Nature Reviews Neuroscience | Published online 3 December 2015

IN BRIEF

NEURONAL CIRCUITS

Anxiety control

Anxiety disorders are thought to involve altered top-down regulation of the amygdala by the medial prefrontal cortex (mPFC), but the subset of neurons targeted have not been identified. Using various anatomical mapping methods, the authors showed that, in mice, there is a neuronal projection from the ventral mPFC (vmPFC) to the basomedial amygdala (BMA). Optogenetic activation of either vmPFC neurons or BMA neurons produced an anxiolytic effect in mouse models of anxiety, and the firing rates of BMA neurons differed between the anxiogenic and safe environment in these models. This revealed a vmPFC–BMA pathway involved in anxiety-like behaviours.

ORIGINAL RESEARCH PAPER Adhikari, A. *et al.* Basomedial amygdala mediates top-down control of anxiety and fear. *Nature* **527**, 179–185 (2015)

CIRCADIAN RHYTHMS

Melatonin influence on circadian rhythms

Melatonin is sometimes used to treat sleep disorders owing to its effects on circadian rhythms, but the underlying mechanisms are not known. In this study, knockout of G-protein-coupled inwardly rectifying potassium channel 2 (GIRK2) in mice reduced the phase-advancing effects (in which the onset of behavioural activity started at an earlier time) of melatonin on wheel-running behaviour and reduced spontaneous firing frequency in suprachiasmatic nucleus neurons, suggesting that melatonin activation of GIRKs is sufficient to affect circadian rhythms.

ORIGINAL RESEARCH PAPER Hablitz, L. M. *et al.* GIRK channels mediate the nonphotic effects of exogenous melatonin. *J. Neurosci.* **35**, 14957–14965 (2015)

NEUROTRANSMISSION

Acidification by optogenetics

Many intracellular organelles have an intraluminal acidic environment, but a full understanding of its functional role is lacking. A new report details a method involving a light-activated proton pump fused with a pH-sensitive pHluorin (pHoexin) to study the relationship between vesicle pH and neurotransmitter content. By changing neurotransmitter content in vesicles by optogenetically altering acidification, the authors found that glutamatergic synaptic vesicles that were full of neurotransmitter had a higher release probability than those that were incompletely full, and suggest that this technique could be applied to the study of other organelles.

ORIGINAL RESEARCH PAPER Rost, B. R. *et al.* Optogenetic acidification of synaptic vesicles and lysosomes. *Nat. Neurosci.* **18**, 1845–1852 (2015)

STEM CELLS

Unlocking your full potential

Although some lines of evidence suggest that neurogenesis in the adult hippocampus involves neural stem cells (NSCs) that can differentiate into oligodendrocytes, neurons and astrocytes, fate-mapping studies suggest that only astrocytes and neurons are generated. Here, conditional inactivation of neurofibromin (*NF1*) resulted in the generation of a large number of oligodendrocyte precursor cells (OPCs) that were not present in controls, suggesting that NF1 actively suppresses the OPC-producing potential of NSCs in the mature hippocampus.

ORIGINAL RESEARCH PAPER Sun, G. J. *et al.* Latent tri-lineage potential of adult hippocampal neural stem cells revealed by *Nf1* inactivation. *Nat. Neurosci.* **18**, 1722–1724 (2015)