Matthias Seedorf

PhD 1995 Christian-Albrechts University, Kiel, Germany,
Postdoctoral work at the Dana-Farber Cancer Institute,
Harvard Medical School, Boston, USA,
at Zentrum für Molekular Biologie (ZMBH) since 1998.

mRNA Transport and Protein Localization

Current Research

Early in the biogenesis of mRNA, starting at transcription, RNA-binding proteins coat nascent RNAs. At all steps of RNA-metabolism a pool of these RNA-binding proteins associate with mRNA. Some proteins not only accompany mRNAs into the cytoplasm but also control their activities in the cytoplasm including mRNA localization, mRNA translation, and mRNA turnover.

In order to study the cytoplasmic distribution of RNA-containing particles, we analyzed the intracellular localization of the RNA-binding, polysome-associated protein Scp160p. Scp160p-ribosome complexes accumulate at the endoplasmic reticulum (ER) in a microtubule-dependent manner. Using affinity-tags and precipitation techniques, we isolated fractions enriched in Scp160p-bound polysomes and identified a specific pool of Scp160p-bound mRNAs. In the future, we would like to localize these mRNAs and we will characterize other components of the mRNA-targeting machinery. This will help us to understand how the transport of mRNA and the spatial regulation of translation contributes to the process of protein sorting and the asymmetric distribution of proteins within the cell.

Contact:
Dr. Matthias Seedorf
ZMBH, Room 221a
Im Neuenheimer Feld 282
69120 Heidelberg, Germany

Tel: - 49 - 6221 - 54 82 99
Fax: - 49 - 6221 - 54 58 92
email: m.seedorf@zmbh.uni-heidelberg.de

Projects for a doctoral thesis

1) Scp160p-dependent translation of specific mRNAs. In vitro quantification of translation efficiencies of Scp160p-bound mRNAs and identification of factors mediating translational control of these mRNAs.

2) Study the intracellular dynamics of Scp160p-bound mRNA-particles. Intracellular localization of RNAs using “green RNA“ technology by expression of fluorescently tagged-RNA transcripts in living yeast cells.

3) Employing conditional yeast motor- and cytoskeletal-mutants to study the transport of Scp160p-particles. Characterization of factors which mediate the targeting and anchoring of Scp160p-bound polysomes to the ER.

Selected Publications

Frey, S., Pool, M. and M. Seedorf (submitted to J Biol Chem). Scp160p, an RNA-binding, polysome-associated protein localizes to the endoplasmic reticulum of Saccharomyces cerevisiae in a microtubule-dependent manner.

Chung K.M. et al. (2000). Nonstructural protein 5A of hepatitis C virus inhibits the function of karypherin beta3. J Virol 74, 5233-5241.

Seedorf, M. et al. (1999). Interactions between a nuclear transporter and a subset of nuclear pore complex proteins depend on Ran GTPase. Mol Cell Biol 19, 1547-1557.

Seedorf, M. and P.A. Silver (1997). Importin/karyopherin protein family members required for mRNA export from the nucleus. Proc Natl Acad Sci U S A 94, 8590-8595.

Corbett, A. (1996). Genetic analysis of macromolecular transport across the nuclear envelope. Exp Cell Res 229, 212-216.