MD Project
Biomedical Sciences Stream

Charles Sturt University

WESTERN SYDNEY UNIVERSITY

Turning Up the Heat: Exploring a Low-cost Therapy to Combat Alzheimer's Disease

A Behavioural Analysis

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The Challenge:
Alzheimer's Disease (AD)

Dementia is the **second leading cause of death** in Australia

- *Leading cause of death for women*[1]

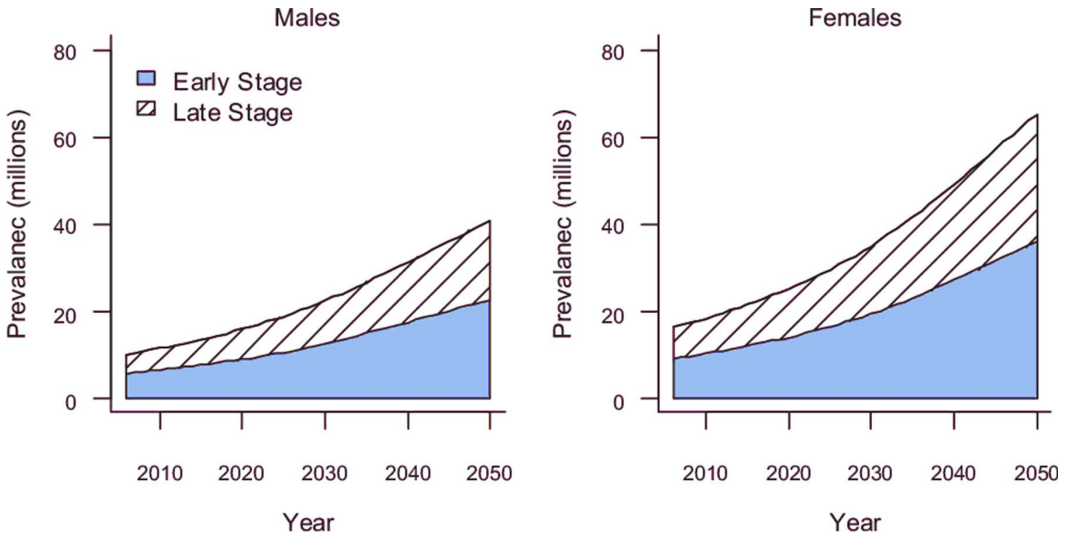

Figure 1: Worldwide projections of Alzheimer's prevalence[2]

Research Gaps

Lack of studies on HT in AD models

- *Underrepresentation of females in neurodegenerative research*

A Solution:
Heat Therapy (HT)

HT improves health outcomes:

- obesity
- diabetes
- cardiovascular disease
- dementia risk[3]

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Aim

Investigate if heat treatment can **rescue** cognitive decline in male & female AD mouse models in later stages of the disease

Hypothesis

Heat treatment will reverse AD-like behavioural phenotype at later stages of disease

Significance

Validates heat therapy as a cost-effective & non-invasive solution

WT = Wild type (normal mice)

TAU58/2 = Tauopathy type (AD model)

Handling *3 days* → **Habituation** *3 days* → **Treatment** *2x/wk - 8wks* → **Behaviours** *2.5 weeks* → **Tissue Collection** → **Analysis** *ANOVA, T-test*

Treatment

6-month-old cohort

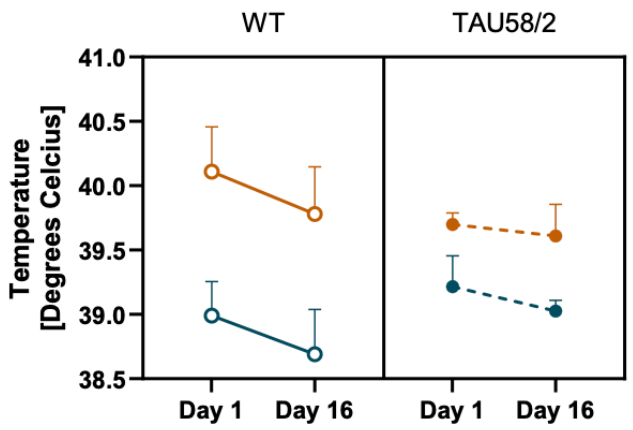
MALE	WT	TAU58/2
CTR	5	2
HT	4	3

FEMALE	WT	TAU58/2
CTR	2	3
HT	1	2

Two future cohorts: all groups will have n≥12

Heat treatment

Average temperature



CTR — **Control →** *Room temp ~24°C*

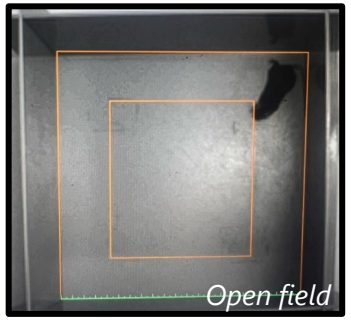
HT — **Heat therapy →** *42.0±0.2°C*

Effect of day p = 0.03
Effect of treatment p = 0.0002

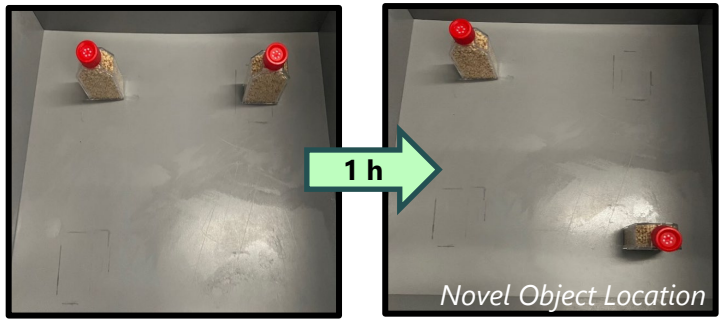
Behaviours

9-months-old

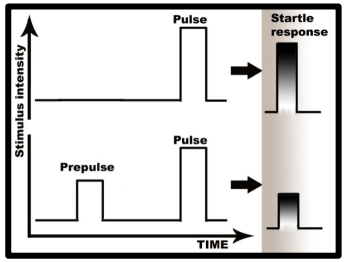
Motor



Memory



Sensorimotor gating



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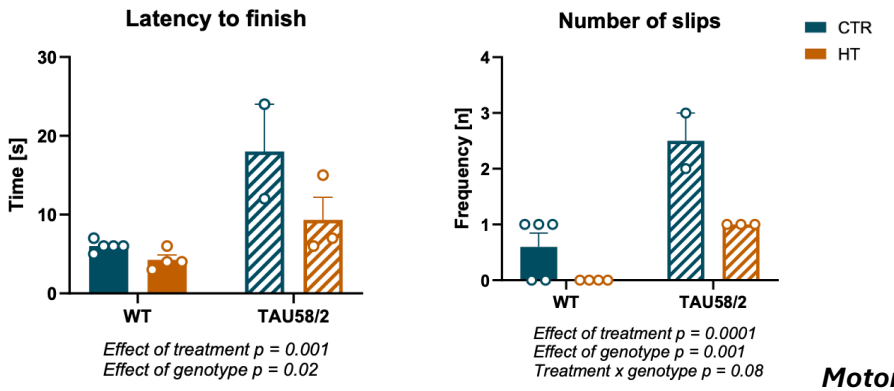
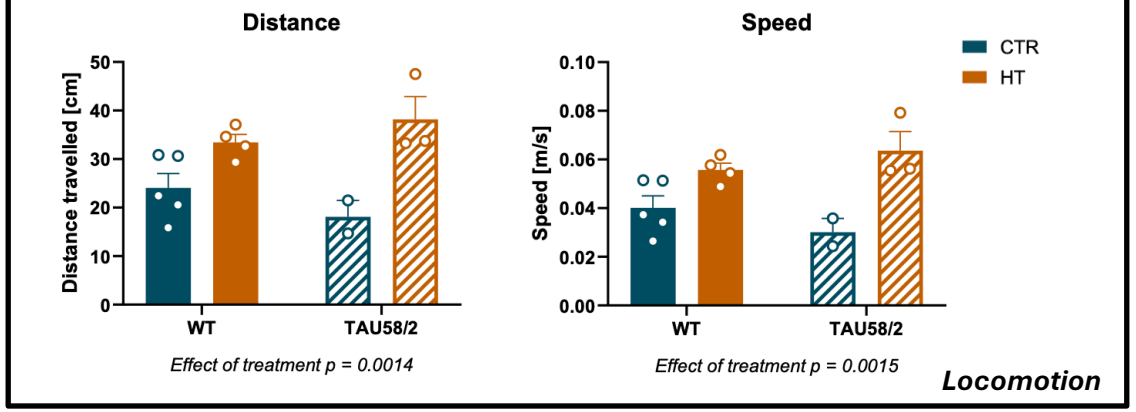
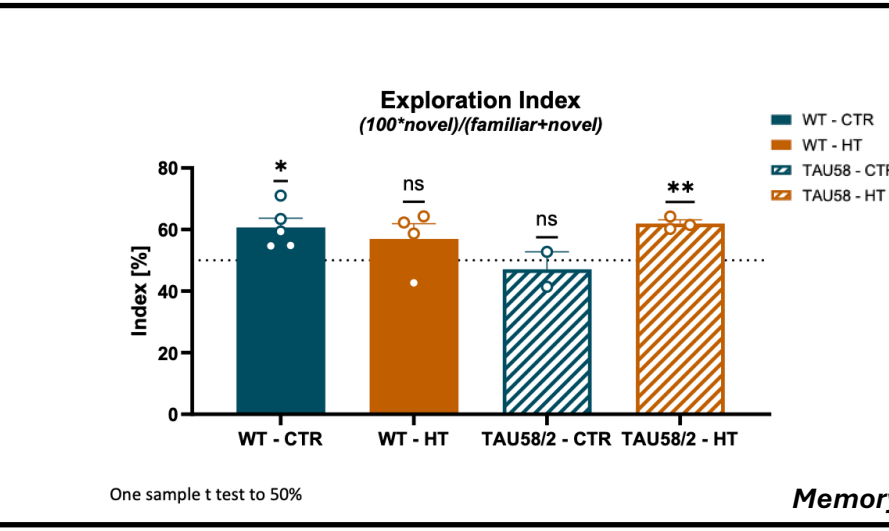
BEAM WALK



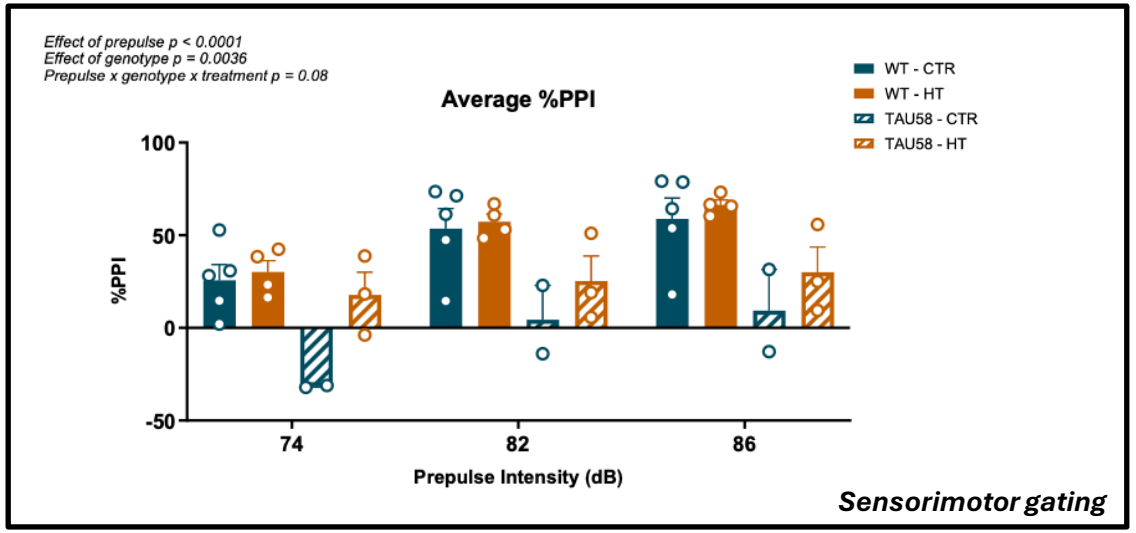
OPEN FIELD



NOVEL OBJECT LOCATION



PREPULSE INHIBITION



Heat therapy has the potential to improve behavioural responses in AD mouse models

Motor coordination & cognition
Well-defined improvement

Sensorimotor gating
Notable difference – consider sample size

Locomotion
Increased mobility

Supports current evidence for heat therapy in neurodegeneration[3]

Strengths

- Comprehensive behavioural assessment
- Easily translatable
- Safe protocol

Limitations

- Small sample size*

**Two future cohorts: all groups will have n≥12*

Future Considerations

- Finish all cohorts – six & two months
- Western Blot for heat shock pathway
- Immunofluorescence (microglia, astrocytes & tau)

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- Benjamin Smits
- Isabella Jajjo
- Jack Coleman

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MY CONTRIBUTIONS

Mice handling & ethics, protein assay, western blotting, statistical & data analysis, tissue collection, heat treatment, behavioural tests

References

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3. Von Schulze AT, Deng F, Morris JK, Geiger PC. **Heat therapy: possible benefits for cognitive function and the aging brain**. J Appl Physiol [Internet]. 2020 Dec 1 [cited 2025 Mar 18];129(6):1468-1476. Available from: https://doi.org/10.1152/japplphysiol.00168.2020.