Anti-Kv2.1 antibody

Description	Kv2.1 is a protein encoded by the KCNB1 gene which is approximately 95,8 kDa. Kv2.1 is localised to the cell membrane. It is involved in integration of energy metabolism, potassium channels and aquaporin-mediated transport. It contributes to the regulation of the action potential (AP) repolarization, duration and frequency of repetitive AP firing in neurons, muscle cells and endocrine cells and also plays a role in homeostatic attenuation of electrical excitability throughout the brain. Kv2.1 is expressed in the brain, heart, lung, liver, colon, kidney and adrenal gland. Mutations in the KCNB1 gene may result in epileptic encephalopathy. STJ93873 was affinity-purified from rabbit antiserum by affinity-chromatography using epitope-specific immunogen. This polyclonal antibody detects endogenous levels of Kv2.1 protein.
Model	STJ93873
Host	Rabbit
Reactivity	Human, Mouse, Rat
Applications	ELISA, IF, IHC
Immunogen	Synthesized peptide derived from human Kv2.1 around the non-phosphorylation site of S567.
Immunogen Region	510-590 aa
Gene ID	3745
Gene Symbol	KCNB1
Dilution range	IHC 1:100-1:300IF 1:200-1:1000ELISA 1:20000
Specificity	Kv2.1 Polyclonal Antibody detects endogenous levels of Kv2.1 protein.

Tissue Specificity	Expressed in neocortical pyramidal cells . Expressed in pancreatic beta cells (at protein level) . Expressed in brain, heart, lung, liver, colon, kidney and adrenal gland . Expressed in the cortex, amygdala, cerebellum, pons, thalamus, hypothalamus, hippocampus and substantia nigra .
Purification	The antibody was affinity-purified from rabbit antiserum by affinity-chromatography using epitope-specific immunogen.
Note	For Research Use Only (RUO).
Protein Name	Potassium voltage-gated channel subfamily B member 1 Delayed rectifier potassium channel 1 DRK1 h-DRK1 Voltage-gated potassium channel subunit Kv2.1
Molecular Weight	90 kDa
Clonality	Polyclonal
Conjugation	Unconjugated
Isotype	IgG
Formulation	Liquid in PBS containing 50% glycerol, 0.5% BSA and 0.02% sodium azide.
Concentration	1 mg/ml
Storage Instruction	Store at -20°C, and avoid repeat freeze-thaw cycles.
Database Links	HGNC:6231OMIM:600397
Alternative Names	Potassium voltage-gated channel subfamily B member 1 Delayed rectifier potassium channel 1 DRK1 h-DRK1 Voltage-gated potassium channel subunit Kv2.1
Function	Voltage-gated potassium channel that mediates transmembrane potassium transport in excitable membranes, primarily in the brain, but also in the pancreas and cardiovascular system. Contributes to the regulation of the action potential (AP) repolarization, duration and frequency of repetitive AP firing in neurons, muscle cells and endocrine cells and plays a role in homeostatic attenuation of electrical excitability throughout the brain . Plays also a role in the regulation of exocytosis independently of its electrical function . Forms tetrameric potassium-selective channels through which potassium ions pass in accordance with their electrochemical gradient. The channel alternates between opened and closed conformations in response to the voltage difference across the membrane. Homotetrameric channels mediate a delayed-rectifier voltage-dependent outward potassium current that display rapid activation and slow inactivation in response to membrane depolarization . Can form functional homotetrameric and heterotetrameric channels that contain variable proportions of KCNB2; channel properties depend on the type of alpha subunits that are part of the channel . Can also form functional heterotetrameric channels with other alpha subunits that are non-conducting when expressed alone, such as KCNF1, KCNG1, KCNG3, KCNG4, KCNH1, KCNH2, KCNS1, KCNS2, KCNS3 and KCNV1, creating a functionally diverse range of channel complexes . Heterotetrameric channel activity formed with KCNS3 show increased current amplitude with the threshold for action potential activation shifted towards more negative values in hypoxic-treated pulmonary artery smooth muscle cells . Channel properties are also modulated by cytoplasmic ancillary beta subunits such as AMIGO1, KCNE1, KCNE2 and KCNE3, slowing activation and inactivation rate of the delayed

	rectifier potassium channels . In vivo, membranes probably contain a mixture of heteromeric potassium channel complexes, making it difficult to assign currents observed in intact tissues to any particular potassium channel family member. Major contributor to the slowly inactivating delayed-rectifier voltage-gated potassium current in neurons of the central nervous system, sympathetic ganglion neurons, neuroendocrine cells, pancreatic beta cells, cardiomyocytes and smooth muscle cells. Mediates the major part of the somatodendritic delayed-rectifier potassium current in hippocampal and cortical pyramidal neurons and sympathetic superior cervical ganglion (CGC) neurons that acts to slow down periods of firing, especially during high frequency stimulation. Plays a role in the induction of long-term potentiation (LTP) of neuron excitability in the CA3 layer of the hippocampus . Contributes to the regulation of glucose-induced action potential amplitude and duration in pancreatic beta cells, hence limiting calcium influx and insulin secretion . Plays a role in the regulation of resting membrane potential and contraction in hypoxia-treated pulmonary artery smooth muscle cells. May contribute to the regulation of the duration of both the action potential of cardiomyocytes and the heart ventricular repolarization QT interval. Contributes to the pronounced pro-apoptotic potassium current surge during neuronal apoptotic cell death in response to oxidative injury. May confer neuroprotection in response to hypoxia/ischemic insults by suppressing pyramidal neurons hyperexcitability in hippocampal and cortical regions . Promotes trafficking of KCNG3, KCNH1 and KCNH2 to the cell surface membrane, presumably by forming heterotetrameric channels with these subunits . Plays a role in the calcium-dependent recruitment and release of fusion-competent vesicles from the soma of neurons, neuroendocrine and glucose-induced pancreatic beta cells by binding key components of the fusion machinery in a pore-independent manner .
Sequence and Domain Family	The transmembrane segment S4 functions as voltage-sensor and is characterized by a series of positively charged amino acids at every third position. Channel opening and closing is effected by a conformation change that affects the position and orientation of the voltage-sensor paddle formed by S3 and S4 within the membrane. A transmembrane electric field that is positive inside would push the positively charged S4 segment outwards, thereby opening the pore, while a field that is negative inside would pull the S4 segment inwards and close the pore. Changes in the position and orientation of S4 are then transmitted to the activation gate formed by the inner helix bundle via the S4-S5 linker region. The N-terminal and C-terminal cytoplasmic regions mediate homooligomerization; self-association is required to regulate trafficking, gating and C-terminal phosphorylation-dependent modulation of the channel . The N-terminal cytoplasmic region is important for interaction with other channel-forming alpha subunits and with ancillary beta subunits . The C-terminus is necessary and sufficient for the restricted localization to, and clustering within, both in soma and proximal portions of dendrite of neurons and in lateral membrane of non-neuronal polarized cells. The C-terminus is both necessary and sufficient as a mediator of cholinergic and calcium-stimulated modulation of channel cell membrane clustering localization and activity in hippocampal neurons .
Cellular Localization	Cell membrane Perikaryon Cell projection, axon Cell projection, dendrite Membrane. Multi-pass membrane protein. Cell junction, synapse, postsynaptic cell membrane Cell junction, synapse Cell junction, synapse, synaptosome Lateral cell membrane Cell membrane, sarcolemma. Localizes to high-density

somatodendritic clusters and non-clustered sites on the surface of neocortical and hippocampal pyramidal neurons in a cortical actin cytoskeleton-dependent manner . Localizes also to high-density clusters in the axon initial segment (AIS), at ankyrin-G-deficient sites, on the surface of neocortical and hippocampal pyramidal neurons . KCNB1-containing AIS clusters localize either in close apposition to smooth endoplasmic reticulum cisternal organelles or with GABA-A receptor-containing synapses of hippocampal and cortical pyramidal neurons, respectively . Localizes to high-density clusters on the cell surface of atrial and ventricular myocytes and at the lateral plasma membrane in epithelial cells. Localizes both to the axial and transverse tubules (T tubule) and sarcolemma in ventricular myocytes. Associated with lipid raft domains. In cortical neurons, apoptotic injuries induce de novo plasma membrane insertion in a SNARE-dependent manner causing an apoptotic potassium current surge.

Post-translational Modifications

Phosphorylated. Differential C-terminal phosphorylation on a subset of serines allows graded activity-dependent regulation of channel gating in hippocampal neurons. Ser-607 and Tyr-128 are significant sites of voltage-gated regulation through phosphorylation/dephosphorylation activities. Tyr-128 can be phosphorylated by Src and dephosphorylated by cytoplasmic form of the phosphatase PTPRE. CDK5-induced Ser-607 phosphorylation increases in response to acute blockade of neuronal activity. Phosphorylated on Tyr-128 by Src and on Ser-805 by MAPK14/P38MAPK; phosphorylations are necessary and sufficient for an increase in plasma membrane insertion, apoptotic potassium current surge and completion of the neuronal cell death program. Phosphorylated on Ser-520, Ser-607, Ser-656 and Ser-805 by CDK5; phosphorylation is necessary for KCNB1 channel clustering formation. The Ser-607 phosphorylation state differs between KCNB1-containing clusters on the proximal and distal portions of the axon initial segment (AIS). Highly phosphorylated on serine residues in the C-terminal cytoplasmic tail in resting neurons. Phosphorylated in pancreatic beta cells in response to incretin hormones stimulation in a PKA- and RPS6KA5/MSK1-dependent signaling pathway, promoting beta cell survival. Phosphorylation on Ser-567 is reduced during postnatal development with low levels at P2 and P5; levels then increase to reach adult levels by P14. Phosphorylation on Ser-457, Ser-541, Ser-567, Ser-607, Ser-656 and Ser-720 as well as the N-terminal Ser-15 are sensitive to calcineurin-mediated dephosphorylation contributing to the modulation of the voltage-dependent gating properties. Dephosphorylation by phosphatase PTPRE confers neuroprotection by its inhibitory influence on the neuronal apoptotic potassium current surge in a Zn(2+)-dependent manner. Dephosphorylated at Ser-607 by protein phosphatase PPP1CA. Hypoxia-, seizure- or glutamate-induced neuronal activity promote calcium/calcineurin-dependent dephosphorylation resulting in a loss of KCNB1-containing clustering and enhanced channel activity. In response to brain ischemia, Ser-567 and Ser-607 are strongly dephosphorylated while Ser-457 and Ser-720 are less dephosphorylated. In response to brain seizures, phosphorylation levels on Ser-567 and Ser-607 are greatly reduced. Phosphorylated/dephosphorylated by Src or FYN tyrosine-protein kinases and tyrosine phosphatase PTPRE in primary Schwann cells and sciatic nerve tissue . Acetylated. Acetylation occurs in pancreatic beta cells in response to stimulation by incretin hormones in a histone acetyltransferase (HAT)/histone deacetylase (HDAC)-dependent signaling pathway, promoting beta cell survival. Sumoylated on Lys-474, preferentially with SUMO1; sumoylation induces a positive shift in the voltage-dependence

of activation and inhibits channel activity . Sumoylation increases the frequency of repetitive action potential firing at the cell surface of hippocampal neurons and decreases its frequency in pancreatic beta cells . Desumoylated by SENP1 .