

The bovine protein α -lactalbumin increases the plasma ratio of tryptophan to the other large neutral amino acids, and in vulnerable subjects raises brain serotonin activity, reduces cortisol concentration, and improves mood under stress¹⁻³

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ABSTRACT

Background: Increased brain serotonin may improve the ability to cope with stress, whereas a decline in serotonin activity is involved in depressive mood. The uptake of the serotonin precursor, tryptophan, into the brain is dependent on nutrients that influence the cerebral availability of tryptophan via a change in the ratio of plasma tryptophan to the sum of the other large neutral amino acids (Trp-LNAA ratio). Therefore, a diet-induced increase in tryptophan availability may increase brain serotonin synthesis and improve coping and mood, particularly in stress-vulnerable subjects.

Objective: We tested whether α -lactalbumin, a whey protein with a high tryptophan content, may increase the plasma Trp-LNAA ratio and reduce depressive mood and cortisol concentrations in stress-vulnerable subjects under acute stress.

Design: Twenty-nine highly stress-vulnerable subjects and 29 relatively stress-invulnerable subjects participated in a double-blind, placebo-controlled study. Subjects were exposed to experimental stress after the intake of a diet enriched with either α -lactalbumin or sodium-caseinate. Diet-induced changes in the plasma Trp-LNAA ratio and prolactin were measured. Changes in mood, pulse rate, skin conductance, and cortisol concentrations were assessed before and after the stressor.

Results: The plasma Trp-LNAA ratio was 48% higher after the α -lactalbumin diet than after the casein diet ($P = 0.0001$). In stress-vulnerable subjects this was accompanied by higher prolactin concentrations ($P = 0.001$), a decrease in cortisol ($P = 0.036$), and reduced depressive feelings ($P = 0.007$) under stress.

Conclusions: Consumption of a dietary protein enriched in tryptophan increased the plasma Trp-LNAA ratio and, in stress-vulnerable subjects, improved coping ability, probably through alterations in brain serotonin. *Am J Clin Nutr* 2000;71:1536-44.

KEY WORDS Tryptophan, α -lactalbumin, serotonin, prolactin, cortisol, stress, mood