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MBoC TECHNICAL PERSPECTIVE
Every laboratory with a fluorescence microscope should consider counting molecules
V. C. Coffman and Jian-Qiu Wu 1545–1548

ARTICLES

Cell Cycle
The fission yeast spore is coated by a proteinaceous surface layer comprising mainly Isp3
The outermost layer of fission yeast spore is mainly composed of the Isp3 protein. Isp3-deleted spores show decreased tolerance to heat, digestive enzymes, and ethanol. Thus Isp3 constitutes the spore coat, thereby conferring resistance to various environmental stresses.

Cell Interactions
The membrane scaffold CD82 regulates cell adhesion by altering α4 integrin stability and molecular density
CD82 expression alters cell–matrix adhesion and integrin surface expression. The use of superresolution microscopy together with protein clustering algorithms leads to identification of a critical role for CD82 in regulating the molecular density of the α4 integrin.

Trans-dimerization of JAM-A regulates Rap2 and is mediated by a domain that is distinct from the cis-dimerization interface
Junctional adhesion molecule-A (JAM-A) is a tight junction–associated signaling protein that homodimerizes across cells at a unique motif to activate the small GTPase Rap2, previously implicated in the regulation of barrier function. JAM-A may therefore act as a barrier-inducing molecular switch that is activated when cells become confluent.

Leader cell positioning drives wound-directed collective migration in TGFβ-stimulated epithelial sheets
D. A. Chapnick and Xuedong Liu 1586–1593
Motility analysis of collectively migrating epithelial sheets reveals the interplay between cellular density and leader cell positioning throughout a collective group, as well as the functional role of leader cell constraint in directing a migrating group of cells.

Cytoskeleton
Cell type–specific expression of SEPT3-homology subgroup members controls the subunit number of heteromeric septin complexes
M. E. Sellin, S. Stenmark, and M. Gullberg 1594–1607
Heteromeric septin complexes serve as building blocks of filaments that organize the cortex of fungal and animal cells. This report addresses determinants that direct heterooligomerization of the 13 septin paralogues of mammals. It shows that three distinct septins direct assembly of tissue-specific heterotetramers.
Membrane Trafficking

Dynamic association of the PI3P-interacting Mon1-Ccz1 GEF with vacuoles is controlled through its phosphorylation by the type 1 casein kinase Yck3


Recruitment and activation of the late endosomal Rab Ypt7 require the GEF Mon1-Ccz1. Association of Mon1 with vacuoles depends on the lipid PI3P, and Mon1 is phosphorylated by the casein kinase Yck3. Phospho-Mon1 is subsequently released from vacuoles as part of a putative recycling mechanism.

Dab2 inhibits the cholesterol-dependent activation of JNK by TGF-β

K. E. Shapira, T. Hirschhorn, L. Barzilay, N. I. Smorodinsky, Y. I. Henis, and M. Ehrlich 1620–1628

TGF-β signals through Smad-dependent and non-Smad pathways, depending on cell context. In ovarian cancer cells, the clathrin adaptor Dab2 enhances internalization of the type I TGF-β receptor, restricts its lateral mobility, and inhibits TGF-β-mediated, cholesterol-dependent JNK activation.

Casein kinase 18 functions at the centrosome and Golgi to promote ciliogenesis

Y. E. Greer, C. J. Westlake, B. Gao, K. Bharti, Y. Shiba, C. P. Xavier, G. J. Pazour, Yingzi Yang, and J. S. Rubin 1629–1640

CK18 acts at the centrosome and Golgi to support polarized transport for ciliogenesis. It controls distribution of ciliary effectors Rab11, Rab8, CEP290, PCM1, and IFT20 and also promotes MT nucleation at the Golgi and positioning and integrity of the Golgi. Interaction of CK18 with AKAP450 mediates Golgi MT nucleation and ciliogenesis.

Nuclear Functions

Nucleophosmin modulates stability, activity, and nucleolar accumulation of base excision repair proteins


NPM1 is a novel modulator of the BER pathway. NPM1 depletion results in BER protein up-regulation; NPM1 has a stimulatory effect on BER capacity and promotes accumulation of BER proteins within nucleoli. Cisplatin leads to redistribution of NPM1 and BER proteins from nucleoli.

Multiple inputs control sulfur-containing amino acid synthesis in Saccharomyces cerevisiae


Genes in Saccharomyces cerevisiae involved in sulfur-containing amino acid synthesis are transcriptionally induced by either cysteine or S-adenosyl-methionine deficiency, as well as defects in phosphatidylcholine synthesis. Met30p, a regulator of these genes, changes physically in inducing conditions, which may mediate its regulatory activity.

Signaling

A Highlights from MBoC Selection

Reciprocal knock-in mice to investigate the functional redundancy of lamin B1 and lamin B2


To assess the redundancy of lamin B1 and B2, knock-in lines were created that produce lamin B2 from the Lmnb1 locus and lamin B1 from the Lmnb2 locus. Both lines developed severe neurodevelopmental abnormalities, indicating that the abnormalities elicited by the loss of one B-type lamina cannot be prevented by increased synthesis of the other.

Angiomotins link F-actin architecture to Hippo pathway signaling

S. Mana-Capelli, M. Paramasivam, S. Dutta, and D. McCollum 1676–1685

Angiomotin proteins, together with LATS kinase, regulate the Hippo pathway transcriptional coactivator YAP in response to changes in the F-actin cytoskeleton. Competition between F-actin and YAP for binding to angiomotins makes YAP regulation responsive to F-actin levels. Phosphorylation by LATS can switch angiomotins from F-actin to YAP binding.

Selective mRNA translation during eIF2 phosphorylation induces expression of IBTKα


This study measured changes in global mRNA translation in response to ER stress. The analysis suggests that translation of a majority of gene transcripts is either repressed or resistant, whereas select key regulators are subject to preferential translation. From this last group, IBTKα is identified as a novel target of the UPR central to cell fate.