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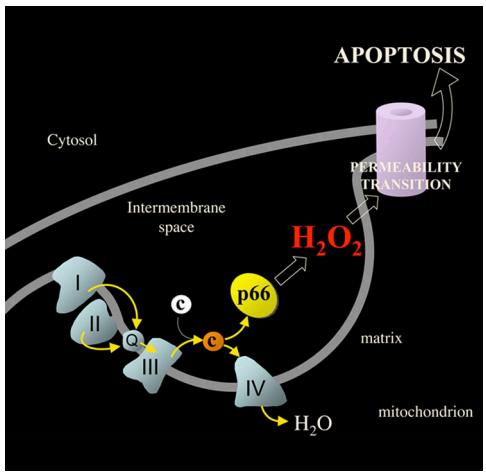


GIORGIO/ELSEVIER

p66^{Shc} reduces cytochrome *c* and generates hydrogen peroxide.

Making ROS for apoptosis

Reactive oxygen species (ROS) are not all accidental and unwanted byproducts. Marco Giorgio, Enrica Migliaccio, Pier Giuseppe Pelicci (University of Milan, Italy), and colleagues report that a protein called p66^{Shc} purposely siphons electrons from the respiratory chain and uses them to trigger apoptosis during times of stress.

Cells that lack p66^{Shc} were known to produce less ROS and be resistant to various pro-apoptosis stimuli. Giorgio et al. now show that p66^{Shc} is sufficient to induce mitochondrial swelling and rupture when added to purified mitochondria. The protein also induces excess ROS production, but only when the organelles are undergoing respiration.

p66^{Shc} takes electrons from the respiratory protein cytochrome *c* and uses them to produce the ROS hydrogen peroxide. p66^{Shc} diverts only a fraction of the electrons though, and respiration continues in its presence.

Because hydrogen peroxide can diffuse through the mitochondria and open holes in the membrane, p66^{Shc}'s redirection of electrons must somehow be regulated to prevent unwanted apoptosis. p66^{Shc} increases production of ROS during times of stress, when cellular damage might be too extensive to repair. But just how the cell limits p66^{Shc} activity during healthy times is not yet clear. JCB

Reference: Giorgio, M., et al. 2005. *Cell.* 122:221–233.

Dynein holds still

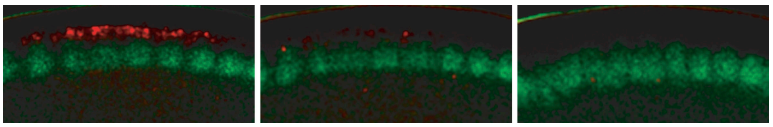
Dynein, well-known for moving cargo down microtubules, is now also shown to anchor its cargo at the target site, according to results from Renald Delanoue and Ilan Davis (University of Edinburgh, UK).

Dynein's cargoes include the *wingless* and *runt* mRNAs, which concentrate at the apical tip of fly embryos. Delanoue and Davis found that agents that disrupt microtubule function caused the mRNAs to disperse. Injection of antibodies against dynein subunits disrupted localization of both injected exogenous RNAs and endogenous transcripts, indicating that dynein itself was doing the anchoring.

To distinguish between static anchoring and continuous localization, the team used a two-step injection design. They injected one batch of labeled RNA, allowed it to localize, and then injected a second batch along with an ATPase inhibitor to block dynein motility. Under these conditions, the previously localized RNA stayed put, while the newly injected RNA failed to localize. The team thus concluded that dynein remains with its cargo and anchors it at the target site.

"We'd like to think the use of a motor for anchoring is a general mechanism both in terms of other cargoes and other motors," says Davis. "There could be a whole range of transport and anchoring mechanisms involving different motors." He points out that motors are abundant in most cells and could provide a convenient tether after transport. JCB

Reference: Delanoue, R., and I. Davis. 2005. *Cell.* 122:97–106.



DAVIS/ELSEVIER

Runt RNA (red) disperses (left to right) after injection of anti-dynein antibody.

Cohesins and breaks in yeast

A protein that holds DNA together is also needed to break it apart. Chad Ellermeier and Gerald Smith (Fred Hutchinson Cancer Research Center, Seattle, WA) show that the DNA glue cohesin regulates meiotic double-strand break (DSB) formation and recombination in fission yeast.

The cohesins that hold sister chromatids together during meiosis, called Rec8 and Rec11, are early arrivals on chromosomes during premeiotic replication. They provide a binding site for Rec10, which is a main component of linear elements—fission yeast's version of synaptonemal complexes.

Ellermeier and Smith found that deletion of Rec8 and Rec11 caused region-specific decreases in DSB formation and recombination. Loss of Rec10 blocked breakage and recombination throughout the genome. The team thinks the widespread problems in Rec10 occur because it must be present to bring in the enzyme that actually clips the DNA, called Rec12. Rec8 and Rec11, by contrast, are not evenly distributed over the meiotic chromosomes, and thus their absence only causes intermittent problems.

"It is surprising that cohesins, which hold sister chromatids together, are so important in recombination," says Smith, "because cross-overs occur between homologues." But the ordered loading process explains the puzzle. Cohesins are the first to load onto the meiotic chromosomes and must be there for the rest of the events to follow. JCB

Reference: Ellermeier, C., and G.R. Smith. 2005. *Proc. Natl. Acad. Sci. USA.* doi:10.1073pnas.0504805102.