Pituitary gland function

The pituitary gland functions prominently in the control of most endocrine systems in the body. Diverse processes such as metabolism, growth, reproduction, and water balance are tightly regulated by the pituitary in conjunction with the hypothalamus and various downstream endocrine organs. Benign tumors of the pituitary gland are the primary cause of pituitary pathology and can result in the inappropriate secretion of pituitary hormones or loss of pituitary function. First-line management of clinically significant tumors often involves surgical resection. Understanding of normal pituitary physiology and basic testing strategies to assess for pituitary dysfunction should be familiar to any skull base surgeon [1)].

Thyroid Stimulating Hormone (TSH)

Follicle-Stimulating Hormone (FSH)

Luteinizing Hormone (LH)

Prolactin (PRL)

Growth Hormone (GH)

ACTH

Alpha Melanocyte-Stimulating Hormone (α-MSH)

Vasopressin

Oxytocin

Anterior

The anterior pituitary synthesizes and secretes hormones. All releasing hormones (-RH) referred to, can also be referred to as releasing factors (-RF).

Somatotropes:

Human growth hormone (HGH), also referred to as 'growth hormone' (GH), and also as somatotropin, is released under the influence of hypothalamic growth hormone-releasing hormone (GHRH), and is inhibited by hypothalamic somatostatin. Corticotropes:

Cleaved from the precursor proopiomelanocortin protein, and include adrenocorticotropic hormone (ACTH), and beta-endorphin, and melanocyte-stimulating hormone are released under the influence of hypothalamic corticotropin-releasing hormone (CRH).[6][7]:1210 Thyrotropes:

Thyroid-stimulating hormone (TSH), is released under the influence of hypothalamic thyrotropin-releasing hormone (TRH) and is inhibited by somatostatin. Gonadotropes:

Luteinizing hormone (LH). Follicle-stimulating hormone (FSH), both released under influence of Gonadotropin-releasing Hormone (GnRH) Lactotropes:

Prolactin (PRL), whose release is inconsistently stimulated by hypothalamic TRH, oxytocin, vasopressin, vasoactive intestinal peptide, angiotensin II, neuropeptide Y, galanin, substance P, bombesin-like peptides (gastrin-releasing peptide, neuromedin B and C), and neurotensin, and inhibited by hypothalamic dopamine. These hormones are released from the anterior pituitary under the influence of the hypothalamus. Hypothalamic hormones are secreted to the anterior lobe by way of a special capillary system, called the hypothalamic-hypophysial portal system.

There is also a non-endocrine cell population called folliculostellate cells.

Intermediate

The intermediate lobe synthesizes and secretes the following important endocrine hormone:

Melanocyte–stimulating hormone (MSH). This is also produced in the anterior lobe. When produced in the intermediate lobe, MSHs are sometimes called “intermedins”.

Posterior

The posterior pituitary stores and secretes (but does not synthesize) the following important endocrine hormones:

Magnocellular neurons:

Antidiuretic hormone (ADH, also known as vasopressin and arginine vasopressin AVP), the majority of which is released from the supraoptic nucleus in the hypothalamus. Oxytocin, most of which is released from the paraventricular nucleus in the hypothalamus. Oxytocin is one of the few hormones to create a positive feedback loop. For example, uterine contractions stimulate the release of oxytocin from the posterior pituitary, which, in turn, increases uterine contractions. This positive feedback loop continues throughout labour. Hormones Hormones secreted from the pituitary gland help control the following body processes:

Growth (GH) Blood pressure Some aspects of pregnancy and childbirth including stimulation of uterine contractions Breast milk production Sex organ functions in both sexes Thyroid gland function Metabolic conversion of food into energy Water and osmolarity regulation in the body Water balance via the control of reabsorption of water by the kidneys Temperature regulation Pain relief

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The ability to restore pituitary gland function following endoscopic surgery remains limited, whilst new deficits still occur. It is essential that patients are counseled accordingly as hormonal replacement therapy can have a significant impact on the quality of life. Larger longer-term collaborative studies of endocrine outcome in endoscopic pituitary surgery are needed [2].

1)
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2)
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