

Researchers find drug therapy that could eventually reverse memory decline in seniors

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It may seem normal: As we age, we misplace car keys, or can't remember a name we just learned or a meal we just ordered. But University of Florida researchers say memory trouble doesn't have to be inevitable, and they've found a drug therapy that could potentially reverse this type of memory decline.

The drug can't yet be used in humans, but the researchers are pursuing compounds that could someday help the population of aging adults who don't have Alzheimer's or other dementias but still have trouble remembering day-to-day items. Their findings will be published in today's (March 5) issue of the *Journal of Neuroscience*.

The kind of memory responsible for holding information in the mind for short periods of time is called "working memory." Working memory relies on a balance of chemicals in the brain. The UF study shows this chemical balance tips in older adults, and working memory declines. The reason? It could be because their brains are producing too much of a chemical that slows [neural activity](#).

"Graduate student Cristina Banuelos' work suggests that cells that normally provide the brake on neural activity are in overdrive in the aged [prefrontal cortex](#)," said researcher Jennifer Bizon, Ph.D., an associate professor in the department of neuroscience and a member of UF's Evelyn F. & William L. McKnight Brain Institute.

This chemical, an inhibitory brain neurotransmitter called GABA, is

essential. Without it, brain cells can become too active, similar to what happens in the brains of people with schizophrenia and epilepsy. A normal level of GABA helps maintain the optimal levels of cell activation, said collaborator Barry Setlow, Ph.D., an associate professor in UF's departments of psychiatry and neuroscience.

Working memory underlies many mental abilities and is sometimes referred to as the brain's mental sketchpad, Bizon said. For example, Bizon said, you use your working memory in many everyday activities such as calculating your final bill at the end of dining at a restaurant. Most people can calculate a 15 percent tip and add it to the cost of their meal without pencil and paper. Central to this process is the ability to keep multiple pieces of information in mind for a short duration—such as remembering the cost of your dinner while calculating the amount needed for the tip.

"Almost all higher cognitive processes depend on this fundamental operation," Bizon said.

To determine the culprit behind working [memory decline](#), the researchers tested the memory of young and aged [rats](#) in a "Skinner box." In the Skinner box, rats had to remember the location of a lever for short periods of up to 30 seconds. The scientists found that while both young and old rats could remember the location of the lever for brief periods of time, as those time periods lengthened, old rats had more difficulty remembering the location of the lever than young rats.

But not all older rats did poorly on the memory test, just as not all [older adults](#) have memory problems. The study shows the older brains of some people or rats with no memory problems might compensate for the overactive inhibitory system—they are able to produce fewer GABA receptors and therefore bind less of the inhibitory chemical.

Older rats with [memory problems](#) had more GABA receptors. The drug the researchers tested blocked GABA receptors, mimicking the lower number of those receptors that some older rats had naturally and restoring [working memory](#) in aged rats to the level of younger rats.

"Modern medicine has done a terrific job of keeping us alive for longer, and now we have to keep up and determine how to maximize the quality of life for seniors," Bizon said. "A key aspect of that is going to be developing strategies and therapies that can maintain and improve cognitive health."

Provided by University of Florida

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