The Effect of Estradiol on Delayed Memory Performance in Women

Alzheimer's Disease (AD) is the most common form of dementia, accounting for about 60% of all dementia cases. It occurs in 1 in every 9 people over the age of 65 and causes severe memory, thinking, and behavioral problems. Currently, more than 6 million Americans live with Alzheimer's Disease, with almost two-thirds of those Americans being women. It is still unknown as to why women are more vulnerable to AD but it remains the overall fifth leading cause of death in women, while being the eighth leading cause of death in men.

A major life event during midlife for women that has no parallel in men and may be highly significant for AD risk is menopause, when production of estradiol ceases. Previous studies have found conflicting results about whether estradiol improves cognitive ability or harms brain function. This study examined the relationship between estradiol levels in women ages 36-100 (split into groups based on menopausal status) and delayed memory performance as measured by the Montreal Cognitive Test (MoCA), Picture Sequence Memory Test (PSM), and the Rey Auditory Verbal Learning Test (RAVLT) from the Human Connectome Project-Aging (HCP-A) Dataset. Multiple studies have found that in years prior to official diagnosis of AD, delayed memory performance significantly worsens and this study aimed to confirm a relationship between estradiol and the ultimate onset of AD.

A direct correlation between estradiol levels and cognitive test scores yielded no significant results, confirming previous studies that couldn't find significant results as well and/or found conflicting results. More importantly, the lack of a significant correlation showed that the relationship between estradiol and cognition is much more complex and other outside factors, such as progesterone, must be taken into consideration in order to obtain a deeper understanding of the hormonal changes during menopause that may lead to cognitive impairment.

Mentor: Dr. Carolyn Fredericks, Yale University