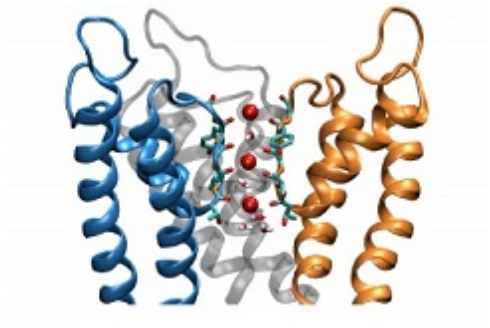
Technology transfer for academic research
A company of the LifeScience Foundation

KCNQ4 and KCNQ5 ion channels for the identification of selective channel function modulators

Reference Number: TO 03-00341

Challenge

Ion channels represent an interesting target class and are prominent components of the nervous system. They do also regulate a wide variety of biological processes that involve rapid changes in cells, such as cardiac, skeletal, and smooth muscle contraction, epithelial transport of nutrients and ions, T-cell activation and pancreatic beta-cell insulin release. As an important subclass, voltage-gated potassium channels (KV) are known mainly for their role in repolarizing the cell membrane following action potentials. Among the KCNQ family, five subtypes are coupled to several important physiological functions (KCNQ1-5 or Kv7.1 - Kv7.5). Therefore the development of selective KCNQ channel blockers or activators is of great interest.



Tetrameric structure of a Kv channel allowing rapid and selective flow of potassium across the cell membrane

Technology

A patent portfolio from Leibniz-Institut für Molekulare Pharmakologie (FMP) and Max-Delbrück-Center for Molecular Medicine (MDC) covering the ion channels KCNQ4 (Kv7.4) and KCNQ5 (Kv7.5) is offered. The patents provide protection of substance matter regarding the respective proteins and encoding nucleic acids. In case of KCNQ4, a mutant protein which is associated with inherited hearing loss is also covered. Provided are also assays to identify modulators of the respective ion channels.

KCNQ4 mediates potassium efflux from outer hair cells and is therefore an interesting target to address hearing loss and tinnitus. KCNQ4 is also found in peripheral sensory neurons and vascular smooth muscle and may play a role in blood pressure regulation.

KCNQ5 is mainly expressed in the brain, smooth and skeletal muscle and offers new perspectives for the treatment of neurological disorders. For instance, KCNQ5 is discussed as a potential target to treat epileptic disorders.

Commercial Opportunity

The patent families are available either for purchase or for licensing

Patent Situation

Both targets are covered by patents in EP, US and Japan originating from the PCT-applications:

WO0044786 (KCNQ4, priority date 26.1.1999/19.5.1999)

WO0077035 (KCNQ5, priority date 11.6.1999)

Further Reading

Jentsch, T.J. et al. KCNQ4, a novel potassium channel expressed in sensory outer hair cells, is mutated in dominant deafness. Cell **96** (3), 437-46 (1999).

Jentsch, T.J. et al. KCNQ5, a novel potassium channel broadly expressed in brain, mediates M-type currents. Journal of Biological Chemistry **275** (31), 24089-24095 (2000).

Chadha, P.S. et al. Reduced KCNQ4-encoded voltage-dependent potassium channel activity underlies impaired β-adrenoceptor-mediated relaxation of renal arteries in hypertension. Hypertension **59**, 877-884 (2012).

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