IN BRIEF

DEVELOPMENT

Notch and Ras promote sequential steps of excretory tube development in C. elegans

Abdus-Saboor, I. Development 138, 3545-3555 (2011)

The excretory organ in Caenorhabditis elegans is made up of three stacked unicellular tubes — an excretory canal cell, a duct and a G1 pore, the second two of which arise from one of two equivalent progenitor cells. Abdus-Saboor et al. now show that LET-60 (RAS in mammals) promotes duct over G1 pore identity. as well as the stacking of the duct and G1 pore next to the canal cell, through the canonical LIN-3-LET-60-mitogen-activated protein kinase 1 pathway. The canal cell, which they found to express LIN-3 (epidermal growth factor in mammals), is required for duct and G1 pore stacking, as its removal (by inhibition of Notch signalling) disrupted this. So, Notch signalling promotes the formation of LIN-3-expressing canal cells, and LIN-3 activates LET-60 signalling in one progenitor cell to promote duct formation.

EPIGENETICS

Jarid2 regulates mouse epidermal stem cell activation and differentiation

Mejetta, S. et al. EMBO J. 2 Aug 2011 (doi:10.1038/emboj.2011.265)

In embryonic stem cells, JARID2 (jumonji and ARID domain-containing 2) is required for the recruitment of polycomb repressive complex 2 (PRC2), which catalyses histone H3 Lys27 trimethylation (H3K27me3); however, the role of JARID2 in late development and adult tissues was not well understood. Mejetta et al. conditionally deleted JARID2 in mouse epidermis and found that it is involved in maintaining robust proliferation of hair follicles during the postnatal anagen (growth) phase. JARID2 was dispensable for embryonic epidermal development but was important postnatally, as loss of JARID2 reduced proliferation and enhanced differentiation of postnatal epidermal progenitor cells. Consistent with JARID2's function in recruiting PRC2, there was a mild reduction in global H3K27me3 and reduced H3K27me3 at known PRC2 target genes in JARID2-knockout neonatal epidermis. The authors propose that JARID2 functions to maintain normal epidermal homeostasis and is required for efficient postnatal activation of hair follicle stem cells.

DEVELOPMENT

On the growth and form of the gut

Savin, T. et al. Nature 476, 57-62 (2011)

Savin et al. studied the looping morphogenesis of the aut in vertebrates as an example of the role of mechanical forces in organogenesis. The gut starts as a linear tube and forms a looped pattern as it develops in the body cavity. By carrying out surgical experiments, the authors showed that loop formation results from tissues growing at different rates — there is uniform differential growth between the gut tube and the anchoring dorsal mesentery (a structure of mesodermal origin that is important for gut development and the normal function of the adult digestive system). The authors then simulated the formation of the loop pattern using a simple physical model based on a rubber tube and a thin latex tube. This system was used to develop a computational model that predicts the number, size and shape of intestinal loops based solely on mechanical properties of tissues: geometry, elasticity and relative growth. This should help to understand how biophysical and biochemical events drive tissue development.