IN BRIEF

STEM CELLS

Epigenetic reversion of post-implantation epiblast to pluripotent embryonic stem cells

Bao, S. *et al. Nature* **461**, 1292–1295 (2009)

This study shows that mouse epiblasts from embryonic days 5.5–7.5 can be reprogrammed to embryonic stem (ES) cell-like cells in response to leukaemia inhibitory factor (LIF)–signal transducer and activator of transcription 3 (STAT3) signalling *in vitro*. Epiblasts were cultured in the presence of LIF. Although they did not initially express a fluorescent reporter protein that is expressed by ES cells and primordial germ cells but not epiblasts, expression was detected by epiblast colonies 14–35 days after culture. This reprogramming event was coupled with changes in gene expression and epigenetics. Specifically, the cells lost key properties of epiblasts, including loss of Lys27 trimethylation at histone H3 (associated with X chromosome reactivation — a hallmark of reprogramming), and upregulated their expression of E-cadherin while downregulating N-cadherin. Finally, the cells could contribute to the germ line of developing chimeric embryos, indicating a true reversion to an ES cell-like state.

AGEING

Induction of autophagy by spermidine promotes longevity

Eisenberg, T. *et al. Nature Cell Biol.* **11**, 1305–1314 (2009)

One of the many effects of ageing is the decrease in intracellular polyamines, but the possibility that a reduction in polyamine levels causes ageing had not been investigated. Now, Eisenberg *et al.* report that administration of the polyamine spermidine can delay ageing in yeast, flies, worms and human peripheral blood mononuclear cells. This effect correlates with a decrease in free radicals, high levels of which contribute to ageing, and a reduction of necrosis. Moreover, spermidine induces hypoacetylation of histone H3 by inhibiting histone acetylases but also triggers hyperacetylation of histone H3 in the promoter of some autophagy genes, including *ATG7*. This results in enhanced levels of autophagy in yeast, flies, worms and human cell lines. As spermidine treatment does not affect the lifespan of Atg7-deficient yeast, the authors conclude that spermidine delays ageing by inducing autophagy.

ORGANELLE DYNAMICS

GOLPH3 bridges phosphatidylinositol-4-phosphate and actomyosin to stretch and shape the Golgi to promote budding

Dippold, H. C. *et al. Cell* **139**, 337–351 (2009)

Phosphatidylinositol-4-phosphate (PtdIns4P) is required for Golgi function in many organisms, but its precise role was unknown. Using a proteomic screen, Dippold *et al.* found that PtdIns4P binds to Golgi phosphoprotein 3 (GOLPH3) and is required for its localization to the Golgi. Loss of GOLPH3 results in reduced vesicle trafficking from the Golgi to the plasma membrane and changes the Golgi morphology by causing cisternae (flattened membrane discs) to dilate. Actin depolymerization also induces changes in Golgi morphology, indicating that GOLPH3 might link the Golgi to the actin cytoskeleton. Indeed, GOLPH3 colocalizes and interacts with myosin 18A. As knockdown of PtdIns4P, GOLPH3 or myosin 18A impairs Golgi vesicle trafficking, the authors propose that PtdIns4P recruits GOLPH3 to the Golgi, where it interacts with actin through myosin 18A to apply the tensile force required for vesicle budding.