

## INDIVIDUAL HORMONAL AGENTS

Selected drugs are described below. Indications for use, routes, and dosage ranges are listed in Drugs at a Glance: Hypothalamic and Pituitary Agents.

### Hypothalamic Hormones

**Gonadorelin** (Factrel), **goserelin** (Zoladex), **histrelin** (Supprelin), **leuprolide** (Lupron), **nafarelin** (Synarel), and **triptorelin** (Trelstar) are equivalent to gonadotropin-releasing hormone. After initial stimulation of LH and FSH secretion, chronic administration of therapeutic doses inhibits gonadotropin secretion. This action results in decreased production of testosterone and estrogen, which is reversible when drug administration is stopped. In males, testosterone is reduced to castrate levels. In premenopausal females, estrogens are reduced to postmenopausal levels. These effects occur within 2 to 4 weeks after drug therapy is begun. In children with central precocious puberty (CPP), gonadotropins (testosterone in males, estrogen in females) are reduced to prepubertal levels.

The drugs cannot be given orally because they would be destroyed by enzymes in the GI tract. Most are given by injection and are available in depot preparations that can be given once monthly or less often. Adverse effects are basically those of testosterone or estrogen deficiency. When given for prostate cancer, the drugs may cause increased bone pain and increased difficulty in urinating during the first few weeks of treatment. The drugs may also cause or aggravate depression.

**Octreotide** (Sandostatin) has pharmacologic actions similar to those of somatostatin. Indications for use include acromegaly, in which it reduces blood levels of growth hormone and insulin-like growth factor-1; carcinoid tumors, in which it inhibits diarrhea and flushing; and in vasoactive intestinal peptide tumors, in which it relieves diarrhea (by decreasing GI secretions and motility). It is also used to treat diarrhea in acquired immunodeficiency syndrome and other conditions. The drug is most often given subcutaneously (SC) and may be self-administered. The long-acting formulation (Sandostatin LAR Depot) must be given intramuscularly (IM) in a gluteal muscle of the hip. Dosage should be reduced for older adults.

### Anterior Pituitary Hormones

**Corticotropin** (ACTH, Acthar), which is obtained from animal pituitary glands, is mainly of historical interest. For therapeutic purposes, it has been replaced by adrenal corticosteroids. It may be used occasionally as a diagnostic test to differentiate primary adrenal insufficiency (Addison's disease, which is associated with atrophy of the adrenal gland) from secondary adrenal insufficiency caused by inadequate pituitary secretion of corticotropin. However, **cosyntropin** (Cortrosyn), a synthetic

formulation, is more commonly used to test for suspected adrenal insufficiency.

**Growth hormone** is synthesized from bacteria by recombinant DNA technology. Somatropin (Humatrope) and somatrem (Protropin) are therapeutically equivalent to endogenous growth hormone produced by the pituitary gland. The main clinical use of the drugs is for children whose growth is impaired by a deficiency of endogenous hormone. The drugs are ineffective when impaired growth results from other causes or after puberty, when epiphyses of the long bones have closed. They are also used to treat short stature in children that is associated with chronic renal failure or Turner syndrome (a genetic disorder that occurs in girls). In adults, the drugs may be used to treat deficiency states (eg, those caused by disease, surgery, or radiation of the pituitary gland) or the tissue wasting associated with acquired immunodeficiency syndrome. In general, dosage should be individualized according to response. Excessive administration can cause excessive growth (gigantism).

**Human chorionic gonadotropin** (HCG; Chorex, others) produces physiologic effects similar to those of the naturally occurring LH. In males, it is used to evaluate the ability of Leydig's cells to produce testosterone, to treat hypogonadism due to pituitary deficiency, and to treat cryptorchidism (undescended testicle) in preadolescent boys. In women, HCG is used in combination with menotropins to induce ovulation in the treatment of infertility. Excessive doses or prolonged administration can lead to sexual precocity, edema, and breast enlargement caused by oversecretion of testosterone and estrogen.

**Menotropins** (Pergonal), a gonadotropin preparation obtained from the urine of postmenopausal women, contains both FSH and LH. It is usually combined with HCG to induce ovulation in the treatment of infertility caused by lack of pituitary gonadotropins.

**Thyrotropin** (Thyropar) is used as a diagnostic agent to distinguish between primary hypothyroidism (caused by a thyroid disorder) and secondary hypothyroidism (caused by pituitary malfunction). If thyroid hormones in serum are elevated after the administration of thyrotropin, then the hypothyroidism is secondary to inadequate pituitary function. Thyrotropin must be used cautiously in clients with coronary artery disease, congestive heart failure, or adrenocortical insufficiency. **Thyrotropin alfa** (Thyrogen) is a synthetic formulation of TSH used to treat thyroid cancer.

### Posterior Pituitary Hormones

**Desmopressin** (DDAVP, Stimate), **lypressin**, and **vasopressin** (Pitressin) are synthetic equivalents of antidiuretic hormone (ADH). A major clinical use is the treatment of neurogenic diabetes insipidus, a disorder characterized by a deficiency of ADH and the excretion of large amounts of dilute urine. Diabetes insipidus may be idiopathic, hereditary, or acquired as a result of trauma, surgery, tumor, infection, or other conditions that impair the function of the hypothalamus or posterior pituitary.