ORGANELLE DYNAMICS

A histone anchor on lipid droplets

> Jabba acts as a histone-docking protein, recruiting histones to lipid droplets by direct physical interactions

Significant levels of extranuclear histones are known to accumulate on lipid droplets, and this is thought to prevent excess histones from affecting cellular processes. However, the mechanisms that eliminate excess histones in this manner had been unclear. Here Li *et al.* investigate histone binding to lipid droplets in *Drosophila melanogaster* embryos.

The authors had previously shown that histones H2A and H2B are present in high levels on lipid droplets of early embryos. This raises the possibility that histones are bound to the droplet surface via specific protein anchors. If true, then these anchors should be present on the droplets. To determine this, the authors separated co-purifying proteins by SDS–PAGE and identified the most prominent bands by mass spectrometry. One of these proteins, which the authors termed Jabba, was specifically enriched in the droplet compartment. Immunostaining with a Jabba-specific antibody in wild-type embryos revealed cytoplasmic structures with a ring pattern, which is characteristic of proteins that are present on the surface of lipid droplets; these structures were absent from Jabba-deleted mutants. After purification of lipid droplets and SDS–PAGE separation, several bands, including H2A and H2B, were missing from the mutant sample, indicating that a lack of Jabba leads to a loss of particular proteins that localize on lipid droplets.

So, does Jabba function as a histone anchor or does it recruit the anchor? If Jabba itself recruits histones, the amount of Jabba should directly influence the amount of histones present on the lipid droplets. Indeed, although the nuclear levels of H2A.v and H2B in embryos from mothers carrying one copy or two copies of *Jabba* were similar, embryos with one copy of *Jabba* showed reduced levels of these histones on lipid droplets. Furthermore, purification of lipid droplets from embryos expressing GFP-tagged H2A.v revealed that Jabba co-precipitates with H2A.v–GFP. On the basis of this, the authors propose that Jabba acts as a histone-docking protein, recruiting histones to lipid droplets by direct physical interactions.

Finally, the authors observed that the extra-nuclear pool of histones that is normally present in *D. melanogaster* embryos was missing in Jabba mutants, which suggests that lipid droplets are necessary to protect these histones from degradation. By manipulating the expression of histones, the authors were also able to show that sufficient histone biosynthesis is necessary for Jabba-deleted embryos to survive, supporting the biological significance of histones on lipid droplets.

The authors speculate that lipid droplets may provide a storage facility for histones and other proteins destined for other cellular compartments. Indeed, the fact that diverse proteins, including heat shock protein 70 (HSP70) and inosine monophosphate dehydrogenase, have also been reported to accumulate in lipid droplets under certain conditions suggests that lipid droplets have a general role in sequestering and inactivating proteins, facilitate protein complex assembly, promote protein delivery or aid protein degradation.

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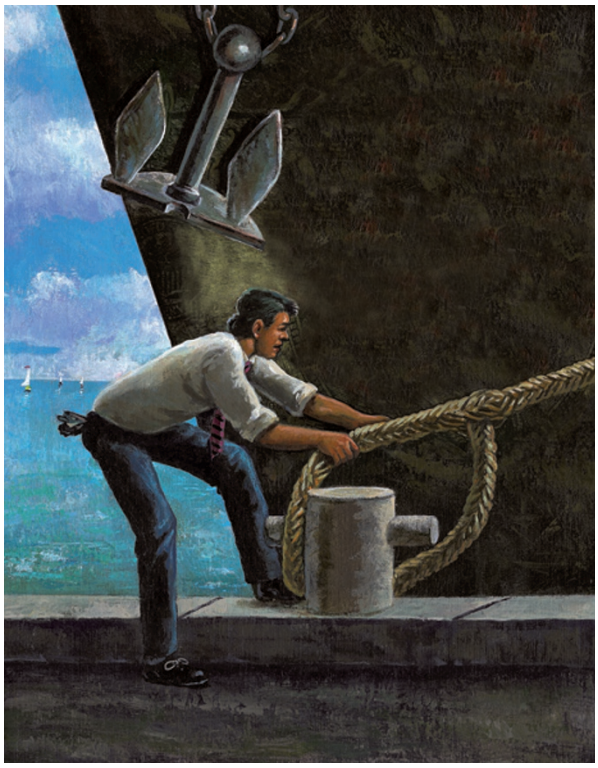

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