MedicalXpress

Brain's 'trust machinery' identified

May 21 2008

The brain centers triggered by a betrayal of trust have been identified by researchers, who found they could suppress such triggering and maintain trust by administering the brain chemical oxytocin. The researchers said their findings not only offer basic insights into the neural machinery underlying trust; the results may also help in understanding the neural basis of social disorders such as phobias and autism.

Thomas Baumgartner and colleagues published their findings in the May 22, 2008, issue of the journal *Neuron*.

In their experiments, the researchers asked volunteer subjects to play two types of games—a trust game and a risk game. In the trust game, subjects were asked to contribute money, with the understanding that a human trustee would invest the money and decide whether to return the profits, or betray the subjects' trust and keep all the money. In the risk game, the subjects were told that a computer would randomly decide whether their money would be repaid or not.

The subjects also received doses of either the brain chemical oxytocin (OT) or a placebo via nasal spray. They chose OT because studies by other researchers had shown that OT specifically increases people's willingness to trust others.

During the games, the subjects' brains were scanned using functional magnetic resonance imaging. This common analytical technique involves using harmless magnetic fields and radio waves to map blood flow in brain regions, which reflects brain activity.

The researchers found that—in the trust game, but not the risk game—OT reduced activity in two brain regions: the amygdala, which processes fear, danger and possibly risk of social betrayal; and an area of the striatum, part of the circuitry that guides and adjusts future behavior based on reward feedback.

Baumgartner and colleagues concluded that their findings showed that oxytocin affected the subjects' responses specifically related to trust.

"If subjects face the nonsocial risks in the risk game, OT does not affect their behavioral responses to the feedback. Both subjects in the OT group and the placebo group do not change their willingness to take risks after the feedback. In contrast, if subjects face social risks, such as in the trust game, those who received placebo respond to the feedback with a decrease in trusting behavior while subjects with OT demonstrate no change in their trusting behavior although they were informed that their interaction partners did not honor their trust in roughly 50% of the cases."

The researchers also wrote that "our insights into the neural circuitry of trust adaptation, and oxytocin's role in trust adaptation, may also contribute to a deeper understanding of mental disorders such as social phobia or autism that are associated with social deficits. In particular, social phobia (which is the third most common mental health disorder) is characterized by persistent fear and avoidance of social interactions."

Rutgers University psychologist Mauricio Delgado, in a preview in the same issue of Neuron, wrote that the paper "represents an ambitious and informative development in the literature," He commented that the study "has significant implications for understanding mental disorders where deficits in social behavior are observed. Betrayal aversion, for example, could serve as a precursor to social phobia, a disorder characterized by aversion to social interactions, with the reported oxytocin finding

providing a bridge for potential clinical applications."

Source: Cell Press