

STRESS RESEARCH: The Mental Meltdown

You're running late, stuck in traffic, or pushing a deadline. The day seems a bit more out of control than usual and, bam, you've driven past your freeway exit. Whether it's something like this, or drawing a blank during a big meeting, or getting into a fender-bender on the way to a parent-teacher conference, we all have had moments where life's little pressures ganged up on us and we, somehow, made the problem worse by forgetting something or overlooking a significant detail.

Scientists have known that stress can impact your memory. What they're beginning to understand now is the changes your brain undergoes because of stress.

Jeansok Kim an associate professor at the University of Washington's psychology department, studies memory by using mice. He's found a way to measure activity inside the brain's hippocampus. He says, "Think of it as putting a miniature microphone into the hippocampus and as the animal is navigating, you are listening to the cells." What he's hearing is the cells firing as a mouse moves from one location to another. When a mouse is a new location, various cells in the hippocampus fire, creating a memory of that spot. When the mouse returns to that location, the same cells fire.

Scientists often test how well a mouse thinks by putting them in a pool of water. Mice are good but reluctant swimmers and soon locate a platform hidden out of sight, just beneath the water's surface. In later tests, they could easily remember where the platform was and quickly swim to it.

However, Kim played some mice a series of sporadic brief hissing sounds that stress the mice. When those mice were put in the water, they had trouble finding the platform even though they had done this test before being exposed to the hissing.

"Following stress, the cells that fired in a particular location still fired at the same location, but tended to fire at a different frequency," Kim says. "You're actually looking at stress effects on ongoing brain cell activity as the animal is behaving."

Writing in the Proceedings of the National Academy of Sciences, Kim also reported finding that stress affected the brain cell connections, or synapses, that connect with other cells to form memories and to learn, a concept scientists call brain plasticity. He said there was less of a protein called LTP, which is important in forming these connections.

"If you underwent a traumatic stress and then afterwards the information is not processed correctly, then at a later time when it comes time to use that information to make some certain important decision, you may not be able to make the proper decision that you would normally make," Kim says.

While none of this will help the next time you're late for work and can't find your keys, just remember those mice keeping their heads above water and know that's its not just you.

This research was published in the Proceedings of the National Academy of Sciences Online early edition for the week of November 5, 2007 and was funded by the Whitehall Foundation, the National Institutes of Health and the University of Washington.

