



**LOYOLA
UNIVERSITY
CHICAGO**

Kv7 Potassium Channel Electrophysiology Uses

Novel Method of Screening Therapeutics to Predict Cardiovascular Effects and to Potentially Identify New Cardiovascular Therapeutics Products

Contact

Loyola University of Chicago
Stritch School of Medicine
Office of Research Services
2160 S. First Ave.
Building 120, Room 400
Maywood, IL 60153

Inventors

Kenneth Byron, Ph.D.
Lioubov Brueggemann, Ph.D.

Field

Pharmaceutical – Drug discovery and development

Technology

Utilization of vascular Kv7 potassium channel electrophysiology to assess potential cardiovascular effects of therapeutics and to potentially identify new cardiovascular therapeutic products

Key Features

- Multiple uses – screening and identification of therapeutics
- Accurate
- Sensitive
- Scaleable

Key Benefits

- Prediction or detection of adverse cardiovascular effects of therapeutics not detected by current methods

Stage of Development

Proof of concept demonstrated

Status

Seeking development, manufacturing, and distribution partner

Patent Status

Provisional patent application filed 10/31/2008

Background

Nearly all eukaryotic cells have an amount of voltage-sensitive ionic permeability controlled by proteinaceous channels that are integrated into the lipid membrane of the cell. Voltage-gated potassium channels are the most widely distributed type of ion channel and have profound effects on vascular smooth muscle cell function, such as controlling constriction or dilation of blood vessels resulting in blood pressure control. The Kv7 family of voltage-activated potassium channels plays an important role in regulating cellular membrane potential. Loyola University of Chicago has discovered that Kv7.5 channels are expressed and functional in smooth muscle cells. Additional studies have demonstrated that Kv7 channel modulators used to treat a number of neurological conditions have a pronounced effect on vascular Kv7 channels with corresponding changes in systemic blood pressure in non-clinical studies.

Kv7 Potassium Channel Screening Method

The scope of the present invention is a method and tools used to measure vascular Kv7 channel activities and/or functional contributions of these channels in vascular smooth muscle cells. To screen therapeutics for potential vascular side effects associated with changes in vascular smooth muscle Kv7 channel activity, the therapeutic is applied to vascular smooth muscle cells expressing Kv7 channels while measuring the electrical activity that results from changes in channel opening. Loyola University of Chicago has developed measurement techniques for accurate and sensitive monitoring of Kv7 channel activity in smooth muscle cells. Based on electrical activity measurement results, therapeutics that increase Kv7 activity are predicted to have reduced risk of cardiovascular side effects and therapeutics that decrease Kv7 activity are predicted to have an increased risk of cardiovascular side effects.

Current Solutions

A common screening technique for cardiovascular side effects of therapeutics in clinical development is to measure the effects of hERG (human ether-a-go-go related gene) potassium channels in cell cultures. The hERG screening assay does not detect effects of therapeutics on vascular Kv7 channel activity and will not be useful for predicting or detecting adverse cardiovascular side effects associated with such activity. Since vascular Kv7 potassium channels have not been previously recognized as a potential site of adverse or beneficial cardiovascular effects, no vascular Kv7 screening assays have been developed to date for use in therapeutics in clinical development or in clinical use. Furthermore, the researchers at Loyola University Chicago have developed unique expertise in measuring vascular Kv7 channel activity for the development of therapeutics screening assays.

Opportunity

Loyola University of Chicago is looking for a commercial partner to further develop, manufacture, and distribute a screening assay utilizing the method and tools described to measure vascular Kv7 channel activities.



**LOYOLA
UNIVERSITY
CHICAGO**

Kv7 Potassium Channel Electrophysiology Uses

*Novel Method of Screening Therapeutics to Predict
Cardiovascular Effects and to Potentially Identify New
Cardiovascular Therapeutics Products*

Inventor

Dr. Kenneth Byron

Kenneth L. Byron was born and raised in western Massachusetts and later moved to Maryland where he obtained an undergraduate degree (B.A.) in Natural Sciences from Johns Hopkins University in Baltimore. He continued his career, working for 5 years as a Laboratory Scientist in the Department of Pharmacology & Toxicology at the University of Maryland in Baltimore until 1985, when he moved to Chicago to pursue a graduate degree. On completion of a Ph.D. in Cell Physiology in 1990 from the University of Chicago, Dr. Byron was awarded the Harry Ginsberg Prize for his dissertation research on Calcium Signaling. In 1993, after 3-years as a Wellcome Trust Fellow at Cambridge University in England, Dr. Byron accepted a faculty position at Loyola University Chicago, where he has since established an independent research laboratory that is internationally recognized for its groundbreaking work on the mechanisms of action of vasoconstrictor hormones and the role of ion channels in regulating vascular tone and blood pressure. Dr. Byron is currently a tenured Associate Professor of Pharmacology and Experimental Therapeutics at Loyola University Chicago.