

Male hormone Testosterone:

Testosterone Is an Anabolic Steroid Hormone Secreted by the Leydig Cells of the Testes. The hormone is formed from cholesterol in amounts ranging from 2 to 10 mg/day. In the blood, testosterone is carried in association with albumin or is tightly bound to sex hormone-binding globulin. The hormone is removed from the blood within 30 to 60 minutes of secretion by fixation to target tissue cells or degradation to inactive compounds. It is metabolized to dihydrotestosterone (the biologically active androgen) in target tissues and to estrogen in adipose tissue.

Testosterone has effects on reproductive and nonreproductive organs. The hormone is required for stimulation of prenatal differentiation and pubertal development of the testes, penis, epididymis, seminal vesicles, and prostate. Testosterone is required in adult men for maintenance and normal function of the primary sex organs. Testosterone also has effects on bone, stimulating growth and proliferation of bone cells, resulting in increased density of the bones. It also has effects on hair distribution and causes the skin to thicken. Testosterone affects the liver, causing synthesis of clotting factors and hepatic lipases. Under the influence of testosterone, blood high density lipoprotein levels decrease, and low density lipoprotein levels increase. Hematocrit and hemoglobin concentrations are elevated because of the effect of testosterone to stimulate production of erythropoietin. The hormone has a generalized effect in many tissues to enhance the rate of protein synthesis.

Being a steroid hormone, testosterone readily enters the cytoplasm of target tissue cells by diffusion through the cell membrane. The enzyme 5 α -ketoreductase converts it to dihydrotestosterone, which then binds with a cytoplasmic receptor protein. This combination migrates to the nucleus, where it binds with a nuclear protein that induces DNA-RNA transcription.

Gonadotropin-Releasing Hormone Increases Release of LH and FSH from the Anterior Pituitary Gland. The polypeptide hormone, which is also referred to as gonadotropin-releasing hormone (GnRH), is secreted from the hypothalamus into the hypothalamic-hypophyseal portal system. Its formation is inhibited by testosterone and estrogen (Fig. 80–1).

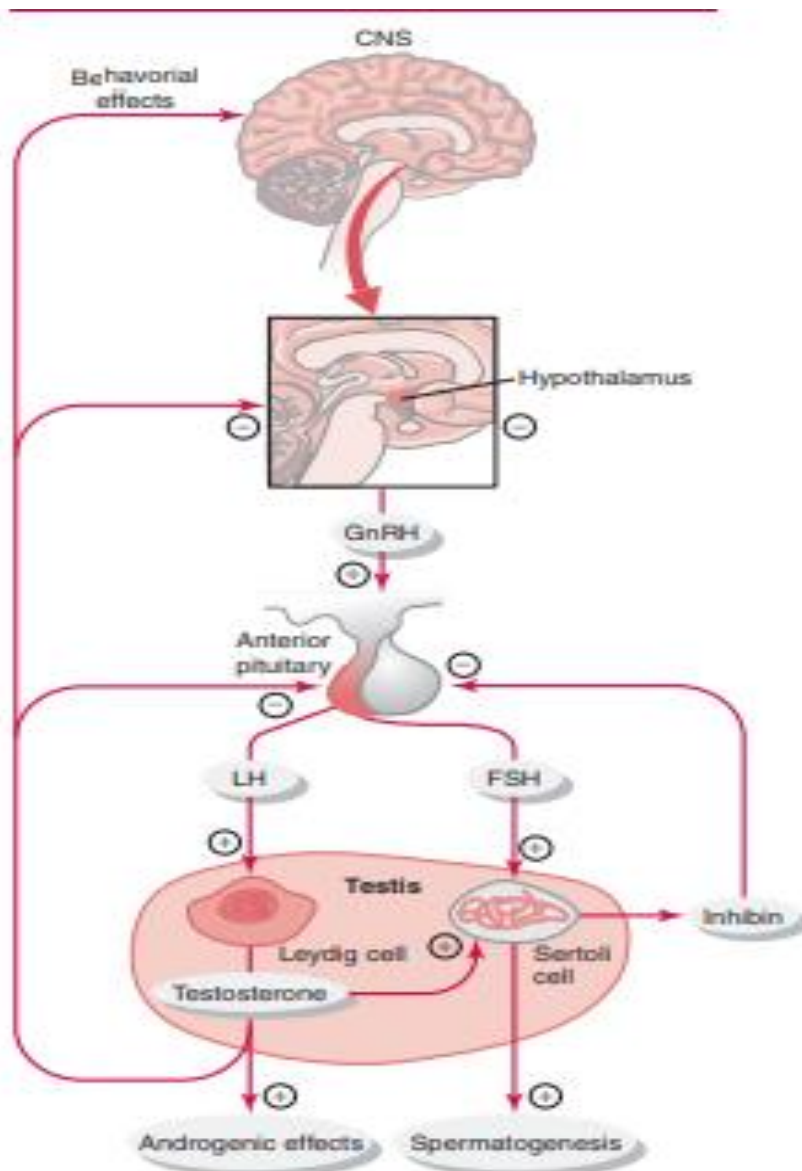


Figure 80–1. Feedback regulation of the hypothalamic-pituitary-testicular axis in males. Stimulatory effects are shown by ⊕ and negative feedback's inhibitory effects are shown by ⊖. FSH, follicle-stimulating hormone; GnRH, gonadotropin-releasing hormone; LH, luteinizing hormone.

LH Stimulates Testosterone Formation by the Leydig Cells, and FSH Stimulates Spermatogenesis and Spermiogenesis. They are secreted from the basophilic cells of the anterior pituitary. Their release is stimulated by GnRH.

Inhibin Is Formed by Sertoli Cells and Inhibits FSH Secretion. Inhibin formation increases as the rate of sperm cell production increases.