

# Technique used commonly in physics finds application in neuroscience

August 3 2006

---

To understand how brain cells release compounds (or transmitters) used when the cells communicate with each other, Vladimir Parpura, associate professor of neuroscience, and Umar Mohideen, professor of physics, devised a new technique, used commonly in physics, that can be applied now to the study of a wide range of biological processes and interactions.

The researchers, who performed their experiments on brain proteins called SNAREs, published their results in the July issue of *Biophysical Journal*.

The technique, commonly referred to as Atomic Force Microscopy, uses the deflection of microfabricated membranes of silicon nitride, about 100 times thinner than the human hair, to measure very small forces. Using this technique on rat brain proteins, the researchers were able to measure the bonding between single protein molecules that are involved in the release of the neurotransmitters. They also were able to classify the strength of the molecular interactions (bonding) between 3 of the SNARE proteins that participate in the process.

SNARE proteins are located on vesicles (tiny membrane-encased packets that contain neurotransmitters or enzymes) and the plasma membrane of brain cells. These proteins are thought to play a key role in the final fusion of the synaptic vesicle with the plasma membrane, a process that makes communication between cells possible.

"Our results shed new light on how these proteins are involved in exocytosis - the process by which a biological cell releases substances into its environment," Parpura said. "We now understand better how these proteins interact at the molecular level and we can apply this to improve our detection of toxins acting on these proteins."

The researchers used the technique also to develop a sensor for detecting botulinum toxin, responsible for an often fatal type of food poisoning.

"Our sensor is extremely sensitive because it is capable of detecting interactions between two single molecules," Mohideen said. "As a result, the sample size you need for testing can be extremely small, of the order of a few molecules."

Source: University of California, Riverside

Citation: Technique used commonly in physics finds application in neuroscience (2006, August 3) retrieved 7 May 2024 from

<https://phys.org/news/2006-08-technique-commonly-physics-application-neuroscience.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.