

# Sex hormones/Introduction

Sex hormones (estrogen and progesterone in women and testosterone in men) play an important role in the development and maintenance of sex differences. Sex hormones can pass through the cell membrane and bind to special hormone receptors. <sup>[1]</sup>Kindler-Röhrborn A, Pfeleiderer B. Gendermedizin - Modewort oder Notwendigkeit?: - Die Rolle des Geschlechts in der Medizin. XX 2012; 1(03):146-52.</ref>

## Estrogen

In addition to functions such as the promotion of bone metabolism, the development of the secondary female sex organs, the stimulation of libido and the initiation of follicular maturation, the female sex hormone estrogen also has a decisive influence on brain processes. Estrogens can influence the release of neurotransmitters such as serotonin thereby affecting pain perception and depressive symptoms. <sup>[1]</sup></ref> The menstrual cycle can have a strong modulating effect on some brain functions and can affect pain perception.

## Testosterone

Testosterone level differs considerably in concentration in men and women and mechanism of action varies between the sexes as well. In addition to the main functions such as growth, muscle mass development and sperm production, testosterone also has a crucial impact on the brain. Testosterone is produced not only in the testicles, but (like estrogen) also in neurons and astrocytes of the brain (especially at sites with high concentrations of testosterone receptors). <sup>[2]</sup>

The significance of testosterone becomes particularly clear when a deficiency is present. The relationship between testosterone and depression is also well documented. Results suggest that certain subgroups of depressive men suffer from low testosterone levels and can thus benefit from testosterone replacement. <sup>[1]</sup></ref>

## Literature

[Click here to expand literature references.](#)

1. **Cite error: Invalid <ref> tag; no text was provided for refs named "Kindler-Röhrborn"**
2. Iivonen S, Heikkinen T, Puoliväli J, Helisalmi S, Hiltunen M, Soininen H et al. Effects of estradiol on spatial learning, hippocampal cytochrome P450 19, and estrogen alpha and beta

mRNA levels in ovariectomized female mice. Neuroscience 2006; 137(4):1143-52.

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