despite no differences in cocaine intake during the self-administration period. Importantly, a high level of drug-seeking behaviour was associated with relapse after periods of withdrawal of either 5 days or 30 days, which was not seen in rats that showed low levels of addiction-like behaviour.

These two papers present an animal model that distinguishes between drug taking and true addiction, and so opens up new avenues for the study of the biological mechanisms of drug dependence. Crucially, this might help to answer some key questions, such as why some individuals are more vulnerable to addiction than others.

Alison Rowan

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But is this synchronized activity related to behaviour? To test this, the authors compared trials in which the attentional blink prevented the subject from spotting the second target with those in which the second target was correctly identified, on the grounds that these two types of trial showed different attentional effects. They found that both overall synchronization during the trial and temporal modulation of synchronization (by targets as compared to distractors) were stronger in trials that showed no attentional blink (when subjects successfully identified the second target). The authors suggest that this enhancement of synchronization might reflect a state of higher vigilance, which allows the successful performance of the task.

These findings support the idea that different brain areas that form an 'attentional network' communicate through synchronization (in the beta band, but possibly also at other frequencies). Together with other evidence, this emphasizes the potential importance of synchronized neural activity in cognitive processes.

Rachel Jones

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PSYCHIATRIC DISORDERS

The anxious transmitter

Anxiety and sleep disorders affect millions of people around the world, but they are not well understood and often cannot be treated effectively. Reporting in *Neuron*, Xu and colleagues characterized a novel modulator, neuropeptide S (NPS), which might modulate arousal and regulate anxiety-related behaviours.

NPS was discovered as the ligand of an orphan G-protein-coupled receptor (GPCR) — a cloned GPCR with an unknown endogenous ligand. In this study, the authors analysed the pharmacological profiles of NPS and its cognate receptor, NPSR, and found that NPS binds to and activates NPSR with high potency and specificity.

Xu and colleagues then studied the tissue distribution of NPS and NPSR in rats. The mRNAs of both the NPS precursor and NPSR are expressed in various tissues, including the brain, thyroid, salivary and mammary glands. In the brain, the NPSR mRNA is widely expressed, including in the amydala and the midline thalamic nuclei. The NPS precursor mRNA is concentrated in a group of cells between the locus coeruleus and Barrington's nucleus, but its expression does not colocalize with either tyrosine hydroxylase or corticotrophin-releasing factor, which are markers of the predominant neuronal populations in these areas. The authors conclude that the NPS-expressing neurons might represent a previously unrecognized cluster of cells.

The locus coeruleus is the primary source of noradrenaline-mediated input to the cortex and has been implicated in regulating arousal and anxiety. Therefore, the authors conjectured that NPS might also be involved in arousal and anxiety. They found that intracerebroventricular injection of NPS increased locomotor activity in both naive and habituated mice. This correlated with the increased wakefulness and reduced amounts of slow wave sleep (stages 1 and 2) and REM sleep seen in rats treated with NPS.

But does NPS affect anxiety? In a test of free exploratory behaviour in a new environment, mice treated with NPS made an increased number of entries into the central zone of an open field, which could indicate an anxiolytic-like effect. To further study the effects of NPS on anxiety, the authors used another two tests — the light–dark box and the elevated plus maze — and found that mice treated with NPS showed less anxiety-related behaviour. As compounds that simulate general locomotor activity could also enhance exploration, the authors used the marble-burying test to validate the observed anxiolytic-like effects. They found that NPS reduced the number of marbles buried in a dose-dependent manner, an effect that is similar to that of several anxiolytic drugs such as the benzodiazepines.

Overall, these results support the idea that NPS might be part of a neurotransmitter system that modulates sleep–wake cycles and anxiety. This finding might shed new light on our understanding of sleep disorders such as insomnia and pathological states of anxiety.

Jane Qiu

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Civelli's laboratory: http://www.ucihs.uci.edu/pharmaco/Research/laboratories/CIVELLI.html