VGCCs are composed of four subunits ($\alpha-1$, $\alpha-2$, $\beta$, and $\delta$) in a 1:1:1:1 ratio. The $\alpha-1A$ isoform occurs in processes like metabolism, cell proliferation and cell death.

VGCCs, also referred to as voltage sensitive calcium channels (VSCCs), are present in most excitable cells. They mediate the influx of $\text{Ca}^{2+}$ ions into the cell and trigger the release of neurotransmitters or hormones but are also involved in other calcium dependent processes like metabolism, cell proliferation and cell death.

VGCCs are composed of four subunits ($\alpha-1, \alpha-2, \beta$ and $\delta$) in a 1:1:1:1 ratio. The $\alpha-1A$ isoform occurs in VGCCs of the P/Q-type while isoform $\alpha-1B$ is found in the N-type. Both belong to the high voltage activated group (hva).

**Selected References SYSY Antibodies**

Active zone protein Bassoon co-localizes with presynaptic calcium channel, modifies channel function, and recovers from aging related loss by exercise.

PloS one (2012) 7(6): e38029. **IHC; KO verified; tested species: mouse**

$\alpha-2\delta$ expression sets presynaptic calcium channel abundance and release probability.

Hoppa MB, Lana B, Margas W, Dolphin AC, Ryan TA

Delayed postnatal loss of P/Q-type calcium channels recapitulates the absence epilepsy, dyskinesia, and ataxia phenotypes of genomic Cacna1a mutations.


Alternative Splicing of P/Q-Type Ca2+ Channels Shapes Presynaptic Plasticity.

Thalhammer A, Contestabile A, Ermoluk YS, Ng T, Volynski KE, Soong TW, Goda Y, Cingolani LA

Nanoscale Structural Plasticity of the Active Zone Matrix Modulates Presynaptic Function.


Differential calcium signaling mediated by voltage-gated calcium channels in rat retinal ganglion cells and their unmethylated axons.

Sargoy A, Sun X, Barnes S, Brecha NC

The active zone protein family ELKS supports Ca2+ influx at nerve terminals of inhibitory hippocampal neurons.

Liu C, Bickford LS, Held RC, Nyitray H, Südhof TC, Kaeber PS

Postnatal loss of P/Q-type channels confined to rhombic-lip-derived neurons alters synaptic transmission at the parallel fiber to purkinje cell synapse and replicates genomic Cacna1a mutation phenotype of ataxia and seizures in mice.

Maejima T, Wollenweber P, Teusner LU, Noebels JL, Herlitze S, Mark MD

Extensive remodeling of the presynaptic cytomatrix upon homeostatic adaptation to network activity silencing.

Lazarevic V, Schöne C, Heine M, Gundelfinger ED, Fejtova A

Reciprocal interactions regulate targeting of calcium channel beta subunits and membrane expression of alpha1 subunits in cultured hippocampal neurons.


**Selected General References**

Calcium channel types with distinct presynaptic localization couple differentially to transmitter release in single calyx-type synapses.

Wu LG, Westenbroek RE, Borst JC, Catterall WA, Sakmann B

Localizaton of Ca2+ channel subtypes on rat spinal motor neurons, interneurons, and nerve terminals.

Westenbroek RE, Hoskins L, Catterall WA

Biochemical properties and subcellular distribution of the Bi and rBi isoforms of alpha 1A subunits of brain calcium channels.

Sakurai T, Westenbroek RE, Rettig J, Hell J, Catterall WA

Immunohistochemical identification and subcellular distribution of the alpha 1A subunits of brain calcium channels.

Westenbroek RE, Sakurai T, Elliott EM, Hell JW, Starr TV, Snutch TP, Catterall WA

Immunohistochemical identification and differential phosphorylation of alternatively spliced forms of the alpha 1A subunit of brain calcium channels.

Sakurai T, Hell JW, Wopmann A, Miljanich GP, Catterall WA

Primary structure of a calcium channel that is highly expressed in the rat cerebellum.

Starr TV, Prystay W, Snutch TP