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Serotonin suppresses food anticipatory activity and synchronizes the food-entrainable oscillator during time-restricted feeding.

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Abstract

The serotonergic and circadian systems are intertwined as serotonin modulates the response of the central brain suprachiasmatic nuclei (SCN) clock to light. Time-restricted feeding (RF) is characterized by increased food anticipatory activity (FAA) and controlled by the food-entrainable oscillator (FEO) rather than the SCN. Our objective was to test whether serotonin affects the FEO. Mice were treated with the selective serotonin reuptake inhibitor (SSRI) fluvoxamine (FLX) or the tryptophan hydroxylase inhibitor parachlorophenylalanine (PCPA) and locomotor activity under ad libitum feeding, RF and different lighting conditions was monitored. Under AL, FLX administration did not affect 24-h locomotor activity, while mice treated with PCPA exhibited increased activity. RF-FLX-treated mice showed less FAA 2h before food availability (ZT2-ZT4) compared to RF- or RF-PCPA-fed mice. Under DD, RF-PCPA-treated mice displayed increased activity, as was seen under LD conditions. Surprisingly, RF-PCPA-treated mice showed free running in the FAA component. These results emphasize the role of serotonin in SCN-mediated activity inhibition and FEO entrainment and activity.

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