PITUITARY GLAND (HYPOPHYSIS)

revised 04Feb2016
Martini’s 6th: p. 615-620, 7th: 600-605, 8th: 614-620, 10th: 619-625

HYPOPHYSIS EMBRYONIC DEVELOPMENT:
organogenetic induction:
anterior pituitary  roof of mouth  (Rathke’s pouch)
posterior pituitary  floor of brain

“MASTERGLAND”:
SEVEN hormones from anterior and TWO from posterior
pituitary, all trigger cAMP as a second message

ANTERIOR PITUITARY (adenohypophysis)
Hangs from infundibulum between optic chiasma and
mamillary bodies, nestled in sella turcica of sphenoid
Blood originates in Circle of Willis,
from superior hypophyseal artery:
hypothalamic-hypophyseal portal system with
fenestrated epithelium capillaries (p 620)
carries releasing factors (RF) from hypothalamus
Four of the hypophyseal hormones regulate other glands (trophic = stim growth)
These are regulated by negative feedback from target organs.

Table of hormones: p 624, 625

1) GROWTH HORMONE (somatotropin): stimulates growth especially of epiphyseal cartilage & muscles.
promotes protein synthesis, mobilization and use of fat, conserves glucose, AA uptake

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Description</th>
<th>Effects</th>
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<tbody>
<tr>
<td>GROWTH HORMONE</td>
<td>stimulates growth especially of epiphyseal cartilage &amp; muscles.</td>
<td>hyposecretion: pituitary dwarf if in childhood, can be replaced if detected in time; hypersecretion: gigantism if in childhood: causes extreme height (basketball players...); acromegaly if in adults: enlarged hands and chin (or exogenous HGH as in body builders).</td>
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2) THYROID STIMULATING HORMONE: glycoprotein, stimulates thyroid to release thyroxine

3) SOMATOSTATIN (body hold agent)
A) inhibits release of growth hormone
B) blocks release of TSH

4) ADRENOCORTICOTROPIC HORMONE: (ACTH) stimulates adrenal cortex to release corticosteroids, especially glucocorticoids. Stim. by corticotropin releasing hormone (CRH)

| GONADOTROPINS: |
|---|---|
| | |
| | |

5) FOLLICLE STIMULATING H.  
spermatogenesis  
oogenesis, inhibited by estrogen

6) LUTEINIZING HORMONE  
stimulates testosterone production: progesterone in ♀

During puberty, gonadotropic cells become active

7) PROLACTIN  
prepares breasts for milk production: breasts enlarge, milk production stimulated. Suckling maintains.
High estrogen levels stimulate PRF, prolactin levels rise dramatically at end of pregnancy.

NEUROHYPOPHYSIS (post. pituitary) (p. 623-625) derived fr hypothalamus, still connected via nerve bundle in infundibulum
TRACT: hypothalamic-hypophyseal, originates from paraventricular and supraoptic nuclei of hypothalamus
consists mostly of neuroglia and nerve fibers, releases hormones in posterior pituitary, synthesized in hypothalamus.

<table>
<thead>
<tr>
<th>Only two hormones</th>
<th>Originating nuclei:</th>
<th>Effects:</th>
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</table>
| OXYTOCIN  
“sharp childbirth agent” (“love hormone”...) | paraventricular | triggers uterine contractions (delivery) and milk let-down Stimulated breasts causes oxytocin release |

| ANTIDIURETIC HORMONE (ADH or vasopressin) | suprapoptic | increases permeability of kidney collecting tubules, thus more concentrated urine formed. Triggered by osmoreceptors, Alcohol inhibits ADH formation, therefore is a diuretic Lack of ADH leads to diabetes insipidus |