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Structural studies of vesicular transport components

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Eukaryotic cells possess an elaborate array of membrane organelles accommodated within the plasma membrane. These organelles are responsible for the biosynthesis, processing, targeting, secretion, internalization and degradation of proteins and lipids. Transport between membrane-bound compartments is carried out by a process known as vesicular transport. Transport vesicles bud from the membrane of a "donor" organelle and then fuse with the membrane of an "acceptor" organelle, thus delivering their fluid contents and membrane associated lipids and proteins to the acceptor organelle. Fine regulation and fidelity of this system are crucial since transport vesicles must be targeted to, and fuse with, the correct acceptor organelle.

Formation and targeting of vesicles are brought about by a complex network of interactions between regulatory and structural molecules. Each stage of vesicular biogenesis depends on the activity of its own subset of proteins. In the earlier stage the cargo destined to leave a compartment is incorporated into vesicles via direct or indirect interactions with cytoplasmic coat proteins. These proteins assemble on the cytoplasmic face of the budding site promoting change of the membrane curvature and emergence of the bud. Pinched vesicles are then actively transported along the microtubulas to the target membrane. Docking and fusion steps are also tightly controlled and involve activity of dozens of molecules with SNARE proteins possibly being chiefly responsible for the physical act of membrane fusion.

Structural studies of the different components of vesicle transporting system are indispensable for understanding the complicated mechanism of transporting between membrane-bound compartments.

Here we present:

· the structure of catalytic domain of Gyp1 protein, a specific GTPase activating protein (GAP) for Ypt proteins, which are the yeast homologues of Rab proteins involved in vesicular transport;

· structural studies of the complexes between Gyp proteins and their substrates - Ypt proteins.