In This Issue

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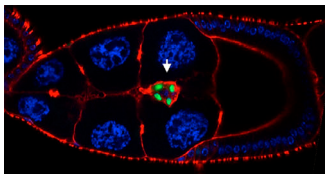
Hippo throws its weight behind migrating cells



A clump of border cells (with nuclei labeled green) migrates through the ovary.

Lucas et al. show that the Hippo pathway helps polarize actin so that groups of *Drosophila* cells can move in unison.

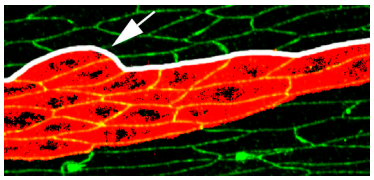
Cells often journey in packs during development and cancer metastasis. In the *Drosophila* ovary, a group of 4–8 border cells traverses the egg chamber and sidles up to the maturing egg. This maneuver requires adjustments by the actin cytoskeleton. Actin is more abundant and more dynamic at the outer edges of the cluster than in the interior, where the cells touch. The Hippo signaling pathway may help organize the actin cytoskeleton in these cells because it responds to polarity-inducing molecules and alters F-actin levels.

Lucas et al. found that members of the Hippo pathway gather at the interior membranes of the border cell cluster, putting them in position to shape cell polarity. Border cells that lack one protein in the pathway move slowly, the team discovered, and cells lacking two pathway members are even more sluggish or immobile.

The Hippo pathway targets the protein Ena, which spurs actin polymerization and formation of cell protrusions. Ena works by blocking capping proteins that thwart actin polymerization. In border cells, the presence of localized Hippo pathway components inhibits Ena at the inner membranes, unleashing capping proteins and damping actin dynamics in the interior of the clusters. In contrast, actin assembly continues at the outer edges of the cluster. Still uncertain, the researchers say, is whether Hippo promotes cell movement in other tissues and in cancer cells.

Lucas, E.P., et al. 2013. *J. Cell Biol.* http://dx.doi.org/10.1083/jcb.201210073.

E-cadherin stops embryonic cells from crossing borders



Two *Drosophila* epidermal cells (arrow) are about to cross a segment boundary (white line) into an adjoining segment.

Restless E-cadherin molecules might help confine *Drosophila* embryonic cells, preventing them from crossing into neighboring segments, Bulgakova et al. report.

E-cadherin fastens cells together by forming adherens junctions. In the epidermis of a fruit fly embryo, E-cadherin shows a striking pattern. The cells are rectangular, and the short sides (which form the dorsal and ventral borders) sport almost twice as much E-cadherin as the long sides (the anterior and posterior borders).

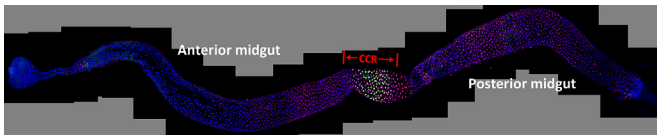
An epidermal cell carries two pools of E-cadherin, the researchers found. An immobile pool spreads around the periphery of the cell, but the dorsal and ventral borders teem with a peripatetic pool of E-cadherin that is continually entering and exiting the cell membrane and shifting around within it. This mobile E-cadherin links to the Bazooka/Par3 protein, which helps position E-cadherin–containing junctions.

Dynamic microtubules, which align along the dorsal–ventral axis of these cells, enable the mobile E-cadherin to amass at the cell membrane, Bulgakova et al. determined. The researchers think that the microtubules draw RhoGEF away from the dorsal–ventral cell borders, allowing mobile E-cadherin to accumulate at these membranes.

What is the function of the transient E-cadherin? In a *Drosophila* embryo, an epidermal cell typically remains within its segment, but it can occasionally stray into an adjoining one. Bulgakova et al.'s results suggest that the mobile E-cadherin prevents cells from crossing the boundary. The molecule might strengthen the dorsal and ventral attachments to adjoining cells or prevent the sides from associating with different neighbors.

Bulgakova, N.A., et al. 2013. *J. Cell Biol.* http://dx.doi.org/10.1083/jcb.201211159.

Bone morphogenetic protein guts it out



The red bracket marks the central, acid-producing region of a fruit fly's midgut.

Bone morphogenetic protein (BMP) signaling reins in stem cell division during intestinal healing, Guo et al. show.

If cells in a fruit fly's midgut suffer damage—say, from noxious bacteria in the insect's diet—intestinal stem cells (start to divide and produce replacements. But the fly needs to turn down the process after the injury has healed to prevent overproduction of new cells. BMP might help restrict this proliferation. The BMP pathway is faulty, for example, in the human genetic disorder juvenile polyposis syndrome, which is characterized by a profusion of intestinal polyps.

Guo et al. found that the BMP pathway performs different jobs in different parts of the fly midgut. The central zone of the midgut, which releases acid and functions like a stomach, continually activates BMP signaling, which was essential for renewal of the acid-producing copper cells.

The anterior and posterior portions of the midgut, by contrast, boost BMP signaling only after an injury. In these sections of the intestine, the pathway serves as a brake on stem cell division. For example, the researchers found that flies with defective BMP signaling spawned more cells after intestinal damage than did controls. But when the pathway was overactive, the flies accumulated fewer fresh intestinal cells. The researchers also determined that muscles surrounding the gut release the molecule, decapentaplegic, that triggers the increase in BMP output. The findings suggest that the symptoms of juvenile polyposis syndrome might result from an abnormal response to intestinal injury.

Guo, Z., et al. 2013. *J. Cell Biol.* http://dx.doi.org/10.1083/jcb.201302049.