Food can lift mood by affecting mood-regulating neurocircuits via a serotonergic mechanism.


Abstract

It is commonly assumed that food can affect mood. One prevalent notion is that food containing tryptophan increases serotonin levels in the brain and alters neural processing in mood-regulating neurocircuits. However, tryptophan competes with other long-neutral-amino-acids (LNAA) for transport across the blood-brain-barrier, a limitation that can be mitigated by increasing the tryptophan/LNAA ratio. We therefore tested in a double-blind, placebo-controlled crossover study (N=32) whether a drink with a favourable tryptophan/LNAA ratio improves mood and modulates specific brain processes as assessed by functional magnetic resonance imaging (fMRI). We show that one serving of this drink increases the tryptophan/LNAA ratio in blood plasma, lifts mood in healthy young women and alters task-specific and resting-state processing in brain regions implicated in mood regulation. Specifically, Test-drink consumption reduced neural responses of the dorsal caudate nucleus during reward anticipation, increased neural responses in the dorsal cingulate cortex during fear processing, and increased ventromedial prefrontal-lateral prefrontal connectivity under resting-state conditions. Our results suggest that increasing tryptophan/LNAA ratios can lift mood by affecting mood-regulating neurocircuits.

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KEYWORDS: Food; Long-neutral-amino-acids; Mood; Serotonin; Tryptophan; fMRI

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