



# The importance of estradiol in female cognitive function via neuroplasticity in the neuroendocrine system

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## Abstract

As of 2014, The United States National Institutes of Health (NIH) initiated a requirement that all NIH grant recipients to use both male and female animals in their research. Historically, prior to 2014, only male animals were used in NIH research. Women's digital health market includes software apps, websites, databases, devices, sensors, and coaching services to support women of reproductive and post-reproductive ages. The global women's health digital technology market will grow by 22% over the next five years. In 2024, global women's health technology is expected to hit \$297 million reaching up to 1.46 billion women by 2028. The Global Neurology market is expected to cost \$39.4 billion in 2024. The global cost associated with neurological diseases is expected to be over \$ 6 trillion in 2030.

**Keywords:** cognitive function, estradiol, neurology, neuroendocrine, neuroplasticity

## Introduction

Although a solid foundation of research on the relationship between estrogen and serotonin exist, guidelines for clinical practice on neuroendocrinology are significantly lacking. The understanding of the neurology/psychology, reproductive/endocrinology, immunology/gastroenterology systems bidirectional communications, the Psychiatric- Neurologic-Endocrine-Immunity Scientific field of study (PNEI) is critical, essential, and necessary for developing clinical practice guidelines for woman's health as a Health and Human Rights Issue [1]. In 2022, The World Health Organization (WHO) set forth menstrual health to be recognized for 5 acknowledgments:

- Recognized as a Health and Human Rights issue, not a hygiene issue.
- Framed as a female lifetime health issue involving physical, psychological, and social developments from onset of secondary sex characteristics, puberty, reproduction, menopause, and post- menopause.
- Access to education, menstrual products, clean water, sanitation systems, healthcare, and competent healthcare providers throughout the female lifespan [2,3].

- Global humanitarianism that female menstrual health is an essential element of human existence to be validated in law and constitutional rights in education, employment, armed forces, and healthcare.
- WHO Council has placed menstrual health on the agendas of global health, education, human rights, and gender equality/equity [4].

## Discussion

Chemistry and physiology of the female; specifically, the hypothalamic-hypophyseal portal circulation system, splenic immunity and circulatory pathways, inflammatory neural and humoral pathways, reproductive organs vasculogenic and angiogenesis, neurotransmitters, and neuroplasticity for cognitive processes as well as genetics must be understood in symphony for a complete understanding of woman's health and humanitarian rights. This specific field of study is called the Psycho-Neuro-Endocrine-Immunology (PNEI) scientific field of women's health [5]. In 2020, the life expectancy at birth for females is 80 years old [6]. In my opinion, due to the importance of cognition, neurohormones, and neurotransmitters; further research in female development according to these age groupings would be beneficial: Birth- 2 years, 3 years-5 years, 6 years-9 years, 10 years -12 years, 13years

-19 years., 20 years-25 years, 26 years-35 Years, 36 years-45 years, 46 years-55 years, 56 years  
-65 years, 66 years-75 years, and 76+ years.

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