

IN BRIEF

➔ PAIN

The effect of treatment expectation on drug efficacy: imaging the analgesic benefit of the opioid remifentanyl

Bingel, U. *et al. Sci. Transl. Med.* **3**, 70ra14 (2011)

A patient's expectations can modulate the efficacy of a drug, but the neurological mechanisms of this effect are unclear. Here, the authors measured the effect of the opioid remifentanyl in volunteers who received constant heat pain and had different expectations of treatment efficacy. A positive expectation doubled the analgesic effect of remifentanyl, whereas an expectation of enhanced pain abolished remifentanyl-mediated analgesia. Importantly, functional MRI revealed that different brain regions were activated in the two conditions, providing objective support for the self-report findings.

➔ SENSORY SYSTEMS

Serotonin mediates cross-modal reorganization of cortical circuits

Jitsuki, S. *et al. Neuron* **69**, 780–792 (2011)

Compensation for the loss of one sensory modality with enhanced sensitivity of another is a well-documented but poorly characterized phenomenon. Here, the authors showed that visual deprivation in juvenile rats improved somatosensory whisker function by facilitating synaptic strengthening in layer 2–3 of the barrel cortex (the cortical region that receives sensory input from the whiskers). Visual deprivation raised extracellular levels of serotonin in the barrel cortex, triggering a phosphorylation cascade that promotes AMPA receptor trafficking to the synapse and thereby fine-tunes the whisker barrel map.

➔ MOTOR SYSTEMS

The neural substrates of rapid-onset Dystonia-Parkinsonism

Calderon, D. P. *et al. Nature Neurosci.* **14**, 357–365 (2011)

Rapid-onset dystonia–Parkinsonism (RDP), which usually manifests after extreme stress, is a heritable movement disorder caused by mutations in the $(\text{Na}^+ + \text{K}^+)\text{ATPase}$. Calderon *et al.* showed that applying the $(\text{Na}^+ + \text{K}^+)\text{ATPase}$ inhibitor ouabain to the cerebellum of mice recapitulated the features of RDP, and was associated with aberrant neural activity in this region. Electrically severing a di-synaptic thalamic pathway from the cerebellum to the basal ganglia — regions that are commonly involved in motor impairments — alleviated symptoms in the mouse model, suggesting a possible strategy for treating RDP.

➔ OLFACTION

Molecular vibration-sensing component in *Drosophila melanogaster* olfaction

Franco, M. I. *et al. Proc. Natl Acad. Sci. USA* **108**, 3797–3802 (2011)

Different odours are thought to be discriminated by olfactory receptors on the basis of their molecular shapes. However, Franco *et al.* showed that replacing some of the hydrogen atoms in acetophenone with deuterium ('heavy hydrogen') made the odorant repellent rather than attractive to fruit flies. The repellent effect was absent in anosmic mutants, highlighting the importance of olfaction for the response. As the presence of deuterium affects the vibrational modes of an odorant molecule without affecting its size, these findings support a model of odorant recognition based on molecular vibration.