

# The Impacts of Menopause on Cognitive Function

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## Problem Statement

An estimated 1.3 million women will enter menopause each year in the US.<sup>1</sup> While menopause is commonly viewed as affecting only reproductive health, studies have shown that the reduction of estrogen significantly impacts cognitive functioning as well.<sup>2,3</sup> A decline in cognitive functioning may begin as forgetfulness, then progress to cognitive impairment and eventually lead to dementia. Alzheimer's Disease (AD) is the most common cause of dementia and kills 1 in 3 older adults annually.<sup>4</sup> Women make up two-thirds of AD and dementia diagnoses, yet there is no information from either the Centers for Disease Control<sup>5</sup> or the Alzheimer's Association<sup>4</sup> that is specific to women and estrogen. This shows that more research needs to be done to examine the connection between estrogen and cognition to determine potential prevention and treatment for dementia in aging women.

## Status of Literature

Every woman goes through menopause, either through the natural aging process or the surgical removal of the ovaries. The most common symptoms of menopause are hot flashes, changes in mood and appetite, sleeping difficulties, lower libido, decreased concentration, and issues with cognition and memory.<sup>6</sup> Some of these symptoms are cloaked in stigma, while hot flashes and reduced sex drive are widely, and stereotypically, discussed in the popular media, drawing attention away from the important neurological symptoms.<sup>7</sup> Both brain and ovaries are part of the neuroendocrine system, and estrogen produced by the ovaries is critical for providing energy to the brain.<sup>8</sup> Conde et al.<sup>9</sup> found

that a decline in cognitive performance was a prevailing complaint among menopausal women.

Menopause also has a documented impact on women's brain functioning, especially in relation to memory. The majority of women report memory decline, especially short-term memory loss, to be a major symptom of menopause.<sup>10</sup> Studies have also shown menopause to cause a reduction in processing speed and verbal memory.<sup>10</sup> Additionally, in a neuroimaging comparison to age-similar men, menopausal women showed changes in brain structure such as volume reduction in certain areas and hypometabolism of glucose.<sup>11</sup>

Depression and anxiety are also common symptoms due to the decrease in estrogen. Estrogen loss is correlated with diminished synapse formation in the basal forebrain and hippocampus and reduced cholinergic and serotonergic brain functions, which impacts cognition and mood.<sup>3</sup> Depression and anxiety can also affect cognition, as Devere explains,<sup>12</sup> indicating there may be more to consider when diagnosing and treating cognitive impairment. Because menopause has so many associated symptoms, it can be difficult to discern whether a patient's mental health symptoms are a result of menopause or have a different etiology.<sup>10</sup> It is crucial that healthcare providers understand the scope of menopausal symptoms and how they might interact with mental health.

Unfortunately, mental health symptoms, issues with working memory and verbal memory, and slower cognition are not the only obstacles facing menopausal women. The impact of reduced estrogen on the brain can put women at a higher risk of developing AD.<sup>6</sup> Menopausal women display similar neurological

changes as those with AD, including reduced gray matter in the parietal and temporal regions and brain underactivity as indicated by glucose tracers.<sup>6</sup>

## Call to Action

Studies have shown that estrogen influences cognitive function across several regions of the brain, namely those involved with information retrieval and memory, and evidence proves that menopause and AD are linked.<sup>12</sup> This is an under researched topic, and one that is critical to the well-being of women. While some literature about cognitive decline in menopause

contains controversy over the treatment of dementia, it is still a valid research area<sup>2</sup> that further highlights the importance of recognizing the effects of decreased estrogen levels on cognitive decline. It is important for neurologists to take menopause as well as perimenopause into consideration when evaluating memory decline among women. Lastly, because there is the potential for contradiction in study results due to studying women with a variety of genetic factors for dementia, further research needs to take a more individualized approach to examine the effects of hormone replacement therapy among postmenopausal women. This is an issue that, if addressed, can have a life-changing impact on women's well-being and longevity.

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