

Estradiol treatment in postmenopausal women increased functional connectivity in brain networks associated with cognition

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The decrease in circulating estrogens in women after menopause has direct effects on cognitive functioning. Estrogen treatment in postmenopausal women influences frontal lobe and hippocampal functioning and improves performance on working memory and episodic memory tasks. However, the brain mechanisms involved have yet to be elucidated. Thus far no study has examined the effects of estrogen treatment in postmenopausal women on functional connectivity of large scale brain networks involved in cognition in an effort to understand hormone influences on the functional organization of the brain. Twenty-four healthy, cognitively normal postmenopausal women were randomly assigned to either three months of oral 17-beta estradiol or matching placebo. At baseline and after three months of treatment women took part in fMRI scanning sessions to examine estrogen effects on functional connectivity. Results showed that the estrogen treated group had increased connectivity between hippocampal, posterior cingulate, inferior parietal, and insula regions compared to the placebo treated group. These results demonstrate the ability of estradiol treatment after menopause to modulate brain functional connectivity. The increase in connectivity may be one mechanism underlying how estrogen benefits cognition supported by these functional networks in postmenopausal women.