

**Drugs affecting testosterone**

Drugs affecting testosterone are any medication/agent that influences circulating testosterone levels and includes antihypertensives, and agents such as statins (ie, atorvastatin and simvastatin) and spironolactone, which decrease testosterone levels, whereas the ovulation inducer clomiphene increases testosterone levels.

**Erectile dysfunction**

Erectile dysfunction is a form of sexual dysfunction that involves an inability of the penis to maintain an erection during sexual activity. Erectile dysfunction is commonly treated with phosphodiesterase type 5 inhibitors such as sildenafil (Viagra), which prevent the breakdown of cyclic guanosine monophosphate and relaxes smooth muscle cells in the blood vessels supplying the corpus cavernosum of the penis.

**Follicle-stimulating hormone**

Follicle-stimulating hormone (FSH) is a heterodimeric glycoprotein consisting of  $\alpha$  and  $\beta$  subunits, and has a molecular weight of 28-29 kDa. FSH is synthesized and released by gonadotrophs in the anterior pituitary in response to stimulation by gonadotropin-releasing hormone, itself released from hypothalamic neurons into the capillary networks of the hypothalamic median eminence and lower infundibular trunk. In males, FSH stimulates Sertoli cells in the testis, which are critical to germ-cell development. In females, it acts on the ovaries to stimulate follicle development and is the main hormone controlling estrogen secretion.

**Hormones**

Hormones are chemical substances classically released from ductless cells into the circulation (can also be released into the interstitial fluid), and elicit effects at target cells. These effects may occur at distant target cells, nearby cells (paracrine), or the same cell (autocrine). Hormones regulate and coordinate biological functions via cell-to-cell communication and thus contribute to the maintenance of homeostasis.

**Luteinizing hormone**

Luteinizing hormone (LH) is a heterodimeric glycoprotein consisting of  $\alpha$  and  $\beta$  subunits, and has a molecular weight of 28-29 kDa. LH is synthesized and released by gonadotrophs in the anterior pituitary in response to stimulation by gonadotropin releasing hormone, itself released from hypothalamic neurons into the capillary networks of the hypothalamic median

eminence and lower infundibular trunk. In males, LH stimulates Leydig cells in the testis to produce testosterone. In females, LH causes ovulation, the formation of the corpus luteum, and stimulation of the ovaries to produce estrogen and progesterone.

**Pituitary gland**

The pituitary gland is a pea-sized endocrine gland consisting of three lobes (anterior, intermediate, and posterior) that protrudes from the bottom of the hypothalamus of the brain, and synthesizes and secretes a number of hormones that control/regulate growth (human growth hormone), blood pressure (vasopressin), sexual reproduction (FSH and LH), and pregnancy (oxytocin).

**Prostate-specific antigen**

Prostate-specific antigen (PSA) is a member of the kallikrein (KLK)-related peptidase family, and is also known as KLK3. PSA is a serine protease synthesized in prostate cells as 261 amino acid preproprotein, which is subsequently processed to a 244 amino acid pro-PSA. Pro-PSA is processed via cleavage of a seven amino acid peptide to yield mature/active PSA, which circulates as an 80-90 kDa complex with  $\alpha$ -1-antichymotrypsin. PSA is widely used as a tumour marker, as cancerous prostate tissue releases up to 10-fold greater amounts when compared with normal and benign hyperplastic prostate tissue, despite similar levels of overall expression.

**Testosterone**

Testosterone is an anabolic steroid hormone (derived from cholesterol). In males, testosterone is required for the development of secondary sexual characteristics and spermatogenesis. In the bloodstream, the majority of testosterone is tightly bound to sex hormone-binding globulin (SHBG), weakly bound to albumin (and other proteins), or freely circulating. Only a minor fraction of testosterone in the circulation is free/nonprotein bound. Testosterone that is not bound to SHBG (ie, albumin bound and free testosterone) is considered to be bioavailable. Several algorithms have been developed to calculate free testosterone concentration. If the circulating concentration of SHBG (nmol/L) and total testosterone (nmol/L) is measured, an estimate of circulating free testosterone concentration (nmol/L) can be calculated as follows:

$$[\text{Free testosterone}] = \frac{[\text{Total Testosterone}]}{(6.11 - 2.38 \log_{10} [\text{SHBG}])}$$