IN BRIEF

DEVELOPMENT

LIS1 regulates CNS lamination by interacting with mNudE, a central component of the centrosome.

Feng, Y. *et al*. *Neuron* **28**, 665–679 (2000)

Mutations in LIS1 cause lissencephaly, a developmental disorder related to defects in neuronal migration. The precise relationship between LIS1 and cell migration is not known, but recent work has indicated that it may involve LIS1 interaction with centrosome proteins. This and two related papers in the same issue of *Neuron* provide additional evidence for this hypothesis by showing that LIS1 binds to newly identified centrosome proteins that have homologues in the fungus *Aspergillus nidulans*.

NEUROPATHOLOGY

Mutations in GFAP, encoding glial fibrillary acidic protein, are associated with Alexander disease.

Brenner, M. *et al*. *Nature Genet*. **27**, 117–120 (2001)

Alexander disease is a rare brain disorder that is characterized by macrocephaly and seizures, and by the appearance of cytoplasmic inclusions in astrocytes. These inclusions contain glial fibrillary acidic protein (GFAP), indicating that defects in the *GFAP* gene may be the causative factor. This was confirmed by Brenner *et al.*, who showed that patients with different variants of the disease all had mutations in *GFAP*. This is the first genetic brain disorder that has been attributed to a defect in astrocytes.

COMPUTATIONAL NEUROSCIENCE

A global geometric framework for nonlinear dimensionality reduction.

Tenenbaum, J. B. *et al*. *Science* **290**, 2319–2323 (2000)

How does the brain extract a few perceptually relevant features from the high-dimensional sensory stimuli that it receives? This and another paper in the same issue of *Science* used a mathematical approach to address this problem known as dimensionality reduction. The algorithms developed in both papers obtained accurate solutions using artificial and real data. As dimensionality reduction is a problem encountered in many branches of science, these algorithms are likely to have widespread application.

STEM CELLS

Direct isolation of human central nervous system stem cells.

Uchida, N. *et al*. *Proc. Natl Acad. Sci. USA* **97**, 14720–14725 (2000)

Until recently, isolation of human neural stem cells required prior transfection of the tissue with the green fluorescent protein gene driven by the nestin promoter. Uchida *et al.* identified a set of antibodies that enables sorting on the basis of surface marker expression. Using 5F3, which detects the CD133 antigen, and the novel antibody 5E12 raised against fetal brain, they isolated stem cells directly from fresh brain tissue. This method for isolating human stem cells bypasses the need for genetic manipulation.

LEARNING THEORY

Incentive memory

The brain mechanisms of reward have been the subject of considerable study, but rather less is known about the process by which reward-related processes influence the actions that lead to the acquisition of reward. The gustatory cortex (GC) is implicated in this process because taste aversion experiments indicate that the GC encodes the specific taste features of biologically potent events, with damage to this area inducing a form of taste agnosia. Balleine and Dickinson explored this hypothesis by evaluating the role of the GC in acquisition and performance of instrumental conditioning in rats.

Hungry rats were trained in separate behavioural sessions to press a lever or pull a chain for reward — one response led to the delivery of food pellets and the other to a maltodextrin solution. Once these instrumental responses had been established, the rats were allowed to consume one of the two foods for 1 hour, leading to a specific devaluation of that food. The rats were then immediately given a choice test in which both instrumental outcomes were available (the lever and the chain). The key question is which action would the rats perform in the choice test and how would this vary with satiety and lesions of GC?

In the choice test, the control rats performed fewer of the responses that had been devalued by prior food exposure. Lesions of GC attenuated this effect, but only when the choice test was performed in extinction (i.e. when food was not delivered following either action). So, if rewards were provided during the choice test, then the lesioned rats showed the devaluation effect, much like the control rats. This suggests that GC lesions affect the rat's ability to recall the effects of the devaluation treatments on outcome value without affecting their ability to detect such effects. This elegant combination of neurobiology with the precise behavioural control that has become a hallmark of classical animal learning theory indicates that the GC is critical in incentive memory and that the link between reward and action is now becoming a tractable problem.

Peter Collins

References and links

ORIGINAL RESEARCH PAPER Balleine, B. W. & Dickinson, A. The effect of lesions of the insular cortex on instrumental conditioning: evidence for a role in incentive memory. *J. Neurosci.* **20**, 8954–8964 (2000)

FURTHER READING Schultz, W. Multiple reward signals in the brain. *Nature Rev. Neurosci.* **1**, 199–207 (2000)

WEB SITE Bernard Balleine's lab