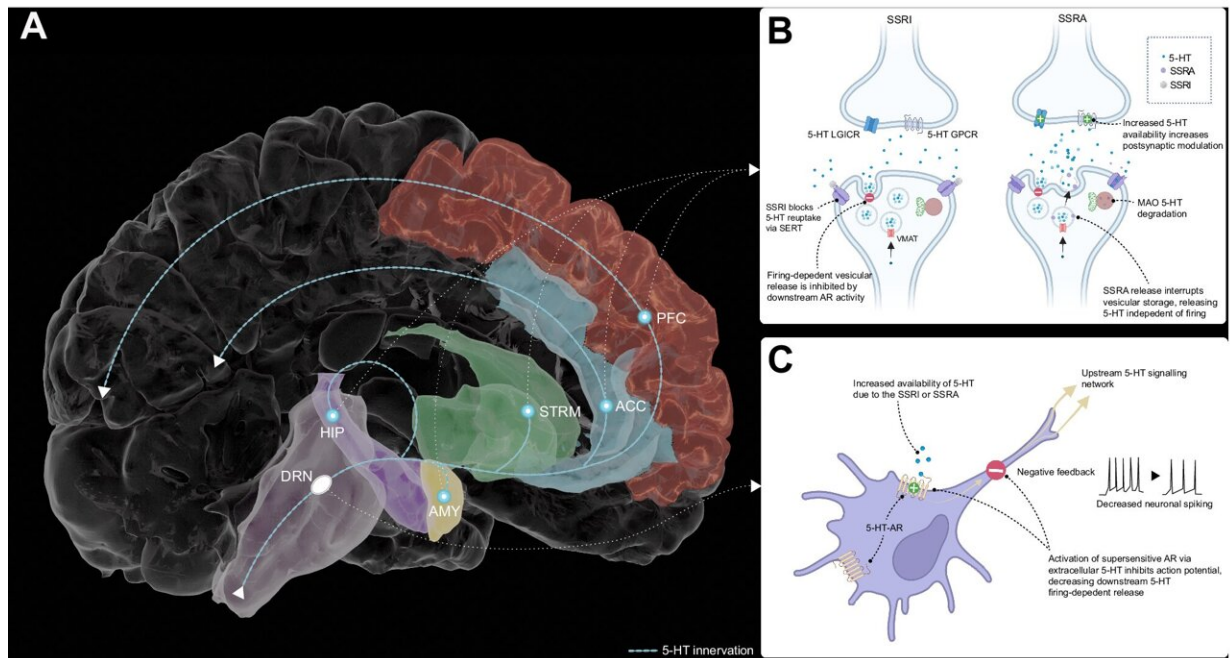


Serotonin changes how people learn and respond to negative information

August 9 2024



Selective serotonin releasing agent is not negated by 5-HT_{1A} supersensitivity, resulting in a rapid onset of pro-serotonergic activity. Credit: *Nature Communications* (2024). DOI: 10.1038/s41467-024-50394-x

Increasing serotonin can change how people learn from negative information, as well as improving how they respond to it, according to a new study [published](#) in the journal *Nature Communications*.

The study by scientists at the University of Oxford's Department of Psychiatry and the National Institute of Health and Care Research (NIHR) Oxford Health Biomedical Research Center (OH BRC) found people with increased serotonin levels had reduced sensitivity to punishing outcomes (for example, losing money in a game) without significantly affecting sensitivity to rewarding ones (winning money).

The study involved 26 participants who were given the drug to increase serotonin, with a further 27 in a [control group](#), who were asked to do a series of tasks measuring learning and behavioral control. State-of-the-art models were then used to understand participant behavior.

The researchers found that increasing serotonin made individuals better able to control their behavior, particularly when exposed to negative information. The study also showed that elevated serotonin levels benefited different types of memory.

Michael Colwell of Oxford's Department of Psychiatry, the lead author of the paper, said, "These findings shed new light on how serotonin shapes human behavior, particularly in negative environments.

"We believe it may offer important insights into the cause and treatment of depression."

Instead of using traditional antidepressants (SSRIs or [selective serotonin reuptake inhibitors](#)) to test responses, the researchers used a new technique to test the effects of serotonin, using a selective serotonin releasing agent, a drug currently used to treat a rare form of epilepsy called Dravet Syndrome. Unlike traditional techniques, this novel drug directly increases serotonin levels in the human brain.

Professor Catherine Harmer, Professor of Cognitive Neuroscience at the University of Oxford, and OH BRC Theme Lead for Depression

Therapeutics said, "Despite nearly a century of research, our understanding of how serotonin influences human behavior has remained unclear and controversial.

"This provides us with some exciting new information about the role of serotonin in humans. It shows that serotonin, which has been implicated in depression and in the effects of antidepressants, has more of a role in processing negative things, rather than boosting positive responses.

"Serotonin is often referred to colloquially as the 'happy chemical' but perhaps it is time we thought of it as the 'not-so-bad chemical.'"

Professor Susannah Murphy, Associate Professor at the University of Oxford, said, "By directly manipulating levels of serotonin in the brain, this study helps us to understand some of the core functions this important brain chemical plays in humans.

"Our findings underscore the central role that serotonin plays in effortful cognitive processes, such as our ability to put the brakes on unwanted behaviors. This study helps to further understand why drugs that change [serotonin levels](#) are effective treatments for many [mental illnesses](#), including depression, anxiety and obsessive-compulsive disorder."

More information: Michael J. Colwell et al, Direct serotonin release in humans shapes aversive learning and inhibition, *Nature Communications* (2024). [DOI: 10.1038/s41467-024-50394-x](https://doi.org/10.1038/s41467-024-50394-x)

Provided by University of Oxford

Citation: Serotonin changes how people learn and respond to negative information (2024, August 9) retrieved 9 August 2024 from

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