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Neuroimage. 2014 Jan 1;84:825-32. doi: 10.1016/j.neuroimage.2013.09.041. Epub 2013 Sep 25.

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

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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.

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

PMID: 24076224 DOI: 10.1016/j.neuroimage.2013.09.041

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