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IN BRIEF

HIPPOCAMPAL PROCESSING

A new direction

Previous studies of rodent navigation have suggested that the firing of hippocampal neurons is modulated by an animal's spatial position but not by its head direction. By recording from rat CA1 neurons during random foraging in real-world and virtual reality environments, Acharya *et al.* provide new evidence for head-directional selectivity in hippocampal neurons. Furthermore, they show that information from visual cues is sufficient to drive the neurons' head-directional selectivity, whereas vestibular information is not required.

ORIGINAL ARTICLE Acharya, L. *et al.* Causal influence of visual cues on hippocampal directional selectivity. *Cell* http://dx.doi.org/10.1016/j.cell.2015.12.015 (2015)

LEARNING AND MEMORY

Mnemonic modifications

Chromatin modifications, including histone post-translational modifications (HPTMs) and DNA methylation, are linked to learning and memory. Halder *et al.* assessed the functional involvement of these modifications in different stages of contextual fear conditioning (CFC) in mice. Global HPTM changes were associated with the phase of cellular memory consolidation. Changes in DNA methylation in different brain regions were observed during the consolidation and maintenance phases of CFC, and were targeted to genes associated with plasticity and rewiring.

ORIGINAL ARTICLE Halder, R. *et al.* DNA methylation changes in plasticity genes accompany the formation and maintenance of memory. *Nat. Neurosci.* **19**, 102–110 (2016)

REWARD

Top-down control

Impaired motivation to seek reward (anhedonia) has been proposed to be caused by changes in the top-down (cortical) control of subcortical reward pathways. Here, Ferenczi *et al.* combine optogenetics with functional MRI and testing of reward-related behaviours to assess this idea. They show that, in rats, increased medial prefrontal cortex activity reduces the striatal blood oxygen level-dependent signal in response to midbrain dopamine neuron stimulation, alters functional interactions between cortical and limbic brain regions, and suppresses reward-related behaviours.

ORIGINAL ARTICLE Ferenczi, E. A. *et al.* Prefrontal cortical regulation of brainwide circuit dynamics and reward-related behavior. *Science* **351**, aac9698 (2016)

EMOTION

Fear factors

The neural circuitry underlying innate fear is thought to be distinct from the circuits that mediate conditioned fear, but is poorly understood. Yang *et al.* show that, in mice, the laterodorsal tegmentum (LDT) is activated by a TMT, a predator odorant that induces an innate fear response. Optogenetic stimulation of two different populations of LDT GABAergic neurons had opposing effects on the fear response: stimulation of parvalbumin-expressing interneurons induced fear-like responses, whereas stimulation of somatostatin-expressing interneurons attenuated TMT-induced fear responses. The authors further demonstrate that glutamatergic input from the lateral habenula drives LDT activity to mediate the fear response.

ORIGINAL ARTICLE Yang, H. *et al.* Laterodorsal tegmentum interneuron subtypes oppositely regulate olfactory cue-induced innate fear. *Nat. Neurosci.* http://dx.doi.org/10.1038/nn.4208 (2016)