Lessons on EMT cellular dynamics from live in vivo embryo imaging

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Video Byte

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Abstract

During epithelial-mesenchymal transition (EMT), epithelial cells lose their polarity and their cell-cell connections to become mobile, in part via transcription factor (TF) activation. EMT and its reverse process, MET, are critical for tissue development in embryos, and EMT enables wound healing during adulthood, but EMT is also how cancer cells metastasize. Live imaging of animal embryos can yield important insights into these key processes. For example, FGF and actomyosin have been found to regulate intercellular adherens junction (AJ) remodeling during EMT in fruit flies. In addition, in zebrafish embryos, the planar cell polarity (PCP) protein pk1 ensures proper EMT of neural crest cells (NCCs), and cadherin 6 ultimately regulates NCC migration. As demonstrated by confocal microscopy, formation of the zebrafish Kupffer's vesicle (KV), a left-right patterning organizer, from dorsal forerunner cells (DFCs) involves MET, while KV breakdown involves EMT, making KV an excellent model for research on these transitions. In mouse embryos, imaging has shown that the protein Crumbs2 mediates epiblast EMT during gut tube development. Although much remains to be learned about these processes and their implications for cancer treatment, continued development and application of live embryo imaging will provide new opportunities to test hypotheses and identify EMT/MET regulators.