

GH stimulates growth of body mass and elongation of bones

GH secretion is regulated by GHRH and somatostatin (GHIH)

Growth Hormone

Growth hormone (GH) stimulates growth of the body mass and elongation of the bones. Although GH is produced in fetuses, it plays no role in fetal development. Later, GH is essential for the growth that takes place until skeletal development is complete (p. 300). GH is a protein hormone composed of 191 amino acids. GH-producing cells constitute the most abundant cell type in the anterior pituitary. GH has considerable structural similarity with prolactin (p. 265) and chorionic somatomammotropin (CS, p. 841).

Regulation of secretion of growth hormone

Secretion of GH is episodic, with several secretory peaks during a 24-h period. As noted, secretion of GH is regulated by two hypothalamic neurohormones (Fig. 6.10), a stimulatory hormone (GHRH) and an inhibitory hormone (somatostatin, GHIH). The dual control of GH-producing cells facilitates precise regulation of hormone secretion. Variations in GH secretion are primarily due to variations in GHRH secretion, whereas GHIH plays a relatively minor role. GH deficiency is not usually caused by a hypothalamic defect, but by malfunctioning of the pituitary cells that produce the hormone (clinical example, p. 264). In addition to GHRH, the peptide ghrelin, which is also produced in the hypothalamus, stimulates secretion of GH. The physiological significance of this effect of ghrelin is uncertain. Ghrelin is primarily produced by acid-producing cells (parietal cells) in the stomach. Secretion increases in the postabsorptive state and decreases rapidly after eating. Ghrelin produced in the stomach has an appetite-stimulating effect on the hypothalamus (p. 642). Somatostatin is also produced in the stomach, where it inhibits acid production through paracrine mechanisms (p. 243).

Hypothalamic regulation of GH secretion is largely based on input from other parts of the central nervous system (Fig. 6.10). Various physiological situations result in increased GH secretion. Physical exertion, fasting, stress, protein-rich meals, and a low glucose concentration in the blood are among the factors leading to increased GH secretion. Some hormones not produced in the hypothalamus or the pituitary also participate in the regulation of GH secretion.

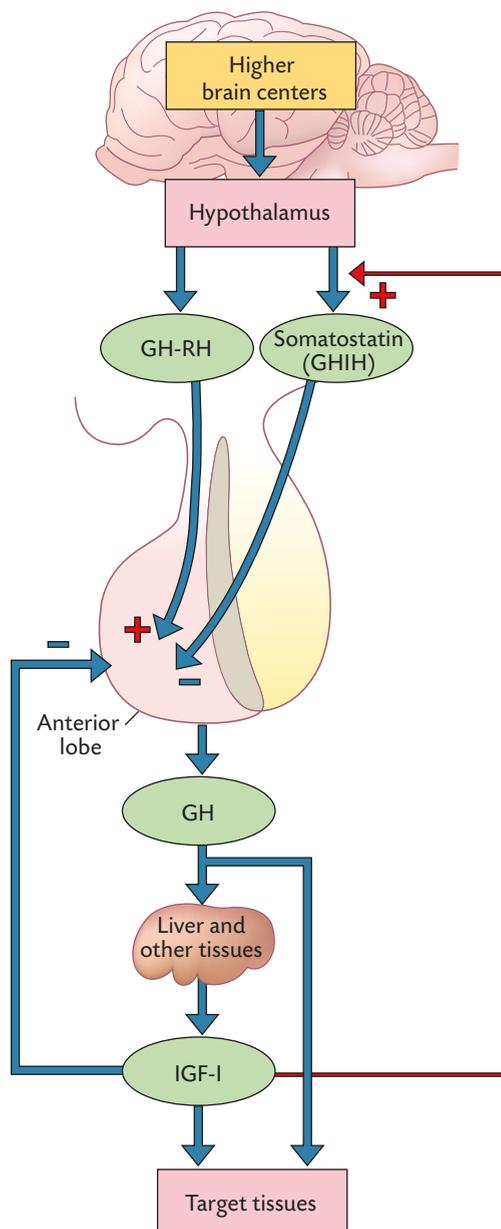


Figure 6.10 Regulation of growth hormone (GH) secretion. GH secretion is regulated by GH-releasing hormone (GHRH) and GH-inhibiting hormone (somatostatin, GHIH) from the hypothalamus. GH stimulates production of insulin-like growth factor (IGF-1) in the liver and other tissues. IGF-1 inhibits secretion of GH by inhibiting the anterior pituitary directly and by stimulating the hypothalamic secretion of GHIH. GH probably does not suppress its own secretion by influencing the release of GHRH or GHIH from the hypothalamus.