Targeted mRNA trafficking and its role in protein localization and cell growth in yeast

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Targeted mRNA trafficking may play a pivotal role in determining the local concentration of protein and, thus, influence essential cellular processes, such as polarization, cell division, and body morphogenesis. By employing the yeast *Saccharomyces cerevisiae*, we have demonstrated that mRNAs encoding polarity and secretion factors involved in both polarity establishment and polarized growth are trafficked to the presumptive bud site and localize to the bud tip during division. As mRNA trafficking precedes polarity factor enrichment and subsequent budding, it suggests that mRNA transport facilitates polarized growth in yeast (Aronov *et al.*, 2007 *Mol. Cell. Biol.* 27:3441-55). Importantly, asymmetric mRNA trafficking appears directly connected to the transport of cortical ER (cER) into the bud. Therefore, mRNA-cER interactions may facilitate cell polarization, probably by coordinating the delivery of both message and the translocational platform. Interestingly, both mRNA and cER delivery are dependent upon the same factors - an RNA binding protein, She2, and an exocyst component, Sec3. Thus, a functional connection exists between cER-mRNA transport and the exocytic apparatus. Other work demonstrates that non-polarized mRNAs, such as those encoding peroxisomal and mitochondrial proteins, are also targeted to specific sub-cellular destinations. Thus, all mRNAs have a specific pattern of distribution and we are employing novel techniques to localize endogenous mRNAs *in vivo* (Haim *et al.*, 2007 *Nat. Methods*, 4:409-412) to perform genome-wide mRNA localization mapping. Initial results regarding mRNAs encoding peroxisomal proteins show three patterns of mRNA localization.