

Global proteome profiling of the temporal cortex of female rats exposed to chronic stress and a western diet

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Introduction: Animal studies have confirmed that long-term intake of obesogenic diets and stress exposure impair cognition, especially with regard to aspects that are dependent on the hippocampus, including memory processes and reversal learning. The main aim of our study was to verify the hypothesis that 12-week exposure to stress modifies alterations in the brain proteome induced by western diet in the female rats.

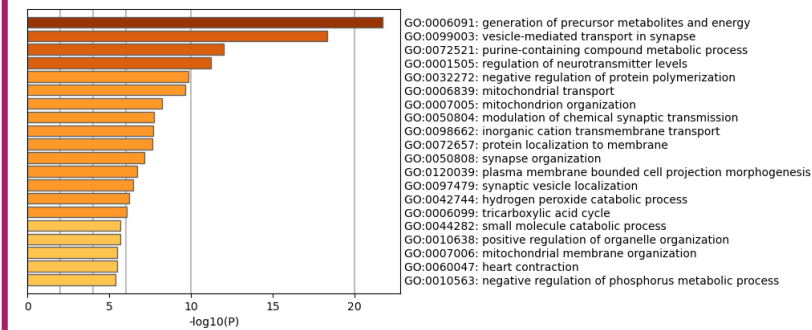
Methods: Female Long Evans rats with or without exposure to social stress received standard chow diet, or obesogenic rodent diet (a western diet with human snacks). The cerebrocortical samples from each rat were immediately frozen on dry ice and stored for liquid chromatography-tandem mass spectrometry (LC-MS/MS) analysis.

Results: Based on the discovery analysis, a total of 2,793 proteins were identified and quantified, of which 239 were changed significantly between the temporal cortices across the four animal groups. Statistical analysis showed that western diet consumption alone and in combination with stress exposure resulted in changes only in 5.4% and 3.8% proteins, respectively. Whereas 48% of proteins were affected statistically by chronic stress exposure and this exposition down-regulated 86.3% of them. The most overrepresented biological processes were related to generation of precursor metabolites and energy, synapse transport, and regulation of neurotransmitter levels.

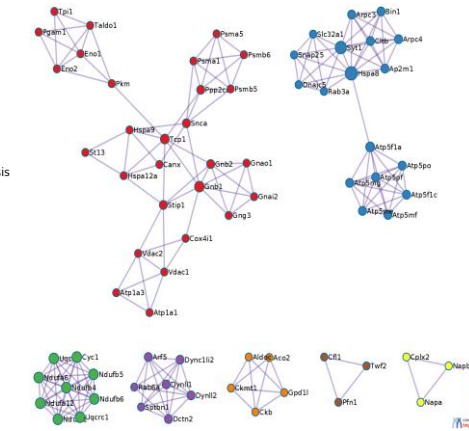
Conclusion: Observed changes may contribute to the understanding of functional and morphological brain alterations described in literature as well as behavioral disturbances induced by exposure to the western diet and stress.

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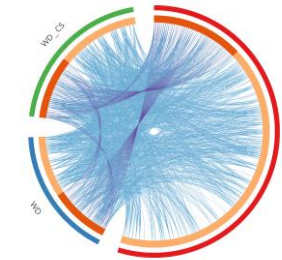
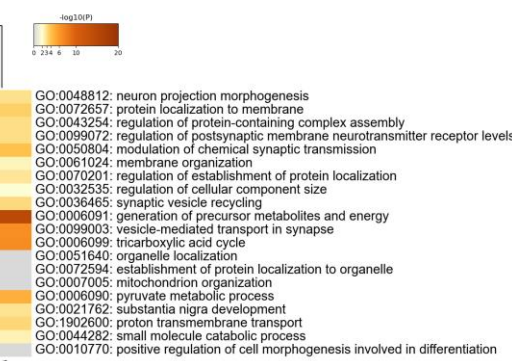
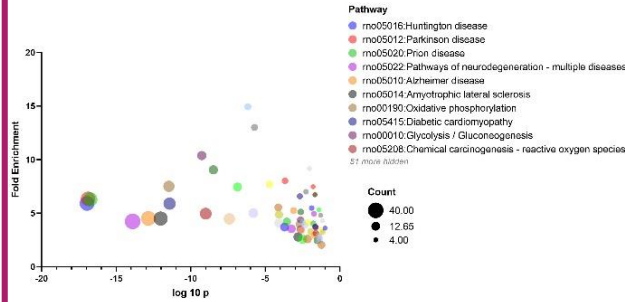
Significantly enriched biological processes



Protein-protein interaction (PPI) networks



Bubble chart shows KEGG analysis of differential genes



Enriched terms identified for proteins that were significantly different in the WD and CS/WD groups (both in comparison to CTR), filtered, and hierarchically clustered (Metascape)