

## IN BRIEF

## PERCEPTION

**Excitability modulates synaesthesia**

Synaesthetes who experience colours when perceiving or representing numbers exhibit structural and functional differences in cortical areas that are involved in number and colour processing compared to non-synaesthetes. Using transcranial magnetic stimulation or transcranial direct current stimulation, the authors showed that in humans, grapheme-colour synaesthesia is characterized by enhanced cortical excitability in the primary visual cortex and can be augmented or attenuated with cathodal or anodal stimulation, respectively.

**ORIGINAL RESEARCH PAPER** Terhune, D. B. *et al.* Enhanced cortical excitability in grapheme-color synesthesia and its modulation. *Curr. Biol.* **21**, 2006–2009 (2011)

## NEUROPHARMACOLOGY

**Striking the right balance between G<sub>i</sub> and G<sub>q</sub> signalling**

A new study explains why some inhibitors of the serotonin G<sub>q</sub> protein-coupled receptor 2AR (such as clozapine), but not others (such as ritanserin), have antipsychotic actions. The authors showed that 2AR can form a heteromeric complex with metabotropic glutamate receptor 2 (mGluR2) — which is a G<sub>i</sub> protein-coupled receptor — and that this interaction can enhance glutamate-induced G<sub>i</sub> signalling and reduce serotonin-induced G<sub>q</sub> signalling. The intracellular G<sub>i</sub> and G<sub>q</sub> signalling balance is predictive of the anti- or pro-psychotic activity of drugs targeting 2AR and mGluR2, providing a potential new metric to improve current antipsychotic therapies.

**ORIGINAL RESEARCH PAPER** Fribourg, M. *et al.* Decoding the signaling of a GPCR heteromeric complex reveals a unifying mechanism of action of antipsychotic drugs. *Cell* **147**, 1011–1023 (2011)

## BEHAVIOURAL NEUROSCIENCE

**Curbing sweet cravings**

In this study, the authors examined the reward value of sweeteners in mice by assessing the animals' preferences for sweeteners compared to lick-induced optogenetic activation of midbrain dopaminergic neurons. They found that mice preferred optogenetic stimulation to the artificial sweetener sucralose, but not to sucrose. Interestingly, following a period of food restriction, the reward value of sucrose increased, whereas after administration of leptin it decreased. These results highlight the post-ingestive effects of fat metabolism on nutrient preference.

**ORIGINAL RESEARCH PAPER** Domingos, A. I. *et al.* Leptin regulates the reward value of nutrient. *Nature Neurosci.* **14**, 1562–1568 (2011)

## ADDICTION

**NR2B — a target for preventing drug relapse?**

The propensity for drug relapse has been associated with cognitive impairments in the prefrontal cortex. Here, the authors examined changes in synaptic plasticity during relapse in a rat model of heroin addiction. They found that there was an increase in the long-term potentiation-like synaptic strength of prefrontal projection neurons that project to the nucleus accumbens, and that this increase was dependent on the recruitment of NR2B-containing NMDA receptors to the cell surface. Furthermore, they found that treatment of addicted rats with the NMDA receptor inhibitor ifenprodil prevented heroin relapse. These findings suggest that NR2B-containing NMDA receptors could represent a novel therapeutic target for addiction.

**ORIGINAL RESEARCH PAPER** Shen, H. *et al.* Heroin relapse requires long-term potentiation-like plasticity mediated by NMDA2b-containing receptors. *Proc. Natl Acad. Sci. USA* **108**, 19407–19412 (2011)