USF Available Technologies

Technology Transfer Office

Method of Electrogenically Controlling Pump Molecules

Researchers at the University of South Florida have developed a method to control the ion-transporters in a cell membrane by a non-invasively applied oscillating electric field.

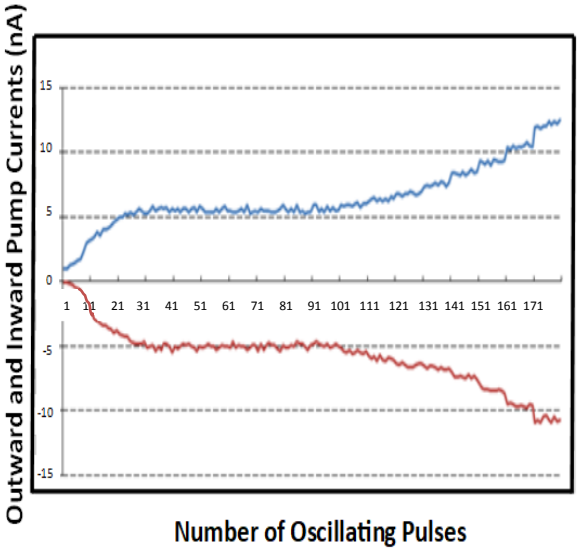
In living systems, there are many ion-transporters such as electrogenic pump molecules and carrier-mediated ion-exchangers. The functions of these ion-transporters are to maintain the specific ionic concentrations in the cell, as well as to modulate the ionic concentration gradients across the cell membrane. These ionic concentration gradients play a significant role in controlling the cell volume and in maintaining a homeostatic environment. The Na/K pump or Na/K ATPase is one of the most prevalent house-keeping proteins, and is found within the membrane of almost every cell. To date, there is no practical technique available to non-invasively and effectively activate the pumping cycle of the Na/K pumps or other carrier-mediated ion transporters. Thus, there is a need for a technique to be developed which accelerates or decelerates the pumping rates of Na/K pumps or other carrier-mediated ion transporters.

USF researchers have developed a state of the art technique to effectively control the functions of Na/K pumps. This technique involves applying a non-invasive oscillating electric field to a living system, which then results in synchronization of the individual pump molecules. This novel technique proves to be an effective way to activate the Na/K pumps or other carrier-mediated ion transporters and is applicable to the treatment of many diseases including myotonic dystrophy, diabetes, cystic fibrosis, McArdle disease, Alzheimer's disease, Huntington's disease, hypertension, brain ischemia, cardiac diseases, and electrical injury.

ADVANTAGES:

- **A non-invasive technique**
- **Electric field has modulating frequency**
- **Used to treat various diseases caused by the malfunction of Na/K pumps**

A Non-Invasive Technique to Electrogenically Control Na/K Pumps



An Increase in Outward and Inward Pump Currents were Shown with Higher Oscillating Pulses

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