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Differential gene expression changes in response to PTSD: a multi-cohort approach to understanding the biological impact of PTSD

The molecular impact of PTSD is not well understood, yet is thought to influence a number biological processes involved in the long term health of affected persons. The physiological consequences of PTSD include inflammation, immune function dysregulation, impaired wound healing, and abnormalities in the stress response. Our objective is to perform gene expression profiling of blood samples from individuals with and without PTSD to identify genes, pathways, and networks that may serve as biomarkers of PTSD that may provide targets for intervention.

In order to investigate the impact of PTSD on gene expression we leverage existing cohort studies and gene expression data, in order to rigorously identify and validate gene expression differences associated with PTSD and the subset of genes, pathways and networks that are perturbed. A comprehensive evaluation of publicly available gene expression data to date resulted in the identification of 4 PTSD datasets suitable for the proposed study..

Our methods employ cutting-edge approaches to gene expression analyses to evaluate perturbed genes, pathways, and networks. Leveraging data from 4 PTSD cohorts (n=734), and address the following specific aims:

1. Discover and validate differentially expressed genes associated with PTSD in blood samples. Hypothesis: Gene expression perturbations in blood samples from individuals with PTSD will be enriched for immune-related processes.

Preliminary results are based on running our pipelines on these datasets. As expected augmented genes include those that are a crucial component of the innate and adaptive immune response. In addition, endoplasmic reticulum, and genes associated with protein packaging are also significant, as they are important for creation, packaging and movement of proteins. These changes can be related to numerous upregulated proteins associated with the metabolic activity associated with immune cell production, neuronal activity, and inflammation.