A flipping permease

Lipid bilayers should be a no-flipping zone for integral membrane proteins, with the hydrophobicity blocking any cross-membrane excursions. But now Mikhail Bogdanov, Phillip Heacock, and William Dowhan (University of Texas, Houston, TX) report that fully synthesized lactose permease (LacY) can reverse orientation when the lipid composition of the membrane is changed.

Dowhan focused on phosphatidylethanolamine (PE), which is the only zwitterionic lipid in Escherichia coli (the other lipids all have anionic head groups). He knew that PE was needed for LacY synthesis, the existing LacY flipped back into PE synthesis was induced in the absence of new protein complexes after they diffuse away from these sites. Transcription factors may either provoke a lethal interaction, and with human homologues of the THO proteins that make up the THO complex. This complex connects directly to mRNA exporters, binds a collection of proteins in the complex could be tracked by chromatin immunoprecipitation as they moved along a transcribed gene.

Hurt found that yeast protein Sub2, which with Yra1 connects directly to mRNA exporters, binds a collection of proteins that make up the THO complex. This complex promotes transcription by acting on the elongation step. The proposed connections were confirmed by synthetic lethal interactions, and with human homologues of the THO proteins. Hurt and colleagues named the combined complex the transcription–export or TREX complex, and found that proteins in the complex could be tracked by chromatin immunoprecipitation as they moved along a transcribed gene with RNA polymerase.

Mutants lacking a THO component had an mRNA export defect, but Hurt does not think that transcripts get posted directly from a gene into a nuclear pore complex. Transcription occurs throughout the nucleoplasm, and TREX factor binding at these sites may simply allow nuclear pores to capture mRNA–protein complexes after they diffuse away from these sites.

Reference: Andreola, G., et al. 2002. J. Exp. Med. 195:1303–1316.

Reference: Dräger, K., et al. 2002. Nature. 10.1038/nature746.

Melanoma cells send out microvesicles loaded with Fas ligand (FasL) to kill their would-be assassins, according to Stefano Fais (Istituto Superiore di Sanità, Rome, Italy), Licia Rivoltini (Istituto Nazionale dei Tumori, Milan, Italy), and colleagues.

The FasL hijacks a normal transport pathway for melanin, the pigment that melanosomes load into microvesicles and send to neighboring keratinocytes. In melanoma cells, these microvesicles, or exosomes, are also loaded with FasL, which can trigger apoptosis in Fas-expressing immune cells that might otherwise counteract tumor growth.

Melanoma cells can attack using microvesicles loaded with FasL (red).

This mechanism of counterattack may operate in other tumors, as microvesicles are released from a number of cell types. In the case of melanoma cells, the new work clears up a controversy. Microvesicles explain how melanoma cells can have an apoptotic effect (the initial observation) without expressing FasL on their cell surface (the subsequent, seemingly contradictory observation).

Although purified microvesicles can kill cultured Fas-expressing cells, the same cells are not killed by coculture with melanoma cells. This suggests that, in vivo, some other microenvironmental factors may either provoke a higher level of microvesicle production or optimize the effects of the killer exosomes.

Fais also hopes to determine how the Fas-expressing melanoma cells manage to avoid killing themselves with their own microvesicles.

Reference: Andreola, G., et al. 2002. J. Exp. Med. 195:1303–1316.

The transcription–export link

Transcription is a congested business, with many different proteins crowding in to exert their influence. Now Katja Dräger, Ed Hurt (University of Heidelberg, Germany), and colleagues have found that even nuclear export proteins get into the act, via an interaction with transcription elongation factors. The findings suggest that transcription, splicing and nuclear export are linked processes, and that there are many levels of regulation between these processes that remain to be discovered.

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Reference: Bogdanov, M., et al. 2002. EMBO J. 21:2107–2116.

Defects in a transcription elongation factor lead to problems in mRNA export (right).