Medical Xpress

Method to erase traumatic memories may be on the horizon

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Soldiers haunted by scenes of war and victims scarred by violence may wish they could wipe the memories from their minds. Researchers at the Johns Hopkins University say that may someday be possible.

A commercial drug remains far off - and its use would be subject to many ethical and practical questions. But scientists have laid a foundation with their discovery that proteins can be removed from the brain's fear center to erase memories forever.

"When a traumatic event occurs, it creates a fearful memory that can last a lifetime and have a debilitating effect on a person's life," says Richard L. Huganir, professor and chair of neuroscience in the Hopkins School of Medicine. He said his finding on the molecular process "raises the possibility of manipulating those mechanisms with drugs to enhance behavioral therapy for such conditions as post-traumatic stress disorder."

The research has drawn interest from some involved in mental health care, and some concern.

Kate Farinholt, executive director of the mental health support and information group NAMI Maryland, said many people suffering from a traumatic event might benefit from erasing a memory. But there are a lot of unanswered questions, she said.

"Erasing a memory and then everything bad built on that is an amazing idea, and I can see all sorts of potential," she said. "But completely

deleting a memory, assuming it's one memory, is a little scary. How do you remove a memory without removing a whole part of someone's life, and is it best to do that, considering that people grow and learn from their experiences."

Past research already had shown that a specific form of behavior therapy seemed to erase painful memories. But relapse was possible because the memory wasn't necessarily gone.

By looking at that process, Huganir and postdoctoral fellow Roger L. Clem discovered a "window of vulnerability" when unique receptor proteins are created. The proteins mediate signals traveling within the brain as painful memories are made. Because the proteins are unstable, they can be easily removed with drugs or behavior therapy during the window, ensuring the memory is eliminated.

Researchers used mice to find the window, but believe the process would be the same in humans. They conditioned the rodents with electric shocks to fear a tone. The sound triggered creation of the proteins, called calcium-permeable AMPARS, which formed for a day or two in the fear center, or amygdala, of the mice's brains.

The researchers are working on ways to reopen the window down the road by recalling the painful memory, and using medication to eliminate the protein. That's important because doctors often don't see victims immediately after a traumatic event. PTSD, for example, can surface months later.

Huganir, whose report on erasing fear memories in rodents was published online last month by *Science Express*, also believes that the window may exist in other centers of learning and may eventually be used to treat pain or drug addiction.

Connie Walker, a Leonardtown, Md., mother of an Iraq war veteran suffering from PTSD, said there isn't enough attention given to the injuries of service members in general and she specifically supports research into PTSD-related therapy. But Walker, a 23-year-Navy veteran herself, said she wouldn't want her son to take a medication to erase what he witnessed.

She said her son began functioning well after he was finally able to get therapy, which she said should be more readily available to every wounded veteran.

"My gut reaction to a drug that erases memories forever is to be frightened," she said. "A person's memory is very much a part of who they are. I recognize we all have some bad memories, though I doubt they can compete with what's coming back from Iraq and Afghanistan. But how can a drug like that be controlled? What else gets eliminated accidentally?"

For now, there aren't yet drugs to erase memories. But there are medications also targeting the amygdala and used with behavior therapy that can lessen the emotional response to painful memories in those with PTSD, such as propranolol, a beta blocker commonly used to treat hypertension.

Paul Root Wolpe, director of the Center for Ethics at Emory University in Atlanta, says permanently erasing memories in humans, if it can be done, wouldn't be a lot different ethically than such behavior modification. Both are memory manipulation. But he said erasing memories is fraught with many more potential pitfalls.

He also said that PTSD sufferers, such as service members in Iraq and Afghanistan, frequently experience more than one traumatic event, and trying to eliminate all the memories could significantly alter a person's

personality and history. So could forgetting a whole person after a painful loss or breakup, as depicted in the 2004 movie "Eternal Sunshine of the Spotless Mind."

Wolpe said it can be called dementia when someone forgets that much of their past.

"I don't know what it means to erase that much of a person's life," he said. "You'd leave a giant hole in a person's history. I tend to doubt you'd even be able to."

Further, he said, the safeguards necessary to protect the process from abuse would be difficult. Inmates or soldiers in danger of capture could be subjected to it, for example. Many questions should be decided before testing is pursued in humans, because its use may become "too tempting," he said.

Wolpe could see only limited uses for erasing a memory for now, such as for those suffering after a rape or single terrifying event.

"Certainly, there may be appropriate applications," he said. "But human identity is tied into memory. It creates our distinctive personalities. It's a troublesome idea to begin to be able to manipulate that, even if for the best of motives."

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