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MBoC TECHNICAL PERSPECTIVE

What's that gene (or protein)? Online resources for exploring functions of genes, transcripts, and proteins
J. R. A. Hutchins 1187–1201

ARTICLES

Cell Biology of Disease

A pathway linking oxidative stress and the Ran GTPase system in progeria
S. Datta, C. J. Snow, and B. M. Paschal 1202–1215
In progeria, a mutant form of lamin A constitutively tethered to the inner nuclear membrane causes disruption of the Ran GTPase system by inducing ROS. However, ROS are also induced by disruption of the Ran system. The data suggest that the nuclear lamina and Ran GTPase system are part of a pathway that contains positive and negative feedback loops.

Kdm3a lysine demethylase is an Hsp90 client required for cytoskeletal rearrangements during spermatogenesis
Chromatin remodeling enzymes can also have nonhistone roles, broadening their biological functions. It is shown that Kdm3a binding to cellular chaperones in the cytoplasm is relevant for morphogenetic events leading to infertility in enzymatically null mice. This provides evidence that Kdm3a is not just a histone modifier.

Inhibition of Smurf2 translation by miR-322/503 modulates TGF-β/Smad signaling and intestinal epithelial homeostasis
Smurf2 is an E3 ubiquitin ligase that regulates TGF-β/Smad signaling and is implicated in a wide variety of cellular responses. miR-322 and miR-503 repress Smurf2 translation and thus modulate TGF-β/Smad2 signaling and intestinal epithelial homeostasis.

Cell Physiology

A Highlights from MBoC Selection

Regulation of the epithelial Ca^{2+} channel TRPV5 by reversible histidine phosphorylation mediated by NDPK-B and PHPT1
Xinjiang Cai, S. Srivastava, S. Surindran, Zhai Li, and E. Y. Skolnik 1244–1250
A novel mechanism is shown by which TRPV5 and Ca^{2+} reabsorption by the kidney is regulated. This supports the idea that histidine phosphorylation plays other, yet-uncovered roles in mammalian biology.

The signaling lipid PI(3,5)P_{2} stabilizes V_{1}–V_{o} sector interactions and activates the V-ATPase
Certain stress-responsive changes in V-ATPase activity and assembly require the signaling lipid PI(3,5)P_{2}. Purified V_{o} complexes bind preferentially to this lipid, and the cytosolic domain of one V_{o} subunit shows PI(3,5)P_{2}-dependent recruitment to membranes in vivo. Lipid interactions with V-ATPases could provide compartment-specific regulation.
Cytoskeleton

The availability of filament ends modulates actin stochastic dynamics in live plant cells


To test the role of filament barbed ends in actin dynamics, a system is established to modulate the levels of capping protein (CP) genetically. CP levels correlate with changes in actin array architecture, availability of filament ends, and axial cell expansion.

heminway is required for sperm flagella assembly and ciliary motility in Drosophila


Motile cilia play important functions in many organisms. In Drosophila, heminway (hmw) encodes a novel protein conserved in species with motile cilia. hmw-mutant flies are hearing impaired and male sterile. HMW is required for acquisition of motile properties of cilia in the fly sound receiver and stability of the sperm axoneme.

Membrane Trafficking

The Neurospora crassa exocyst complex tethers Spitzenkörper vesicles to the apical plasma membrane during polarized growth


The Neurospora crassa exocyst presents two distinct localization patterns. EXO-70 and -84 colocalize with a region of the Spitzenkörper occupied by secretory macrovesicles. In contrast, SEC-3, -5, -6, -8, and -15 localize distinctively at the apical plasma membrane.

The HOPS complex mediates autophagosome–lysosome fusion through interaction with syntaxin 17

P. Jiang, T. Nishimura, Y. Sakamaki, E. Itakura, T. Hatta, T. Natsume, and N. Mizushima

Autophagosome–lysosome fusion requires the autophagosomal SNARE syntaxin 17. Syntaxin 17 interacts with the HOPS-tethering complex. HOPS is required for syntaxin 17–dependent autophagosome–lysosome fusion, besides its function in endolysosomal fusion.

Interaction of the HOPS complex with Syntaxin 17 mediates autophagosome clearance in Drosophila


Interaction of the autophagosomal SNARE Syntaxin 17 (Syx17) with the homotypic fusion and vacuole protein–sorting (HOPS) tethering complex is necessary for the fusion of autophagosomes with lysosomes. HOPS, but not Syx17, is also required for endocytic degradation and biosynthetic transport to lysosomes and eye pigment granules.

The role of spartin and its novel ubiquitin binding region in DALIS occurrence

A. B. Karlsson, J. Washington, V. Dimitrova, C. Hooper, A. Shekhtman, and J. C. Bakowska

Spartin contributes to the formation of dendritic aggresome-like induced structures (DALIS) through a unique ubiquitin-binding region (UBR). Using NMR and in vitro binding, the authors characterize spartin’s UBR and show that DALIS formation depends on key residues within its UBR.
Methods

Nucleolus-tethering system (NoTS) reveals that assembly of photobodies follows a self-organization model
Yin Liu, Qi Liu, Qingqing Yan, Leilei Shi, and Yuda Fang
A nucleolus-tethering system (NoTS) based on nucleolin2 is developed by artificially tethering a protein of interest to the nucleolus for analyzing protein–protein interactions and the initiation of nuclear bodies. The NoTS is used to demonstrate a self-organization model for the biogenesis of photobodies.

Nuclear Functions

Transcription of the Geminin gene is regulated by a negative-feedback loop
Geminin transcription, regulated by E2Fs, is negatively regulated by Geminin through the inhibition of chromatin remodeling. Geminin transcription is thus regulated by a negative-feedback loop through the chromatin configuration. Homeostatically regulated Geminin may help couple regulation of DNA replication and transcription.

Signaling

Differential regulation of myosin heavy chains defines new muscle domains in zebrafish
Numerous muscle lineages are formed during myogenesis within both slow- and fast-specific cell groups. New muscle domains are identified along the anteroposterior axis in zebrafish and are defined by individual nonoverlapping expression of myosin heavy chain isoforms differentially regulated by retinoic acid and wnt.

Slt2p phosphorylation induces cyclin C nuclear-to-cytoplasmic translocation in response to oxidative stress
Chunyan Jin, R. Strich, and K. F. Cooper
The conserved transcription factor cyclin C is both translocated to the cytoplasm and destroyed after oxidative stress. The signaling pathway that transmits the stress signal to cyclin C is complex and uses both the MAPK Slt2p and its pseudokinase homologue, Kdx1, via different mechanisms.

Corrections

Precursor Oxidation by Mia40 and Erv1 Promotes Vectorial Transport of Proteins into the Mitochondrial Intermembrane Space
J. M. Müller, D. Milenkovic, B. Guiard, N. Pfanner, and A. Chacinska
Combinatorial control of diverse metabolic and physiological functions by transcriptional regulators of the yeast sulfur assimilation pathway
A. A. Petti, R. S. McIsaac, O. Ho-Shing, H. J. Bussemaker, and D. Botstein