TOM is high molecular mass protein complex that facilitates the transfer of nearly all mitochondrial preproteins across outer mitochondrial membrane. Preproteins bound by different receptor subunits travel via a pore formed by a specific subunit that constitutes an ion-conducting channel into mitochondria. High resolution ion conductance measurements through mitochondrial TOM40 channel in the presence of peptide revealed binding kinetics. More specifically, we have investigated the voltage dependence of the membrane transport of the peptide pF1β through single TOM40 channel. It is shown that association rate kon and dissociation rate koff strongly depends on the applied transmembrane voltage and kinetic constants increase with increase in the applied voltage. This model involves a binding site inside the channel and attractive interactions between the peptide and binding site in the channel facilitates the peptide translocation at increasing voltage. Our analysis of the data provides a full quantitative description of all the relevant thermodynamic, kinetic and electric parameters including a detailed formulation of the peptide partition through the channel at single molecule level.

Reference