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# eLab - Medical

## Serotonin fairness

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The neurotransmitter serotonin, which acts as a chemical messenger between nerve cells, plays a critical role in regulating emotions such as aggression during social decision-making, new research by scientists at England's University of Cambridge and UCLA suggests. Their findings appear June 6 in the peer-reviewed journal Science.

Serotonin has long been associated with social behaviour, and low levels of serotonin are associated with depression and anxiety, but its precise involvement in impulsive aggression has been controversial. Though many scientists have hypothesised a link between serotonin and impulsivity, this is one of the first studies to show a causal link between the two.

The findings highlight why some of us may become combative or aggressive when we have not eaten. The essential amino acid necessary for the body to create serotonin can only be obtained through diet; our serotonin levels naturally decline when we don't eat.

The research also provides insight into clinical disorders characterised by low serotonin levels, such as depression and obsessive-compulsive disorder, and may help explain some of the social difficulties associated with these disorders.

UCLA scientists reported in April that the human brain responds to being treated fairly the same way it responds to winning money and eating chocolate; being treated fairly turns on the brain's reward circuitry. In the new Science study, they and their Cambridge colleagues report that people with low serotonin levels were found to be more sensitive to being treated unfairly.

The Science study involved 20 subjects, 14 of them female, with an average age of 25. As in the April study, published in the journal Psychological Science, participants were presented with fair and insulting offers for dividing sums of money. If they declined, neither they nor the person making the offer would receive anything. Some of the offers were fair, such as receiving 5 British pounds out of 10 or out of 12, while others were unfair, such as receiving 5 pounds out of 23.

In this study, however, after initially responding to the offers, participants were given a drink that significantly reduced their serotonin levels. They were then presented with the offers again.

When their serotonin levels were reduced, they rejected 82 percent of the unfair offers; when their serotonin levels were normal, they rejected only 67 percent of the unfair offers. Thus, people with low serotonin levels were more likely to reject unfair offers.

“The same person may experience the same thing as fair and unfair on different days based on how the neurochemistry of the brain is functioning,” said study co-author Matthew D. Lieberman, UCLA associate professor of psychology and a founder of social cognitive neuroscience. “When we feel something is unfair, that may have to do with how our brain causes us to experience the world. Our subjects are not aware their serotonin levels are affecting the way they experience the world. This suggests we should be more forgiving of other people’s perspectives.”

“A sense of fair play is not a purely rational process,” he added. “It seems not to be the case that, like a math formula, if something is fair, it’s fair for all time, in all situations.”

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