Regulation of membrane scission in yeast endocytosis

During clathrin-mediated endocytosis, flat plasma membrane is transformed into an invagination and eventually into an endocytic vesicle. In mammalian cells, the transition from invagination to vesicle is driven by the GTPase dynamin together with BAR domain proteins. In yeast cells, a heterodimeric BAR protein Rvs (Rvs161/Rvs167) is implicated, although the scission mechanism remains unclear. We used quantitative live-cell imaging and genetic manipulation to understand the recruitment and function of Rvs and other potential scission effectors.

We found that Rvs assembly is timed by interaction of its BAR domain with membrane curvature. A second domain, the SH3 domain, affects localization efficiency of Rvs. This SH3 dependent localization is mediated via myosin Myo3. Removal of the SH3 domain also affects actin assembly dynamics and invagination growth. Our results indicate that both BAR and SH3 domains are important for the role of Rvs in scission. We found that neither synaptojanins nor dynamin contribute directly to scission. We propose that the Rvs BAR domain stabilizes the membrane invagination, thereby delaying scission and allowing the invaginations to grow longer. We also propose that vesicle formation is dependent on the force exerted by the actin network component of the endocytic machinery.