

## IN BRIEF

**COGNITIVE NEUROSCIENCE**

**Modulating neuronal activity produces specific and long-lasting changes in numerical competence**

Cohen Kadosh, R. *et al.* *Curr. Biol.* **20**, 1–5 (2010)

The right parietal lobe is involved in numerical cognition, but does stimulation of this area improve numerical abilities? Here, volunteers learned the relative value of arbitrary numerical symbols while receiving transcranial direct current stimulation (TDCS). Enhancing and reducing activity of the right and left parietal lobes, respectively, during learning improved performance in a subsequent test of the newly created number sense. This effect persisted 6 months later, indicating a therapeutic potential of TDCS in disorders of numerical cognition.

**ION CHANNELS**

**Dopaminergic modulation of axon initial segment calcium channels regulates action potential initiation**

Bender, K. J., Ford, C. P. & Trussell, L. O. *Neuron* **68**, 500–511 (2010)

The axon initial segment (AIS) is a specialized neuronal compartment in which action potentials originate, and it has recently been shown to express Ca<sup>2+</sup> channels in addition to the classic Na<sup>+</sup> and K<sup>+</sup> channels. Studying brain slices from the mouse dorsal cochlear nucleus, the authors showed that activation of dopamine receptors leads to inhibition of T-type Ca<sup>2+</sup> channels specifically in the AIS through protein kinase C signalling, decreasing firing frequency. This could be a general mechanism by which T-type Ca<sup>2+</sup> channels fine-tune neuronal output.

**METABOLISM**

**5-HT<sub>2C</sub>Rs expressed by pro-opiomelanocortin neurons regulate insulin sensitivity in liver**

Xu, Y. *et al.* *Nature Neurosci.* 31 Oct 2010 (doi:10.1038/nn.2664)

5-hydroxytryptamine 2C receptors (5-HT<sub>2C</sub>Rs) in the brain regulate glucose homeostasis, but the underlying mechanisms are not known. Xu *et al.* generated mice that expressed 5-HT<sub>2C</sub>Rs only in neurons containing pro-opiomelanocortin (POMC). POMC is a precursor peptide of the melanocortin system, which is involved in glucose regulation. In contrast to mice completely lacking 5-HT<sub>2C</sub>Rs, these mice retained normal insulin sensitivity and hepatic glucose production and showed improved glucose tolerance following administration of a 5-HT<sub>2C</sub>R agonist. Thus, 5-HT<sub>2C</sub>Rs expressed by POMC neurons are sufficient to mediate the receptor's effects on glucose homeostasis.

**CANCER**

**miR-380-5p represses p53 to control cellular survival and is associated with poor outcome in MYCN-amplified neuroblastoma**

Swarbrick, A. *et al.* *Nature Med.* **16**, 1134–1140 (2010)

The p53 tumour suppressor is inactivated in many cancers, but it is surprisingly still expressed in neuroblastoma. This paper showed that, in humans, such tumours silence p53 activity with the microRNA miR-380-5p. This microRNA is highly expressed in many primary neuroblastomas and functions as a proto-oncogene in a mouse mammary transplant model. Inhibition of miR-380-5p upregulated p53 and resulted in induction of apoptosis in embryonic stem and neuroblastoma cells, and diminished tumour growth in mice, demonstrating a new approach to reactivating p53 in neuroblastoma.