Abstract

Vitamin C impacts anxiety-like behavior and stress-induced anorexia relative to social environment in SMP30/GNL knockout mice.

Koizumi M, Kondo Y, Isaka A, Ishigami A, Suzuki E.

Department of Nutrition and Food Science, Ohanomizu University, 2-1-1 Ohtsuka, Bunkyo, Tokyo 112-8610, Japan; Molecular Regulation of Aging, Tokyo Metropolitan Institute of Gerontology, 35-2 Sakaecho, Itabashi, Tokyo 173-0015, Japan; Department of Nutrition and Food Science, Ohanomizu University, 2-1-1 Ohtsuka, Bunkyo, Tokyo 112-8610, Japan; Molecular Regulation of Aging, Tokyo Metropolitan Institute of Gerontology, 35-2 Sakaecho, Itabashi, Tokyo 173-0015, Japan; Department of Nutrition and Food Science, Ohanomizu University, 2-1-1 Ohtsuka, Bunkyo, Tokyo 112-8610, Japan.

OBJECTIVE: The role of endogenous vitamin C (VC) in emotion and psychiatric measures has long been uncertain. We aimed to investigate how an individual’s VC status impacts his or her mental health. Our hypothesis is that body VC levels modulate anxiety, anorexia, and depressive phenotypes under the influence of psychosocial rearing environments and sex.

METHODS: The VC status of senescence marker protein-30/gluconolactonase knockout mice, which lack the ability to synthesize VC, were continuously shifted from adequate (VC+) to depleted (VC-) by providing a water with or without VC.

RESULTS: Despite weight loss in both sexes, suppressed feeding was specifically seen in males only during the VC- phase. Anxiety responses in the novelty-suppressed feeding paradigm were worse during the VC-, especially in females. Sensitivity to the forced swim test as determined by the initial latency was significantly shorter in the socially stable animals compared with socially unstable animals during the VC+ condition. The stress coping underlying depressive phenotypes was assessed by immobility duration in a series of forced swim tests. No significant differences were apparent between contrasting VC status. Homeostatic symptoms following stressful behavioral tests consisted of a great loss of appetite during the VC-. It should be noted that anorexia is extremely serious for the females.

CONCLUSION: We conclude that endogenous VC status is critical for determining vulnerability to anxiety and anorexia in a sex-specific manner.

PMID: 27932080