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**Selective transport through nano-channels: do we understand it?**
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Functioning of living cells requires selective molecular transport, which is provided by transport channels that are able to selectively transport certain molecular species while filtering others, even similar ones. Such channels can selectively transport their specific molecules in the presence of vast amounts of non-specific competition. In many cases, efficient and selective transport occurs without direct input of metabolic energy and without transitions from an 'open' to a 'closed' state during the transport event. Examples include selective permeability of porins and transport through the nuclear pore complex. Mechanisms of selectivity of such channels have inspired design of artificial selective nano-channels, which mimic the function of selective biological channels. Mechanisms of selectivity of such nano-channels are still unknown. I present a theoretical model to explain the selectivity of transport through nano-channels, which contains only the essentials of stochastic kinetics inside the channel. The theory provides a mechanism for selectivity based on the differences in the kinetics of transport through the channel between different molecules. The theory explains how the specific molecules are able to filter out the non-specific competitors - and proposes a mechanism for sharp molecular discrimination. The theoretical predictions account for previous experimental results and have been verified in ongoing experiments

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