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Learning about the process could help treat brain disorders

By Mary Ann Roser

Suppose a scientist could peer inside the brain and see how memories are created. The researcher might then have a clue about what happens when people develop Alzheimer's, stroke and other neurological disorders — and how to fix them.

But first that scientist would have to figure out a way to see the tiny structures that help build memories.

That's what University of Texas professor of neuroscience Kristen Harris and her collaborators at UT are doing with a $150,000 grant from the Brain Research Foundation. At a time when larger federal grants for medical research are increasingly hard to get, the grant will enable Harris' team to test out a novel idea that could pay off big someday.

"We're trying to understand how memory is stored... and this grant gives us the opportunity to explore new methods for doing that, " she said.

Harris' team is focusing on synapses, the junctions between nerve cells that enable neurons to communicate with one another. Harris and two others at UT's Center for Learning and Memory - assistant professor Boris Zemelman and research associate Masaaki Kuwajima - speculate that not all synapses function the same: Some are stronger than others. They're activated during learning and have the ability to create long-term memories. The weaker ones can't do that.

To test that concept, Zemelman has developed a way to activate specific synapses in the brains of mice and rats. He manipulates genes to make the synapse sensitive to light. The team is developing a new approach to mark the light-activated synapses so they can be studied at very high magnification in an electron microscope. That way, the team can determine how the activated synapses change structure and composition to support memory.

Being able to identify such targets in the brain can ultimately lead to new treatments for a variety of neurological disorders, Harris said. "If you can understand how they work, then you can figure out how to fix them."

"It's an extremely innovative proposal, " said Terre Constantine, a former researcher who is executive director and CEO of the Brain Research Foundation. It's also risky because there's no guarantee it will work.

"We like risky, " she said. "We call ourselves the venture capitalists of neuroscience research."

Funders willing to take a chance on innovative research have become increasingly important to advancing science.

The National Institutes of Health's $30 billion annual budget has lost 22 percent of its purchasing power since 2003, NIH chief Francis Collins told Congress recently. As a result, many young scientists can't get grants and many senior researchers face repeated rejections that can put their labs in jeopardy.

It's an issue that the new UT Dell Medical School will face as it seeks to greatly expand medical research in the Austin area. Faculty members at UT increasingly are seeking support from foundations, said Dean Appling, the associate dean for research and facilities at UT's College of Natural Sciences.

"These foundations can turn a project NIH thought was risky and show that this is actually going to work, " Appling said. The NIH might then turn around and award the scientist a larger grant to continue , he said.

Harris said she's grateful for the chance and hopeful about the results. So is Constantine.

"I remember reading Dr. Harris' proposal and I said, ‘Wow, '?" she said, adding that the foundation received about 60 project proposals and ultimately chose three to fund at $150,000 apiece.

"Sometimes we don't find sexy proposals, " Constantine said, "but to me, this is really sexy - finding out how memories are created."