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**ESTROGEN'S EMBRACE: UNLOCKING NEUROPLASTICITY
IN THE FEMALE BRAIN**

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The neuroplastic topography of the female brain is greatly influenced by estrogen, a hormone that is essential for mental health and cognitive performance. This study looks at how estrogen encourages neuroplasticity, specifically in the prefrontal cortex and hippocampus, two areas crucial for memory formation and learning. By boosting long-term potentiation, which strengthens synapses based on activity patterns, estrogen improves synaptic plasticity and transmission.

This Estrogen influences synaptic transmission and increases dendritic spine density in specific brain regions, which improves learning capacities. It makes more synaptic connections available for learning, especially when the brain is developing quickly, like during adolescence. Additionally, estrogen stimulates the synthesis of brain-derived neurotrophic factor (BDNF), which is essential for adaptive learning and cognitive flexibility. In order to maintain the integrity and connectivity of neural circuits involved in memory and learning, BDNF is necessary for neuron growth, differentiation, and survival. It has a significant impact on neurogenesis, the process by which new neurons are formed. Additionally, by boosting BDNF production, estrogen supports neuroplasticity and aids in preserving a woman's robust and resilient cognitive capacities over the course of her life.

Estrogen affects neuroplasticity and cognitive function via controlling the stress response. Deficits in memory and learning can result from prolonged stress. By regulating the hypothalamic-pituitary-adrenal axis, estrogen lessens the effects of stress hormones and increases resistance to cognitive impairments.

The higher risk of neurological diseases and cognitive deterioration that accompanies a drop in estrogen levels during menopause highlights the protective function of estrogen even more. Cognitive decline and an increased risk of neurodegenerative illnesses like Alzheimer's disease are frequently linked to the menopausal transition. According to this correlation, estrogen plays a critical role in preserving cognitive function, and a deeper knowledge of its mechanisms may result in more effective therapies. There may be benefits to improving neuroplasticity and general cognitive performance, according to recent research on estrogen replacement therapy for postmenopausal women. Through the use of estrogen's protective and plasticity-enhancing qualities, such treatments may not only help with menopausal symptoms but also promote cognitive health.

These data emphasize how important it is to comprehend how estrogen affects neuroplasticity and how it affects cognitive health in women of all ages. New treatment approaches can be developed to enhance cognitive resilience and treat neurodegenerative diseases and mood disorders by clarifying the ways in which estrogen affects brain structure and function. This new information paves the way for novel strategies to improve brain function, which will ultimately improve women's general wellbeing and cognitive longevity.