PITUITARY(also called the "Hypophysis")

A. Structure

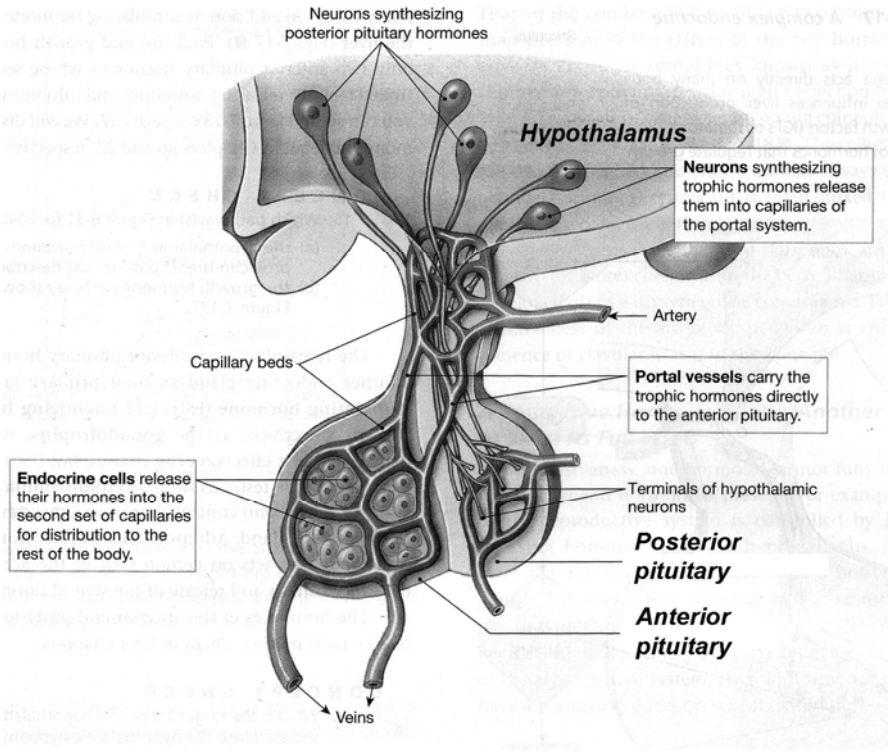
1. Small gland at the base of the brain

2. Divided into the anterior pituitary (also called the adenohypophysis) and posterior pituitary (also called the neurohypophysis); there also is an intermediate region (intermediate lobe)

3. Attached to the hypothalamus by the infundibulum or hypothalamo-hypophyseal stalk, which contains

   a. nerve axons of neurons originating in the hypothalamus and terminating in the posterior pituitary

   b. blood vessels originating in capillary beds in the hypothalamus and terminating in capillary beds in the anterior pituitary (portal system)



B. Control of Posterior Pituitary Secretion

1. Hormones synthesized in neurosecretory cells of the hypothalamus

2. Migrate down the nerve axons to the posterior pituitary

3. Stored in granules in posterior pituitary nerve terminals adjacent to capillaries

4. Released into the circulation upon stimulation of the neurosecretory cells

5. Release controlled by neural excitation & inhibition of the neurosecretory cells

PITUITARY (continued)

C. Control of Anterior Pituitary Secretion

1. Hypothalamic releasing and inhibiting hormones
   a. synthesized in the hypothalamus
   b. released into capillaries in the hypothalamus
   c. transported by hypothalamo-hypophyseal blood vessels to the anterior pituitary capillary bed (portal system)
   d. diffuse from the anterior pituitary capillaries to the pituitary secretory cells
   e. either stimulate (releasing hormones) or inhibit secretion of specific anterior pituitary hormones

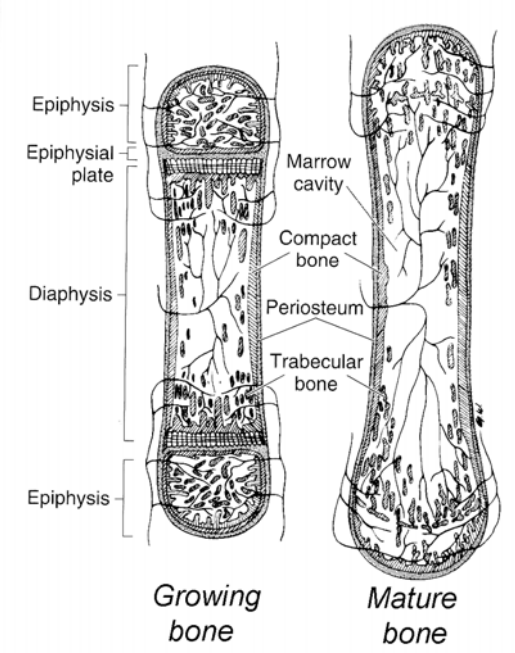
GROWTH HORMONE AND BONE GROWTH

A. Bone Structure of Growing Bone

1. Diaphysis: bone shaft
2. Epiphysis: bone ends
3. Epiphyseal plate: plate of cartilage between the diaphysis and epiphysis

B. Bone Growth

Bone growth occurs as the epiphyseal plate lays down new bone at the end of the shaft. During development, the epiphyseal plate narrows and eventually disappears; this occurs in an orderly sequence at different times for different bones and permits determination of "bone age". When the plate disappears, bone elongation is no longer possible.



C. Effect on Bone Development of GH

1. Before epiphyseal closure: elongation of long bones either by the direct effect of GH on bone or by GH's stimulation of release of somatomedin medators from the liver

2. After epiphyseal closure: bone thickening

D. Pathophysiology

1. Inadequate GH secretion or defective GH receptors during bone development: Dwarfism

2. Excess GH during bone development: Giantism

3. Excess GH after epiphyseal closure: Acromegaly, enlargement of the hands and feet, growth of facial bones, protrusion of the jaw

Acromegaly