A 3-day estrogen treatment improves prefrontal cortex-dependent cognitive function in postmenopausal women.

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Abstract: Estrogen secretion in young women follows a cyclic pattern characterized by a pronounced surge in estrogen around ovulation. The way in which this estrogen peak affects cognitive functioning is unclear. Short-term estrogen treatment for a few days mimicking normal pre-menopausal estrogen dynamics substantially enhanced cognitive functions in ovariectomized animals. Here, we provide evidence that inducing a single estrogen peak in postmenopausal women improves their cognitive abilities. Healthy women (51-64 yrs, n=14) received either 100 microg estrogen transdermally for 3 days or placebo in a double-blind within-subject design. The treatment caused a temporary rise in serum estrogen levels roughly comparable to the mid-cyclic changes in estrogen in young women. At the end of the treatment, the women completed two types of tests involving primarily hippocampus-dependent functions of memory retention or prefrontal cortex-dependent functions. Results revealed a clear beneficial effect of estrogen on tasks mainly involving the prefrontal cortex: performance on a digit-ordering task (p<0.05) and on a task requiring short-term memory of event sequences in an unfamiliar story (p<0.01) were improved, and susceptibility to interference in the Stroop test (p<0.05) was diminished after estrogen. On the other hand, estrogen did not affect hippocampus-dependent retention of a story, with delayed recall tested after 30 min or 1 week, although immediate recall was improved by estrogen. We conclude that in postmenopausal women, a transient increase in plasma estrogen concentration acutely improves prefrontal cortex-dependent cognitive functions, whereas hippocampus-dependent memory retention is less affected. Our results encourage future studies to investigate whether repeated induction of short-lasting estrogen peaks could enhance cognitive efficacy of hormonal replacement therapy. PMID: 16831520