CYCLIC NUCLEOTIDE-GATED ION CHANNELS

Summary

Cyclic nucleotide-gated (CNG) channels are a novel class of cation channels first identified in retinal photoreceptor cells and subsequently found also in other sensory and nonsensory cells. CNG channels form heterotetrameric complexes consisting of two or three different types of channel subunits. Six different genes encoding CNG channels, four A subunits (A1 to A4) and two B subunits (B1and B3), give rise to three different channel types. Functionally, CNG channels belong to the class of ligand-gated channels, which are activated by binding of ligand (cGMP) to a domain in the carboxyl terminal region, but structurally they are similar to voltage-dependent K^+ channels. All channel subunits include six transmembrane segments (S1 to S6), a voltage-sensor motif (S4), a pore region (P) and a cGMP-binding domain. These channels are nonselective cation channels that do not discriminate well between monovalent and divalent ions and even pass divalent cations, in particular Ca^{2+}. Activity of CNG channel is modulated by Ca^{2+}/calmodulin and by phosphorylation. Other factors may also be involved in channel regulation.