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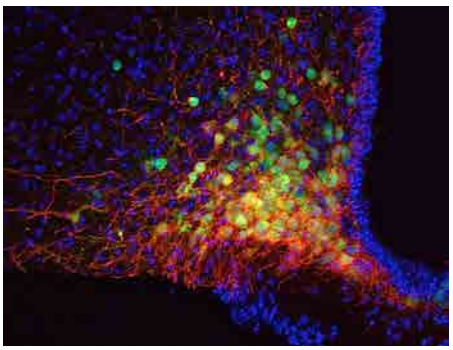
We examine how the brain senses hormone and nutrient information in different metabolic states and how the brain integrates this information to encode physiological and behavioural changes that maintain energy homeostasis. The work is critical to help identify the causes of obesity, anorexia and type-2 diabetes.

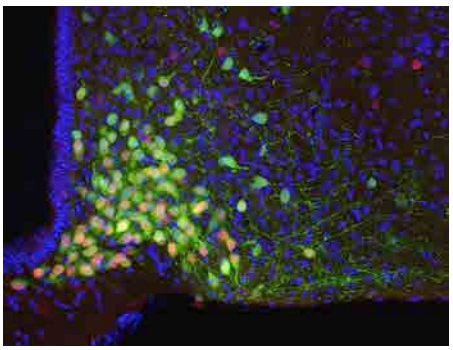
We are examining how metabolic states such as fasting or starvation influence other brain systems, such as anxiety and stress, motivation and memory. Clearly maintaining energy homeostasis is not only good for body weight, but also for mental health. Similarly changes in mental health can affect food intake and body weight. We are working to identify interconnected neural pathways linking metabolism to mood, motivation and neuroprotection.

Research Projects

1. **How does emotional, cognitive and motivational information from the cerebral cortex influence hypothalamic control of energy homeostasis**
2. **How does endocrine feedback during negative energy balance coordinate and integrate metabolism with stress, anxiety, motivation and memory; the role of ghrelin and ghrelin receptors**
3. **How does the brain sense changes in metabolic state in order to control energy homeostasis; implications for obesity and type 2 diabetes**



Designer Receptors Exclusively Activated by Designer Drugs (DREADDs) provide a unique way to remotely control specific neuronal populations. Localised DREADD expression only in arcuate nucleus NPY neurons.



DREADD activation with an exogenous ligand increases cfos, a marker of neuronal activation (red nuclei) expression only in NPY (green) neurons.

Selected significant publications:

1. Bayliss JA, Stark R, Lemus M, Santos VV, Thompson A, Rees D, Galic S, Elsworth J, Kemp BE, Davies JS, **Andrews ZB**. 2016. Ghrelin-AMPK signalling mediates the neuroprotective effects of Calorie Restriction in Parkinson's Disease. *Journal of Neuroscience* (In Press)
2. Lockie SH, Dinan T, Lawrence AJ, Spencer SJ, **Andrews ZB**. 2015. Diet-induced obesity causes ghrelin resistance in reward processing tasks. *Psychoneuroendocrinology* 62: 114-120.
3. Lemus MB, Bayliss JA, Lockie SH, Santos VV, Reichenbach A, Stark R, **Andrews ZB**. 2015. A stereological analysis of NPY, POMC, orexin, GFAP astrocyte and Iba1 microglial cell number and volume in diet-induced obese male mice. *Endocrinology* 156(5)1701-13
4. Briggs DB, Lockie SH, Benzler J, Wu Q, Stark R, Reichenbach A, Hoy AJ, Lemus MB, Coleman HA, Parkington HC, Tups A, **Andrews ZB**. 2014. Evidence that diet-induced hyperleptinemia, but not hypothalamic gliosis, causes ghrelin resistance in NPY/AgRP neurons of male mice. *Endocrinology* 155(7):2411-22.
5. Spencer SJ, Xu L, Clarke MA, Lemus M, Reichenbach A, Geenen B, Kozicz T, **Andrews ZB**. 2012. Ghrelin regulates the hypothalamic-pituitary-adrenal axis and restricts anxiety after acute stress. *Biological Psychiatry* 72(6):457-65.