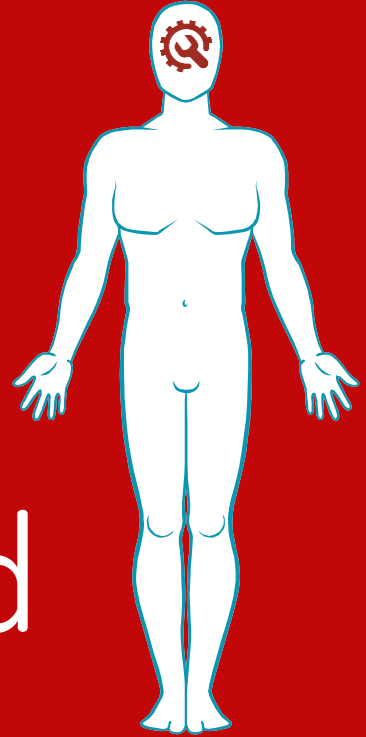


# NeuroScientific Biopharmaceuticals Ltd



NeuroScientific  
BIOPHARMACEUTICALS

Novel drug therapies for neurodegenerative  
conditions

# DISCLAIMER

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# ALZHEIMER'S DISEASE:

## The need for novel therapeutics

### Pathology of AD

- ▶ Characterised by two pathological hallmarks; A $\beta$  plaques & tau aggregates

### Therapeutics

- ▶ Approved drugs do not stop the progression of the disease

### Drug Targets

- ▶ Therapeutic approaches targeting A $\beta$  plaques have yet to succeed past late-stage clinical trials

**Estimated that the frequency of Alzheimer's disease could be reduced by approximately 50% if the onset could be delayed by 5-years**



# ALZHEIMER'S DISEASE: Why so many past failures?

## Pathology of AD

- ▶ Disease pathology not clearly understood
- ▶ A $\beta$  plaques & tau aggregates may not be the cause

## Diagnosis of AD

- ▶ Definitive diagnosis of patients in clinical trials

## Outcomes Measures

- ▶ Lack of reliable biomarkers
- ▶ Clinical end-points to demonstrate efficacy

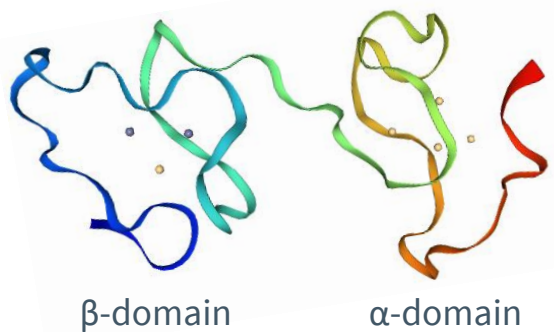
# NEUROSCIENTIFIC BIOPHARMACEUTICALS

## Developing a novel compound for the treatment of AD

- ▶ EmtinB; advanced preclinical lead drug candidate
- ▶ LRP-1 receptor agonist, inducing survival and neurite outgrowth
- ▶ Co-developed by the University of Copenhagen & the University of Tasmania (Menzies Research Inst.)
- ▶ The Emtin technology is based on the structure and function of human metallothionein-2A protein

# EVOLUTION OF EMTINB

## MT-II Structure



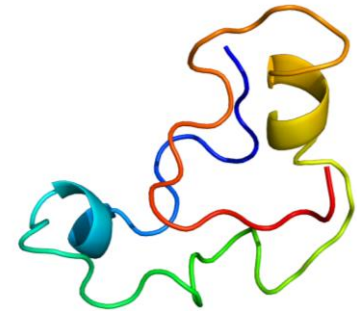
- ▶ 61 amino acid length
- ▶ Binds divalent metal ions
- ▶ Difficult to manufacture

## EmtinB Peptide



- ▶ 14 amino acid length
- ▶ Isolated from the  $\beta$ -domain of MT-II protein

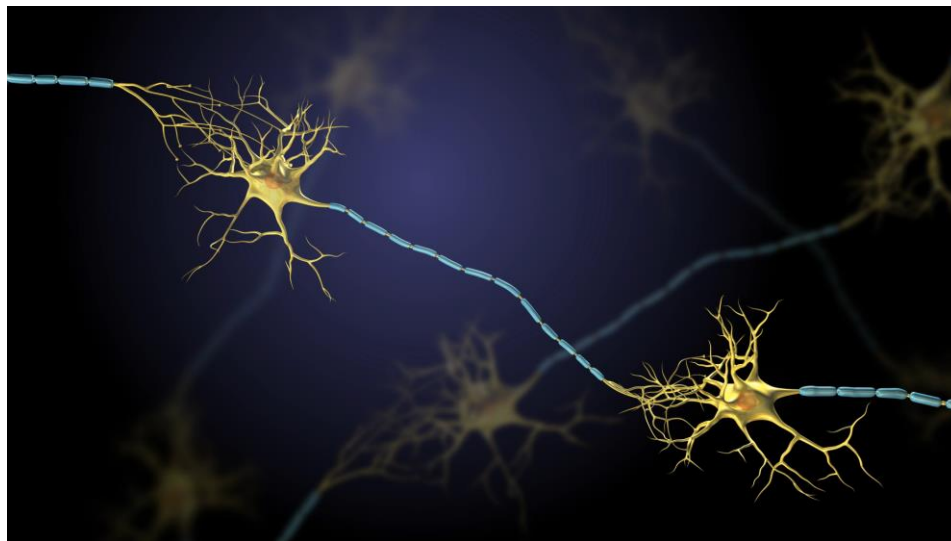
## EmtinB Peptide Dendrimer



- ▶ Synthesised as a dendrimer:
  - Increased potency and stability

# EMTINB MECHANISM OF ACTION

- ▶ Binding of LRP-1 activates signaling molecules extracellular signal-regulated kinase (ERK), protein kinase B (Akt) and cAMP response element binding protein (CREB)

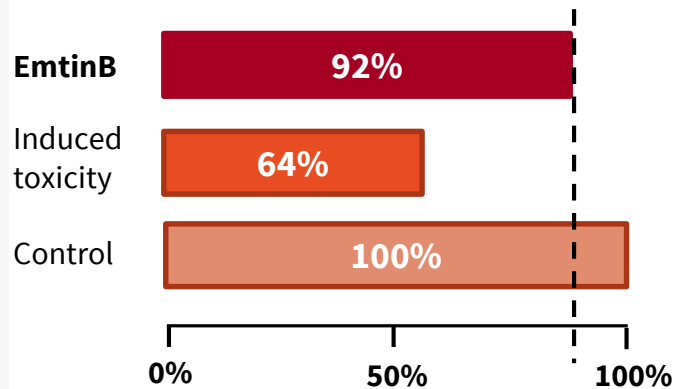


# EMTINB SCIENTIFIC DATA

## Preclinical studies

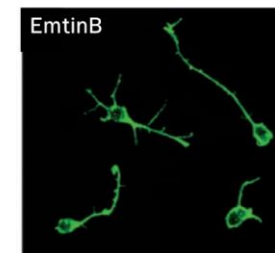
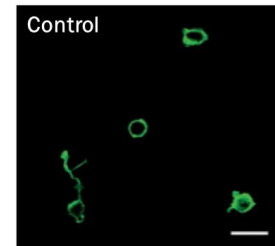
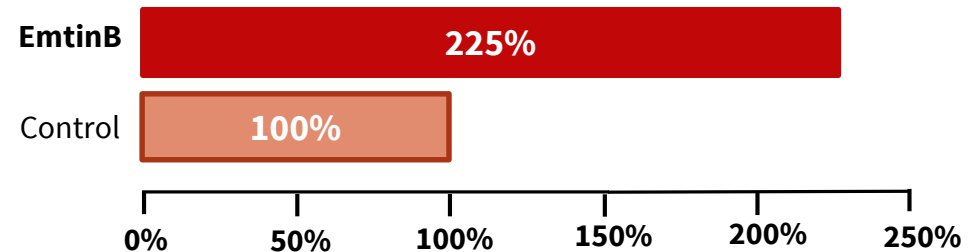
Increased mean survival of rate  
of brain cells >90%

**Cell survival:** 48-hour incubation period



Stimulates neurite  
outgrowth by up to 300%

**Neurite length:** 24-hour treatment period

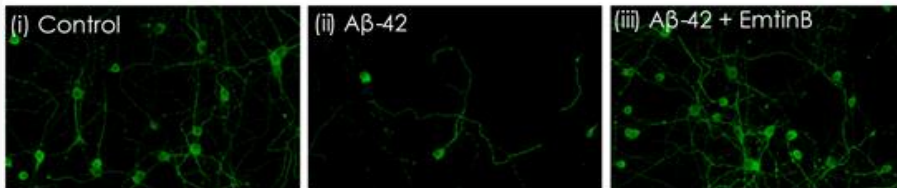
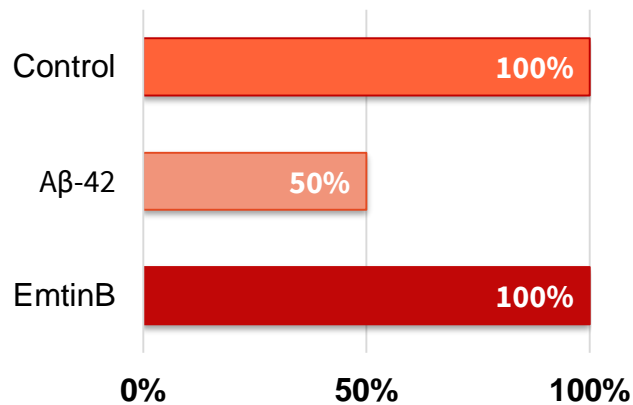




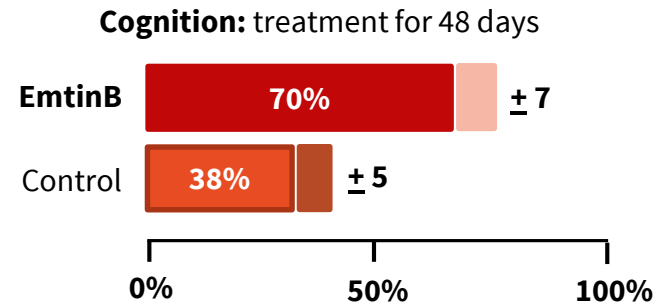
# EMTINB SCIENTIFIC DATA

## Preclinical studies in AD models

Prevented cell death in *in vitro* Alzheimer's model of toxicity



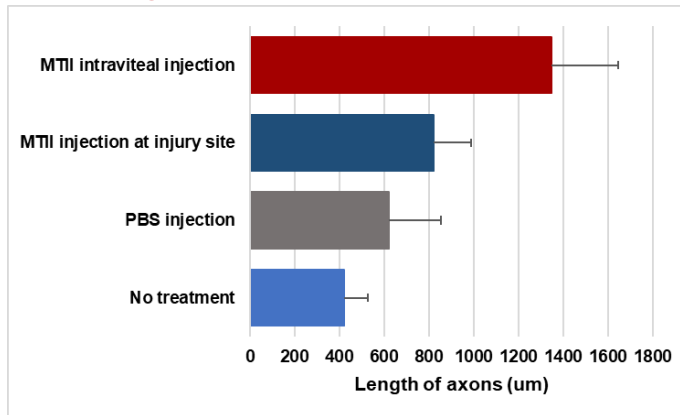
Slowed progression of disease (memory impairment) by >80% in Alzheimer's animal model



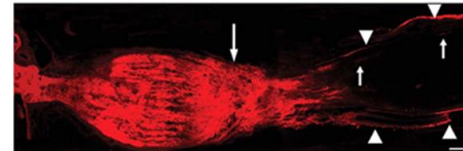
# SUPPORTING SCIENTIFIC DATA

- ▶ Precursor to EmtinB (MT-II) stimulated regenerative growth of optic nerve cells
- ▶ Treatment group (8 rats) all demonstrated 3x regenerative response from single dose 4 weeks post treatment

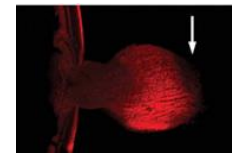
## Regeneration of the Optic Nerve (axonal growth)



Treatment

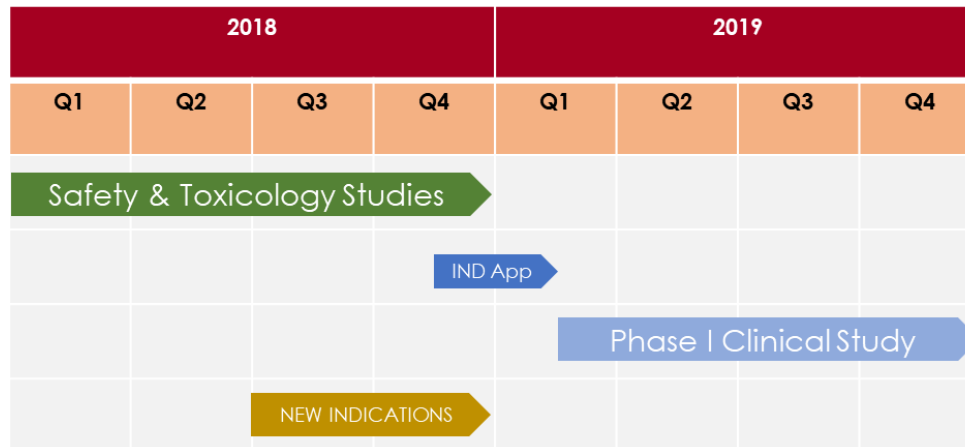


No treatment







# EMTINB DEVELOPMENT SCHEDULE

- ▶ Plan to undertake early-phase clinical studies Q1 2019



# DEVELOPMENT PIPELINE

- NSB has a pipeline of potential drug candidates, including 3 other peptides related to EmtinB

Program	Preclinical Phase			Clinical Phase	
	Lead optimisation	Animal efficacy studies	Safety, & toxicology studies	Phase Ia	Phase Ib
Therapeutic peptides					
Dementia / Alzheimer's disease	Completed 	Completed	Completed Q4 2018	Scheduled for Q1 2019	Scheduled for Q1 2019
Diseases associated with optic nerve degeneration		Planned for Q3 2018	Safety data from above studies		
Other Emtin peptides		Planned for Q3 2018			
Diagnostic peptide					
Alzheimer's disease		Seek to license out for further development			

# CORPORATE OVERVIEW

- ▶ Completed IPO listing on the ASX on the 27 July 2018
- ▶ Lead candidate funded through to completion of Phase I
- ▶ Pipeline of potential therapeutic candidates with IP protection

Capital Structure	
ASX code	NSB
Shares on issue	73,580,592
Price (close 27/07/2018)	\$0.225
Market cap	\$16.5M
Shares escrowed 12-months	1,906,269
Shares escrowed 24-months	19,349,506