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Entropy facilitated transport of potassium ions through Kv 1.2 channels

We analyze how changes of channel pore geometry during membrane depolarization can influence transport properties of Kv 1.2 channel protein. Spatial confinements of the channel give rise to entropic barriers which effectively influence its ability to transport the potassium ions through the membrane.
First, on the base of structures of the channel in an open state at membrane depolarization (full voltage activation of the channel) and hyperpolarization (implying low activity of the channel) we calculate the difference in entropy between fully voltage-activated and resting state of the channel. The obtained result indicates that voltage-activation is an entropy-driven process.
Second, we describe the differences in characteristics of K+ transport through the channel pore at different voltages basing on the results of random walk simulations in entropic and electric potentials.

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