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Kinetics of transport through the nuclear pore complex

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Abstract

Single molecule microscopy techniques allow to visualize the translocation of single transport receptors and cargo molecules or particles through nuclear pore complexes. These data indicate that cargo molecule import into the nucleus takes less than 10 milliseconds and nuclear export of messenger RNA (mRNA) particles takes 50 to 350 milliseconds, up to several seconds for extremely bulky particles. This review summarizes and discusses experimental results on transport of nuclear transport factor 2 (NTF2), importin β and mRNA particles. Putative regulatory functions of importin β for the NPC transport mechanism and the RNA helicase Dbp5 for mRNA export kinetics are discussed.

Keywords

Single molecule microscopy, nucleo-cytoplasmic transport, mRNA export, NPC kinetics, Importin β, Dbp5.

Abbreviations

FCS – Fluorescence correlation spectroscopy, NSOM - Scanning nearfield optical microscope, PAINT - Point accumulation for imaging in nanoscale topography, SPEED - Single-point edge-excitation subdiffraction microscopy, SNR – Signal-to-Noise.