

Metabolic Responses to a Westernized Diet Administered to Rats Selectively Bred for High and Low Amounts of Voluntary Exercise.

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Abstract

Introduction: Motivation for exercise may have a genetic basis, but it is unknown whether genes selected based on motivation to physical activity co-select with metabolic genes whose function to protect in the absence of voluntary exercise. Therefore, the purpose of my study was to determine if rats with varying levels of inherent motivation to voluntarily run in wheels, when given *no* access to voluntary running wheels, would retain any protective effects against a Westernized diet. **Methods:** A novel rat model was previously created in the Booth lab in which rats were artificially selected with the putative motivation to produce high or low amounts of voluntary running (termed HVR and LVR, respectively) each night for several generations. A wild type group was added as a nonselected control group. Every Wistar rat was given zero access to voluntary running in a wheel and fed one of two specific diets for eight continuous weeks. After seven weeks of dieting, a glucose tolerance test was performed. After the full eight weeks of dieting, blood and tissues were extracted immediately after rats were sacrificed.

Results: Without access to running wheels, the metabolic markers of HVR rats, along with the LVR rats, tended to be worse metabolically than that of the WT line. In general, the two selected lines (HVR and LVR) appeared to be closer to a prediabetic-like or pre-metabolic syndrome-like state than WT.

Conclusion: These results suggest that the process of selective breeding for high or low motivation for voluntary running likely co-selected genes that can be undesired or even deleterious on their ability to minimize the negative health consequences of a Western diet, at least when they were not allowed to voluntarily exercise in a wheel. The translation of these results to humans suggests that individuals with a high motivation/drive for voluntary physical activity see diminished or no health benefits in regards to their metabolic state if they do not actually exert this drive for daily exercise by partaking in voluntary physical activity.