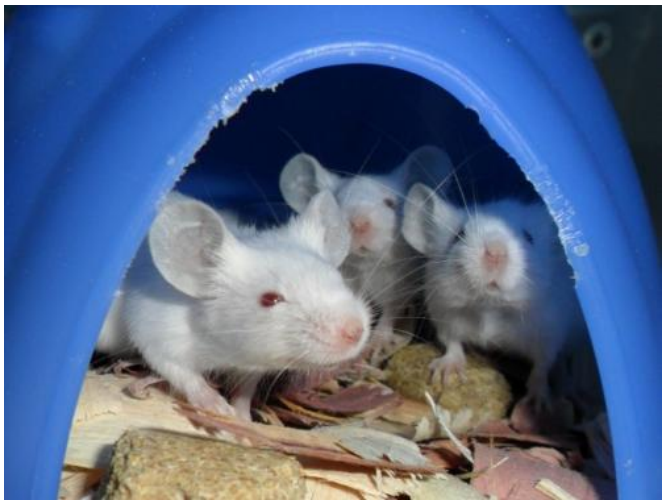
Oxytocin shows promise for improving social skills in autistic mice

28 January 2015, by Mark Wheeler



Credit: Martha Sexton/public domain

People with autism spectrum disorders have difficulty with social behavior and communication, which can make it challenging to form friendships, engage in routine conversations or pick up on the social cues that are second nature to most people. Similarly, mice with symptoms of autism show little interest in interacting or socializing with other mice.

A drug called risperidone has been shown to treat some symptoms of autism—including repetitive behaviors—in both humans and mice, but so far no medication has been found to help improve the ability to socialize.

In a study published online by the journal *Science Translational Medicine*, researchers at UCLA found that giving oxytocin to mice with autism-like symptoms restored their normal social behavior. Oxytocin is a neuropeptide, a type of molecule that helps neurons communicate with one another.

But perhaps the study's biggest surprise was that early postnatal administration of the oxytocin led to longer-lasting positive effects, which continued into the animals' adolescence and adulthood. "This suggests that there may be critical windows of time for treatment that are better than others," said Daniel Geschwind, a UCLA professor of psychiatry, neurology and human genetics and senior author of the study.

In 2011, Geschwind and his colleagues developed a mouse model for autism spectrum disorders by knocking out a gene called contactin-associated protein-like 2, or CNTNAP2, which scientists believe plays an important role in the brain circuits responsible for language and speech. Previous research has linked common CNTNAP2 variants to a heightened risk for autism, while rare variants can lead to an inherited form of autism called cortical dysplasia-focal epilepsy syndrome.

"The oxytocin system is a key mediator of social behavior in mammals, including humans, for maternal behavior, mother–infant bonding, and social memory," said Geschwind, who holds UCLA's Gordon and Virginia MacDonald Distinguished Chair in Human Genetics and is the director of the Center for Autism Research and Treatment at the Semel Institute for Neuroscience and Human Behavior at UCLA. "So it seemed like a natural target for us to go after."

The mice that were engineered for autism have fewer oxytocin neurons in the hypothalamus than other mice and lower-than-normal oxytocin levels throughout the brain. But after researchers treated them with oxytocin, the animals spent normal amounts of time interacting with other mice—the measure scientists used to gauge their sociability.

Separately, the researchers gave the mice melanocortin, an agonist that binds to specific receptors on a cell in order to activate it. They found that it caused a natural release of oxytocin from the mice's brain cells, which also improved the

mice's sociability.

"The study shows that a primary deficit in oxytocin may cause the social problems in these mice, and that correcting this deficit can correct social behavior," Geschwind said.

The next stage of the research, Geschwind said, will be to determine the lowest dosage of oxytocin that still proves effective. Because the mice in the study displayed symptoms similar to those of people on the autism spectrum, the researchers hope that this therapy may someday be applicable to humans.

Provided by University of California, Los Angeles