

Environmental enrichment and cafeteria diet synergistically modify the response to chronic variable stress in rats.

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Stress is known to lead to metabolic and behavioral changes. Evidence shows that exposure to environmental enrichment (EE) or to a highly palatable diet can reduce the response to chronic stress in rats. To further explore the relationships between EE, dietary intake and stress, male Sprague-Dawley rats were fed one of two diets for 5 weeks: high carbohydrate (HC) or “Cafeteria” (CAF) (offering a choice of highly palatable cafeteria foods). Also, they were housed in cages with or without EE. After the first two weeks, half of the animals from each group were stressed daily using a chronic variable stress (CVS) paradigm, while the other half were kept undisturbed until the end of the experiment. The effects of stress, EE and diet on animal adiposity, serum lipids, and stress hormones were analyzed. Results showed increases in liver weight and intra-abdominal fat associated with the CAF diet and an increase in bodyweight gain associated with both the CAF diet and EE. Stressed animals showed increased serum corticosterone (CORT) levels compared to non-stressed animals ($P < 0.001$). In addition, there was an interaction effect of diet and EE ($P = 0.02$) on serum CORT levels: the CVS-induced increase in CORT was attenuated in the presence of EE and the CAF diet. Our study thus provides evidence that the availability of a positive rearing environment combined with highly palatable food renders rats more resilient to the effects of CVS.

