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Serotonin Levels Determine Sense of Fairness

Less of brain chemical makes people more likely to reject unfair offer, study shows

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By Ed Edelson*HealthDay Reporter*

THURSDAY, June 5 (HealthDay News) -- Levels of a brain chemical known as serotonin govern the way people react to unfair offers when they play the game of life, a new study indicates.

Serotonin, which carries messages between neurons, is involved in emotional control. One recent study found that the expression of anger in women was affected by variations in a gene governing the receptors for serotonin in brain cells.

The new study, reported in the June 5 issue of *Science*, had people play what is called the Ultimate Game, which is being used widely in psychological and neurological studies. The game has one player proposing a way to split a pot of money. If the offer is accepted by the other player, both get paid. If it is refused, neither gets a payment.

The researchers had some players make deliberately unfair offers: "I get 80 percent, you get 20 percent." They found that players given a chemical that lowered serotonin levels were more likely to reject an unfair offer.

Serotonin levels have that effect, because the chemical is involved in the activity of the prefrontal region of the brain, explained study author Molly J. Crockett, a doctoral student

at the University of Cambridge in England.

"One recent study on the Ultimate Game showed that when an unfair offer is accepted, you see activity in the prefrontal cortex," Crockett said. "Down-rating the emotional response makes it more unlikely that an unfair offer will be accepted."

In other words, lower serotonin levels also meant a higher level of resentment, so that an offer that wasn't as good as it might be would be turned down. Conversely, higher serotonin levels would make it easier to live in an imperfect world.

It's hard to apply that knowledge directly, Crockett said.

"What we did was have people fast overnight," she said. "On some days of the study, they took either a pill with all amino acids or a placebo. On the experiment day, they took a pill with all the amino acids but tryptophan. Over the course of several hours, that would have been converted to serotonin."

Knowledge about the role of serotonin in the emotions already is being put to use, sometimes legally and sometimes not, said research team member Matthew D. Lieberman, an associate professor of psychology at the University of California, Los Angeles.

Prescription medications such as antidepressants are known to affect serotonin levels, and the same is true of MDMA, the psychedelic drug whose street name is Ecstasy, Lieberman said. It is, he said, "a quick serotonin enhancer."

One everyday implication of the study is that brain chemistry "is going to affect how we judge other people and are treated by other people," Lieberman said.

A proposed experiment would have people play the Ultimate Game inside a magnetic resonance imaging machine that would produce images of brain activity, Lieberman said. "We could see, as we change serotonin levels, how the brain responds in an imaging study to fair and unfair offers," he said.

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