Endocrine system

Review

Adenohypophysis
- Pars distalis
- Pars tuberalis
- Pars intermedia

Neurohypophysis
- Median eminence
- Infundibular stalk
- Pars nervosa

ADH and Oxytocin are produced by both nuclei

The Master Gland

Figure 13-1 Schematic diagram of the pituitary gland and its target organs. ADH, antidiuretic hormone; FSH, follicle-stimulating hormone; GH, growth hormone; TSH, thyroid-stimulating hormone.

Copyright © 2007 by W.B. Saunders Company. All rights reserved.
Pituitary Histology

Pars distalis

Pars intermedia

Pars nervosa

Anterior Pituitary

B=Basophil, A=Acidophil, V=blood vessel, rbc=red blood cells
Things to know

- What do acidophils do? Know target cells.
- What do basophils do? Know target cells.
- Folliculostellate cells: chromophobes that may be regulatory, but we don’t really know their function (local regulator of different functions).
- Know what hormones control each of the anterior pituitary hormones.
- Know about feedback to anterior pituitary cells.

Advantages of portal circulation:

- Capillaries provide increased surface area for lots of nerve fiber endings
- Then, portal veins provide a direct conduit or route to the anterior lobe cells.
- Releasing or inhibiting hormones are not diluted by entire blood stream.
- Don’t have to travel very far.
Target organ produces hormone that may feedback via bloodstream to brain or pituitary

Portal veins transport the hormones to the capillaries of the pars distalis.

Negative feedback blocks the synthesis and secretion of pituitary and hypothalamic hormones. Tells the pituitary to stop stimulating the organ.

Positive feedback enhances the synthesis and secretion of pituitary and hypothalamic hormones.

Feedback Regulation of the Anterior Pituitary cells

Nerve cell bodies in the paraventricular and supraoptic nuclei produce OXYTOCIN and VASOPRESSIN.

These hormones are stored in secretory granules. Sent down axon to pars nervosa via stalk.

Oxytocin and vasopressin are released into blood stream to be distributed to the body

- Oxytocin: Contraction of uterus and mammary gland myoepithelial cells (Lactation) Direct neural stimulation.

- Vasopressin (Anti-diuretic hormone) Raises blood pressure; water and sodium conservation; Collecting ducts in kidney.

Structure and function of the Neurohypophysis
Thyroid Histology

- Thyroid epithelial cells line follicles.
- Base of all cells is adjacent to capillaries.
- Apex faces the colloid.

Figure 13–9 Schematic diagram of the synthesis and iodination of thyroglobulin (A) and release of thyroid hormone (B).

Copyright © 2002 by W.B. Saunders Company. All rights reserved.
Parafollicular or C cells

- C Cells labeled immunocytochemically for calcitonin
- Know function of calcitonin and target cells

Parathyroid Gland

A= fat or adipose cells; Chief= chief cells that produce parathyroid hormone; oxy= oxyphil cells.
**Distinguish Chief and Oxyphil**

- **Chief cells** have paler nuclei
- **Pale cytoplasm**
- **Function?**
  - Produce parathyroid hormone

- **Oxyphil cells** have central, dense nucleus
- **Acidophilic cytoplasm**
- **Often in clusters**
- **Function?**
  - To help you identify the parathyroid gland

**Adrenal Cortex:** Know function of each region and target cells.

Zona Glomerulosa (Z. Glom); Zona Fasciculata (Z. Fas.); Zona reticularis (Z. ret.)
Remember major organelles for steroid synthesis

Know functions of medulla and products.

Adrenal Medulla

Zona reticularis
Cardiac hormones

- Atrial natriuretic peptide; Atriopeptins; cardiodilatin and cardionatrin.
  - Family of peptides; same precursor;
  - Counter renin angiotensin system
  - Decrease aldosterone (adrenal)
  - Decrease sodium and water retention at the level of the kidney
  - Relax smooth muscle (dilates vessels)
  - Inhibits vasopressin
- May be very important clinically in response to cardiac failure and high blood pressure.
Histology of the Islet of Langerhans

- Purple cells in Islet of Langerhans are insulin containing beta cells.
- Reddish cell is a glucagon-containing alpha cell.
Pinealocyte

Pineal Gland

- glial cell
- pinealocyte
Functions of pineal

- Produces melatonin, from serotonin
- Rise in melatonin at night (sensitive to light cues from eye) makes us sleepy
- Melatonin helps establish rhythms
- Also, melatonin is inhibitory to gonadotropins (LH and FSH).
  - Rise in melatonin during short days/long nights causes regression of testes in seasonal breeders
  - Longer days lowers melatonin and allows for breeding
- Children with destroyed pineal gland may go through precocious puberty.