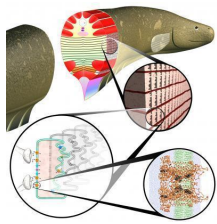


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By: Tudor Vieru, Science Editor



Stacks of electrocytes inside a section of an eel
University of Yale

Medical Implants May Be Powered by Artificial Cells

Scientists think they can recreate the electrical field of a human cell by using eel-inspired artificial cells

The international scientific community is thrilled with excitement over the last discoveries made by scientists at the National Institute of Standards and Technology (NIST) of Yale University. NIST engineer David LaVan announced that the basic principles of creating artificial electric cells have been set in place. In addition, he said that this new invention, which was inspired by the defense mechanisms eels employ when under attack, had the potential to be even more effective than what Mother Nature first designed. This means that the electrical output of future artificial cells could be even larger and steadier than the one the eel generates over short periods of time.

The scientists working at Yale managed to identify the exact process through which eels generate their 600 volt electric burst, and, apparently, it's all in the ions. At a cellular level inside this fish, there is a swift exchange of sodium and potassium ions between membranes. While sodium sweeps in through naturally permissive pores in the cellular membrane, potassium rushes out through similar routes, gaining more and more power as it builds up inside thousand cells throughout the body. Eventually, it becomes a self-propagating process that ends when the charge is eliminated in the environment. Afterwards, the natural permission of the cellular membranes changes, allowing potassium to re-enter the cell and restore its chemical balance with sodium. This is known as the "resting phase."

Working with complicated algorithmic models, LaVan and researcher Jian Xu discovered that the electrical output of natural eel cells can be boosted by up to 40 percent in their artificial replicas. This gives scientists room to tweak the newly-devised cells to the needs they must meet. Namely, they can be used to deliver electrical shock waves at a certain point or to generate a steady, low-intensity electrical output, which can be used multiple ways.

This discovery could have numerous groundbreaking applications, especially in the field of medicine. According to LaVan, a cube-like artificial cell grouping of only 4mm in size could output as much as 300 microwatts, which can be used to power up various types of internal medical implants, such as pacemakers. This level of system biology is still relatively new to researchers, so all future breakthroughs have great potential of opening new paths for research.