

## Voltage-gated calcium channels (version 2019.4) in the IUPHAR/BPS Guide to Pharmacology Database

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### Abstract

Calcium (Ca<sup>2+</sup>) channels are voltage-gated ion channels present in the membrane of most excitable cells. The nomenclature for Ca<sup>2+</sup> channels was proposed by [110] and **approved by the NC-IUPHAR Subcommittee on Ca<sup>2+</sup> channels [60]**. Ca<sup>2+</sup> channels form hetero-oligomeric complexes. The  $\alpha$ 1 subunit is pore-forming and provides the binding site(s) for practically all agonists and antagonists. The 10 cloned  $\alpha$ 1-subunits can be grouped into three families: (1) the high-voltage activated dihydropyridine-sensitive (L-type, Ca<sub>v</sub>1.x) channels; (2) the high-voltage activated dihydropyridine-insensitive (Ca<sub>v</sub>2.x) channels and (3) the low-voltage-activated (T-type, Ca<sub>v</sub>3.x) channels. Each  $\alpha$ 1 subunit has four homologous repeats (I–IV), each repeat having six transmembrane domains and a pore-forming region between transmembrane domains S5 and S6. Gating is thought to be associated with the membrane-spanning S4 segment, which contains highly conserved positive charges. Many of the  $\alpha$ 1-subunit genes give rise to alternatively spliced products. At least for high-voltage activated channels, it is likely that native channels comprise co-assemblies of  $\alpha$ 1,  $\beta$  and  $\alpha$ 2– $\delta$  subunits. The  $\gamma$  subunits have not been proven to associate with channels other than the  $\alpha$ 1s skeletal muscle Cav1.1 channel. The  $\alpha$ 2– $\delta$ 1 and  $\alpha$ 2– $\delta$ 2 subunits bind [gabapentin](#) and [pregabalin](#).

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