IN BRIEF

NEUROTRANSMITTERS

Dopaminergic network differences in human impulsivity

Buckholtz, J. W. *et al. Science* **329**, 532 (2010)

Dopamine (DA) is thought to have a role in impulsivity, but the mechanisms are unclear. The authors estimated midbrain D2 and D3 (inhibitory) autoreceptor levels in healthy volunteers who had taken D-amphetamine (which causes DA release). Trait impulsivity correlated negatively with D2 and/or D3 levels and positively with striatal DA release. Path analysis confirmed the hypothesis that reduced midbrain autoreceptor levels cause impulsivity by increasing stimulated striatal DA release. DA release also correlated with the volunteers' desire for more D-amphetamine, suggesting a link between impulsivity and vulnerability to addiction. These findings link individual variation in DA network functioning to differences in impulsivity.

FEAR

Neural substrates for expectation-modulated fear learning in the amygdala and periaqueductal gray

Johansen, J. P. *et al. Nature Neurosci.* **3**, 979–986 (2010)

During fear conditioning exposure to an aversive unconditioned stimulus (UCS) activates amygdala neurons, but the area that relays USC information to the amygdala is unknown. In this study, UCS-evoked neuronal responses in the lateral nucleus of the amygdala (LnA) and the periaqueductal grey (PAG) decreased during fear conditioning as rats learnt that the conditioned stimulus predicts the UCS. This indicates that expectation modulates UCS processing. PAG inactivation with muscimol reduced UCS-evoked LnA responses and impaired fear conditioning. These data indicate that the PAG relays UCS information to the amygdala during fear conditioning.

STEM CELLS

Quiescence and activation of stem and precursor cell populations in the subependymal zone of the mammalian brain are associated with distinct cellular and extracellular matrix signals

Kazanis, I. *et al. J. Neurosci.* **30**, 9771–9781 (2010)

In the adult brain, new neurons are generated in the subependymal zone. The authors showed that, in this brain region, precursor cells and the neural stem cells (NSCs) from which they are derived express different levels of receptors for extracellular matrix molecules, enabling differential regulation of these two cell pools despite their common microenvironment. Moreover, in NSCs the expression of these receptors changes in response to depletion of the precursor cell pool, leading to NSC proliferation.

DRUG DISCOVERY

Discovery of a proneurogenic, neuroprotective chemical

Pieper, A. A. *et al. Cell* **142**, 39–51 (2010)

The authors screened 1,000 drug-like chemicals in mice for the ability to enhance the survival of newborn neurons in the hippocampus, and identified an aminopropyl carbazole termed P7C3. Chronic, systemic administration of P7C3 to transgenic mice with high levels of apoptosis in the hippocampus enhanced the survival of newborn neurons in the sub-granular zone. Furthermore, it improved the performance of aged rats in a cognitive test. P7C3 might therefore provide a lead for the development of drugs to treat cognitive impairments.