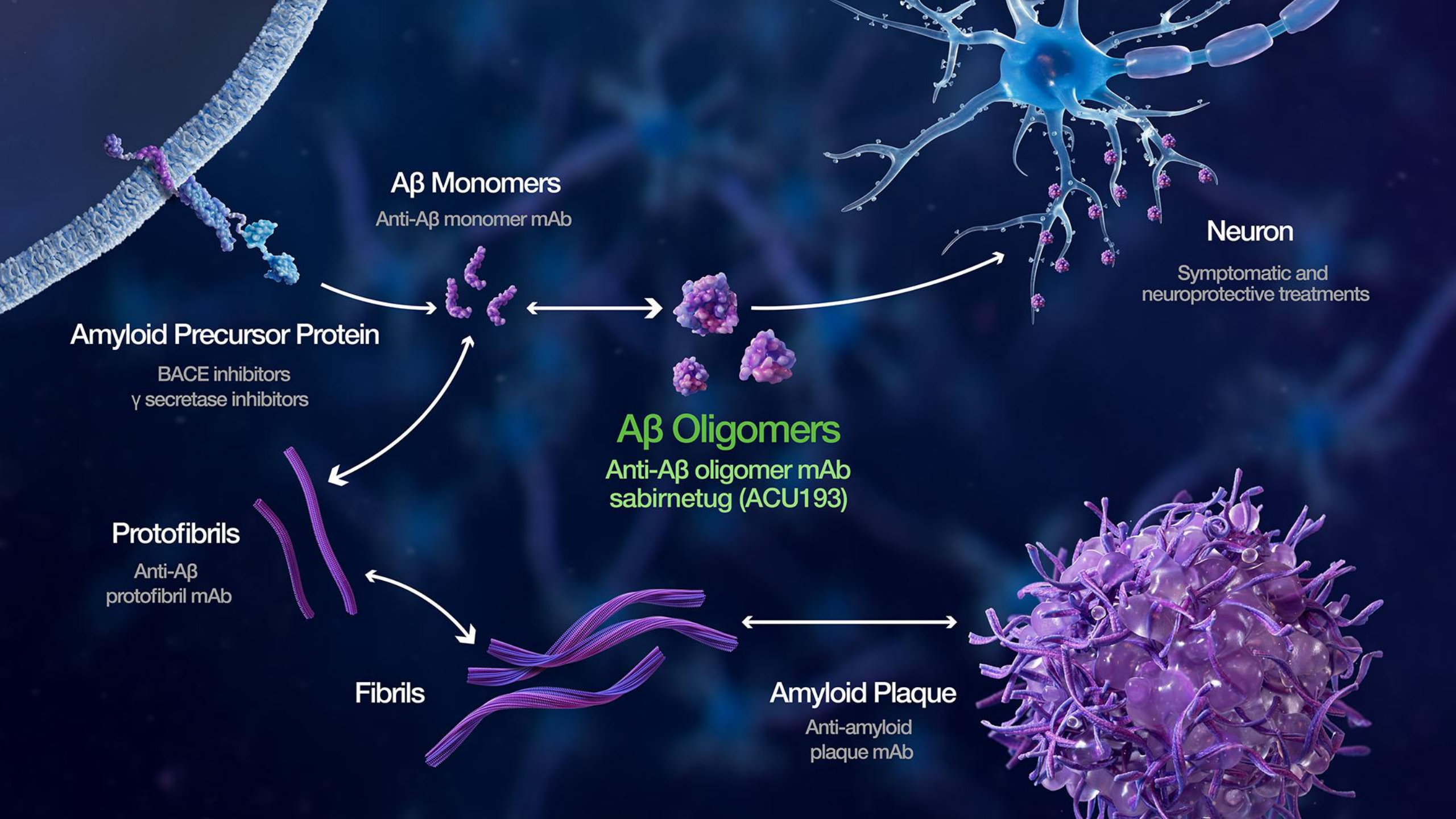
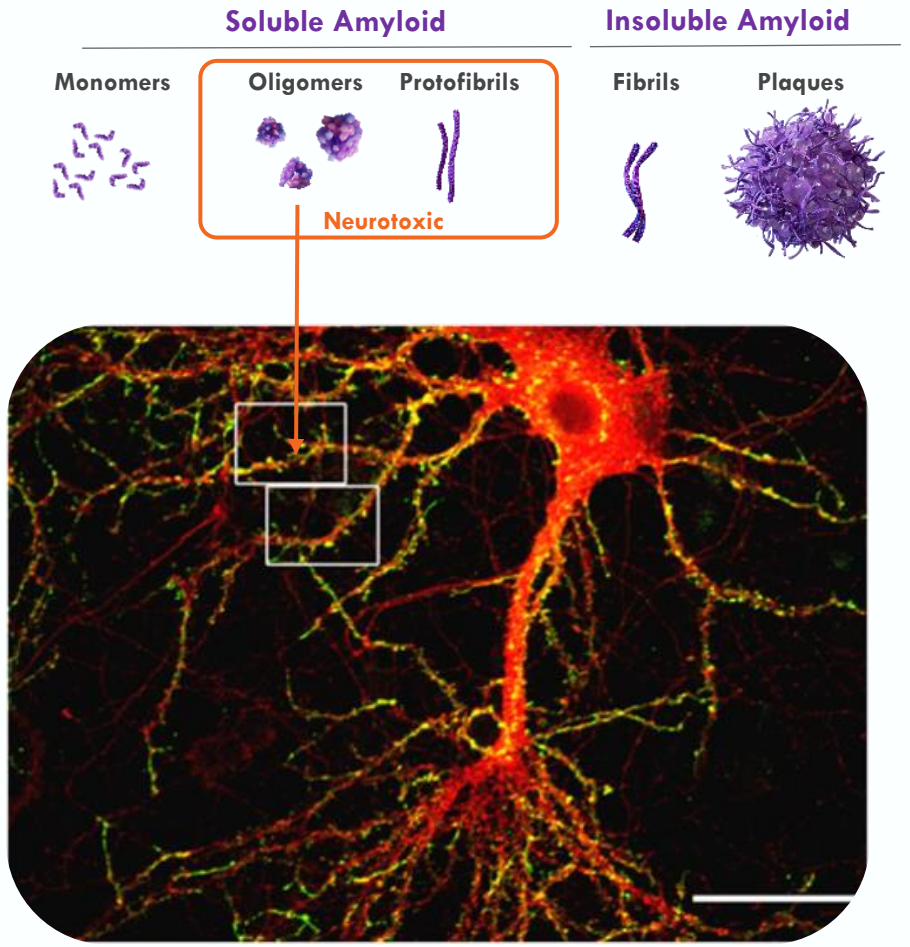

Aβ Monomers
Anti-Aβ monomer mAb
Neuron
Symptomatic and
neuroprotective treatments
Amyloid Precursor Protein
BACE inhibitors
γ secretase inhibitors
Aβ Oligomers
Anti-Aβ oligomer mAb
sabirnetug (ACU193)
Protofibrils
Anti-Aβ
protofibril mAb
Fibrils
Amyloid Plaque
Anti-amyloid
plaque mAb

Amyloid Beta Oligomers (AβOs) are Widely Recognized as Highly Toxic Agents in AD Pathophysiology

- Impair synaptic function[1]
- Contribute to impairment of memory and cognition[2]
- Induce tau hyperphosphorylation[3]



Mature hippocampal neuron and toxic AβOs bound to dendritic spines

Image Lacor et al., 2004.

1. Lacor et al., 2004 & 2007; Townsend et al., 2006; Batista et al., 2018
2. Cleary et al., 2005; Poling et al., 2008; Cline et al., 2019
3. De Felice et al., 2008; Zempel et al., 2010

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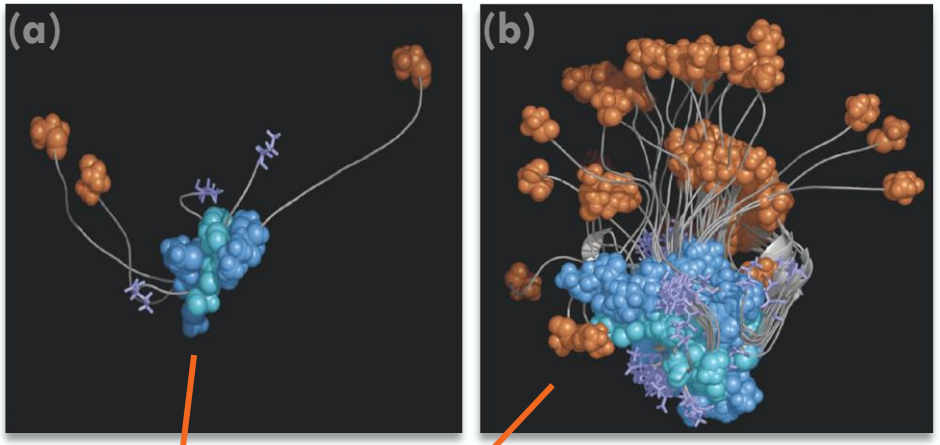
What is an Aβ Oligomer? AβOs May Consist of 2 to >200 Aβ Peptides

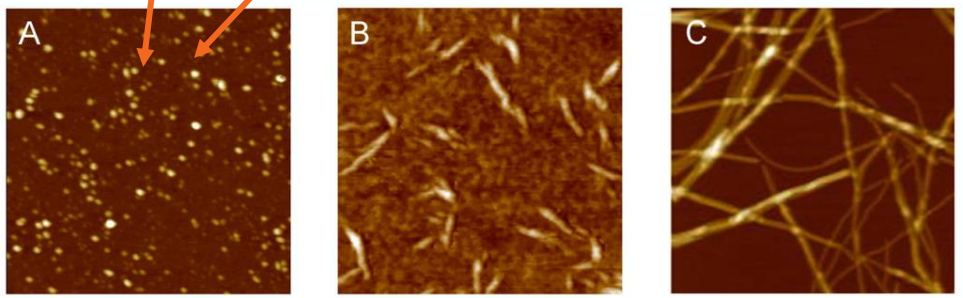
Figure 1. AβOs composed of 3 (a) and 18 (b) Aβ peptides are depicted below.



Source: Kelley et al. J Chem Physics 2008.

Quaternary structures of Aβ oligomers, protofibrils, and fibrils

Figure 2. Atomic force microscopy images of representative steps of amyloid aggregation: (A) oligomers; (B) protofibrils; (C) mature fibrils. Scan size 1.0 μm. Z range (A) 8.0 nm; (B) 15 nm; (C) 20 nm.



Source: Relini et al. Biomolecules 2014.

Sabirnetug: Potential Best-in-Class Immunotherapy for Early AD

Sabirnetug's High Selectivity for Toxic AβOs May Provide Meaningful Cognitive Efficacy and Improved Safety

Rationally Designed for Improved Efficacy & Safety

Humanized, affinity matured mAb developed to target toxic Aβ oligomers

> 500-fold greater selectivity for AβOs over Aβ monomers

> 85-fold greater selectivity for AβOs over Aβ fibrils

IgG2 subclass mAb with reduced effector function

Large Pharma Discovery

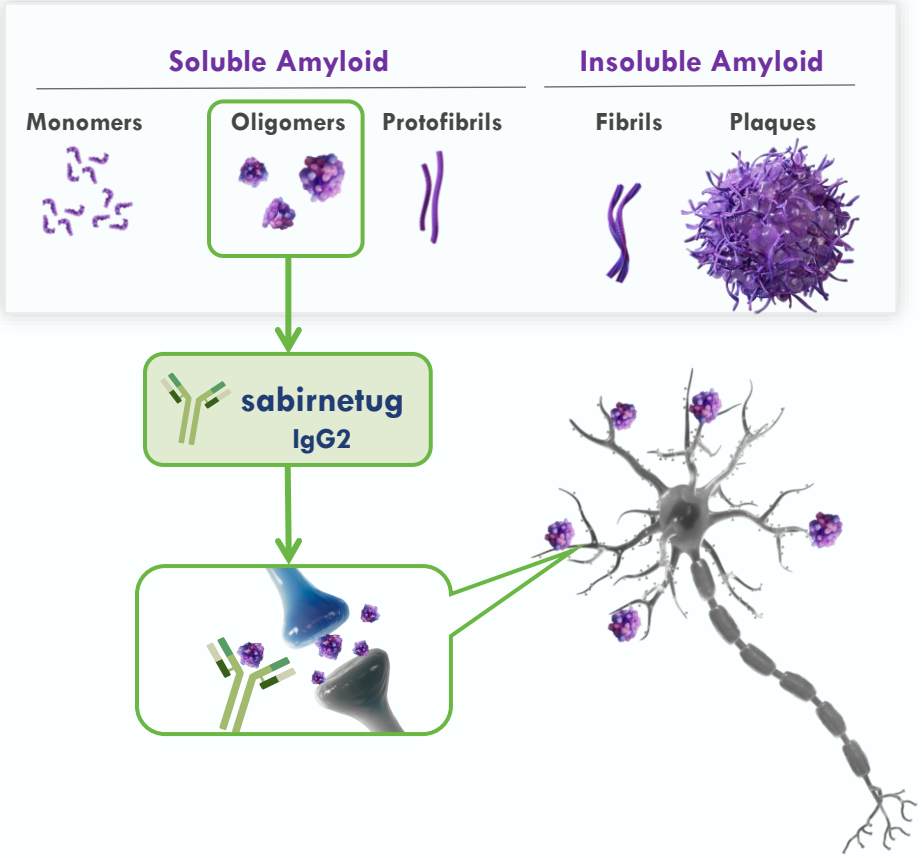
Sabirnetug discovered in collaboration with Merck & Co.

Acumen holds exclusive program rights with no future financial or other obligations due to Merck

Encouraging FDA Interactions

FDA Fast Track designation for the treatment of early Alzheimer's disease

FDA End of Phase 2 meeting in 4Q 2023



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Sabirnetug: Value Proposition

The Alzheimer's disease market is at a **key inflection point** with **recent and expected approvals** paving a new path for the treatment of AD …

… and **sabirnetug** is well-positioned to emerge as a potential **treatment of choice**.

Market will likely remain consolidated with Aβ therapies emerging as the primary treatment option over the next few years

Stakeholders are encouraged about the advancements in the AD treatment landscape and are working together to enable broader patient access

With potential clinical and safety benefits conferred by AβO selectivity, sabirnetug has the opportunity to be a treatment of choice in the broader early AD population

Positive INTERCEPT-AD Phase 1 Results for Sabirnetug

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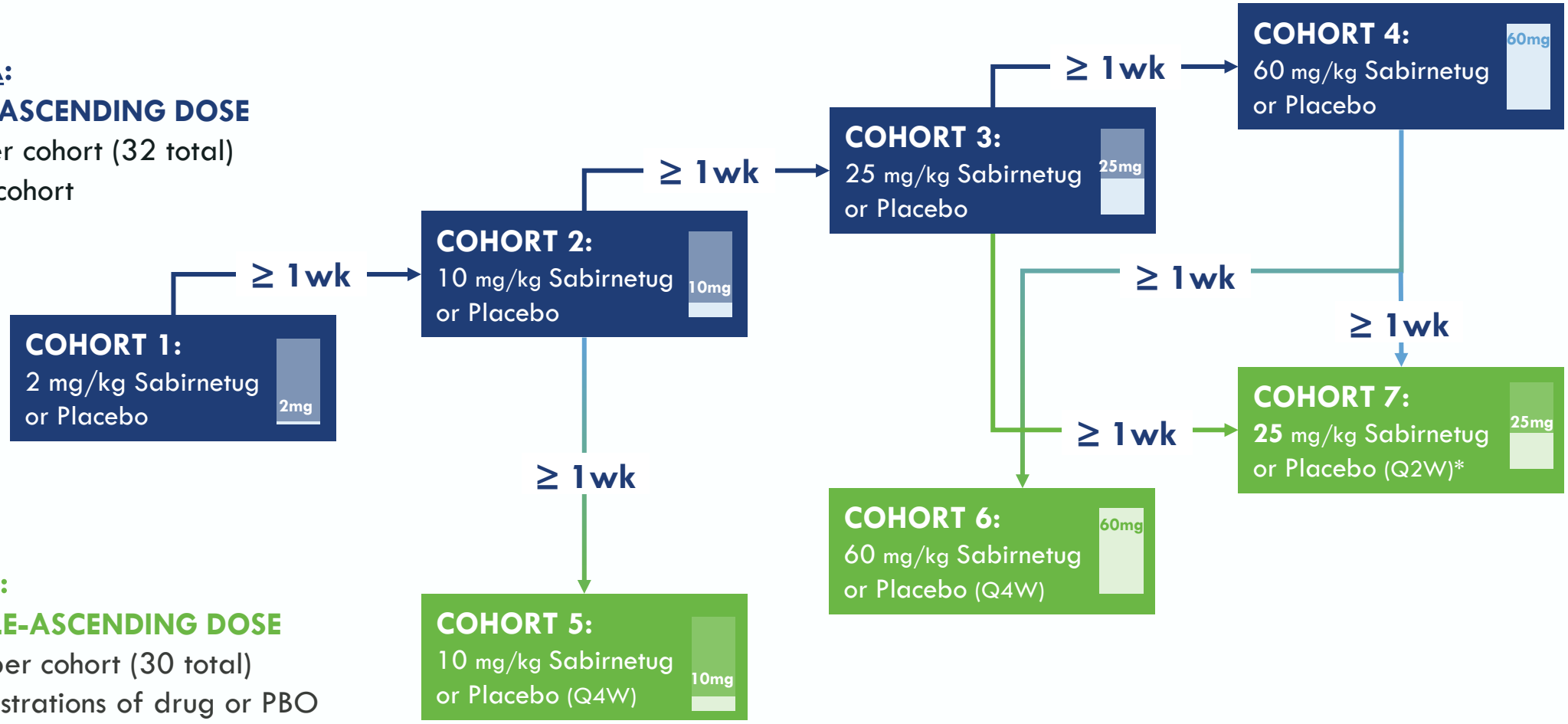
INTERCEPT-AD: A Randomized Placebo Controlled Phase 1 in Early AD Patients



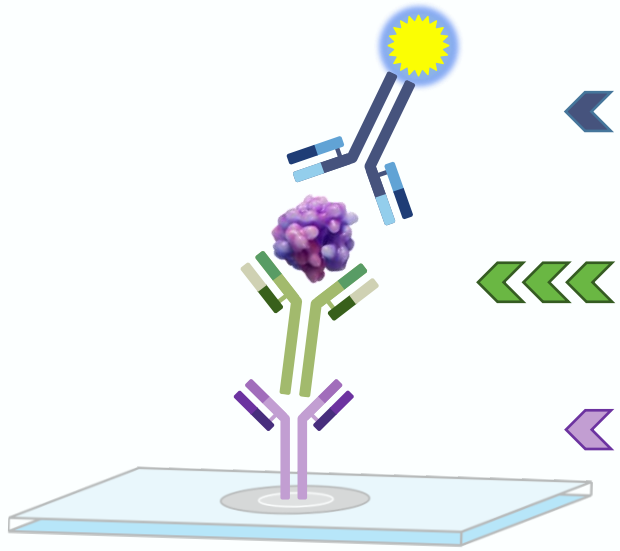
Q2W: Dosing every two weeks; Q4W: Dosing every four weeks.

Target Engagement Assessed by Measuring Sabirnetug-AβO Complex in CSF

- Novel assay configuration tailored to selectively detect sabirnetug-AβO complex in CSF as direct measure of target engagement
- Translated for clinical use from a preclinical assay developed by Merck that showed sabirnetug engages target AβOs in transgenic mouse brain (tg2576) in dose dependent manner

(please see slide 41 for more information)

MSD S-Plex (Turbo) Immunoassay



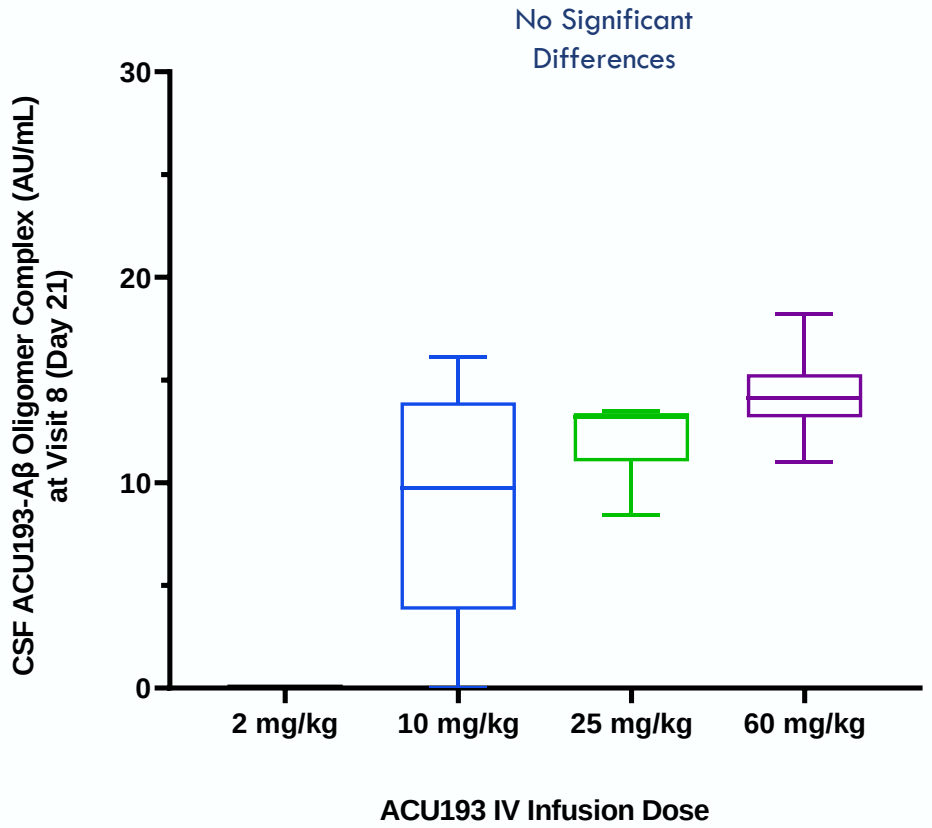
AβO selective detection
(anti-AβO mAb)

Only Sabirnetug-AβO complex is measurable

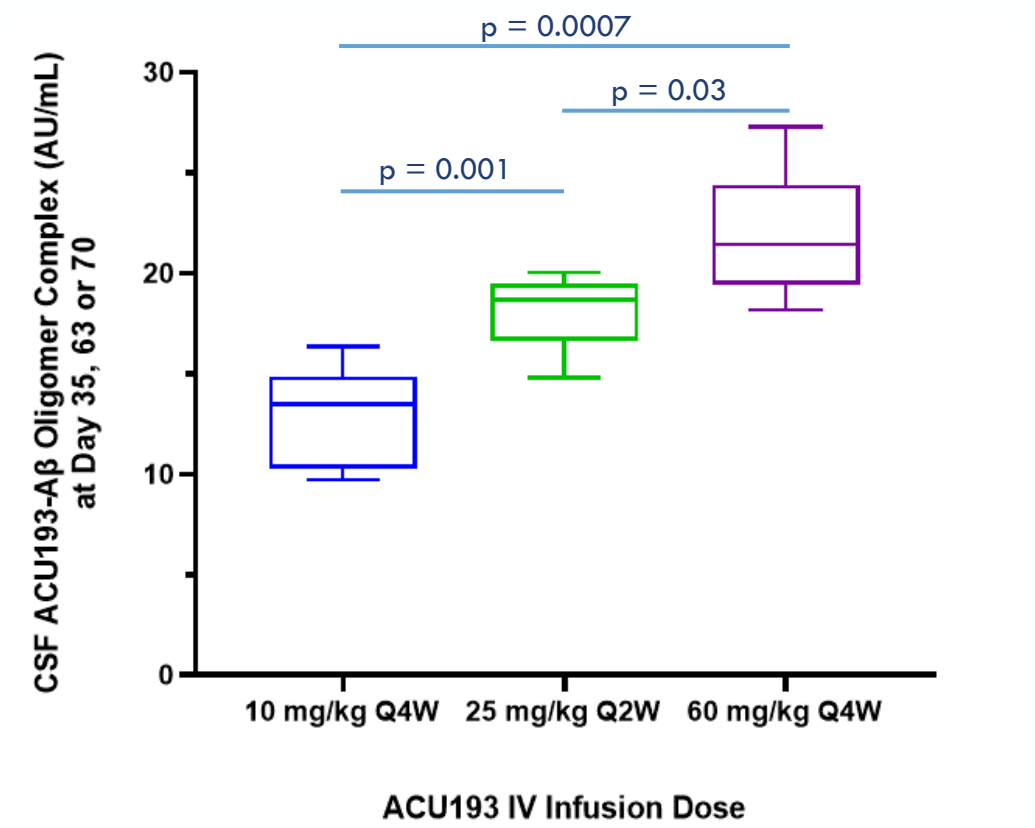
Sabirnetug drug specific capture
(anti-sabirnetug idiotype mAb)

Target Engagement of Sabirnetug with AβOs is Dose Proportional

Single Dose Cohorts



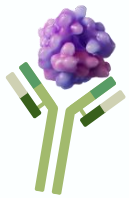
Multiple Dose Cohorts*



*One patient from Cohort 5 (10 mg/kg Q4W) excluded because only received one administration of drug (study drug discontinued after lacunar infarct).

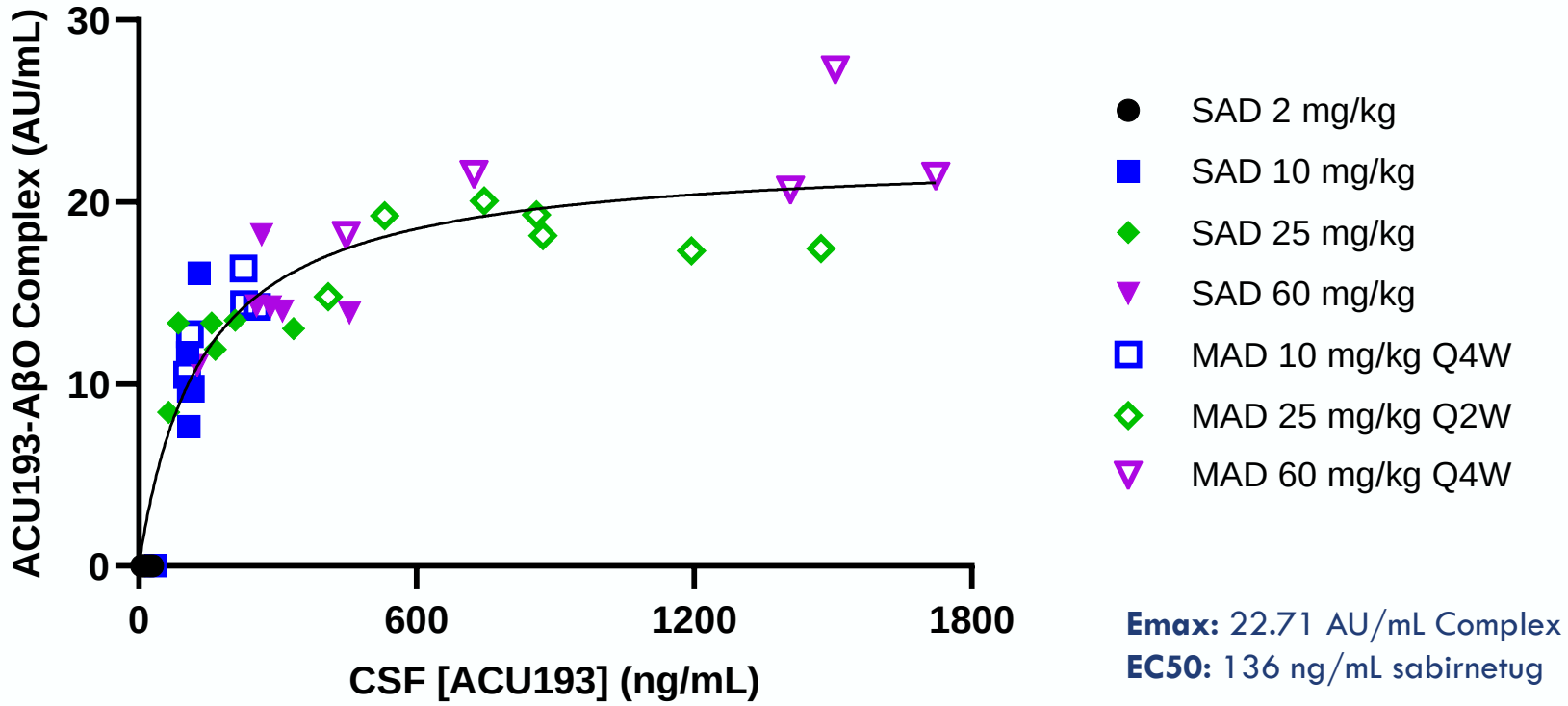
Doses Approaching Maximal Target Engagement Support Sabirnetug AβO Mechanism and Helped Guide Dose Selection for Next Study Phase

Target Engagement



Sabirnetug-AβO Complex

Single & Multiple Dose Cohorts - Exposure Response Relationship (Emax Model)

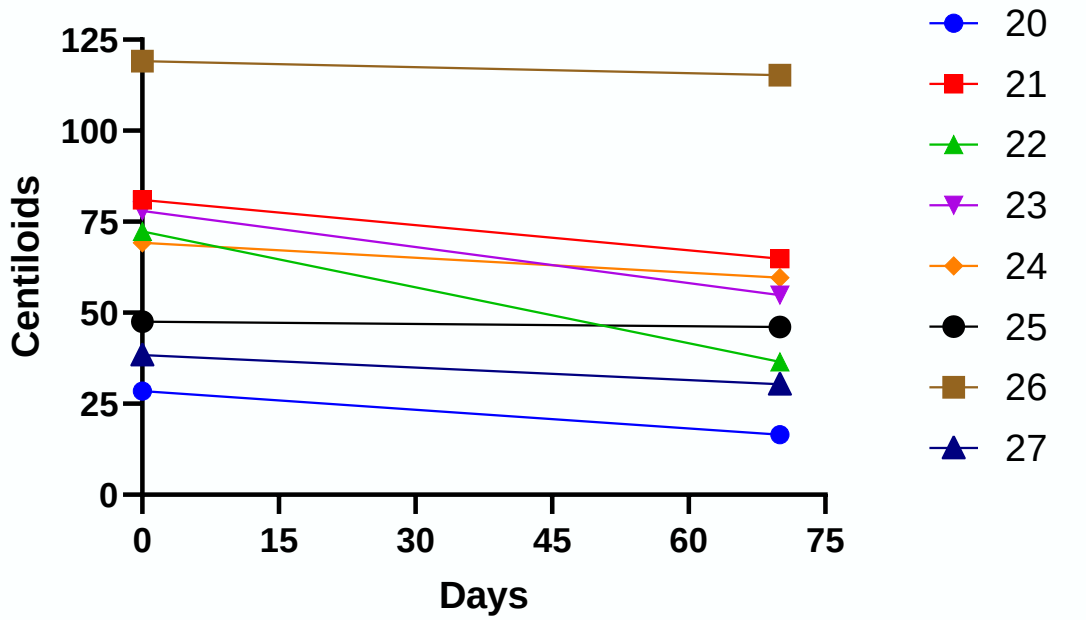


Emax: 22.71 AU/mL Complex
EC50: 136 ng/mL sabirnetug

*One patient from Cohort 5 (10 mg/kg Q4W) excluded because only received one administration of drug (study drug discontinued after lacunar infarct).

Nearly All Sabirnetug-Treated Patients in High Dose MAD Cohorts Showed Reductions in Plaque Load After Three Doses at 63 or 70 days

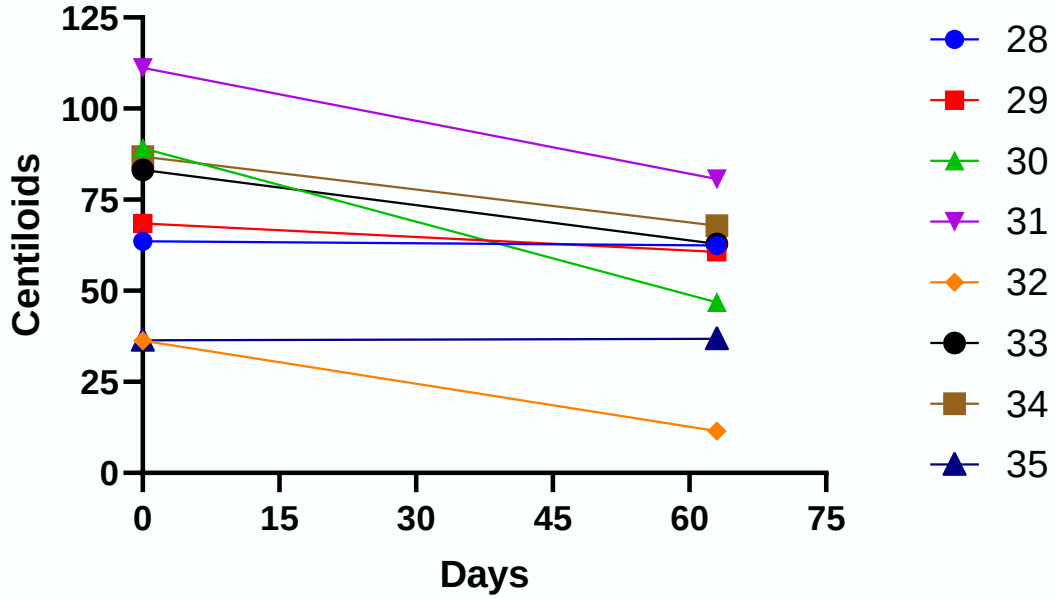
25 mg/kg Q2W MAD



Mean reduction in amyloid plaque

Δ (absolute value, centiloids)	13.7
Δ (%, centiloids)	20.6%

60 mg/kg Q4W MAD



Mean reduction in amyloid plaque

Δ (absolute value, centiloids)	18.1
Δ (%, centiloids)	25.6%

Plaque load based on florbetapir PET

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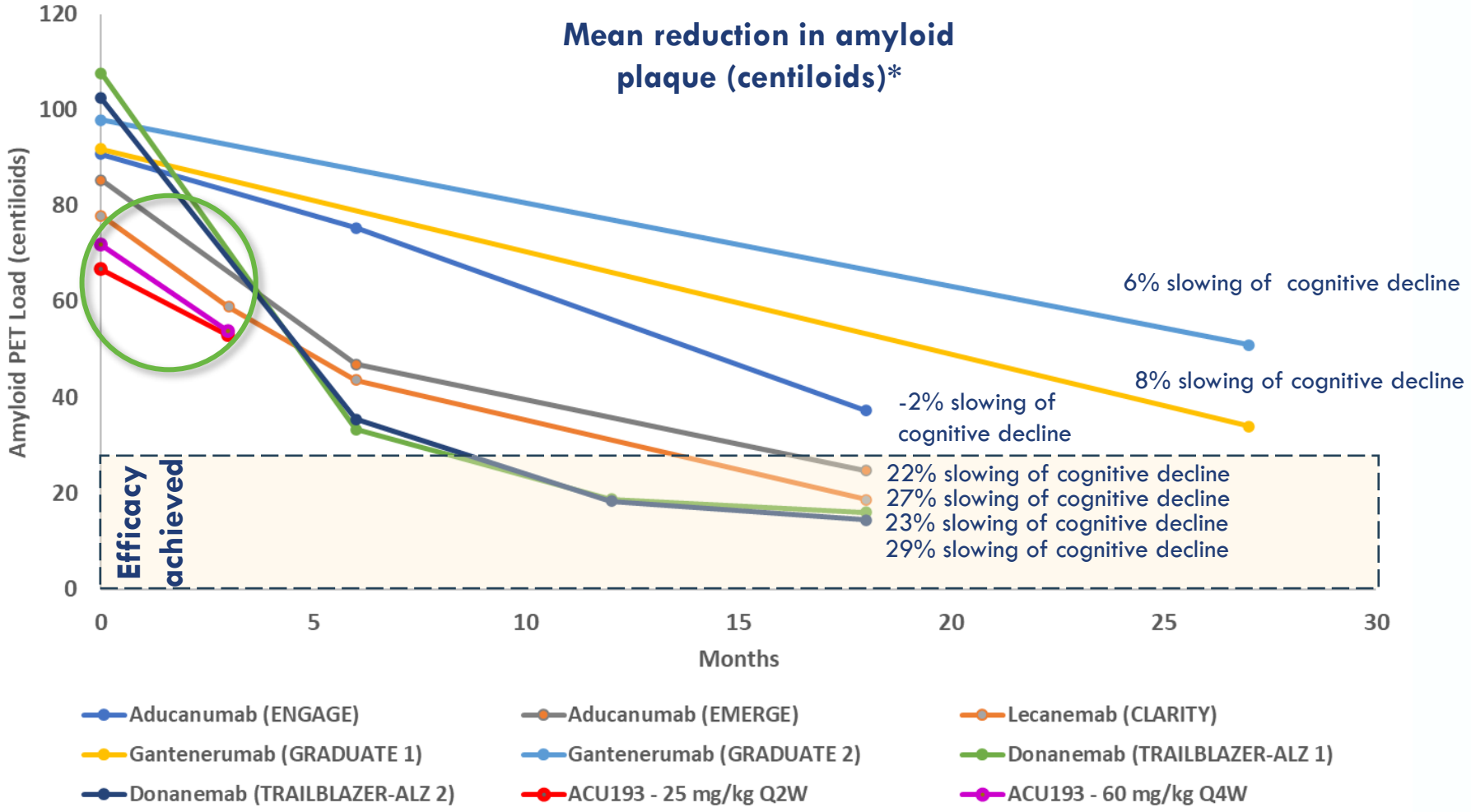
Highest Doses of INTERCEPT-AD Reduced Amyloid Plaque at Similar Rate and Magnitude to Lecanemab at Comparable Timepoints

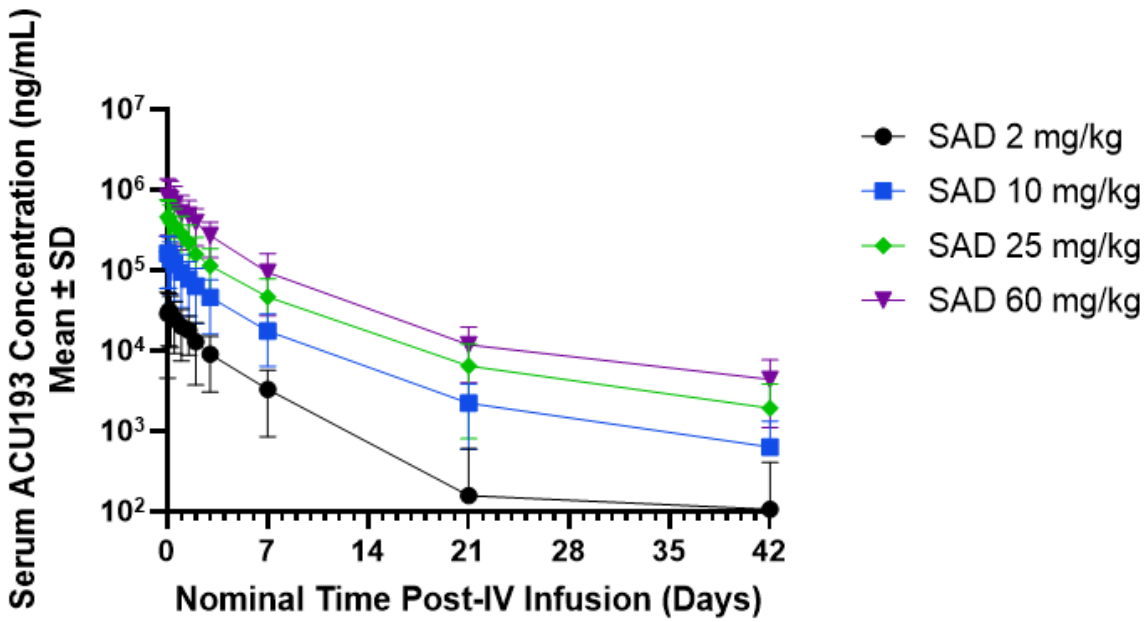


Acumen Pharmaceuticals, data on file; van Dyck (2023), NEJM (amyloid PET reduction estimated from graphs).

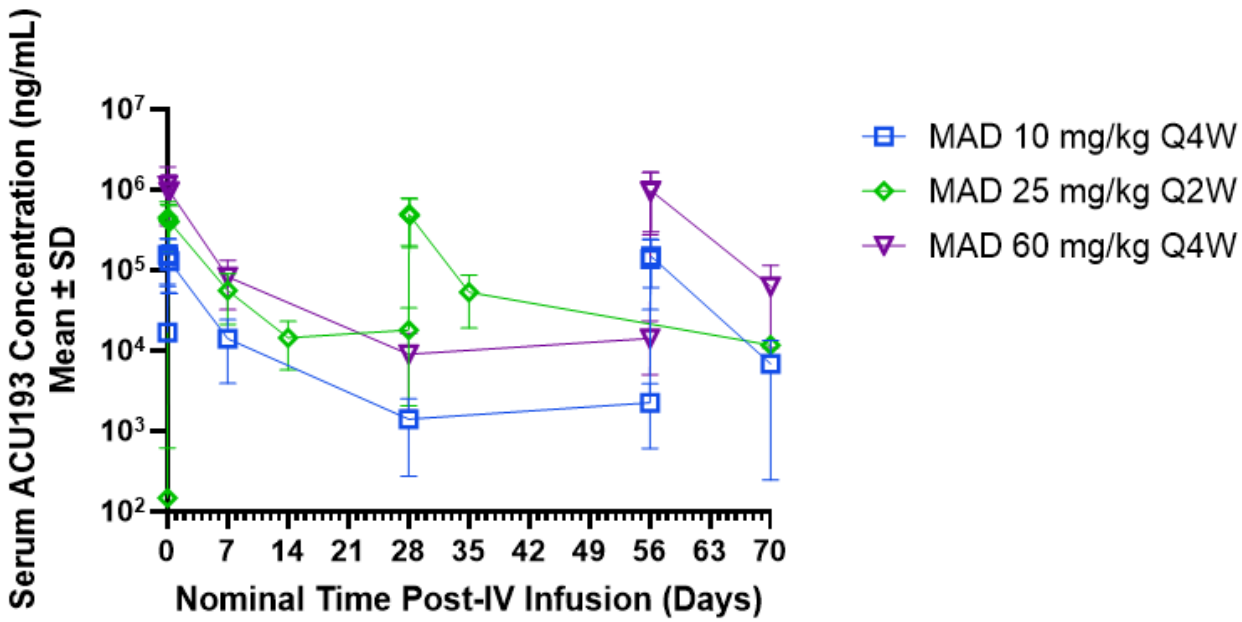
*There have been no head-to-head clinical trials between the product candidates listed above. Study designs and protocols for each product candidate were different, and as a result, results may not be comparable between product candidates.

Sabirnetug Serum Exposure is Dose Proportional Without Accumulation

Single Dose Cohorts



Multiple Dose Cohorts



Estimated serum terminal $T_{1/2}$ of 5-7 days

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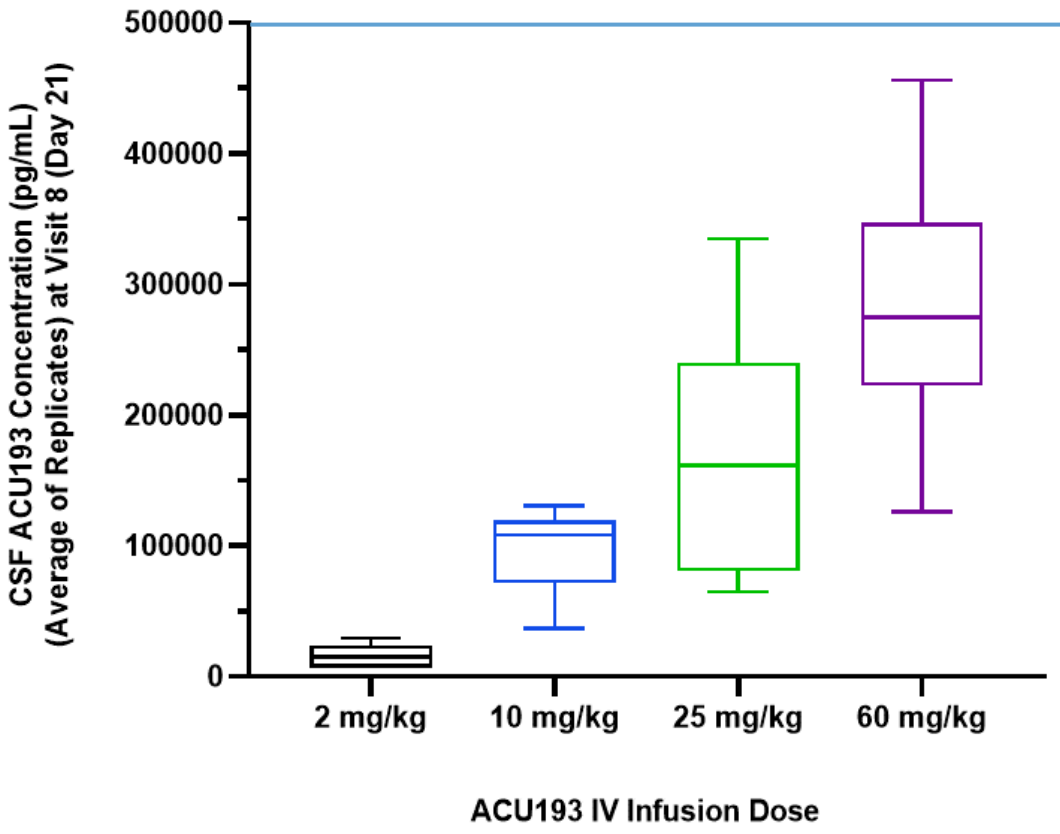
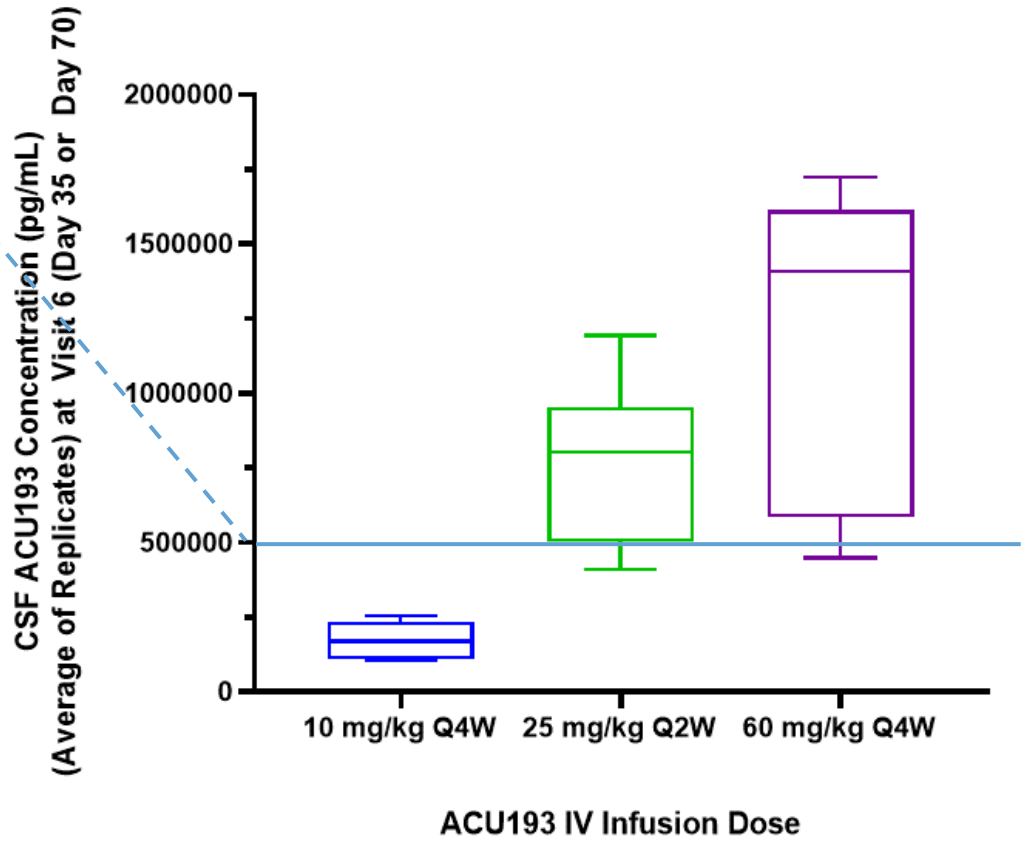
Sabirnetug CSF Exposure is Dose and Dose-Regimen Proportional

Single Dose Cohorts



Multiple Dose Cohorts*



*One patient from Cohort 5 (10 mg/kg Q4W) excluded because only received one administration of drug (study drug discontinued after lacunar infarct).

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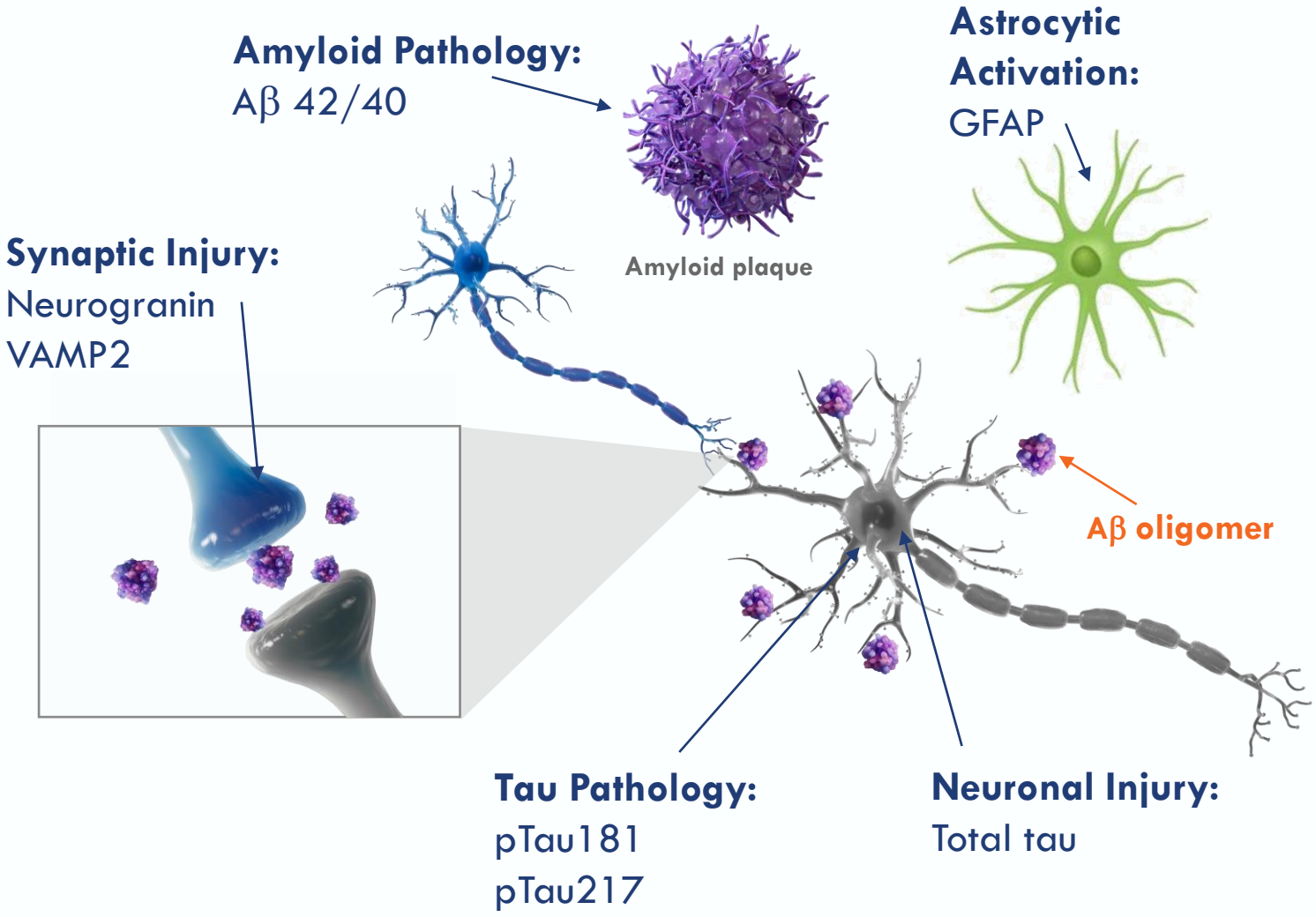
Importance of Key Fluid Biomarkers Associated with AD Pathology

- Biomarkers from cerebrospinal fluid and plasma capture neuronal, synaptic, and axonal injury and reflect the cumulative outcome of different pathological substrates in AD[1]
- Evidence suggests that biomarkers are likely to be better predictors of the underlying pathology of AD than imaging alone[2]

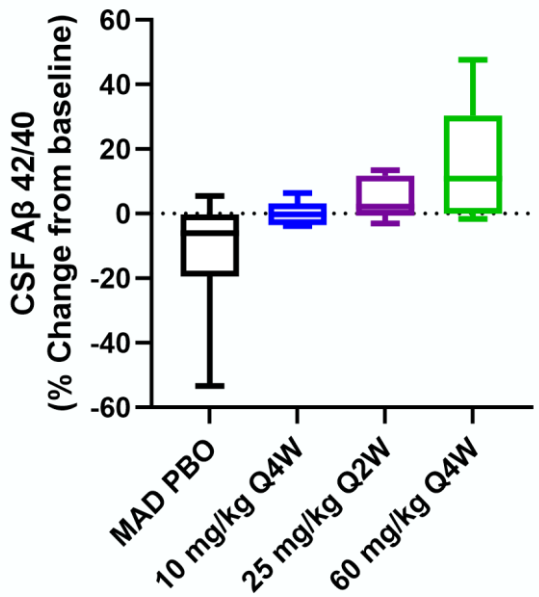
- **After just three administrations of sabirnetug, patients with early AD demonstrated improvements in biomarkers associated with AD pathology**



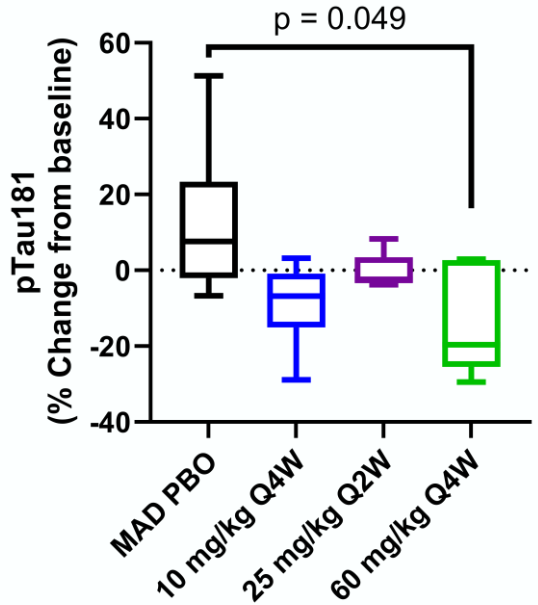
1. Tarawneh, R. Biomarkers: Our Path Towards a Cure for Alzheimer Disease. Biomarker Insights Volume 15: 1–15. 2020; 2. Blennow K, Zetterberg H. The Past and the Future of Alzheimer's Disease Fluid Biomarkers. J Alzheimers Dis. 2018;62(3):1125-1140.

Consistent Improvement in CSF Amyloid, Tau and Synaptic Biomarkers Indicate Downstream Pharmacology of Sabirnetug After Only Three Doses

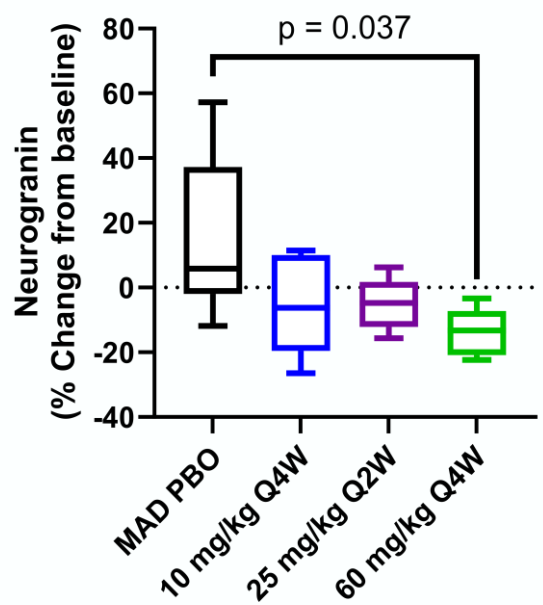
Aβ 42/40 Ratio



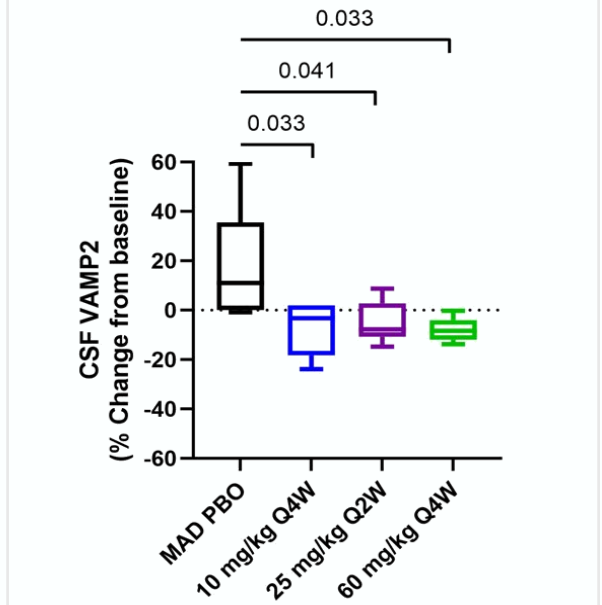
pTau181



Neurogranin



VAMP2



Amyloid pathology

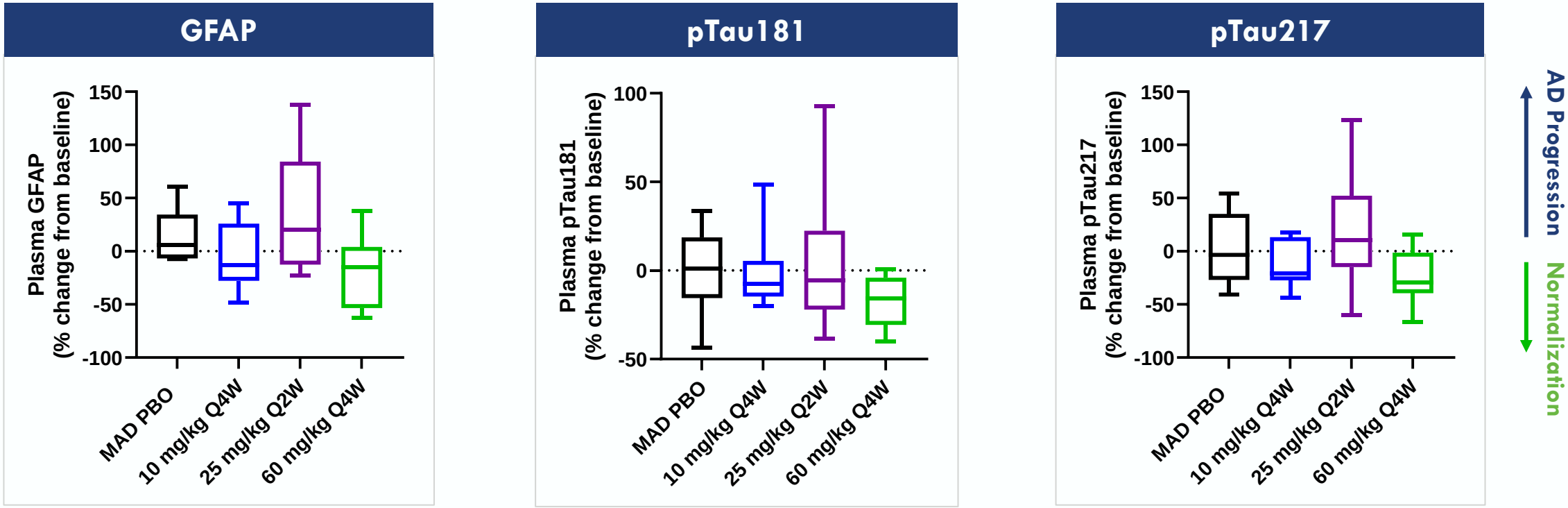
Tau pathology

Synaptic injury

n = 8 subjects/treated group; 6 subjects in pooled placebo (PBO); p-values from unpaired, 2-sided Student's t test

Trend Toward Normalizing Plasma Biomarkers with 10 mg/kg and 60 mg/kg Q4W

1-6 wk post-dosing



- Plasma measurements of glial fibrillary acidic protein (GFAP), pTau181, and pTau217 in 10 mg/kg Q4W & 60 mg/kg Q4W groups were lower than placebo
- More impact to fluid biomarkers was observed with longer dosing duration
  - The 25 mg/kg Q2W cohort differed in dose and sample timing, with drug on board for less time than the 10 mg/kg & 60 mg/kg Q4W cohorts

n = 8 subjects/treated group; 6 subjects in pooled placebo (PBO); p-values from unpaired, 2-sided Student's t test

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Sabirnetug Demonstrates Potential for Best-in-Class Safety

Compelling Overall Safety Profile, with Low Incidence of ARIA-E

INTERCEPT-AD Phase 1 Safety Data

5 Total ARIA-E cases, or ~10%

0 Cases of ARIA-E in ApoE4 homozygotes N=6

0 Deaths, SAEs Related to Study Drug

✓ **Limited incidence of ARIA-E**

- 10 mg/kg Q4W: 1 asymptomatic case
- 25 mg/kg Q2W: 1 asymptomatic case
- 60 mg/kg Q4W: 2 asymptomatic cases; 1 symptomatic case

✓ **No ARIA-E observed in ApoE4 homozygotes (n=6), despite comprising 13% of study**

- Differentiated from other antibodies that have ARIA-E rates ~30% to ~40% in participants who are E4-homozygotes

✓ **Broad therapeutic index** with convenient monthly dosing

- Safety profile may support attractive benefit/risk option for large portion of patients

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INTERCEPT-AD Phase 1 Data Support Potential for Sabirnetug to Offer Best-in-Class Efficacy and Safety

Key Takeaways from INTERCEPT-AD

Potential for Differentiated Efficacy

- ✓ First mAb to demonstrate selective target engagement of AβOs (most toxic form of Aβ)
- ✓ Rapid, significant plaque reduction comparable to the current market front-runners at similar timepoints
- ✓ Improvement of AD biomarkers in CSF and plasma are a strong indication of downstream effects

Potential for Differentiated Safety

- ✓ Compelling safety profile with low incidence of ARIA-E
- ✓ Absence of ARIA-E observed in ApoE4 homozygotes
- ✓ Broad therapeutic index with convenient monthly dosing

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Clinical Development Plans & Strategic Considerations

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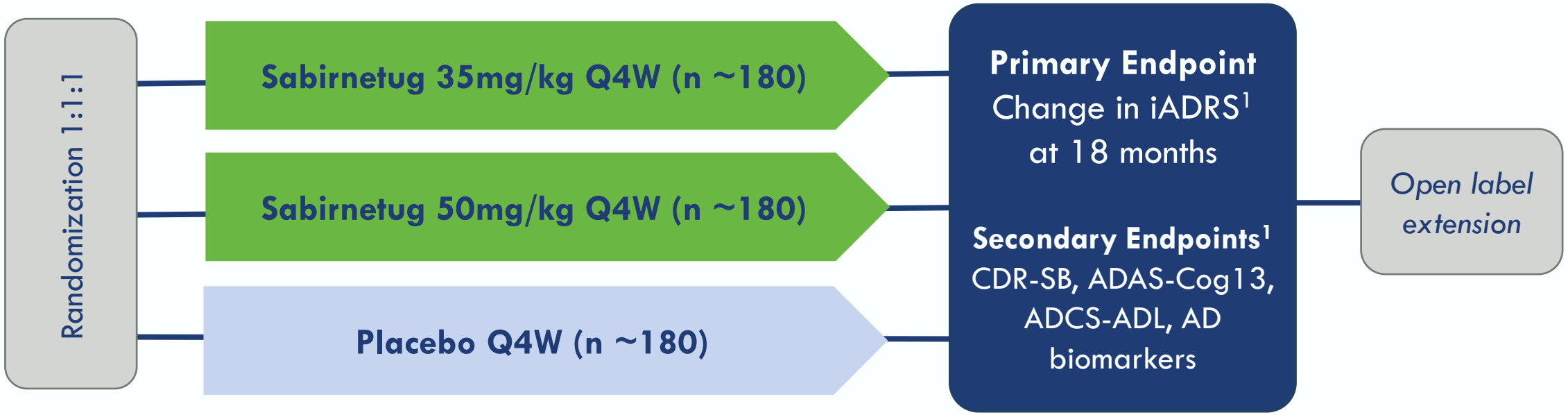
ALTITUDE-AD Study

Currently Enrolling

Objective: To evaluate the clinical efficacy, safety and tolerability of sabirnetug

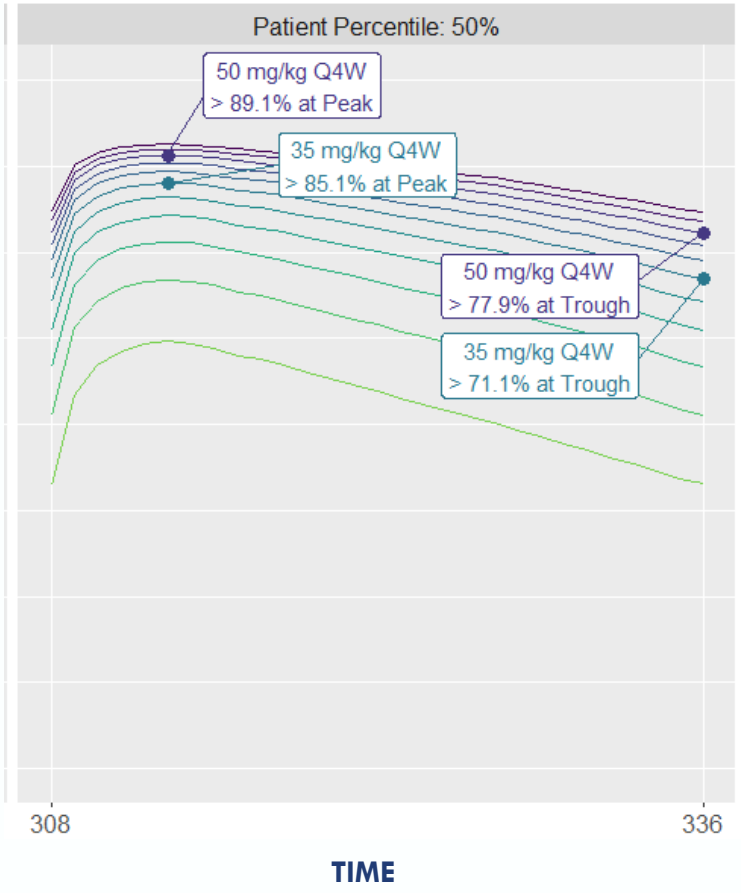
Patient population: Patients with early AD (MCI or mild dementia due to early AD)



1. iADRS: Integrated Alzheimer's Disease Rating Scale; CDR-SB: Clinical Dementia Rating – Sum of Boxes; ADAS-cog: Alzheimer's Disease Assessment Scale – Cognitive Subscale; ADCS-ADL: Alzheimer's Disease Cooperative Study – Activities of Daily Living

Simulated CSF Target Engagement at Steady-State for ALTITUDE-AD Doses

CSF target engagement was simulated at a candidate list of doses given Q4W at steady-state



Ph2 Dosing Strategy (ALTITUDE-AD)

lower dose: 35 mg/kg Q4W

upper dose: 50 mg/kg Q4W

- Notable **diminishing differentiation** as dose increases
- Doses were selected with **peak-trough** variation in mind: select doses based on trough (end of dosing interval) CSF engagement

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Sabirnetug Subcutaneous Formulation Under Development in Collaboration with Halozyme

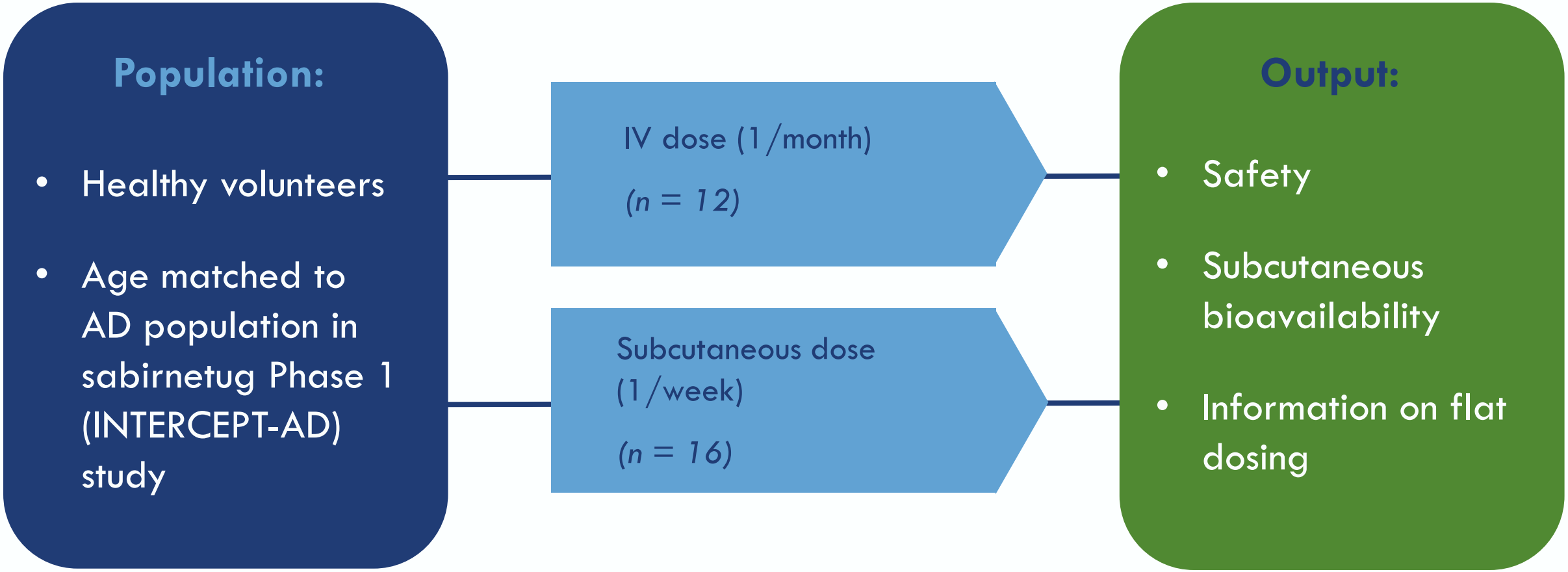
Potential to Broaden Patient Access and Increase Treatment Convenience

- Announced partnership with Halozyme in November 2023 to develop subcutaneous dosing option for sabirnetug
- Halozyme's drug delivery technology, ENHANZE®, is commercially validated in eight approved therapies available in 100+ countries, with >800,000 patients treated
- Current sabirnetug potential target product profile inclusive of no more than single weekly injection

Phase 1 bioavailability study ongoing to compare the pharmacokinetics of subcutaneous form of sabirnetug to the IV form

Ongoing Phase 1 Subcutaneous Healthy Volunteer Study

Topline Results Expected in Q1 2025



Acumen Leadership Team

Experienced in AD/Neuro Drug Development

DANIEL O'CONNELL
Chief Executive Officer
ACUMEN
neuroventures

JAMES DOHERTY, PHD
President &
Chief Development Officer
ACUMEN
Sage Therapeutics · AstraZeneca

ERIC SIEMERS, MD
Chief Medical Officer
ACUMEN
Lilly

MATT ZUGA
Chief Financial Officer &
Chief Business Officer
ACUMEN
HIGHCAPE PARTNERS

RUSSELL BARTON
Chief Operating Officer
ACUMEN
Lilly

JANICE HITCHCOCK, PHD
VP, Regulatory Affairs
ACUMEN
Lilly

LIEAN SCHENK
VP, Head of CMC
ACUMEN
Lilly · Lonza
NOVAVAX

SIEW TIN GAN
Head of Clinical
Operations
ACUMEN
Lundbeck · Takeda

ROBERT DEAN, MD, PHD
Sr. Development Advisor,
Biomarkers and Analytical
Methods
ACUMEN
Lilly

JASNA JERECIC, PHD
Analytical Methods
Leader, Research Scientist
ACUMEN

DEREK MEISNER, JD
Chief Legal Officer
ACUMEN
X4 PHARMACEUTICALS

JULIE BOCKENSTETTE
Executive Vice President,
Head of HR
ACUMEN
Roche · Lilly

Acumen team has decades of experience in Alzheimer's drug discovery and development

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Sabirnetug IP & Market Exclusivity

- Exclusive, perpetual, irrevocable, worldwide, royalty-free license from Merck to its Amyloid Derived Diffusible Ligand (ADDL) IP including issued sabirnetug patents
- Sabirnetug Global IP estate:
  - ✓ Issued patents in 19 countries
  - ✓ Composition of matter patents and methods of use run into July 2031
  - ✓ Patent term extensions may be available, 3-5 years depending on jurisdiction
- Biologics market exclusivity is expected for sabirnetug as a novel biologic drug
  - ✓ US provides 12 years market exclusivity for novel biologics
  - ✓ Europe provides 10 years of market exclusivity for novel biologics

Milestones Achieved in 2024 and Anticipated in 2025

MILESTONES	STATUS/ EXPECTED TIMING
Initiation of ALTITUDE-AD Phase 2 trial	✓
Initiation of Phase 1 subcutaneous trial	✓
Expected Phase 1 subcutaneous topline results	1Q25
Expected completion of enrollment of ALTITUDE-AD	TBD

~$281M

Cash, cash equivalents and marketable securities as of June. 30, 2024

We believe that Acumen has the expertise and resources to advance sabirnetug into the first half of 2027

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Summary

Key Takeaways

- ✓ Significant and growing Alzheimer's population in need of additional treatment options
- ✓ Sabirnetug demonstrates high selectivity for toxic AβOs in AD patients
- ✓ Positive Phase 1 data strengthen potential for sabirnetug to offer best-in-class efficacy and safety
- ✓ Phase 2 IV study and Phase 1 subcutaneous study ongoing

Next Steps

- ➡ Anticipate Phase 1 subcutaneous healthy volunteer topline results in Q1 2025
- ➡ Currently enrolling Phase 2 ALTITUDE-AD study

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Appendix

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Preclinical Data

Sabirnetug: Extensive Data Package Supporting Development

SELECTIVITY

- Nanomolar affinity for AβOs, >500-fold greater selectivity for AβOs over Aβ monomer, with limited or no discernable binding to vascular amyloid or dense core amyloid plaques
- Binds broad range of endogenous Aβ, from dimers to high molecular weight AβOs

PHARMACOLOGY

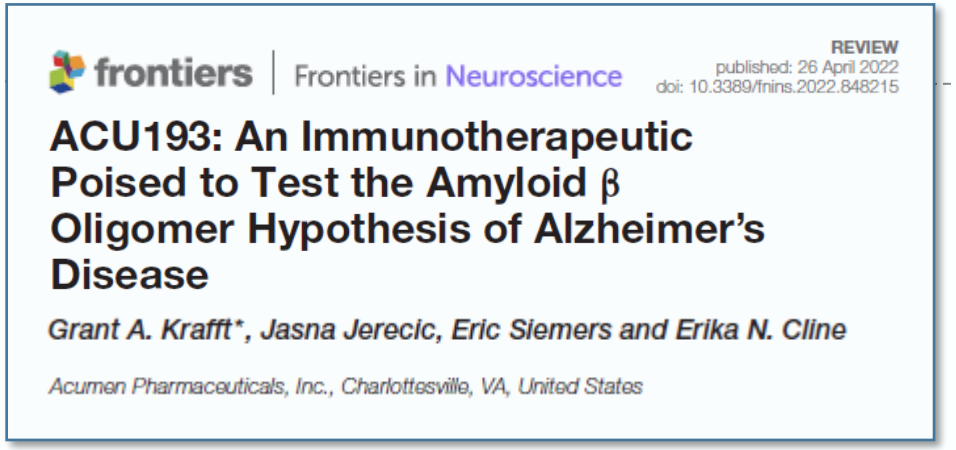
- Dose-dependent effects in multiple in vitro neuroprotection assays
- Positive memory and behavioral effects in multiple in vivo transgenic mouse models for AD

PK/PD

- Brain penetration and biodistribution demonstrated in multiple species
- Performs like other peripherally administered CNS mAbs

SAFETY

- IgG2 subclass lacks inflammatory effector function signaling (FcγR binding)
- Nonclinical microhemorrhage studies show no increased risk of microhemorrhage
- GLP studies demonstrated acceptable safety supporting clinical dosing plans including Ph 2


frontiers | Frontiers in Neuroscience

REVIEW
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ACU193: An Immunotherapeutic Poised to Test the Amyloid β Oligomer Hypothesis of Alzheimer's Disease

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Acumen Pharmaceuticals, Inc., Charlottesville, VA, United States

Sabirnetug is a promising immunotherapy for early AD expected to provide meaningful cognitive and functional benefits, slow disease progression, and offer an attractive safety profile.

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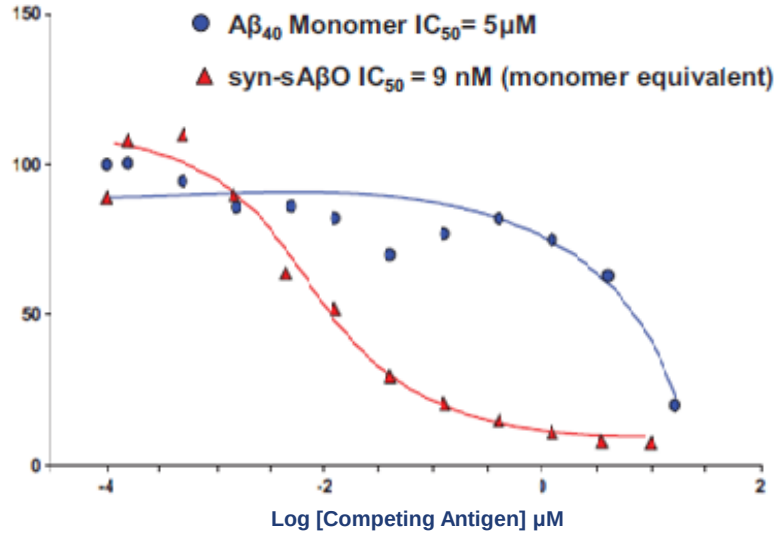
Sabirnetug is the First mAb Developed to Selectively Target AβOs

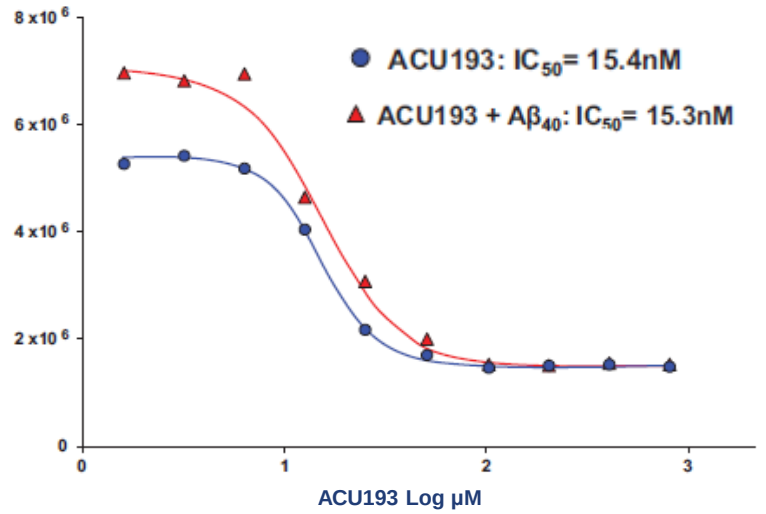
Highly selective for Aβ oligomers versus Aβ monomers

Sabirnetug Selectivity



Binding of sabirnetug to AβOs >500x binding to Aβ monomer

Sabirnetug Selectivity in presence of 5μM monomeric Aβ

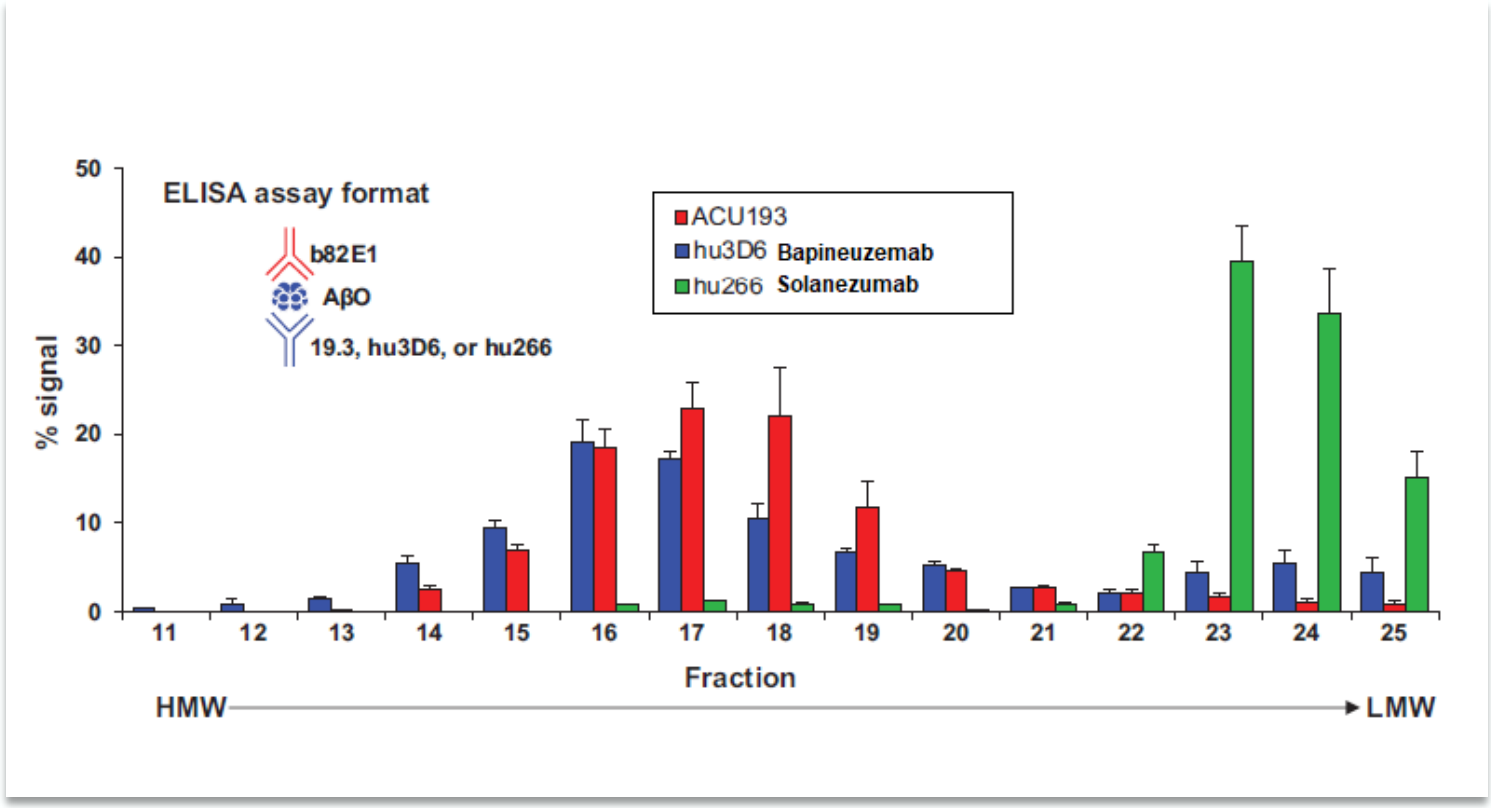


Even in the presence of a large excess of Aβ monomer, binding of sabirnetug to AβOs is unchanged

Sabirnetug selective for binding to AβOs is preserved even in the presence of a large excess of Aβ monomers – such as what is present in the brain, thus limiting 'target distraction'

Sabirnetug Binds to a Wide Range of Oligomeric Species of Aβ

Comparison of Aβ species-mAb complex signals across SEC fractions



Sabirnetug binds to oligomeric species of Aβ that are differentiated from those bound by hu266 (solanezumab) or hu3D6 (bapineuzumab)

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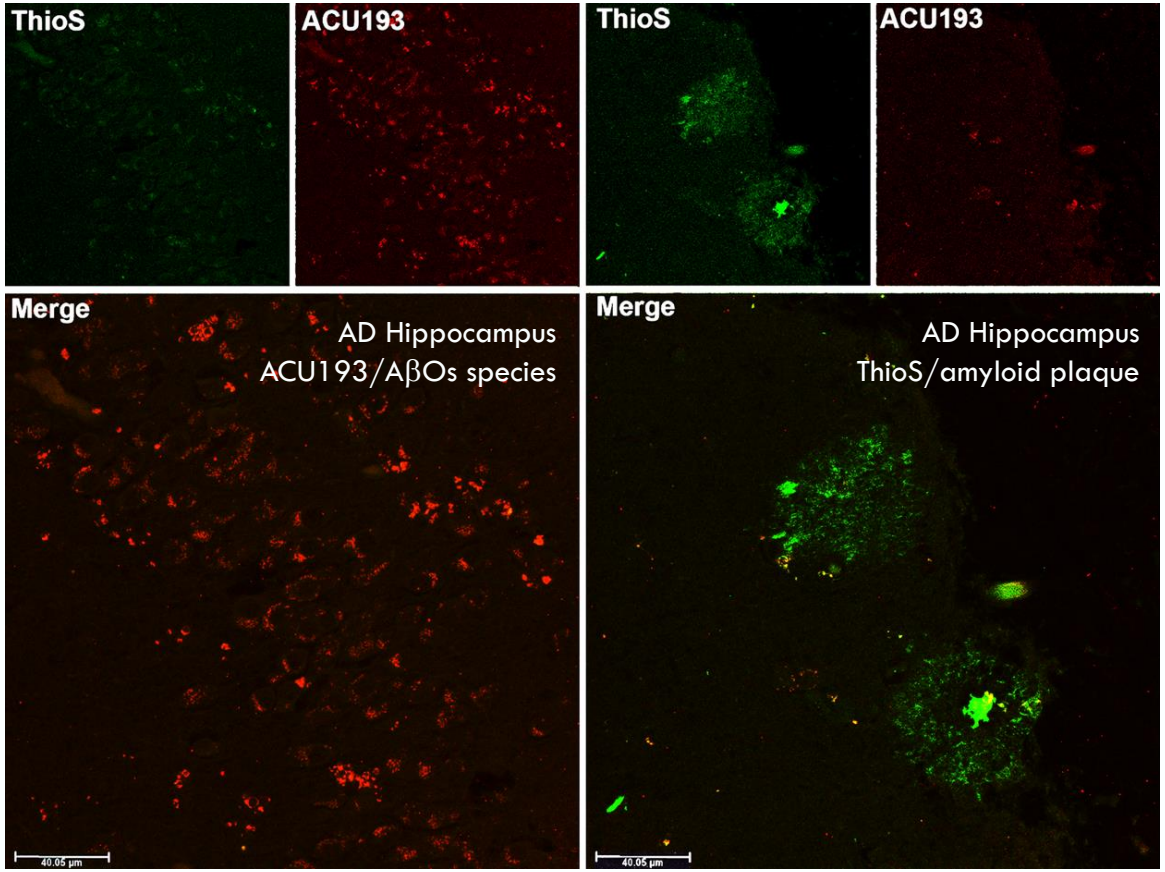
Sabirnetug is Highly Selective for AβOs Versus Aβ Plaques

Sabirnetug staining in human AD brain slices sabirnetug (red) binds non-Thioflavin S positive Aβ (green)



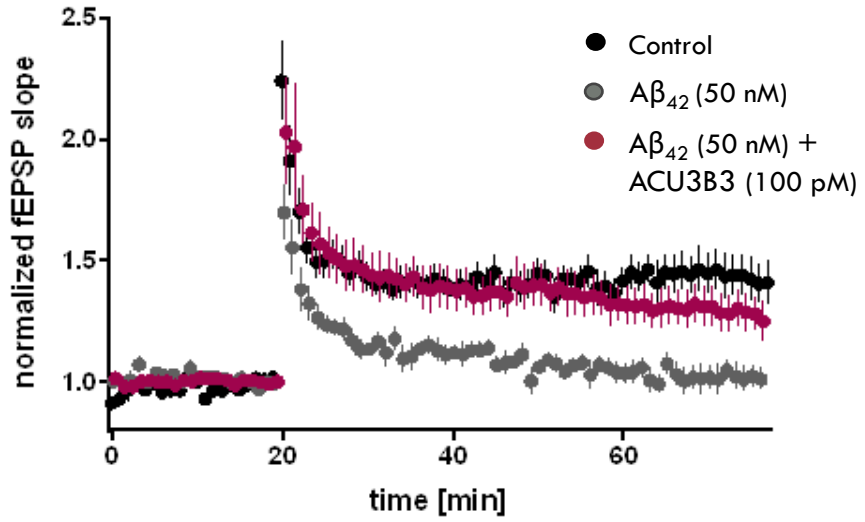
Sabirnetug has little or no binding to thioflavin S positive fibrillar Aβ plaque in human AD brain tissue

Sources: E. Cline et al. CTAD 2019.

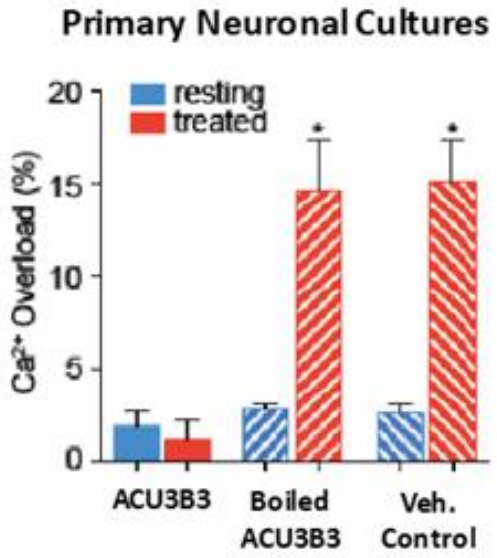
AβOs Bind to Neurons and are Toxic; Mouse Analogue of Sabirnetug Prevents Toxicity

After binding to neurons, AβOs disrupt Long Term Potentiation (LTP) and cause pathologic increases in intracellular calcium that is destructive to cells.

ACU3B3 prevents AβO inhibition of hippocampal LTP *ex vivo*



ACU3B3 prevents AβO mediated Ca2+ elevation in cell cultures

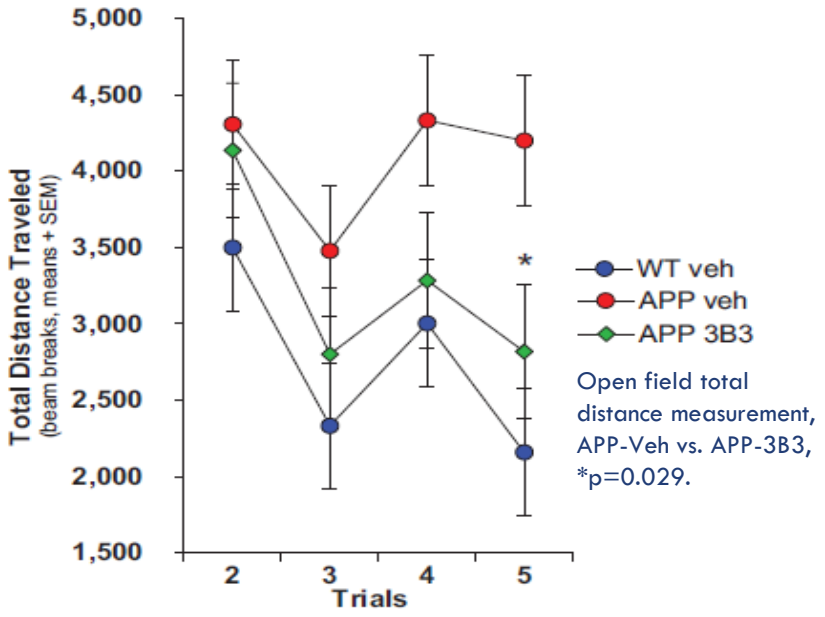


Note: (1) ACU3B3 is the mouse monoclonal antibody precursor to and equivalent of humanized sabirnetug (ACU193)

ACU3B3 prevents changes in aberrant neuronal activity thought to underlie memory loss in AD and prevents AβO mediated disruption of calcium homeostasis in neuronal cultures

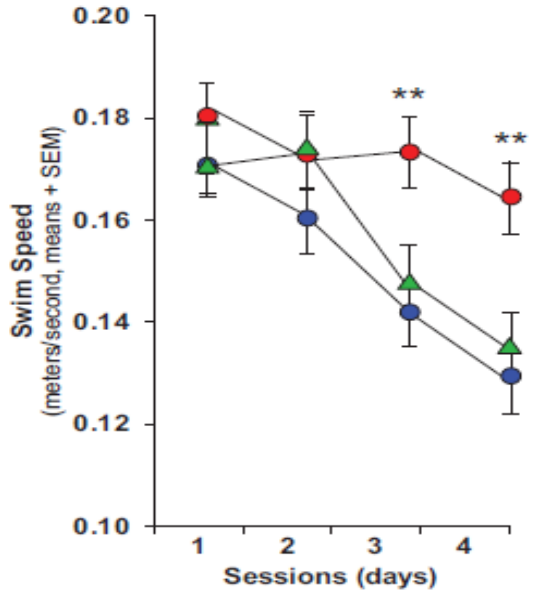
Treatment of a Transgenic Mouse Model of AD Results in Behavioral Improvements

Murine parent version of sabirnetug (ACU3B3) was used to treat younger mice with depositing plaque or older mice with abundant plaque



Open field total distance measurement, APP-Veh vs. APP-3B3, *p=0.029.

Deficits in younger (5-7 months) transgenic mice are markedly reduced with treatment



MWM swim speed abnormality (**p<0.02).

Deficits in older (9-10 months) transgenic mice are markedly reduced with treatment

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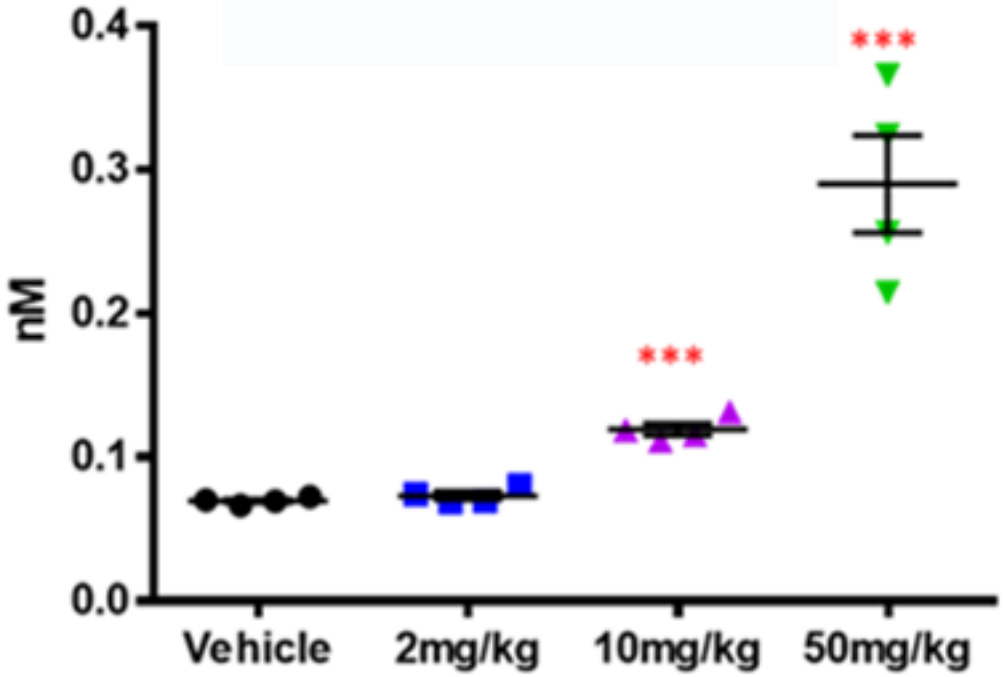
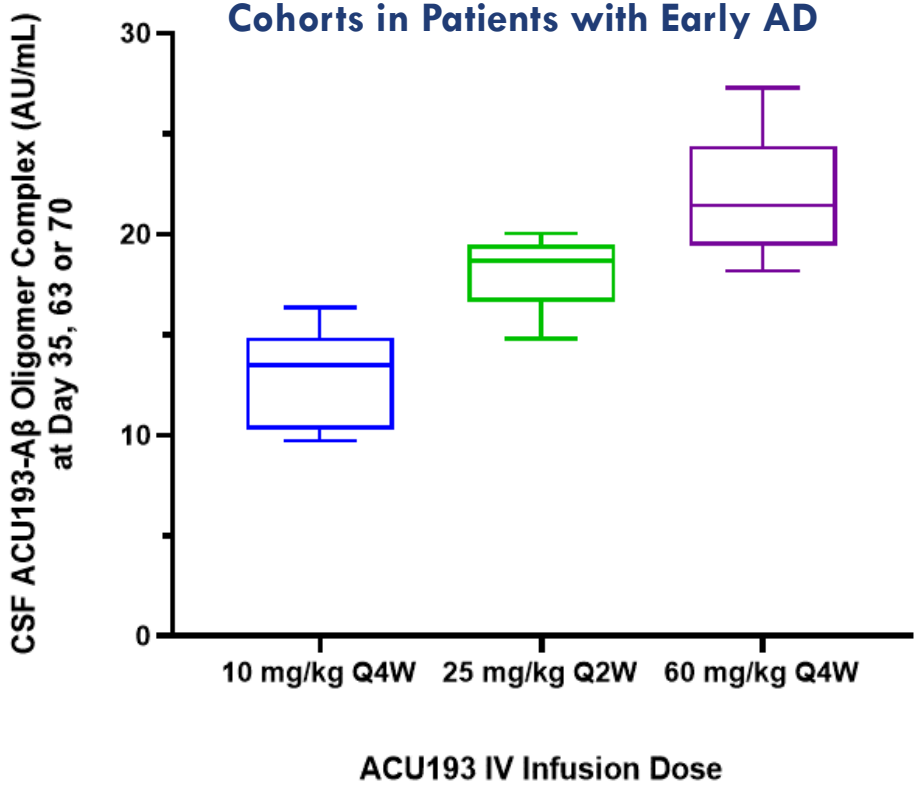
Sabirnetug Enters the CNS and Binds to AβOs in Transgenic Mice and Patients with Early AD in a Dose Dependent Manner

AβO/sabirnetug Complex Levels in tg2576 Mouse Brain



Target Engagement Data* from INTERCEPT-AD Phase 1 Study MAD Cohorts in Patients with Early AD



Sabirnetug engages target AβOs in transgenic mouse brain (tg2576) and is found in CSF of patients with early AD

*One patient from Cohort 5 (10 mg/kg Q4W) excluded because only received one administration of drug (study drug discontinued after lacunar infarct).

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