

ASX ANNOUNCEMENT

Actinogen Alzheimer's Disease biomarkers - context & history

Sydney, 13 September 2022. Actinogen Medical ASX: ACW ("ACW" or "the Company") is pleased to attach a presentation on the Xanamem[®] clinical development program that includes some background on the use of biomarkers for the development of drugs in Azheimer's Disease (AD).

This is in the context of the upcoming release before the end of October 2022 of the Company's Phase 2 biomarker study results in people with Mild AD. This study is a prospective analysis of the effects of Xanamem on AD biomarkers and a new analysis of efficacy in biomarker positive patients.

ENDS

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Announcement authorised by the Board of Directors of Actinogen Medical

About Actinogen Medical

Actinogen Medical (ACW) is an ASX-listed, biotechnology company developing a novel therapy for neurological and neuropsychiatric diseases associated with dysregulated brain cortisol. There is a strong association between cortisol and detrimental changes in the brain, affecting cognitive function, harm to brain cells and long-term cognitive health.

Cognitive function means how a person understands, remembers and thinks clearly. Cognitive functions include memory, attention, reasoning, awareness and decision-making.

Actinogen is currently developing its lead compound, Xanamem, as a promising new therapy for Alzheimer's Disease and Depression and hopes to study Fragile X Syndrome and other neurological and psychiatric diseases in the future. Reducing cortisol inside brain cells could have a positive impact in these and many other diseases. The cognitive dysfunction, behavioural abnormalities, and neuropsychological burden associated with these conditions is debilitating for patients, and there is a substantial unmet medical need for new and improved treatments.

[®] Xanamem is a registered trademark of Actinogen Medical Limited.

About Xanamem

Xanamem's novel mechanism of action is to block the production of cortisol inside cells through the inhibition of the 11β-HSD1 enzyme in the brain. Xanamem is designed to get into the brain after it is absorbed in the intestines upon swallowing its capsule.

Chronically elevated cortisol is associated with cognitive decline in Alzheimer's Disease, and Xanamem has shown the ability to enhance cognition in healthy, older volunteers. Cognitive impairment is also a feature in Depression and many other diseases. Cortisol itself is also associated with depressive symptoms and when targeted via other mechanisms has shown some promise in prior clinical trials.

The Company has studied 11β-HSD1 inhibition by Xanamem in more than 300 volunteers and patients, so far finding a statistically significant improvement in working memory and attention, compared with placebo, in healthy, older volunteers in two consecutive trials. Previously, high levels of target engagement in the brain with doses as low as 5 mg daily have been demonstrated in a human PET imaging study. A series of Phase 2 studies in multiple diseases is being conducted to further confirm and characterize Xanamem's therapeutic potential.

Xanamem is an investigational product and is not approved for use outside of a clinical trial by the FDA or by any global regulatory authority. Xanamem® is a trademark of Actinogen Medical.

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ACTINOGEN MEDICAL ENCOURAGES ALL CURRENT INVESTORS TO GO PAPERLESS BY REGISTERING THEIR DETAILS WITH THE DESIGNATED REGISTRY SERVICE PROVIDER, AUTOMIC GROUP.



Xanamem® Clinical Program Update: Alzheimer's Disease (AD) biomarkers context and history

Dr. Steven Gourlay MBBS PhD MBA, CEO & MD

13 September 2022

Disclaimer



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Actinogen snapshot



Actinogen Medical (ASX:ACW) is developing a novel oral treatment with rapid onset of clinical activity to improve cognition and quality of life



Favourable pharmaceutical properties



Substantial clinical data



Attractive disease indications and rationale



Protected and funded



High functioning semi-virtual company model

- ✓ Demonstrated target engagement in brain and HPA axis¹ in human trials
- ✓ Low dose, ≤10mg
- Low drug-drug interaction potential suitable for combination therapy
- √ >300 subjects or patients safely treated
- Cognitive enhancement activity (attention & working memory) confirmed in two consecutive well-controlled trials (5 mg, 10 mg & 20 mg dose levels vs. placebo)
- ✓ Strong cortisol rationale for treatment of multiple diseases: early stages of Alzheimer's Disease; Depression & related cognitive impairment; Fragile X Syndrome; and many others
- ✓ Molecule in-licensed from U Edinburgh in 2014
- Comprehensive patents in place²
- Cash position A\$16.4M at 30 Jun 2022
- Core team of 10 fulltime employees based in Australia
- Leveraging senior consultants in various fields in Australia, Asia, UK and USA
- ✓ Australian-based operations gains 43.5% as cash rebate

^{1.} Hypothalamic-Pituitary-Adrenal axis (body's system to regulate blood levels of cortisol)

Xanamem Clinical Development Pipeline



Phase 2 Pathway

Outlook



Cognitive impairment in early **Alzheimer's disease**

Biomarker analysis in patients with mild AD

- Phase 2 dataset of 10mg vs. placebo over 12 weeks, H2 2022

Cognitive benefit in patients with early stages of AD

- Phase 2 XanaMIA Part B commencing H2 2022

"Big-to-market"
Multiple Phase 2b/3 trials



Cognitive Impairment in Depressive Disorder

Depression and cognitive impairment placebo-controlled trial

- Phase 2 XanaCIDD trial to commence in Q4 2022

Potential to treat both depression and related cognitive impairment



Anxiety, sleep & behavioural problems in **Fragile X Syndrome**

XanaFX (open IND with Phase 2 protocol)

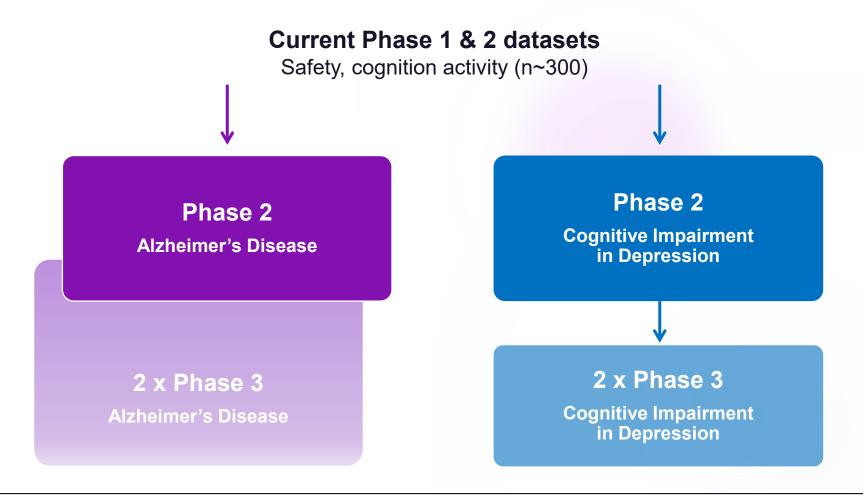
- Phase 2 proof-of-concept in adolescent and young adult males

Pending alternative funding or partnership

Clinical trials program overview



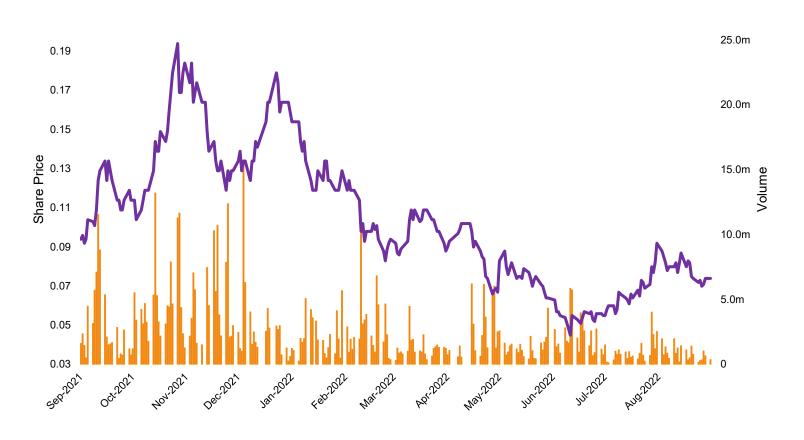
Phase 2 and 3 trials to achieve marketing approvals



ACW top stockholders and stock price



Share price chart at 12 Sep 2022

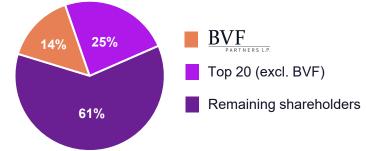


Trading Information

52 week high	A\$0.20
52 week low	A\$0.04
Number of issued shares	1,796M
Market capitalisation (12 Sep 2022)	A\$126M
Cash Balance at 30 Jun 2022	A\$16.4M

Major Shareholders

BVF Partners	13.9%
Steven Gourlay	3.7%
Edinburgh Technology Fund	2.7%



Leadership and Management



Extensive drug development and commercial experience

Experienced Board of Directors...



Dr. Geoff Brooke Chairman

MBBS; MBA





- 30+ years experience in the healthcare investment industry
- Founder and MD of Medvest Inc and GBS Ventures, Chairman of Cynata Therapeutics, Board Member of Acrux



Dr. George Morstyn
Non-Executive Director
MBBS; PhD; FRACP; MAICD







- 25+ years experience in biotech investment and drug development
- Board member of Cancer Therapeutics and Symbio



Mr. Malcolm McComas
Non-Executive Director
BEc, LLB; FAICD; SF Fin



- 25+ years experience in the financial services industry
- Chairman of Pharmaxis and Fitzroy River Corporation

...with a talented management team in place



Dr. Steven Gourlay
CEO & MD
MBBS; FRACP; PhD; MBA



- 30+ years experience in development of novel therapeutics
- Former founding CMO at US-based Principia Biopharma Inc

See full team and bios at: https://actinogen.com.au/ourcompany/#about-us



Jeff Carter
Chief Financial Officer
B. Fin Admin; M. App. Fin; CA



SVP Product Development
M.Med Sci; BSc; MSc; PMP; CPPM



Dr Paul Rolan Chief Medical OfficerMD, FRACP

Tamara Miller



Cheryl Townsend
VP Clinical Operations
RN, M Health Law



Dr Christian Toouli

Head of Business Development
PhD: GAICD

International Cognition Clinical Advisory Board



Global thought leaders in clinical trials for assessment of cognition



Prof. John Harrison

Metis Cognition Ltd

- Expert psychologist with a special interest in cognition
- Chartered psychologist with two PhDs and author/co-author of more than 80 books and scientific articles
- Principal Consultant at Metis Cognition, which advises on selection and integration of cognitive testing into therapeutic development programs



Dr Dana C. Hilt



- 25+ years of drug development experience, primarily of Central Nervous System (CNS) drugs
- Deep experience in Phases 1 to 4 drug development
- CMO at Frequency Therapeutics and has held senior management positions as Chief Medical Officer at various pharmaceutical companies



Dr Christina Kurre Olsen



- 20+ years research expertise in neuroscience, neuropsychopharmacology, CNS therapeutics and monoclonal antibody immunotherapy
- Strong hands-on knowledge across drug development value chain and a passion for cognition
- Medical Director at Orphazyme A/S



Prof. Paul Maruff



- Chief Innovation Officer at Cogstate Ltd
- Professor in Neuroscience at the Florey Institute of Neuroscience and in Psychology Monash University, Melbourne Australia
- Senior management committee of the Australian Imaging, Biomarkers and Lifestyle (AIBL) study of Alzheimer's Disease
- Involved in the development and approval of 13 new drugs that affect cognition including most recently esketamine for treatment resistant depression

AD biomarker fundamentals



Xanamem biomarker profile to be assessed September/October 2022

The Xanamem program in AD is based on the proven use of <u>clinical endpoints</u> of cognition and function for regulatory approvals without reliance on biomarkers. AD biomarkers have no relevance to the Depression program.

Biomarkers have three important uses:



Confirming clinical activity & dose

Clinical activity at a given dose and schedule & disease-modifying potential



Choosing patients with a disease or likely treatment benefit

Confirming patients have AD and are likely to progress



In regulatory submissions as "surrogate" endpoints prior to more definitive Phase 3 trials

e.g. accelerated approvals to shave time off marketing approvals for serious diseases like cancer and AD

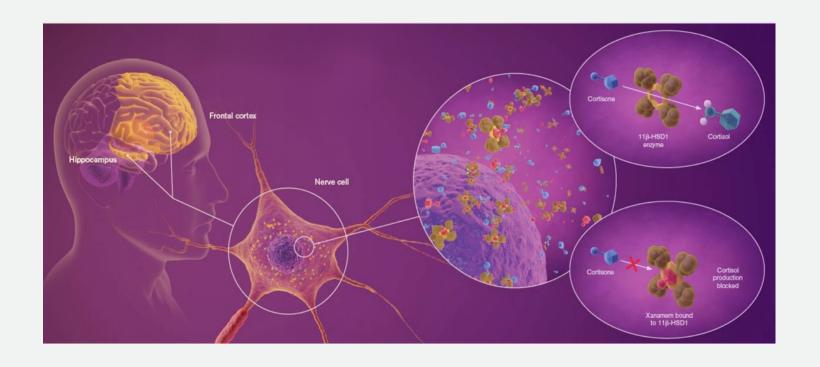


Xanamem: Oral, low dose, once-a-day treatment with a unique mechanism in Phase 2

Brain penetrant 11β-HSD1 small molecule enzyme inhibitor reduces cortisol inside brain cells - modulating signaling pathways and underlying disease processes^{1,2}

Potential to be:

- Rapidly cognitive enhancing
- Disease-modifying (slow or halt progression) in AD



^{1.} Xanamem® is a CNS (Central Nervous System) penetrant small molecule based on human PET scan evidence and cerebrospinal fluid (CSF) measurements

^{2.} Sooy et al. 2015 showing effects on amyloid plaque reduction in an aged mouse model after 28 days associated with increases in insulin degrading enzyme; Popoli et al. 2011 microglial cell modulation in rats, effects on glutamate, cannabinoid and other signalling pathways



A brief history of Alzheimer's Disease drug development

See also Actinogen Clinical Trials
Science Forum August 2022

https://youtu.be/Bm9ATZx1zEk



Xanamem Development Program Update

A small number of drugs to tackle cognition have worked and been approved in AD



Approved on clinical scales¹ in mild-moderate AD, 6-month trials

Mechanism	First Approval	Benefit	Comments
Oral anticholinesterase inhibitors e.g. donepezil, rivastigmine, galantamine	1996	Cognitive & functional scales	Gastrointestinal side effects Multiple trials
Oral NMDA inhibitors e.g. memantine, some in development	2003	Cognitive & functional scales	Gastrointestinal side effects Multiple trials
Oral serotonin reuptake inhibition (vortioxetine)	2018	Executive function scale	DSST vs. placebo Multiple trials
Oral oligomannate (GV-971, brown algae)	2019 China only	Cognitive & functional scales	Single positive trial

The primary Xanamem strategy is to follow this proven clinical pathway



In 2021 the FDA opened the door to an 'accelerated' approval pathway in AD, previously used for cancer, using biomarkers as endpoints

Actinogen is investigating the use of this strategy for Xanamem with a panel of blood biomarkers to choose the right patients for trials and further hasten approval timelines

Amyloid measured by Positron Emission Tomography (PET) brain scan used for FDA approvals



Use of blood and cerebrospinal fluid (CSF) levels is in development

Predictive biomarker	How measured	Observations	FDA	Impact of drug treatment for target
Brain amyloid	PET scan	Aducanumab - major amyloid reduction ¹	√	Minor clinical benefit
	PET scan	Second gen antibodies – under consideration by FDA	√	New clinical trials pending
CSF amyloid	Spinal tap	Part of ATN ² diagnostic criteria for AD, prediction evolving		
Blood amyloid	Blood test	Promising as alternative to spinal tap for CSF or imaging		

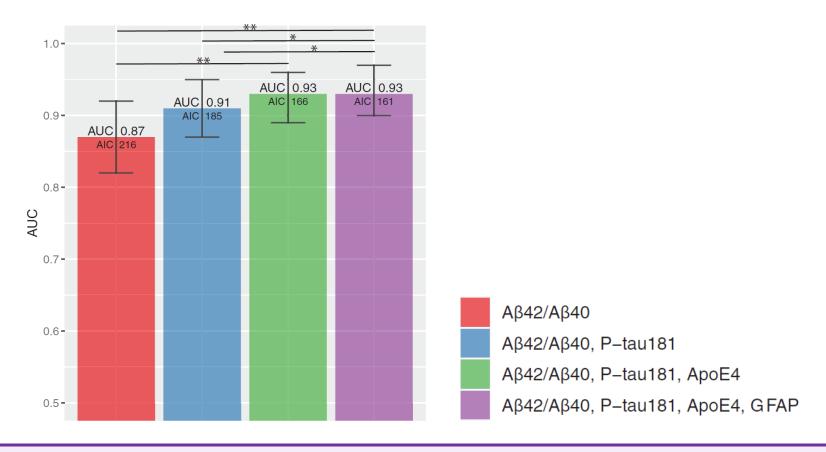
FDA may allow blood biomarkers as surrogate endpoints as it did for amyloid scans

Aduhelm US Product Information

Blood biomarkers predict brain amyloid in AD



High specificity and sensitivity approaching the maximum ROC AUC¹ of 1.0

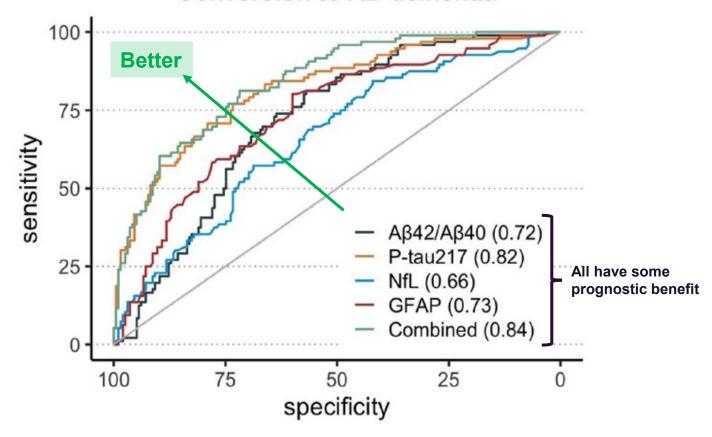


Actinogen's biomarker study includes amyloid (Aβ42 & 40), p-tau181 and GFAP. Blood biomarkers may replace brain scanning in the near future.

Blood P-tau is the best single predictor of progression in early stages of AD¹



Conversion to AD dementia



Improving biomarkers likely to predict clinical response to treatment in AD

Actinogen has the only <u>non-amyloid</u> mechanism drug in development with credible cognitive data



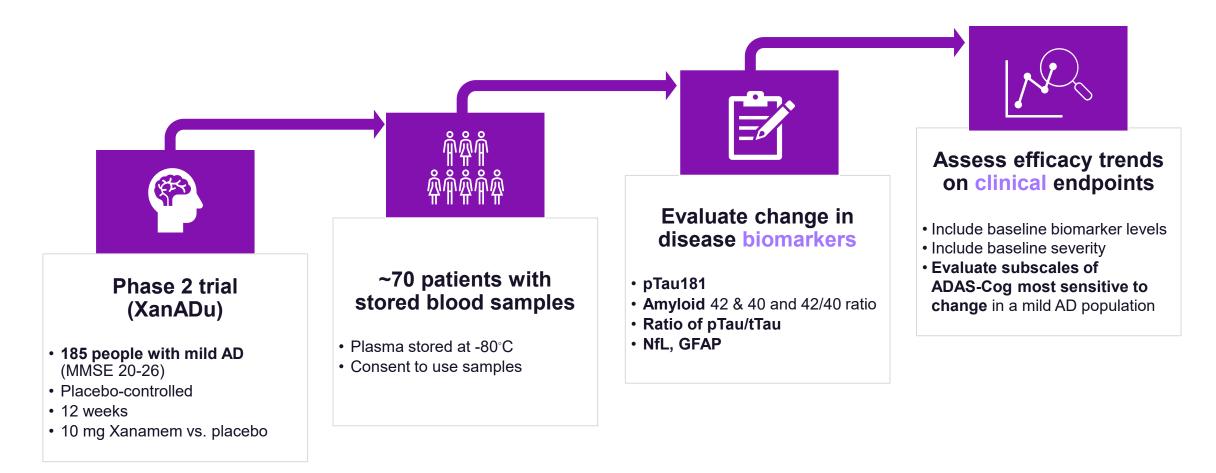
It is potentially* one of only three worldwide AD clinical trial programs for an oral medication with credible cognitive activity data and biomarker improvement data

Mechanism	Stage	Benefit to date	Cognitive endpoint	Company market cap. (\$AU) ¹
Oral Xanamem to lower brain cortisol (Actinogen)	Phase 2	Cognition (AD biomarkers tbc)	Cognitive test battery	126 million
Oral inhibition filamin A to stop Aβ42 amyloid signal to TLR/α7nicR (Cassava Sciences)	Phase 3	Cognition & AD biomarkers	Cognitive test battery	1.9 billion
Oral QPCT inhibitor to prevent toxic amyloid formation (Vivoryon)	Phase 2	Cognition & new biomarkers	Cognitive test battery	238 million

* Xanamem biomarker data pending September/October 2022

Upcoming plasma biomarker study design





Valuable data relating to patient selection and efficacy in a mild AD population

Biomarker conclusions



Xanamem biomarker profile to be assessed September-October 2022

The Xanamem program in AD is focused on the proven use of clinical endpoints of cognition and function for regulatory approvals

However, blood biomarkers show promise to aid drug development in AD and will be fully explored by Actinogen, along with brain scan methods

Almost certainly, blood biomarker profiles at baseline will inform patient selection in the program

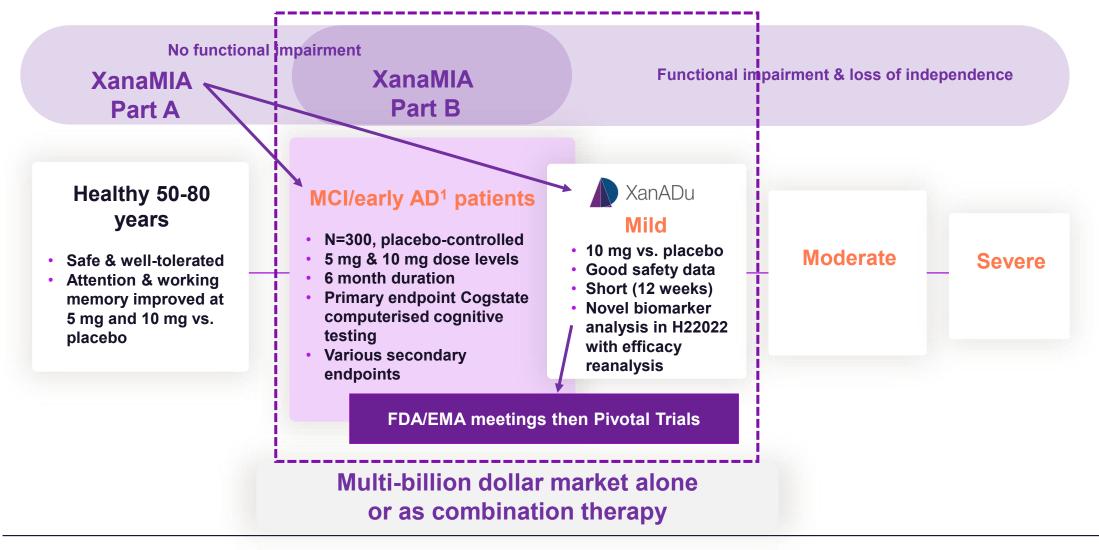
A positive biomarker treatment profile for Xanamem versus placebo would:

- Indicate potential human biologic activity for disease-modification
- ✓ Position Xanamem to explore the accelerated approval pathway
- ✓ Facilitate interactions with regulators, potential commercial and academic partners



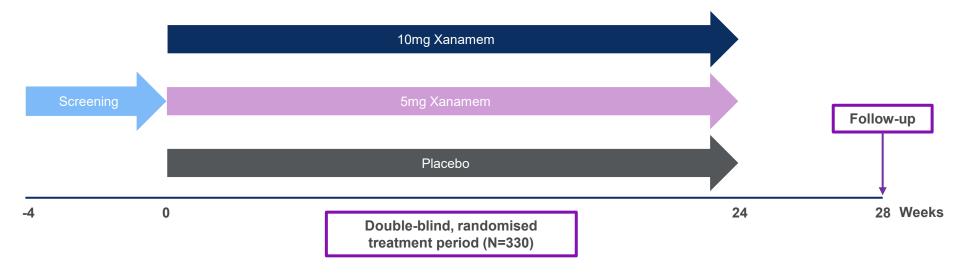
Regulatory consultations and pivotal Phase 3 trials





XanaMIA Part B trial Phase 2 trial design & implementation model





	Key inclusion/exclusion criteria	Primary Endpoints	Key Secondary Endpoints	Key Implementation Features
•	Clinical diagnosis of MCI or mild dementia due to AD (NIA-AA) Positive plasma AD biomarker signature (P-tau181 ± amyloid) Cognitive impairment relative to demographic norms	Cogstate CTB attentional composite (attention and working memory)	 Amsterdam Activity of Daily Living scale Cogstate Executive Function & Episodic Memory Function Composites Individual tests Carer questionnaire / Patient Global Improvement 	 Australian trial sites plus selected international locations Actinogen "hands-on" operational model Optimized for scalable addition of international sites as required



Cognitive Impairment in Depression is a major unmet medical need

See also Actinogen Clinical Trials Science Forum August 2022

https://youtu.be/Bm9ATZx1zEk



Science behind the Xanamem Depression Program

Unmet medical need for rapid, safe treatment

- √ 80-90% report neurocognitive symptoms¹
- ✓ Cognitive symptoms often persist during remission¹
- ✓ Elevated cortisol associated with severe, melancholic depression²
- ✓ Cortisol associated with treatment outcomes, relapse, & cognition³
- ✓ Positive effects with GR receptor antagonism with mifepristone⁴
- ✓ Meta-analysis of clinical cortisol approaches⁵
- ✓ Xanamem & improved human cognition⁶
- 1. 3-year prospective study and review, Conradi et al. 2011
- 2. Quantitative summary of four decades of research, Stetler & Miller 2011
- 3. Depression literature review, Malhi & Mann 2018; HPA axis in major depression, Keller et al. 2016
- GR, glucocorticoid receptor; Combined analysis of mifepristone for psychotic depression, Block et al. 2018; mifepristone effects on depression in biopolar disorder, Young et al. 2004; Evidence from clinical studies with CRH₁ receptor antagonists, Holsboer & Ising 2008
- . Meta-analysis of prior trials aimed at reducing cortisol effects, Ding et. al 2021
- i. Xanamem placebo-controlled trial working memory & attention (Actinogen data on file)



The Xanamem opportunity in depression



Current anti-depressants



work slowly (3 weeks) and initial suicide risk



do not target cognition



multiple adverse effects blood pressure, sexual function, appetite...

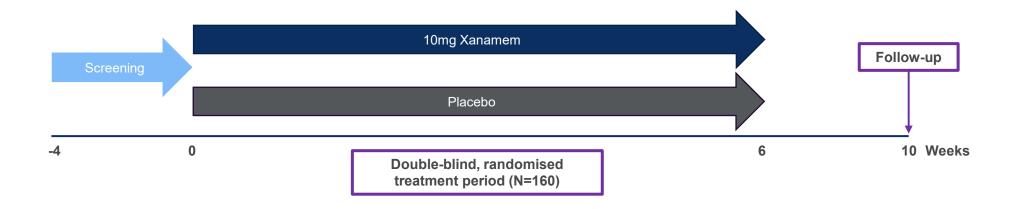


Xanamem improves cognition quickly

Xanamem may improve both depression and cognitive impairment

XanaCIDD trial design & implementation model





ŀ	Key inclusion/exclusion criteria	Primary Endpoints	Key Secondary Endpoints	Key Implementation Features
•	Primary diagnosis of MDD Persistent depressive symptoms despite existing therapy Cognitive impairment relative to demographic norms	Cogstate CTB attentional composite (attention and working memory)	 Montgomery-Åsberg Depression Rating Scale (MADRS) Executive Function Cognitive Composite Memory Function Cognitive Composite 	 Australian trial sites Actinogen "hands-on" operational model



Timeline for Xanamem data & catalysts





- September/October Biomarker data (disease-modification, efficacy)
- November CTAD XanaMIA presentation
- Q4 New trials commence in Alzheimer's Disease and Cognition/Depression
- Q4 Key global regulatory submissions/meetings with FDA, EMA



- XanaMIA Part B enrollment
- XanaCIDD enrollment
 ± topline results
- Presentations & publications



- XanaMIA Part B topline results
- Expand
 Cognitive/Depression
 program
- Expand Alzheimer's
 Disease program

Selected glossary



11β-HSD1 11 beta HydroxySteroid Dehydrogenase-1 enzyme

Aβ Amyloid beta – a type of amyloid protein associated with Alzheimer's Disease

ADAS-Cog Alzheimer's Disease Assessment Score- Cognition

ApoE4 Apoprotein genotype associated with genetic risk of Alzheimer's Disease

ATN Amyloid, Tau, Neurodegeneration

Clinical scales Measure how a patient feels, performs and functions

CNS Central nervous system

CTAD Clinical Trials on Alzheimer's Disease (conference)

CTB Cognitive Test Battery of computerized tests

Double-blind Investigators, participants and company do not know who has active vs placebo treatment during a trial

EMA European Medicines Agency

FDA US Food & Drug Administration

GFAP Glial Fibrilliary Acidic Protein – a marker of microglial cell activation in the brain

Filamen A a protein believed to relate to amyloid toxicity

IDSST International Digit Symbol Substitution Test of cognition

Selected glossary (cont.)



IQCODE Informant Questionnaire on Cognitive Decline in the Elderly

MCI Mild Cognitive Impairment – memory, executive function deterioration with retained functional abilities

MDD Major Depressive Disorder

MMSE Mini Mental State Examination – a 30 point scale of simple questions to assess mental abilities

NfL Neurofilament Light – a nerve protein in the brain and the body

NIA-AA National Institutes of Aging and Alzheimer's Association

NMDA – a type of receptor for glutamate in the brain

PET Positron Emission Tomography – a type of scan

Placebo controlled Non-active treatment for double-blind design

p-Tau181 or 217 AD biomarker of phosphorylated Tau protein

QPCT Glutaminyl-peptide cyclotransferase is an enzyme proposed to create toxic amyloid species

RBANS Repeatable Battery for the Assessment of Neuropsychological Status (a test of mental abilities)

ROC AUC Receiver Operating Curve Area Under the Curve (1.0 ideal) – a type of statistical test to compare two methods of measurement

Tau – a brain protein

Ttau – total tau levels including both phosphorylated and non-phosphorylated tau