Comparing Gene Expression in the Hippocampal Formation of Animals Subjected to Chronic Stress vs. Controls

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Chronic stress involves a response to emotional pressure experienced for a long period of time and is a source of depressive disorders. Studies have suggested that chronic stress impacts cognition. However, little research has been performed observing the underlying gene mechanisms behind this claim. In this study, it is hypothesized that chronic stress results in a differential regulation of genes with prominent roles in cognition. From hippocampal samples of repeated social defeat stressed mice and control mice, both mRNA levels and protein levels were analyzed. RNA was isolated, reverse transcribed, and a quantitative RT-PCR was conducted. For the proteins, after isolation, a BCA protein assay was conducted, and then multiple western blots were performed to observe their expressions. Afterwards, data were collected and analyzed. Student's t-tests were performed to determine the significance of any changes observed in the stressed mice. BDNF V, Synapsin 1, and Synapsin 2 mRNAs were found to be significantly downregulated in the stressed samples. The protein pCREB was found to be surprisingly upregulated in the stressed samples. Overall, this chronic stress does impact genes with roles in cognition, but only to a certain extent and in variation. Interestingly, the downregulation observed is also a characteristic of many brain diseases, suggesting an important link between chronic stress and neurodegenerative diseases.

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