Transport through the nuclear pore complex: two complementary approaches

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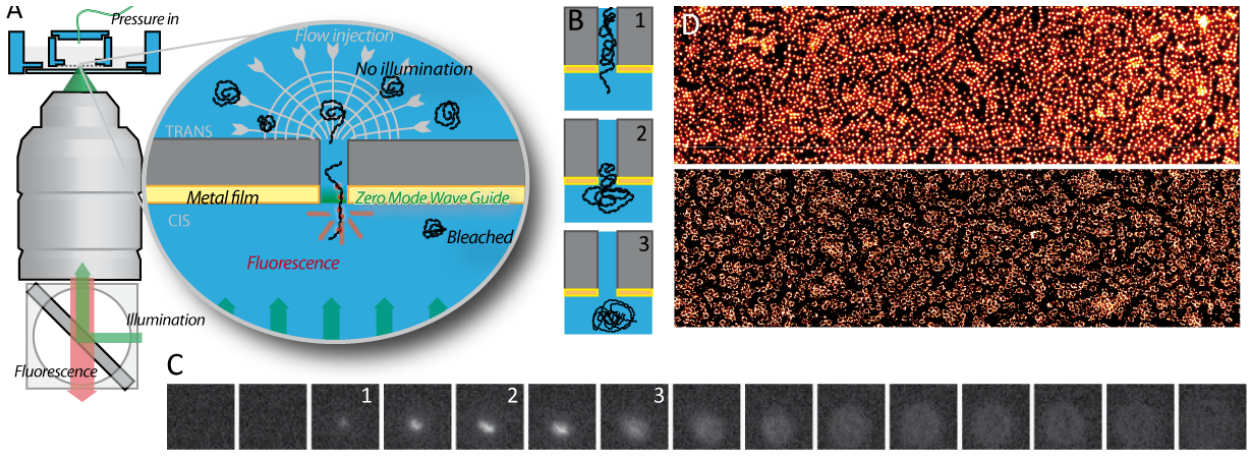
The nuclear pore complex is the unique gateway between the nucleus and the cytoplasm of the cells. It ensures both directional and selective transport of nucleic acids and proteins. Its detailed mechanism is still highly debated. We have started to study its dynamic through two complementary approaches. In a bottom-up approach we use polymer grafted nanopores that mimic the crowding of the native pore. We show using a near field optics (ZMW) that we can use the critical pressure for cargo translocation to measure directly the free energy of translocation through the pore [1]. In a top-down approach we extract nuclear membranes from Xenopus Laevis. Our first results obtained using optical super-resolution (dSTORM) on this system indicates that the organization and the structure of the nuclear pore complex are strongly influenced by the development stage of the oocyte.



a,b,c) Zero-Mode Waveguide detection of nucleic acids transport through nanopores. d) Optical super-resolution imaging of Xenopus Laevis nuclear membranes: labelling of the nuclear pore central channel (top) and luminal ring (bottom).

[1] Zero-mode waveguide detection of flow-driven DNA translocation through nanopores. Auger T, Mathé J, Viasnoff V, Charron G, Di Meglio JM, Auvray L, Montel F. Phys Rev Lett. 2014 Jul 11;113(2):028302.