Cortisol Administration Normalizes Aberrant Functional Connectivity in Women with Depression

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Place: 103 Benton Hall

Abstract
Previous resting-state functional connectivity (rsFC) research has identified aberrant connectivity in several large brain networks in depression, including the default mode (DMN), frontoparietal (FPN), and salience networks (SN). Connectivity of these networks is also related to depressive symptom severity and is affected by cortisol levels. To our knowledge, this is the first study to investigate the effects of acute cortisol administration on rsFC of DMN, FPN, and SN in individuals varying in depression history and severity. We collected resting-state fMRI scans for 74 women with and without a history of depressive disorder after administration of cortisol and placebo using a double-blind, crossover design. We conducted seed-based rsFC with seed regions from the DMN, FPN, and SN to examine the relationship between rsFC changes in these networks after cortisol with depression history group predicting changes in rsFC after cortisol vs. placebo. To investigate rsFC changes in DMN, FPN, and SN due to the administration of cortisol as a function of depression severity we assessed the relationship between Beck Depression Inventory-II scores and rsFC changes in the networks of interest after cortisol vs. placebo administration for the entire sample. We found a main effect of depression history group for connectivity between the left amygdala of the SN and left medial temporal gyrus of the DMN. We also identified main effects of scan for rsFC between the anterior insula of the SN and brain regions within the ventral attention network and DMN. Lastly, we found an interaction between depression symptoms and rsFC between the posterior cingulate cortex (PCC) of the DMN and the right cerebellum of the ventral attention network, with greater depression symptoms associated with increased rsFC of the PCC and cerebellum. These findings are the first to show that women with greater depression severity may be more likely to normalize aberrant connectivity of DMN regions after acute administration of cortisol. Our results could help inform clinical treatments for depression that naturally increase endogenous cortisol levels and efficiency of glucocorticoid receptors, such as long-term daily exercise. Overall, these finding contribute to the literature on the neurobiological effects of exogenous cortisol in depression.

Defense of Dissertation Committee
Carissa Philippi, Ph.D.
Sandra Langeslag, Ph.D.
Bettina Casad, Ph.D.
Katie Jacobs, Ph.D.