Bionomics

CREATING INNOVATIVE THERAPIES
FOR CNS DISORDERS.

BNC210 Phase 2 PTSD Clinical Trial Results Presentation

BNO (Australia: ASX)
BNOEF (USA: OTCQX)

2 October 2018

Central Nervous System (CNS)

Safe Harbor Statement

Factors Affecting Future Performance

This presentation contains "forward-looking" statements within the meaning of the United States' Private Securities Litigation Reform Act of 1995. Any statements contained in this presentation that relate to prospective events or developments, including, without limitation, statements made regarding Bionomics' drug candidates (including BNC210, BNC105 and BNC101), its licensing agreement with Merck & Co. and any milestone or royalty payments thereunder, drug discovery programs, ongoing and future clinical trials, and timing of the receipt of clinical data for our drug candidates are deemed to be forward-looking statements. Words such as "believes," "anticipates," "plans," "expects," "projects," "forecasts," "will" and similar expressions are intended to identify forward-looking statements.

There are a number of important factors that could cause actual results or events to differ materially from those indicated by these forward-looking statements, including unexpected safety or efficacy data, unexpected side effects observed in clinical trials, risks related to our available funds or existing funding arrangements, our failure to introduce new drug candidates or platform technologies or obtain regulatory approvals in a timely manner or at all, regulatory changes, inability to protect our intellectual property, risks related to our international operations, our inability to integrate acquired businesses and technologies into our existing business and to our competitive advantage, as well as other factors. Results of studies performed on our drug candidates and competitors' drugs and drug candidates may vary from those reported when tested in different settings.

Subject to the requirements of any applicable legislation or the listing rules of any stock exchange on which our securities are quoted, we disclaim any intention or obligation to update any forward-looking statements as a result of developments occurring after the date of this presentation.

Bionomics Overview

- Global, clinical stage biopharmaceutical company leveraging proprietary platform technologies, ionX and MultiCore, to discover and develop a deep pipeline of novel drug candidates targeting ion channels in CNS disorders

- Lead candidate, BNC210, is a novel, orally-administered, first-in-class, negative allosteric modulator of the α7 nicotinic acetylcholine receptor, in development for anxiety, panic, agitation, and PTSD:
  - Positive data from Phase 2 trial in Generalised Anxiety Disorder (GAD) patients reported in September 2016
  - Phase 2 trial in Post Traumatic Stress Disorder (PTSD) did not reach primary endpoint reported in October 2018. Evidence of antidepressant and anxiolytic effects on components of CAPS-5
  - Phase 2 trial in Agitation ongoing in Australia with data anticipated in 1Q, CY2019

- Strategic partnership with Merck & Co., (MSD):
  - Cognition therapeutic candidate entered clinical development and triggered US$10M milestone payment in deal valued up to US$506M in upfront, research and milestone payments plus additional royalties on net sales of licensed drugs
  - Merck & Co equity investment in October 2015

- Robust pipeline of first-in-class ion channel programs

- Financials: Cash at 30 June 2018 US$18.4M

BNC210: Next Generation Drug Candidate with Potential to Treat Anxiety, Depression, Agitation, PTSD

Potential Competitive Advantages of BNC210*

Drug	No sedation	No withdrawal syndrome	No memory impairment	Fast acting	No drug/drug interactions	Once-a-day dosing
BNC210	✓	✓	✓	✓	✓	✓
Valium and other BZD	X	X	X	✓	✓	X
Prozac and certain other SSRI/SNRI	✓	X	✓	X	X	✓
Atypical Antipsychotics	X	X	X	✓	X	✓

Anxiety Treatments

- Dominated by benzodiazepines (BZDs)
- Associated with sedation, abuse liability, tolerance and cognitive disturbances
- Not recommended for long-term treatment

Depression Treatments

- SSRIs and SNRIs used to treat depression and anxiety
- Modest efficacy, late onset of action, discontinuation, weight gain, sexual dysfunction and increased thoughts of suicide in adolescents
- Many have black box warnings

Agitation Treatments

- In addition to BZD, anti-psychotics are used to treat agitation and anxiety. They cause dizziness, sedation, weight gain, constipation, movement disorders and have black box warnings for use in elderly (stroke)

Post Traumatic Stress Disorder (PTSD) Treatments

- Sertraline (Zoloft) and paroxetine (Paxil) are only US FDA approved drugs for PTSD.
- Despite lack of efficacy, addictive potential and other harms associated with chronic use, BZDs are still over-prescribed.
- An estimated 2.8M scripts are written off-label for management of PTSD symptoms.
- VA/DoD 'Practice Guideline for PTSD' recommends against the use of BZDs such as Valium for PTSD.
- 50% increase in overall mortality rates associated with long-term benzodiazepine use in PTSD patients – overdosing, sudden unexplained deaths, car crashes, falls.

Selective Serotonin Reuptake Inhibitors (SSRIs).
Serotonin-Norepinephrine Reuptake Inhibitor (SNRI).
Veteran's Affairs (VA). Department of Defense (DoD)

*Based on data from preclinical studies, Phase 1 & 2 clinical trials.

Bionomics

BNC210 Overview: Novel, Best-in-Class Negative Modulator of α7 Nicotinic Acetylcholine Receptor

Mechanism of Action	• Negative allosteric modulator of α7 nicotinic acetylcholine receptor, a ligand gated ion channel
Target Indications	• Anxiety (Generalised Anxiety Disorder) & Post Traumatic Stress Disorder and Agitation • Potential for other CNS indications, including Depression
Ongoing Clinical Trials	• Phase 2 multi-center trial (Australia) in Agitation, topline data 1Q, CY2019
Prior Completed Clinical Trials	• 6 completed Phase 1 trials in > 200 healthy subjects • Demonstrated safety and tolerability; no sedation, cognitive impairment or impaired motor co-ordination; suppressed symptoms of CCK4-induced panic; target engagement in brain demonstrated • Phase 2 in GAD patients met co- primary endpoints; low dose BNC210 outperformed Lorazepam, measured by cerebral perfusion and degree of change in amygdala activation • Secondary endpoint met; high and low dose BNC210 outperformed Lorazepam in an anxiety provoked behavioral task

BNC210.007: A Randomised, Double-blind, Placebo-controlled Phase II Study of BNC210 in Adults with Post-Traumatic Stress Disorder (PTSD)

Study Design

- 193 subjects
- Randomised to 4 treatment arms - placebo, 150 mg, 300 mg and 600 mg BNC210 (1:1:1:1)
- BNC210 or placebo is taken twice daily with food

- 3 week screening period
- 12 week treatment period
- 3 week follow up

- Multi-centre – Australia 6 sites / U.S. 20 sites

Key Patient Selection Criteria for Study Entry

restore

INCLUSION CRITERIA

- A current diagnosis of PTSD as defined by CAPS-5 (Clinician-Administered PTSD Scale for DSM-5)
- Males and females between the ages of 18 - 70
- Concomitant use of current anti-depressant medication allowed (1 anti-depressant only (SSRI or SNRI))
- Rescue use of benzodiazepines allowed (not to exceed 2 days / week)
- Continuation/maintenance of long-term counseling support and /or behavior therapy allowed

EXCLUSION CRITERIA

- Subjects with severe depression were excluded
- Increased risk of suicidal behavior or suicidal ideation with intent
- Moderate to severe substance use disorder in the 2 months prior to study
- Patients with borderline personality disorder, bipolar disorder, psychotic disorders, and significant traumatic brain injury

Bionomics

PTSD Study Objectives

Primary Objective

- To assess the effects of BNC210 on investigator-rated symptoms of PTSD measured by CAPS-5 scores

Secondary Objectives

- To assess effects of BNC210 on Individual Symptom Clusters in CAPS-5:
  - Intrusion
  - Avoidance
  - Negative alterations in cognition and mood
  - Arousal and reactivity
- To assess safety and tolerability of BNC210 in subjects with PTSD

Exploratory Objectives

- To assess the relationship between nicotine use and treatment effect of BNC210
- To assess the relationship between anti-depressant use and treatment effect of BNC210

Patient Demographics

	Placebo	BNC210 150 mg b.i.d.	BNC210 300 mg b.i.d.	BNC210 600 mg b.i.d.
Age (years): Mean	41.1	41.1	43.6	42.2
Sex:				
Male	19	16	22	23
Female	30	31	26	25
Country:				
Australia	11	6	7	7
USA	38	41	41	41
Antidepressant use at baseline:				
Yes	11	8	9	12
No	38	39	39	36
Time since PTSD event (years): Mean	16.4	17.9	16.2	18.8
Nicotine Use:				
Before	11	7	10	9
Never	26	26	25	33
Ongoing	12	14	13	6
Baseline CAPS-5: Mean	35.3	36.5	34.9	29.4

Overall Conclusions from the Trial

- No effect on primary CAPS-5 endpoint
- Australian patients had a greater improvement over placebo than US patients
  - CAPS-5 statistically significant at week 4 in Australians ($p<0.05$)
- Evidence of antidepressant effect in high dose treatment group
  - CAPS-5 Criterion D (negative changes in cognition and mood) overall statistically significant at week 1 in the total population ($p<0.05$)
  - CAPS-5 Criterion D, question 4 (persistent negative emotional state) statistically significant at weeks 4 and 8 in the total population ($p<0.05$)
- Evidence of anxiolytic effect
  - Trend towards improvement on CAPS-5 Criterion E (arousal and reactivity), question 3 (hypervigilance) in the total population
  - Trend towards improvement on CAPS-5 Criterion E, question 4 (exaggerated startle response) in the total population
- Safe and well tolerated

BNC210 has Potential for the Treatment of Agitation

BNC210 rapidly inhibits Amygdala activation in GAD patients during the performance of anxiety provoking tasks

BNC210 rapidly restores emotional stability after a Panic Attack

Higher prevalence of GAD in the elderly

Amygdala activation associated with Agitation

Phase 2 Clinical Trial to Assess the Efficacy and Safety of BNC210 in Hospitalised Elderly Patients with Agitation

Key Selection Criteria	• Hospitalised elderly patients under the care of a specialist Geriatrician • Presenting with agitation requiring intervention in addition to standard-of-care behavioural management
Design	• Randomised, double-blind, placebo controlled parallel dosing, 1:1 ratio • BNC210 300 mg and placebo (twice daily) • 5 days treatment; 2 days follow up • Approximately 40 participants
Objectives	• Primary: to compare the effects of BNC210 and placebo on the time to resolution of agitation as measured by the Pittsburgh Agitation Scale (PAS) • Secondary: to compare the effects of BNC210 and placebo on the change in global function as assessed by the Clinical Global Impression Scale (CGI-S/I) • Exploratory: to assess safety and tolerability of BNC210 in elderly patients with agitation

Our Proprietary Platform Technologies and CNS Therapeutic Focus

ionX

Identifies drug candidates targeting both ligand gated and voltage gated ion channels

Proprietary cell lines and screening approaches

Comprehensive *in vivo* models validate target biology

MultiCore

A diversity orientated chemistry platform for the discovery of small molecule drug candidates

Computer aided pharmacophore modelling

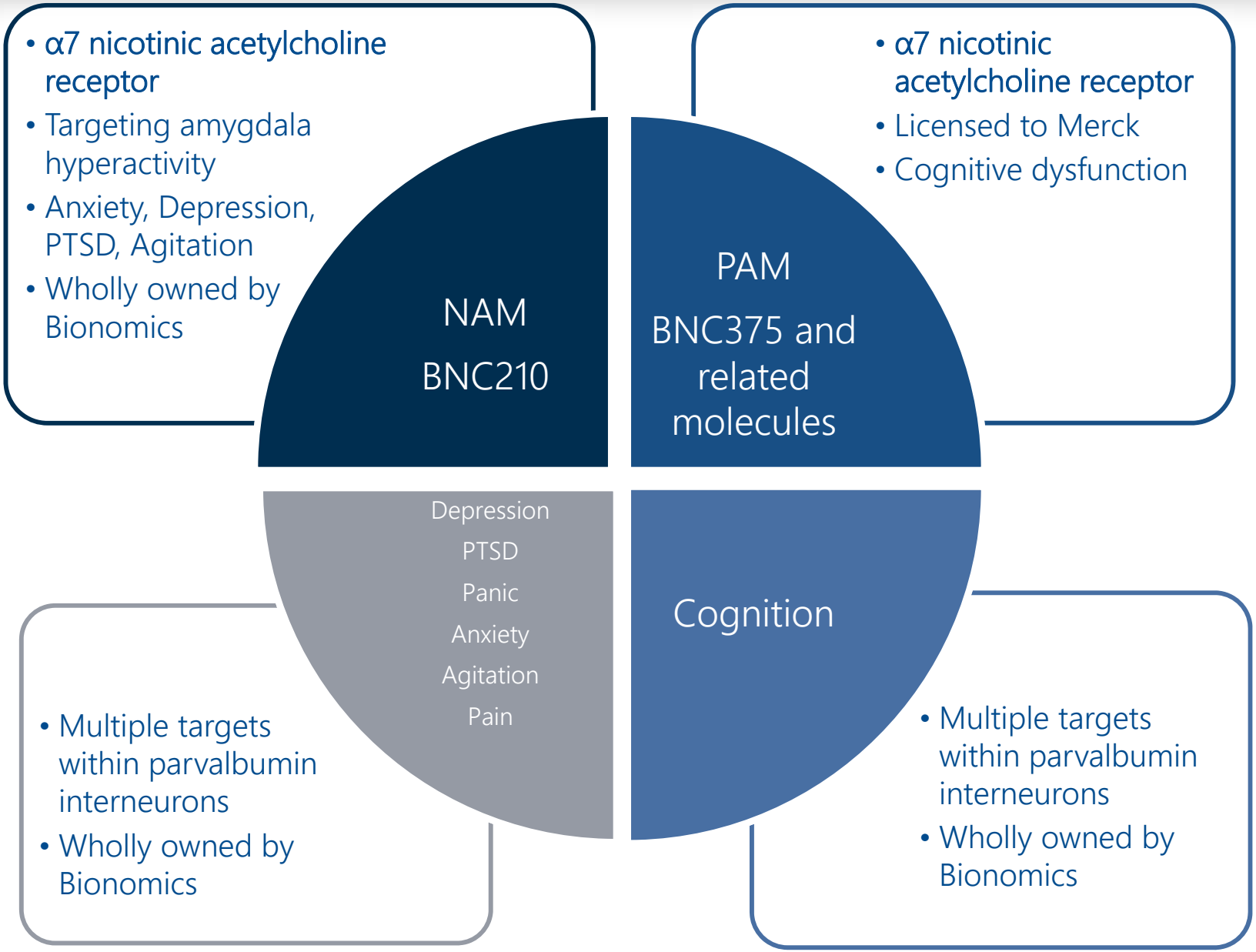
Scaffold hopping synthetic approaches rapidly create diversity in small, focused libraries

Parallel, differentiated chemical series of potential drug candidates

Therapeutic Areas

- PTSD
- Anxiety
- Agitation
- Depression
- Cognitive/Memory Deficits
- Pain

Bionomics' CNS Discovery Engine



Bionomics

Bionomics' CNS Focused Pipeline

Program	Mechanism of Action	Indication	Pre-IND	Phase 1 / 2a	Phase 2b	Bionomics' Commercial Rights	Market Opportunity
BNC210	α7 nicotinic acetylcholine receptor NAM	PTSD	*Fully recruited; results expected late 3Q, 2018*			WW	▪ US$4.7B ▪ 3.4-4% prevalence >18 yrs ▪ ~25% of patients diagnosed and treated
		Agitation	*Phase 2 initiated Q2 2018; results expected Q1 2019*			WW	▪ US$1.6B ▪ ~3.1% dementia prevalence >40yrs ▪ ~9% agitation patients diagnosed and treated
		GAD	*Positive Phase 2a data*			WW	▪ US$2.7B ▪ 3.1% GAD prevalence ▪ ~25% diagnosed and treated ▪ ~50% of SSRI patients treated are partial responders or have relapsed
		Panic	*Positive CCK-4 induced panic data*			WW	▪ US$4.4B ▪ 2.7% prevalence ▪ ~50% diagnosed and treated ▪ Assumes 5% premium to Trintellix 2016 AWP for 30-day supply of $380 – compliance adjusted
MK#	α7 nicotinic acetylcholine receptor PAM	Alzheimer's, Parkinson's	*Phase 1 ongoing*			WW Merck Partnership	▪ US$506M total deal value including upfront and milestones payments ▪ Tiered royalties
Pain, Depression, Memory Enhancement	Undisclosed					WW	

Global License and Collaboration Agreement with Merck & Co in Cognition Provides Validation

- Validates ionX and MultiCore drug discovery platforms
- Partnership with Merck & Co in cognition generated US$20M in upfront payment in 2014, research funding 2014-2017 and US$10M first clinical milestone in February 2017
- Deal valued up to US$506M in upfront, research and milestone payments plus additional royalties on net sales of licensed drugs

- Agreement covers research on BNC375 and related compounds
- BNC375 demonstrated potent memory enhancing properties in animal models – both episodic and working memory improved
- Targeting cognitive impairment in Alzheimer's and Parkinson's and other conditions

Outlook

BNC210 PTSD	▪ Cease development in PTSD ▪ Evaluate opportunities for partnering and other strategic initiatives
BNC210 Agitation	▪ Phase 2 results anticipated in 1Q, CY2019
Pipeline	▪ Additional 1-2 therapeutic candidates prior to June 30 2019

- Validated Platform – Merck partnership and shareholding
  - We anticipate being able to update on progress of the therapeutic candidate in coming months
- Robust pipeline of first in class ion channel candidates addressing significant unmet need in Bionomics' areas of strength in CNS disorders
- In FY18 Bionomics reduced costs by closing the US operations and reducing overall headcount
- We are continuing to assess our strategic options for partnering and portfolio prioritisation whilst conserving cash with the aim of maintaining and enhancing shareholder value

Bionomics

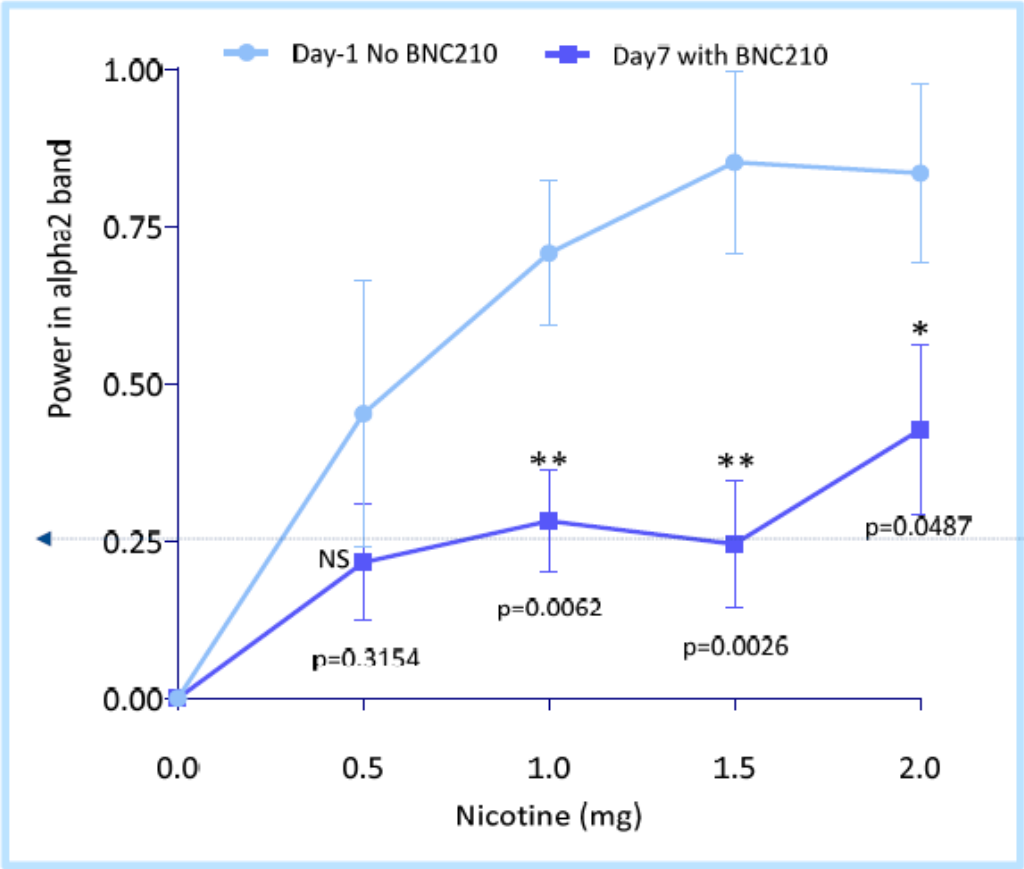
Appendix

Evidence of Target Modulation in Humans: BNC210 Treatment Reduced Amplitude of Nicotine Effects

Day -1: nicotine/EEG dose responses performed for all subjects, 0 - 2.0 mg, no BNC210

Day 7: nicotine/EEG dose responses performed for all subjects, 0 - 2.0 mg, subjects dosed with BNC210 for 7 days

Data analysis measured the difference between the power in the fast alpha2 band (10-12.5 Hz) at each nicotine dose on Day -1 (no BNC210) and Day 7 (BNC210 treatment). Analyses performed in EEG responders[$]



✓ Statistically significant reduction in nicotine response

*Power in the fast Alpha2 band (10-12.5Hz) measured

[$]Responders were defined as those who gave a dose response to nicotine (EEG) both at screening and on Day 1. This analysis was performed before unblinding. There were 13/24 responders. COMT genotyping was also performed – link to power in alpha 2 band. There was no relationship between genotype and nicotine response.

Bionomics

Analysis of BNC210-Induced Changes on EEG Indicate Anxiolysis in the Absence of Sedation

Drug/ EEG Spectrum*	δ	γ	α	α1	α2	β	β1	β2	β3
BNC210			↓		↓	↑			↑
Lorazepam	↑	↓	↓	↓	↓	↑	↑	↑	↑

Increase in delta spectral power during vigilance control session is signature of Lorazepam-induced sedation

Increase in β3 spectral power is associated with the anxiolytic activity of Lorazepam

Brain Maps showing temporal effect of BNC210 on α and β frequency bands

*Arrows represent statistically significant changes in spectral power ($p<0.05$) displayed over considerable surface or scalp regions measured at 6 hours (cMAX for Lorazepam and BNC210).

Bionomics

BNC210 Phase 2 Trial in Generalised Anxiety Disorder (GAD) Demonstrated Acute Anxiolytic Activity

Randomised, double-blind, placebo and Lorazepam-controlled, 4-way crossover design

King's College London Institute of Psychology, Psychiatry and Neuroscience

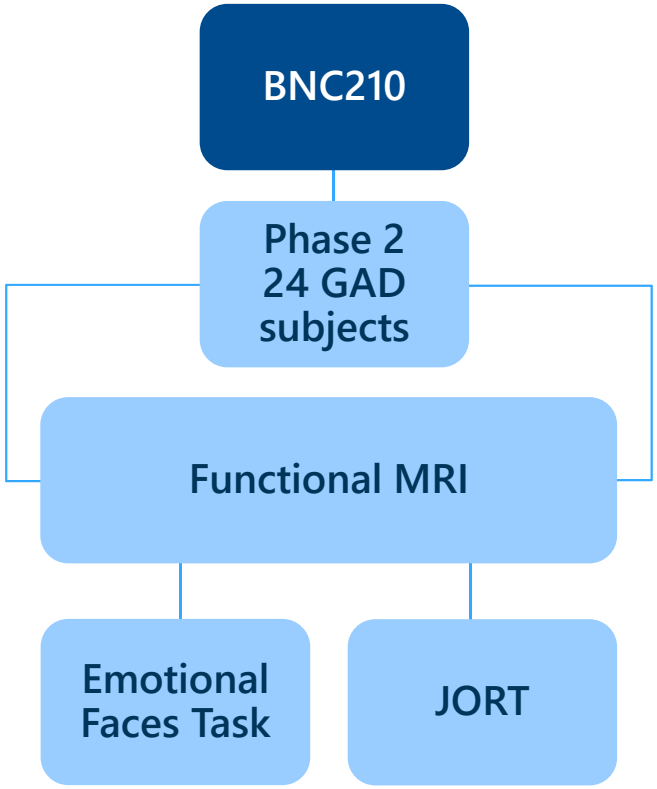
Initiated March 2015

Positive results reported Q3 2016

Primary Endpoints Met:

✓ Changes in cerebral perfusion with BNC210

✓ Changes in brain activation (amygdala) and pathways relevant to anxiety during the performance of an emotional faces task



Secondary Endpoints Met:

✓Significant Changes in defensive behavior using the Joystick Operated Runway Task

✓Safe and well tolerated

BNC210 is not sedating or addictive and does not impair memory or motor co-ordination

All years reflect calendar years. JORT – Joystick Operated Runway Task.

Primary Endpoints Achieved: BNC210 Outperformed Lorazepam in Anxiety Provoked Task

We believe GAD patients treated with BNC210 will have reduced activity in the amygdala during performance of an anxiety provoking task

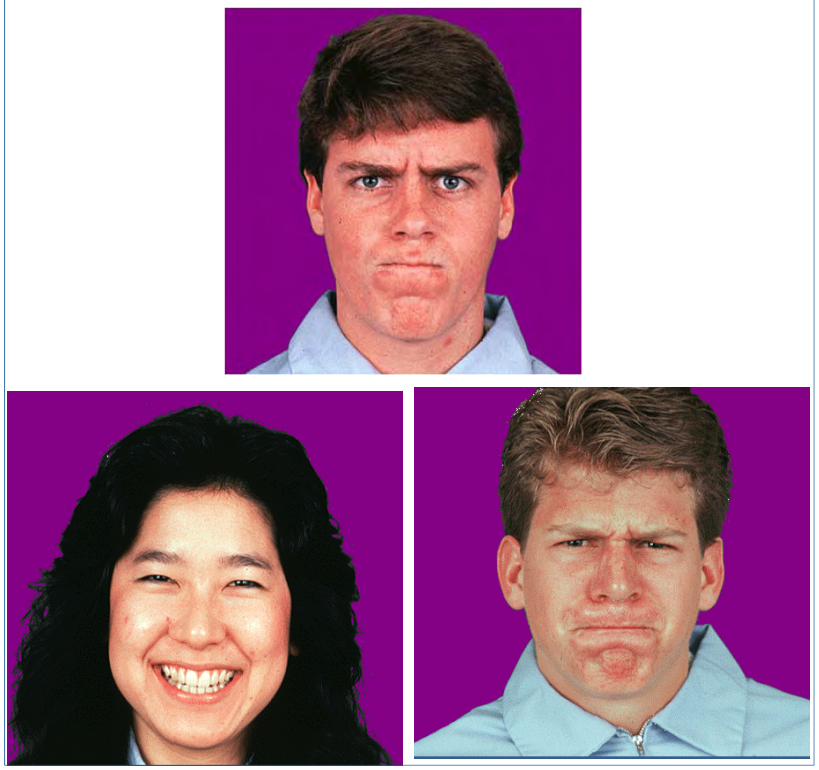
Emotional Faces Task

- Primary Endpoint
- Evaluate activity in the amygdala via Functional MRI
- Several FDA-approved anxiety drugs reduce amygdala activation evoked by performance of the Emotional Faces Task

300 mg BNC210 significantly reduced bilateral amygdala reactivity to fearful faces
$p<0.05$

Clear reduction in amygdala activity produced by lorazepam; approaching significance in the right amygdala at $p = 0.069$

Emotional Faces Task (Hariri Faces)



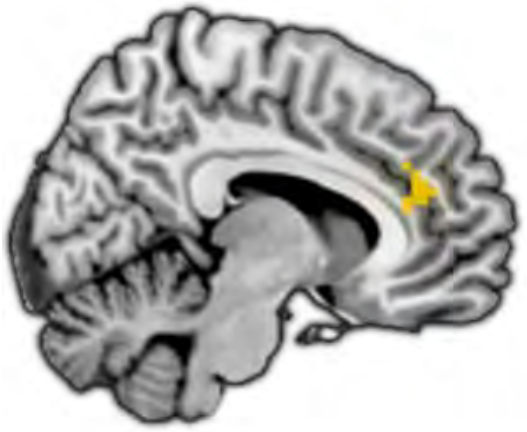
BNC210 Treatment Reduced Connectivity Between the Left Amygdala and the Anterior Cingulate Cortex in GAD Patients

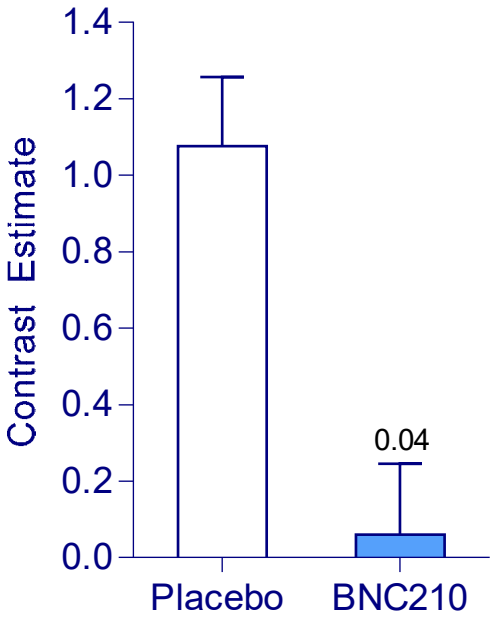
FEATURE OF ANXIETY NEUROCIRCUITRY

- BNC210 (300 mg) reduced connectivity between the left amygdala and anterior cingulate cortex while viewing fearful faces (p = 0.04)

✓ This finding is highly supportive for the anxiolytic activity of BNC210:

- Interactions between the dmPFC/ACC and amygdala constitute an 'aversive-amplification' circuit - increased positive coupling between these regions is associated with elevated threat processing under stress.
- In pathological anxiety this circuit becomes permanently 'switched-on' (Robinson et al. 2011).

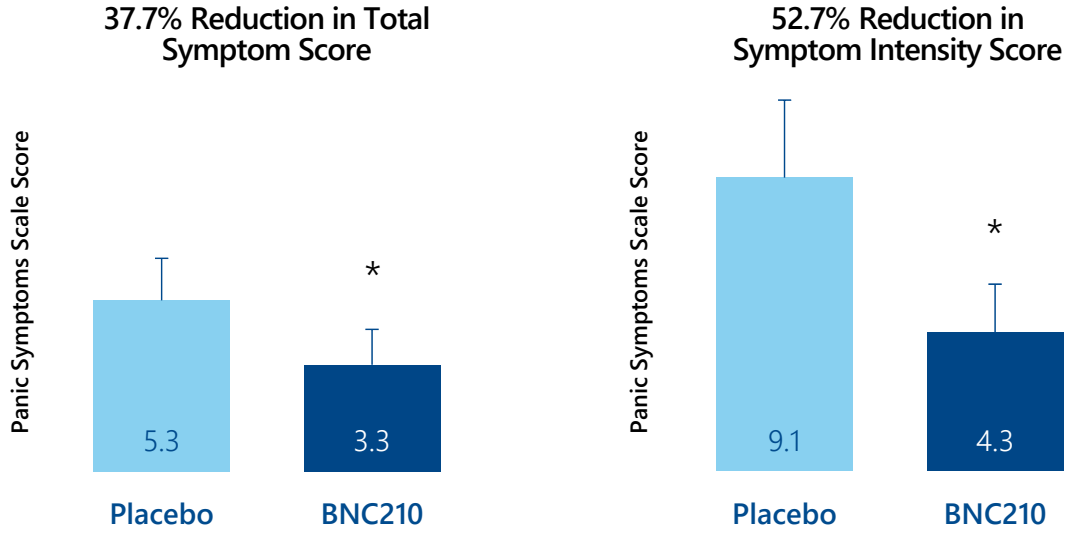




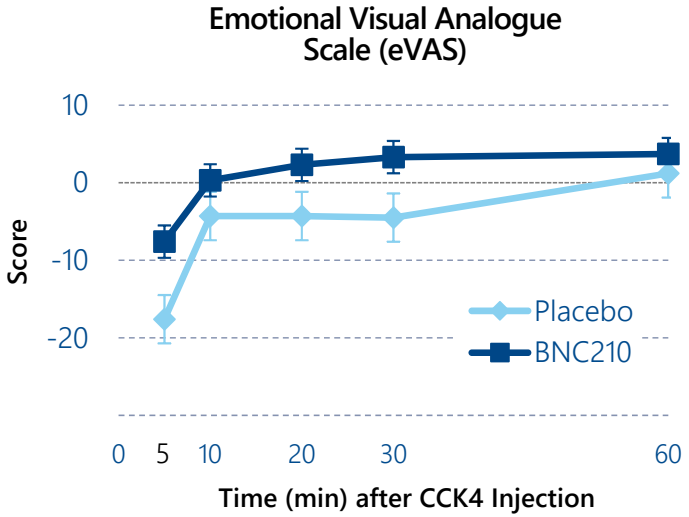
Bionomics

BNC210 Significantly Reduced CCK4-Induced Panic Symptoms in Humans

% Reduction in Total Number of Symptoms & Symptom Intensity



Emotional Visual Analogue Scale (eVAS)



In a Double-blinded, Placebo Controlled Trial Subjects Experiencing Panic Symptoms When Treated with BNC210 (2000mg) Showed:

- Reduction in the number and intensity of panic symptoms compared to placebo as measured by the Panic Symptom Scale (PSS)
- More rapid return to baseline emotional stability compared to placebo reducing opportunity for embedding fear memories

Bionomics