Brain's master switch verified

May 7 2010

Yeon-Kyun Shin, professor of biochemistry, biophysics and molecular biology at ISU, has shown that the protein called synaptotagmin1 is the sole trigger for the release of neurotransmitters in the brain using this instrument that allows a new technique called single vesicle fusion method. Credit: ISU photo by Bob Elbert

The protein that has long been suspected by scientists of being the master switch allowing brains to function has now been verified by an Iowa State University researcher.

Yeon-Kyun Shin, professor of biochemistry, biophysics and molecular biology at ISU, has shown that the protein called synaptotagmin1 (Syt1) is the sole trigger for the release of neurotransmitters in the brain.

Prior to this research, Syt1 was thought to be a part of the protein

structure (not the sole protein) that triggered the release of neurotransmitters at 10 parts per million of calcium.

Shin's research is published in the current issue of the journal *Science*.

"Syt1 was a suspect previously, but people were not able to pinpoint that it's the real one, even though there were lots and lots of different trials," said Shin.

"In this case, we are trying to show in the laboratory that it's the real one. So we excluded everything else, and included SNARE proteins -- that's the machinery of the release, and the Syt1 is a calcium-sensing timer."

Syt1 senses, at 10 ppm of calcium, and tells the SNARE complex to open the pore to allow the movement of the neurotransmitters.

Brain activity occurs when neurotransmitters move into a fusion pore.

"We are showing that this Syt1 senses the calcium at 10 ppm, and sends the signal to the SNARE complex to open the fusion pore. That is the process that we are showing right now," Shin said.

Shin and his researchers were able to pinpoint the protein using a new technique called single vesicle fusion method. Using this method, they were able to create and monitor a single fusion event.

Previous research didn't allow scientists to look at single events, and instead required detecting many events and then taking an average of those events, Shin says.

Shin, who has been looking at this brain activity for 15 years, is happy about the discovery.

"We are quite excited that for the first time we are showing that Syt1 is really what triggers the signal in the brain," he said. "This is a really important thing in terms of neurosciences. This is the heart of the molecular part of the brain function."

Shin believes his discovery may be useful in understanding brain malfunctions such as autism, epilepsy and others.

While researching brain function, Shin has previously shown that taking statin drugs to lower cholesterol may actually inhibit some brain function.

Provided by Iowa State University