Anti-social mice may reveal more about depression

March 1 2011

The research documented that California mice showed signs of social withdrawal after a series of encounters with a stronger, more aggressive mouse. Credit: Mark Chappell/UC Riverside photo

(PhysOrg.com) -- For the first time, UC Davis psychology researchers have been able to produce a "social withdrawal" syndrome in female rodents. The development could yield new insights into the physical basis of human mood disorders such as depression and anxiety, which are twice as common among women than men.

"Social withdrawal is a common feature of mood disorders," said Brian Trainor, assistant professor of psychology at UC Davis.

Trainor and his colleagues discovered that female California mice (Peromyscus californicus) showed signs of social withdrawal after a series of encounters with a stronger, more aggressive mouse.

When the team examined the brains of these mice, they found changes in an area called the nucleus accumbens, which is associated with motivation and reward.

The changes might help to explain why the mice became socially withdrawn, and could lead to new avenues of research on depression in humans, Trainor said. The research was published Feb. 25 in the journal *Public Library of Science (PloS) ONE.*

Animal models are needed to understand the physiological basis of mood disorders, Trainor said. Although an animal cannot be diagnosed as "depressed," researchers can look for changes in behavior comparable to signs of human depression.

In humans, stressful life experiences can trigger depression. To reproduce this in mice, other researchers have used a "social defeat" model. A mouse is paired for a short time with a stronger, aggressive mouse. After several such encounters in a row, the weaker mouse can become withdrawn.

But this method has a flaw: It does not work well for female domestic mice, which are less aggressive than males. Psychologists and neuroscientists want to understand the differences between males and females in this area, because female humans are more vulnerable to depression than males, Trainor said.

Trainor and his colleagues used lab-bred female California mice. In the wild, both male and female California mice are territorial and may fight with other male or female mice that enter their territory.

They found that after just three social defeats, female mice, but not males, would become withdrawn for up to four weeks.

Provided by UC Davis