

## ION CHANNELS AND NUCLEAR PORE CHANNEL GATING

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### Abstract

Calcium, sodium, potassium, zinc, magnesium etc & all other ion channels carry vital biological functions with respective signaling playing great role in plasma, heart beats, dopamine & many other functions either directly by particle, ions or by their waves. There are three main types of ion channels, i.e., voltage-gated, extracellular ligand-gated, and intracellular ligand-gated along with two groups of miscellaneous ion channels. Ion channels facilitate passive movement of ions across biological membranes and are essential for life. Ion-channel engineering approaches help elucidate structure-function mechanisms of proteins. Engineered ion channels are important tools for probing and manipulating cell biology. Voltage-gated channels respond to perturbations in cell membrane potential, and are highly selective for a specific ion, i.e., Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, and Cl<sup>-</sup>. Others are Ligand-Gated Ion Channels (LGIC), 'Cys-Loop' LGIC, Ionotropic Glutamate Receptors, P2X Receptors. Mechano-Sensitive Ion Channels. Their ions & ion channels enable the flow of electrical signals through the body.

Nuclear envelope (NE) cisternal Ca<sup>2+</sup> and cytosolic ATP are required for nuclear-pore-complex-(NPC-) mediated transport of DNAs, RNAs, transcription factors and other large molecules. Isolated cardiomyocyte nuclei, capable of macromolecular transport (MMT), have intrinsic NPC ion channel behavior. Ca<sup>2+</sup> and IP<sub>3</sub> waves may convert the NE into an effective Ca<sup>2+</sup> barrier and, consequently, affect the regulation of gene activity and expression through their feedback on MMT and NPCC gating. Thus, [Ca<sup>2+</sup>] NE regulation by intracellular messengers is an effective mechanism for synchronizing gene activity and expression to the cellular rhythm. We found that calcium ion channels & some other ion channels play great roles in all biological activities & require great investigations in field of nuclear medicines as most of diseases are caused by abnormal functions of ions & ion-channels in lives. Behind biology is physics or nuclear physics & all require simultaneous quite clear definitions in this respect.

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