



TECHNOLOGY INFO SHEET



Modified anuroctonus scorpion toxin peptides for the treatment of autoimmune diseases

Development status

▶ Proof of concept

Development
Product development and Testing
Entering to market
Market development

IP status

In priority year

PCT I.

PCT II.

▶ National/regional phase

Validation

Challenge

Effector memory T cells, which are major contributors to the pathogenesis of several autoimmune diseases (multiple sclerosis, type I diabetes), express Kv1.3 channels in high numbers and consequently their proliferation relies acutely on the operation of these channels. Thus, the progression of certain autoimmune diseases may be controlled with Kv1.3 blockers of high affinity and specificity, and these compounds could serve as the basis for the development of drugs for the treatment of autoimmune diseases in the future.

Technology

Peptide toxins from the venoms of various species, including scorpions, are identified as high affinity ion channel blockers. For a toxin to be available for potential therapeutic application, it is essential that it should only block the ion channel involved in the targeted function of the target cell without influencing other channels. Thus, for compounds developed for the treatment of T cell mediated autoimmune diseases, high selectivity for Kv1.3 is just as an important prerequisite as high affinity for the channel.

Researchers aimed at the improvement of the channel-toxin interaction by increasing the selectivity and affinity of anuroctoxin for Kv1.3, based on directed mutations in its sequence. The inventors have successfully modified anuroctonus scorpion toxin peptides in a way that they could improve its properties in inhibiting Kv1.3 potassium channel protein.

Keywords

autoimmune diseases, multiple sclerosis, type I diabetes, peptidomimetics, ion channel inhibition, Kv.1.3 channel

Benefits

- ▶ High affinity and selectivity of the modified anuroctoxin for blocking Kv1.3 channel.
- ▶ The Delayed-Type Hypersensitivity test has proven the concept of the invention.
- ▶ There is no peptide-based ion channel inhibiting technology on the market.

Development status

The affinity and selectivity of the natural molecule extracted from scorpion venom have been successfully improved through mutation. The researchers synthesized the mutated toxin peptide, and electrophysiological examinations were carried out with positive results.

Recently successful animal experiments have been performed on the synthesized molecule in order to test the inhibiting efficiency in Delayed-Type Hypersensitivity, thereby highlighting its potential beneficial effects in the management of autoimmune diseases. At present the 3D modeling of the toxin is in progress and NMR examinations are to be started on marked toxin in order to further study the channel-toxin interactions, which is crucial for creating peptidomimetics.

The desired outcome of the development is a peptidomimetic to be used in the treatment or prevention of T cell mediated autoimmune disorders.

IP status

After PCT examination (PCT/HU2012/000117) the US national 14/354,540) and the European regional (EP 12843911.4) phases were submitted in 2014. The US patent (Patent No.: 9,062,119) was granted in 2015. The IP rights are shared between the University of Debrecen (70%) and the University of Szeged (30%).

What we are looking for

The University of Szeged is looking for potential utilizers, who are interested in the further development of the technology and are willing to finance the following development phases.

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