

## IN BRIEF

**NEURONAL PLASTICITY**

## Direct conversion of fibroblasts to functional neurons by defined factors

Vierbuchen, T. *et al. Nature* 27 January 2010 (doi:10.1038/nature08797)

Fibroblasts can be reprogrammed *in vitro* to a pluripotent state using a combination of transcription factors. Here, the authors showed that neuronal cells can be derived directly from fibroblasts without having to first induce pluripotency. Combinatorial expression of the neural-lineage-specific transcription factors ASCL1, BRN2 and MYT1L in mouse fibroblasts resulted in the induction of functional neurons that expressed neuronal markers, generated action potentials and formed functional synapses. This opens up the possibility of generating patient-specific neurons without the carcinogenic risks that are associated with pluripotent stem cell therapies.

**SPATIAL AWARENESS**

## Evidence for grid cells in a human memory network

Doeller, C. F. *et al. Nature* **463**, 657–661 (2010)

Grid cells, located in the entorhinal cortex of rodents, provide a precise representation of the location of the animal in space. However, it is not known whether they also exist in humans. Here, the authors applied functional MRI to human subjects exploring a virtual reality environment and provide the first direct piece of evidence for grid-cell-like representations in humans. As in rodents, the signal was strongest in the entorhinal cortex. Moreover, its directional coherence correlated with spatial memory performance, indicating that grid-like representations might also be important for spatial orientation in humans.

**AXON GROWTH**

## Pincher-generated Nogo-A endosomes mediate growth cone collapse and retrograde signaling

Joset, A. *et al. J. Cell Biol.* **188**, 271–285 (2010)

Nogo-A is a potent inhibitor of neurite growth in the adult CNS with important roles in regeneration after injury and plasticity in the intact CNS. Here, the authors show that Nogo-A is internalized into signalling endosomes and transported retrogradely along the axon. This internalization is clathrin independent and occurs by Pincher-dependent macroendocytosis. Therefore, transmission of growth inhibitory signals from the neurites to the soma may also be dependent on the 'signalosomes' previously shown to mediate the effects of neurotrophins.

**MOTOR SYSTEMS**

## Activation of groups of excitatory neurons in the mammalian spinal cord or hindbrain evokes locomotion

Hägglund, M. *et al. Nature Neurosci.* **13**, 246–252 (2010)

Central pattern generators are neuronal networks responsible for rhythmic motor outputs. Glutamatergic neurons are thought to be essential for intrinsic rhythm generation based on evidence from pharmacological experiments. Here, the authors created a transgenic mouse expressing the optically active protein channelrhodopsin 2 in glutamatergic neuronal populations in the hindbrain and spinal cord. When light was used to stimulate these neurons, locomotor activity was evoked, providing direct evidence for the involvement of descending glutamatergic pathways in the generation of these rhythmic outputs.