Molecular transport across porins: Revealing fast kinetics

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The permeation of water soluble molecules across cell membranes is controlled by channel forming proteins and particularly the channel surface determines the selectivity. An adequate method to study properties of these channels is electrophysiology and in particular analyzing the ion current fluctuation in the presence of permeating solutes provides information on possible interactions with the channel surface. As the binding of antibiotic molecules in the channels of interest is significantly weaker than that of preferentially diffusing nutrients in substrate-specific pores, the resolution of conductance measurements has to be significantly increased to be able to resolve the events in all cases. Due to the limited time resolution, fast permeation events are not visible. Here we demonstrate that miniaturization of the lipid bilayer; varying the temperature or changing the solvent may enhance the resolution. Although electrophysiology is considered as a single molecule technique, it does not provide atomic resolution. Molecular details of solute permeation can be revealed by combining electrophysiology and all atom computer modelling.

References