Seminar/Talk

Towards structural insight into the endocytic TPLATE Adaptor Complex

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Host: Eva Benkova

The plant plasma membrane (PM) contains a wide range of receptors, channels and other integral membrane proteins that control nutrient uptake and mediate communication of the cell with the outside world. Modulation of signalling pathways starting from the PM requires control over the PM proteome. While anterograde secretory pathways deposit PM proteins, their removal depends on retrograde transport by endocytosis, in which PM material and extracellular ligands are predominantly internalized using coated vesicles. Clathrin-mediated endocytosis (CME), defined by the involvement of the scaffold protein clathrin to form the cage around the invaginating membrane, is the best characterized endocytic pathway in eukaryotes. Initiation of CME relies on adaptor proteins, which precisely select the cargo to be internalized, recruit the clathrin cage and facilitate membrane curvature. The identification of the TPLATE complex (TPC) as a novel adaptor complex regulating CME in plants challenges the general belief that the mechanism of CME is highly conserved in eukaryotes. The TPC consists out of eight proteins for which no obvious homologs could be identified in animal or yeast genomes. An extensive structural homology-based search did however identify a similar hexameric complex (TSET) in the slime mold Dictyostelium. The TPC/TSET complex is claimed to represent an evolutionary ancient adaptor complex which is lost completely in the lineage leading to animal and fungal cells. Structural modeling and identification of specific protein domains led to a theoretical model of the TPC. This model shows that the TPC shares many features with the evolutionary conserved AP-2 and COPI complexes, but also has distinct differences. Subunit co-interaction assays in yeast and N. benthamiana confirmed the structural predictions of the model and revealed that the TPC is likely a hexameric core complex which associates with its two peripheral subunits, forming the full octameric TPC at the PM. To ultimately reveal the order of recruitment of the various players at the PM during CME and to analyze the immediate effects on retrograde transport by inactivating the TPC, novel tools are being developed.

Monday, January 23, 2017 03:00pm - 04:30pm
Mondi Seminar Room 3, Central Building

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