In This Issue

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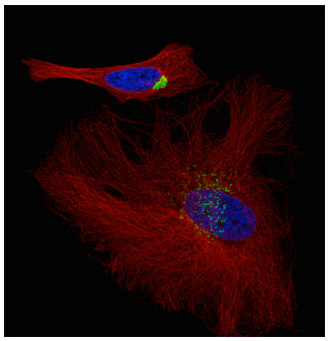
Putting Cyclin E in the trash



The Golgi apparatus (green) is intact in a control cell (top) but fragmented in a cell lacking RhoBTB3 (bottom).

Lu and Pfeffer uncover a protein that helps remove Cyclin E after it has outlasted its usefulness.

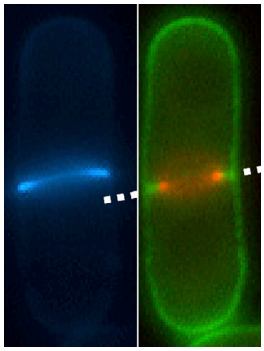
Cyclin E pushes cells from G1 into S phase. But if the protein lingers in cells, they can't progress normally through the rest of the cell cycle. During S phase, the SCF pathway directs phosphorylated Cyclin E to the proteasome for destruction. A second, little-known pathway removes unphosphorylated Cyclin E. This pathway includes the protein Cullin3 (CUL3), which forms part of a ubiquitylating complex. CUL3 partners with proteins in the BTB family, which enable the complex to grab its targets. Lu and Pfeffer tested whether the Golgi-localized BTB protein RhoBTB3 promotes the elimination of Cyclin E.

Cells missing RhoBTB3 arrested in S phase with elevated Cyclin E levels. The Golgi apparatus in these cells also broke up, suggesting that RhoBTB3 helps structure the organelle. RhoBTB3 joined the same ubiquitin-adding complex as CUL3, and it latched onto Cyclin E molecules to spur their ubiquitylation.

The researchers determined that RhoBTB3 functioned properly only if it was located on the Golgi apparatus, yet much of the cell's Cyclin E resides in the nucleus. However, some Cyclin E gathers near the centrosome, which is adjacent to the Golgi apparatus. RhoBTB3 might ensure that the cell disposes of this stockpile of Cyclin E, preventing the centrosome from duplicating more than once.

Lu, A., and S.R. Pfeffer. 2013. *J. Cell Biol.* http://dx.doi.org/10.1083/jcb.201305158.

Polysaccharide's central role in cell division



Two views of a cell show that the septum (blue line, left) and the contractile ring (red, right) are tilted in the absence of B-BG.

Muñoz et al. show that a cell wall polysaccharide promotes fungal cell division by helping to center the contractile ring.

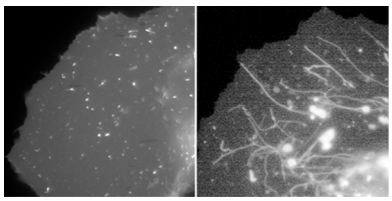
During animal cell division, the contractile ring pinches the cell in two, and then the plasma membrane extends to separate the daughter cells. A fungal cell is encased in a cell wall that complicates the division process. As the contractile ring closes and the plasma membrane expands, an extension of the cell wall called the septum stretches across the cell. When this barrier is complete, the central part of the septum deteriorates and the remaining material forms the new end of each daughter cell. The cell wall and septum contain several polysaccharides known as glucans, including branched β(1,3)glucan (B-BG), which is made by the enzyme Bgs4 and helps the cell maintain its shape and integrity. But the role of B-BG during cell division isn't clear.

The contractile ring typically forms in the middle of the cell, but in cells lacking Bgs4 it was often off center and at the wrong angle. Moreover, the ring often slid instead of remaining in place until septum synthesis started. This suggests that B-BG helps situate the contractile ring and hold it in position.

B-BG also helps locate and fortify the septum. The structure normally grows perpendicular to the sides of the cell, but when B-BG was lacking it sometimes formed at an oblique angle or appeared wavy. The septum usually advances across the cell at the same time that the contractile ring closes and the cell membrane extends. But if B-BG was missing, the contractile ring and cell membrane were out of sync with septum growth, suggesting that B-BG helps link all three together so that they progress in unison.

Muñoz, J., et al. 2013. *J. Cell Biol.* http://dx.doi.org/10.1083/jcb.201304132.

Dynamin 2 cuts the cord for newborn lysosomes



Autolysosomes are small and punctate in a control cell (left), but they swell and grow tubules in the absence of Dynamin 2 (right).

The membrane-snipping protein Dynamin 2 enables cells to burn fat by spurring the formation of new lysosomes, Schulze et al. show.

Many kinds of cells cache lipid droplets that they can consume when nutrients are scarce. One way that cells break down these droplets is through autophagy. A membrane pocket in the cytoplasm encircles a droplet and then merges with a lysosome, forming a structure called an autolysosome that digests the lipids. Autolysosomes sprout buds that detach and mature into fresh lysosomes ready for another delivery of lipids. During endocytosis, the GTPase Dynamin 2 snips free newly formed vesicles. Schulze et al. asked whether the protein performs a similar function during the production of replacement lysosomes.

Knocking down or inhibiting Dynamin 2 suppressed the breakdown of lipid droplets in liver cells, the team found. Lysosomes ballooned to 4–5 times their normal size and sprouted long membranous tubules.

When Schulze et al. dosed liver cells with a Dynamin 2 inhibitor and then removed the compound, some of the tubules that extended from autolysosomes began to fragment. This result suggests that Dynamin 2 helps midwife new lysosomes by cutting them loose from their parental autolysosome. The researchers now want to determine whether Dynamin 2 carries out the same task in other cell types that are reliant on lipid droplets, such as muscle cells and adipocytes.

Schulze, R.J., et al. 2013. *J. Cell Biol.* http://dx.doi.org/10.1083/jcb.201306140.