

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

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## Abstract

Sodium channels are voltage-gated sodium-selective ion channels present in the membrane of most excitable cells. Sodium channels comprise of one pore-forming  $\alpha$  subunit, which may be associated with either one or two  $\beta$  subunits [176].  $\alpha$ -Subunits consist of four homologous domains (I–IV), each containing six transmembrane segments (S1–S6) and a pore-forming loop. The positively charged fourth transmembrane segment (S4) acts as a voltage sensor and is involved in channel gating. The crystal structure of the bacterial NavAb channel has revealed a number of novel structural features compared to earlier potassium channel structures including a short selectivity filter with ion selectivity determined by interactions with glutamate side chains [268]. Interestingly, the pore region is penetrated by fatty acyl chains that extend into the central cavity which may allow the entry of small, hydrophobic pore-blocking drugs [268]. Auxiliary  $\beta$ 1,  $\beta$ 2,  $\beta$ 3 and  $\beta$ 4 subunits consist of a large extracellular N-terminal domain, a single transmembrane segment and a shorter cytoplasmic domain.

**The nomenclature for sodium channels was proposed by Goldin *et al.*, (2000) [143] and approved by the NC-IUPHAR Subcommittee on sodium channels (Catterall *et al.*, 2005, [51]).**

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### Voltage-gated sodium channels

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#### Channels and Subunits

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##### Na<sub>v</sub>1.9

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