IN BRIEF

STEM CELLS

A parallel circuit of LIF signalling pathways maintains pluripotency of mouse ES cells

Niwa, H. *et al. Nature* **460**, 118–122 (2009)

How leukaemia inhibitory factor (LIF) signalling regulates the transcriptional circuitry that controls mouse embryonic stem cell self-renewal and pluripotency was unknown. Niwa *et al.* now show that LIF signals to the core pluripotency transcription factors OCT4, SOX2 and NANOG through two parallel pathways: JAK–STAT3, which activates *Sox2* through the transcription factor KLF4, and PI3K–AKT, which activates *Nanog* through the transcription factor TBX3. These proteins maintain the expression of *Oct4*, which is essential for pluripotency. So, a functional hierarchy of transcription factors links extracellular signalling to embryonic stem cell pluripotency.

CYTOSKELETON

Intermediate filaments exchange subunits along their length and elongate by end-to-end annealing

Çolakoğlu, G. & Brown, A. *J. Cell Biol.* **185**, 769–777 (2009)

Actin filaments and microtubules lengthen and shorten by the addition and loss of subunits at their ends, but is this true for intermediate filaments? The authors found that neurofilaments and vimentin filaments lengthen by joining through the ends of assembled filaments (end-to-end annealing) and incorporate subunits along their length, rather than preferentially at their ends. Whether other classes of intermediate filaments exhibit a similar behaviour remains to be investigated.

CHROMATIN

H3K64 trimethylation marks heterochromatin and is dynamically remodeled during developmental reprogramming

Daujat, R. *et al. Nature Struct. Mol. Biol.* **16**, 777–781 (2009)

Daujat *et al.* report that trimethylation of histone H3 at Lys64 (H3K64me3) is a mark of heterochromatin that is associated with repetitive sequences and transcriptionally inactive chromatin regions. In early mouse embryos, H3K64me3 is inherited maternally and it disappears by the two-cell stage. In primordial germ cells (PGCs), H3K64me3 is present at the time of specification but disappears when PGCs undergo extensive chromatin remodelling and changes in epigenetic marks, a process that is essential for PGC development. Future studies may reveal the mechanisms that underlie the H3K64me3 dynamics during development.

CELL POLARITY

Yurt, Coracle, Neurexin IV and the Na^+,K^+-ATPase form a novel group of epithelial polarity proteins

Laprise, P. *et al. Nature* **459**, 1141–1145 (2009)

Laprise *et al.* have identified a new group of polarity proteins that have a key role in maintaining epithelial polarity during development. The *Drosophila melanogaster* FERM proteins Yurt and Coracle and the membrane proteins Neurexin IV and Na^+/K^+ ATPase promote epithelial basolateral polarity and delimit the apical polarity domain during organogenesis. However, they are not required for the establishment of epithelial polarity or for terminal differentiation. So far, the function of Yurt as a polarity protein has been found to be conserved in mammalian cells.