




The Animal Welfare Science Centre 



www.animalwelfare.net.au

Novel Biomarkers of Animal Welfare.

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- The University of Adelaide (SAVS)
- The University of Melbourne
- The University of Queensland and QAAFI
- The Centre for Nanoscale Biophotonics

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Continuum of animal welfare



Negative **Positive**

Rigorous and repeatable assessment of animal welfare required


Continuum of animal welfare



Negative **Positive**

HPA axis
SA system
HR
Immune

Continuum of animal welfare



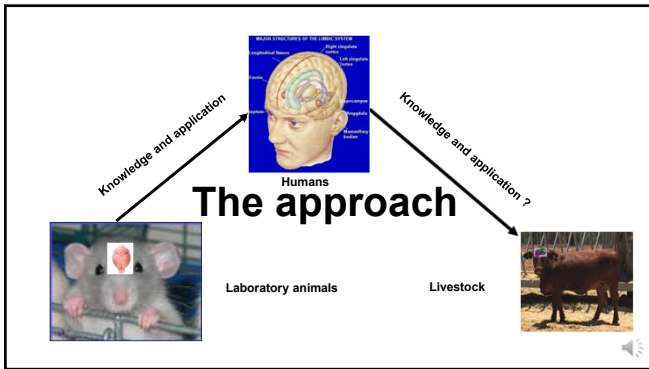
Negative **Positive**

HPA axis
SA system
HR
Immune

HPA axis
SA system
HR
Immune

Need for novel biomarkers of animal welfare that can increase our power to assess the welfare state of the animal.

Positive affective states and negative affective states



Need biomarkers of the activity of key neurophysiological systems

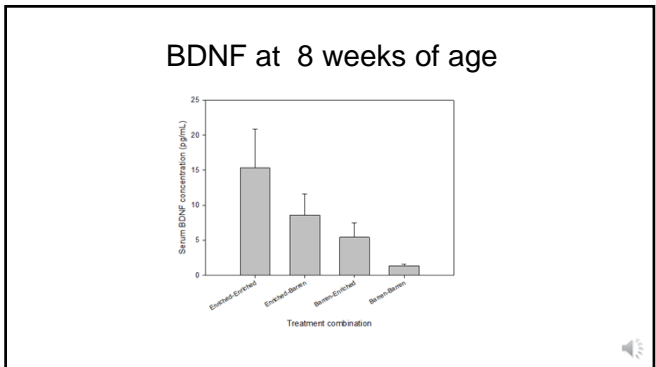
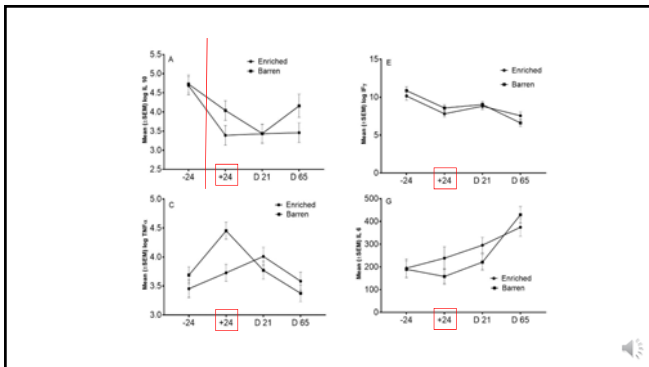
Immune markers (cytokines)

- Tumor necrosis factor alpha (pro-inflammatory)
- C reactive protein (pro-inflammatory)
- Interleukin 10 (anti-inflammatory)
- interleukin 1 beta (anti-inflammatory)

Brain Derived Neurotrophic Factor (BDNF)

MiRNA

- 2 x 2 Factorial experiment
- Enriched or Barren in the sucker phase
- Enriched or Barren in the weaner phase
- Measured immune response 24 h before weaning, 24 h, 21 d and 65 d after weaning



Micro RNA

Potential biomarker of neural activity in the brain?

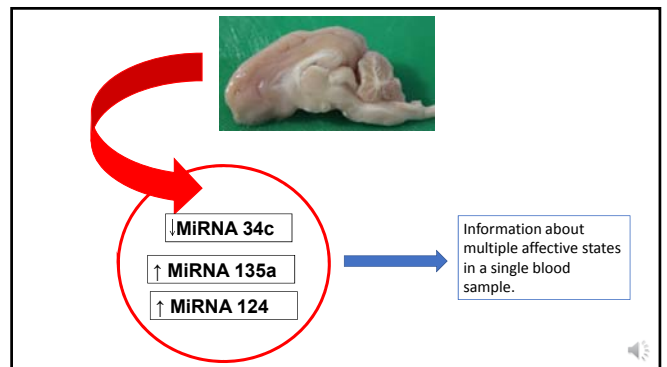
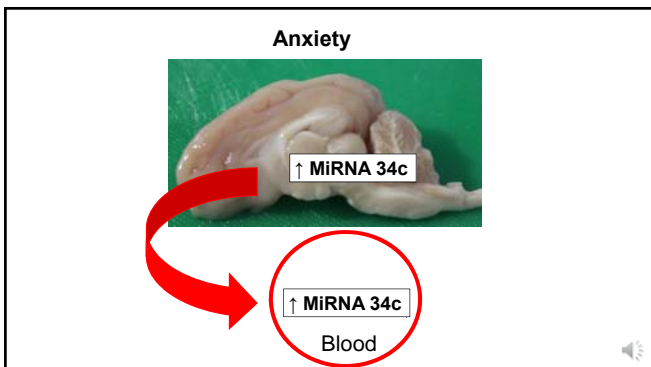
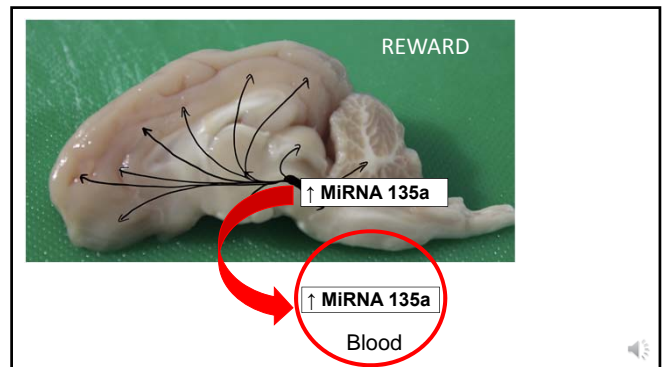
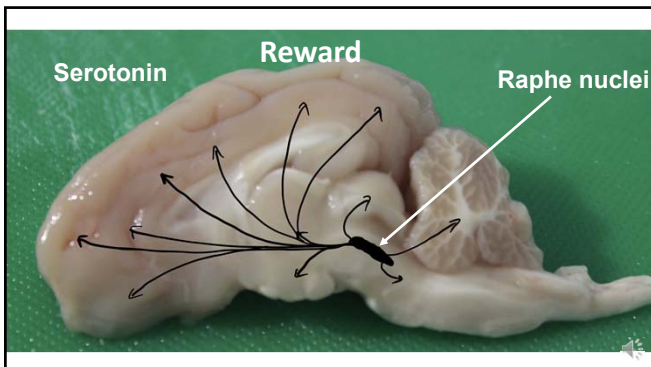
- 22-24 nucleotides
- Regulate gene expression
- Ubiquitous synthesis
- Brain
- Neural activity
- Circulate in blood
- HIGHLY resistant to change

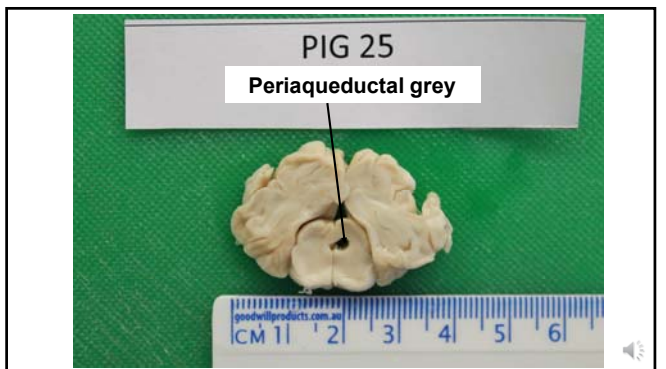
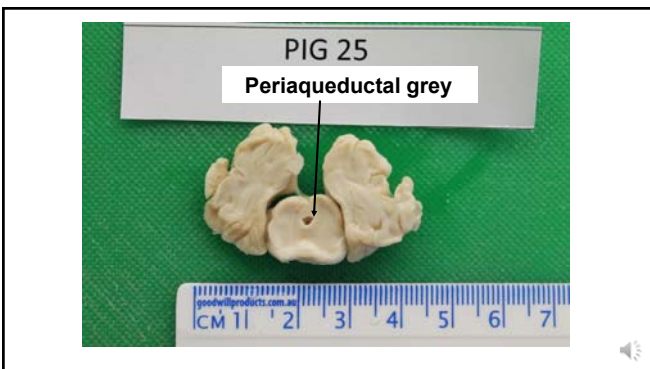
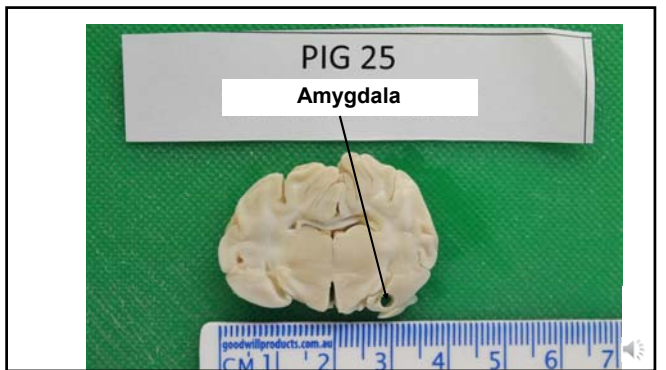
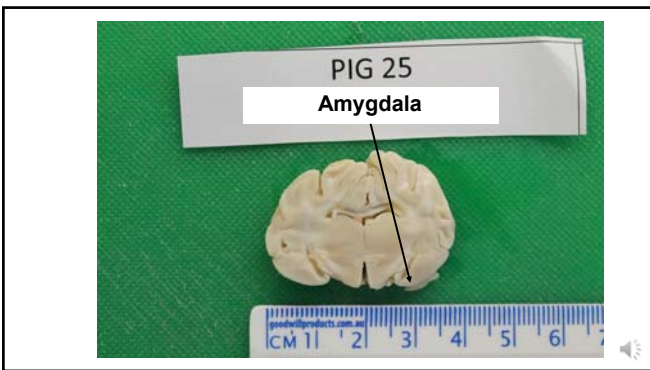
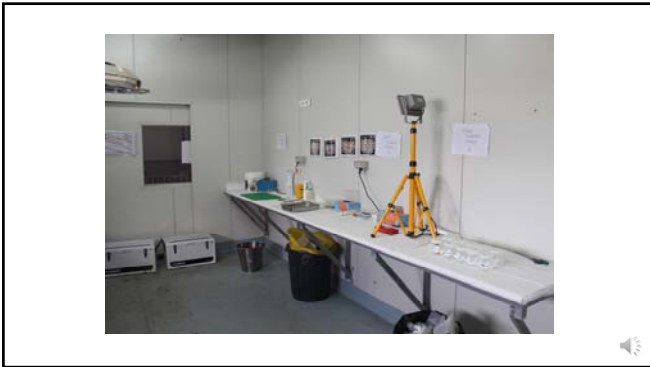
Measured in brain and blood

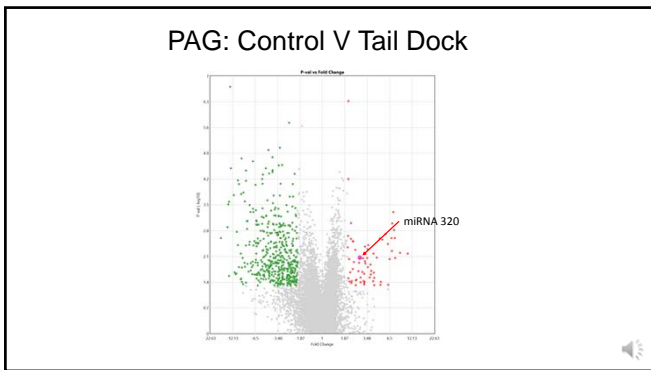
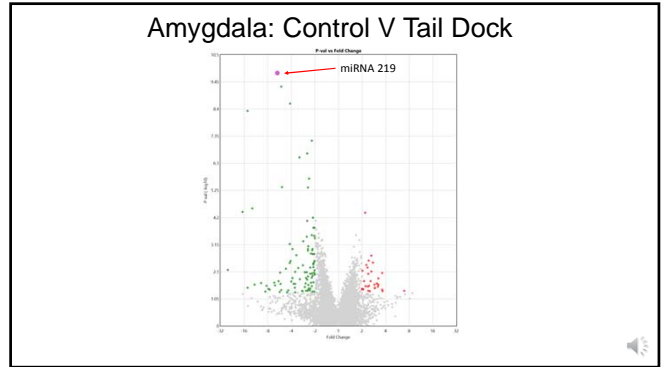
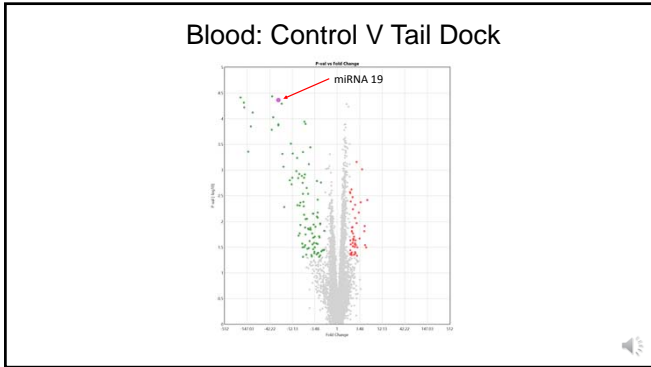
Micro RNA

- miRNA-34c up regulated after chronic social defeat and leads to anxiety and depression like behaviour
- miRNA-135 indicative of stress resilience, serotonergic activity, depression
- miRNA-9 regulated by chronic unpredictable stress and maternal deprivation
- miRNA-21 up regulated by multiple types of peripheral pain
- miRNA-124 up regulated in key reward centres during rewarding experiences

Measured in brain and blood







How is this practical?

Advanced "biophotonics"
Point of care diagnostics

Blood

