

## IN BRIEF

### LEARNING AND MEMORY

#### While you were sleeping

Humans can strengthen existing memories during sleep, but can they also learn new information while asleep? The authors exposed sleeping volunteers to pleasant and unpleasant odours, each paired with a specific tone. Subsequent exposure to the tones alone, during sleep on the same night or while awake the following morning, resulted in deep and superficial 'sniffs' for tones that were previously paired with pleasant and unpleasant odours, respectively. This suggests that humans can form new associations during sleep, without being aware of learning.

**ORIGINAL RESEARCH PAPER** Arzi, A. et al. Humans can learn new information during sleep. *Nature Neurosci.* 26 Aug 2012 (doi:10.1038/nrn.3193)

### PSYCHIATRIC DISORDERS

#### Cognitive prophylaxis for schizophrenia?

Schizophrenia is associated with several cognitive deficits, and the authors investigated whether prodromal cognitive training could reduce or prevent such deficits. They used a neonatal ventral hippocampal lesion rat model of schizophrenia — in adulthood, these rats have cognitive control impairments and altered intrahippocampal synchrony of neural oscillations. Cognitive training during adolescence prevented these abnormalities, pointing to a possible prophylactic strategy for people at risk of schizophrenia.

**ORIGINAL RESEARCH PAPER** Lee, H. et al. Early cognitive experience prevents adult deficits in a neurodevelopmental schizophrenia model. *Neuron* 75, 714–724 (2012)

### NEUROENDOCRINOLOGY

#### No cognitive benefits with standard HRT

Animal data indicate beneficial effects of hormone replacement therapy (HRT) on cognition and cortical spinogenesis, but results from clinical trials are inconsistent. The authors mimicked, in female monkeys, the timing and composition of HRT regimens used in humans. Neither continuous delivery of oestrogen with or without progesterone nor cyclic delivery of combined oestrogen and progesterone increased the number of spines in the dorsolateral prefrontal cortex. The authors conclude that standard HRT regimens are unlikely to provide the cognitive enhancement — shown in animal models — associated with cyclic oestrogen delivery only.

**ORIGINAL RESEARCH PAPER** Ohm, D. T. et al. Clinically relevant hormone treatment fails to induce spinogenesis in prefrontal cortex of aged female rhesus monkeys. *J. Neurosci.* 32, 11700–11705 (2012)

### DECISION-MAKING

#### Predicting susceptibility to habitual behaviour

Some people are more likely to display inflexible, habitual behaviour than others. A diffusion tensor imaging study showed that inter-individual differences in habitual versus goal-directed action control in an instrumental learning task were associated with differential connectivity in corticostriatal networks. Specifically, the strength of white matter tracts between the ventromedial prefrontal cortex and caudate predicted the likelihood of flexible, goal-directed behaviour, and tract strength between the premotor cortex and posterior putamen predicted the likelihood of habitual behaviour. The data suggest that inter-individual differences in tract strength may underlie inter-individual susceptibility to conditions associated with habitual behaviour, such as addiction.

**ORIGINAL RESEARCH PAPER** de Wit, S. et al. Corticostriatal connectivity underlies individual differences in the balance between habitual and goal-directed action control. *J. Neurosci.* 32, 12066–12075 (2012)