Cognitive Effects of Hormones Across the Female Life Span

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As Dr. Neill Epperson said “Age does not make you forgetful; having way too many STUPID things to REMEMBER makes you forgetful”. The science of forgetfulness to a greater extent lies in the hands of chemical messengers so called “HORMONES” in our body. The seminar by Dr. Epperson detailed how these hormones shape brain function at one time or another in every woman’s life. Dr. Neill Epperson, Director of the Penn Center for Women’s Behavioral Wellness, is an internationally renowned clinician for her research in women's mental health, with respect to the pathophysiology and treatment of premenstrual dysphoric disorder and perinatal depression.

Different factors at various stages of our lives effect cognitive functions. The process of aging is one aspect that leads to poor cognition but other factors such as chronic stress, low education, lack of exercise, and obesity/metabolic syndrome also contribute extensively to the decline of memory. Women of childbearing age also encounter problems with cognition due to distress, sleep deprivation, menstrual cycle hormonal changes, pregnancy and later on menopause. Cognition falls under the umbrella of information processing systems which span functions such as attention, pattern recognition, memory, learning, language processing, problem solving, abstract reasoning, and higher order intellectual functions and psychomotor skills. Not every part of the cognitive domain is affected by menopause but Dr. Epperson described in a very eloquent way that non-declarative memory such as how to brush one’s teeth or how to drive a car, remains intact. Gender isn’t supposed to matter in job performance but neuroscientists such as Dr. Epperson are discovering that hormone alterations during menopause deeply affect work–related qualities such as executive functions, organizing and attention-focusing in females. She emphasizes that improving brain health is a lifelong process, so we should “TEACH” teenage girls to adopt a healthy lifestyle now to combat hormonal disorders later in life.
The most important of all the female hormones that dramatically affects cognitive process, mood, and sleep is Estrogen. Estrogen is so important for our brain’s proper function as it protects the neurons from oxidative stress and increases the synthesis of neurotrophic factors which act as fertilizers in response to some injury or reduced blood flow. Different areas (cortex and hippocampus) of the central nervous system are involved in various aspects of cognition and changes in estrogen levels that occur during premenopause, transitional menopause, and postmenopause do not affect all areas uniformly. Dr. Epperson’s research team and various other studies have reported improved performance on tests of memory and cognitive function, improved mood, increased REM sleep and reduced time awake for estrogen therapy (ET)/hormonal therapy (HT) users compared with nonusers in observational studies of elderly postmenopausal women. She suggested that there may be a limited window of time, possibly early in the postmenopause period, during which estrogen therapy is most likely to affect cognitive decline than if initiated after several years. One side of the ET/HT coin suggests that estrogen may be beneficial by improving working memory but the other side of the coin as appears from the Women’s Health Initiative (WHI) and Heart and Estrogen/progestin Replacement Study (HERS) cautions against the use of ET/HT since they found an associated risk for the development of Alzheimer’s disease (AD). Therefore the success of ET/HT also depends upon the APOE4 genotype, a gene that poses as a risk factor for the development of AD of the individual.

Since there are a variety of brain functions controlled by estrogen, Dr. Epperson suggests different ways of intervening in women’s health such as hormone therapy, psychostimulants, non-psychostimulants and exercise. Dr. Epperson recommends exercising throughout one’s life as it improves women’s health by improving brain functioning.