

## Nucleo-cytoplasmic transport

### Current research

The nuclear envelope divides eukaryotic cells into distinct nuclear and cytoplasmic compartments. mRNA, tRNA and ribosomes are made in the nucleus and need to be exported to the cytoplasm where they function in translation. Conversely, all nuclear proteins are synthesised in the cytoplasm and need to be imported into the nucleus. This nucleocytoplasmic transport proceeds through the nuclear pore complexes (NPCs) and is largely mediated by specific carriers such as importins or exportins. The loading and unloading of these carriers with cargo is co-ordinated by the RanGTPase system.

### Projects for a doctoral thesis

NPCs are giant molecular machines that function as highly selective gates between nucleus and cytoplasm. They allow a rapid passage of some molecules, such as nuclear transport receptors, but represent a firm permeability barrier for others. The molecular basis for this selectivity as well as the molecular mechanism(s) of NPC function are major, unresolved issues in the nuclear transport field. These questions are the current focus of our laboratory and will be addressed by microscopical techniques, by biochemical, biophysical, molecular biological approaches, as well as by computer simulations.

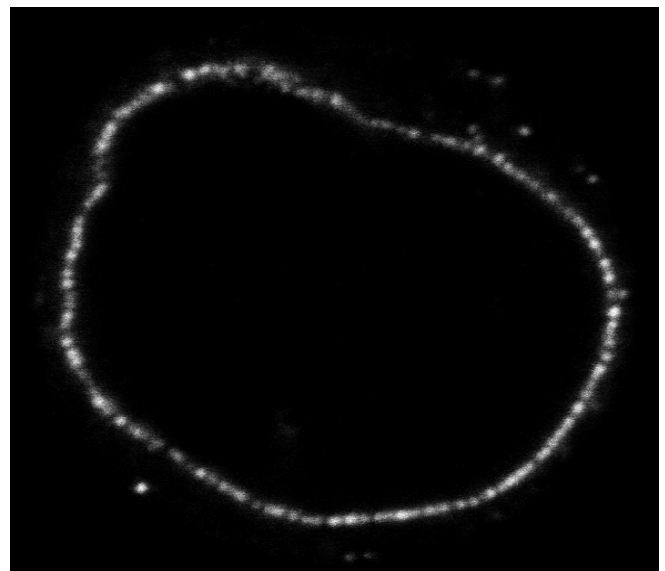
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### Selected publications

- Görlich, D. Kutay, U. (1999) Transport between the cell nucleus and the cytoplasm. *Annu. Rev. Cell Dev. Biology*, 15, 607-660 (Review).
- Kutay, U., Bischoff, F.R., Kostka, S., Kraft, R., and Görlich, D. (1997). Export of importin  $\alpha$  from the nucleus is mediated by a specific nuclear transport factor. *Cell* 90, 1061-1071.
- Ribbeck, K., Lipowsky, G., Kent, H.M., Stewart, M. and Görlich, D.. (1998). NTF2 mediates nuclear import of Ran. *EMBO J.* 17, 6587-6598.
- Jäkel, S., Albig, W., Schwamborn, K., Doenecke, D., and Görlich, D. (1999). The importin $\beta$ / importin7 heterodimer is a functional nuclear import receptor for histone H1. *EMBO J.* 18, 2411-2423.
- Lipowsky, G., Bischoff, F.R., Schwarzmaier, P., Kraft, R., Hartmann, E., Kutay, U., and Görlich, D. (2000). Exportin 4: a mediator of a novel nuclear export pathway in higher eukaryotes. *EMBO J.*, 19, 4362-4371



*Figure shows fluorescent importin beta bound to nuclear pore complexes.*