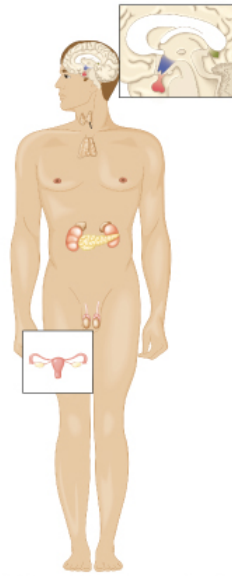


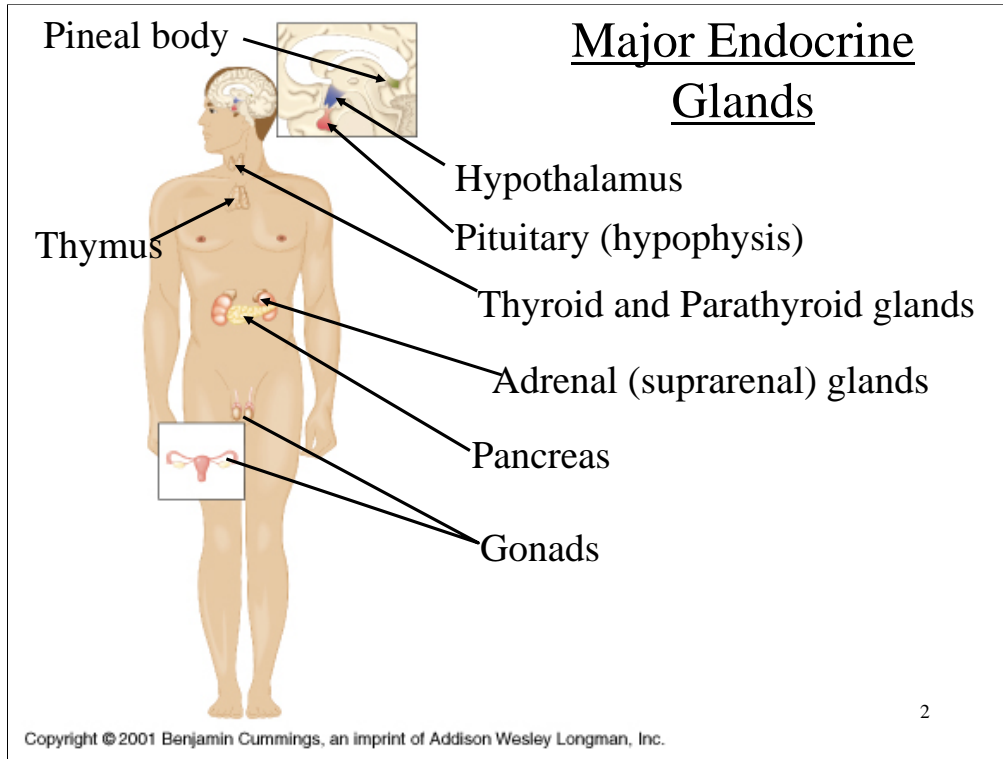
The Endocrine System

Laboratory



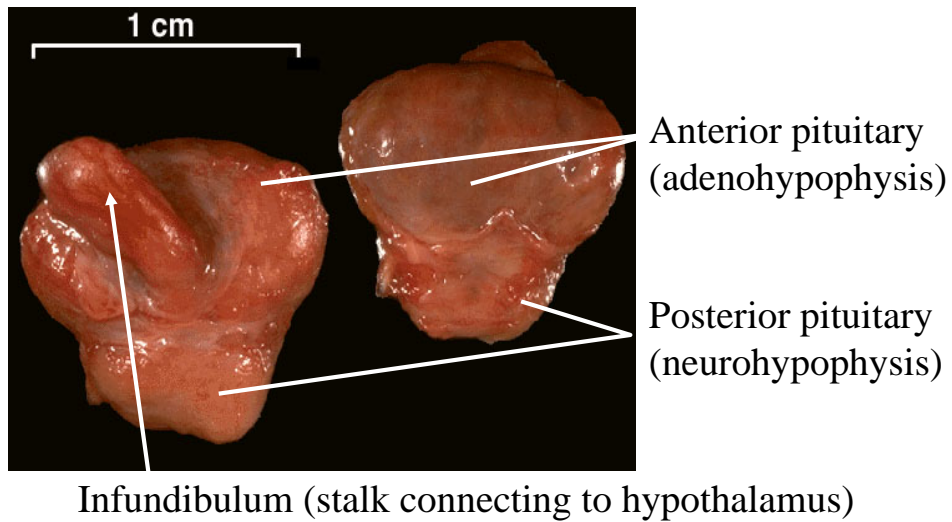
1

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We will discuss all the glands shown above except the pineal body and thymus. These glands have been discussed already in other contexts (the brain, and the immune system). The gonads will be discussed in the reproductive laboratories.

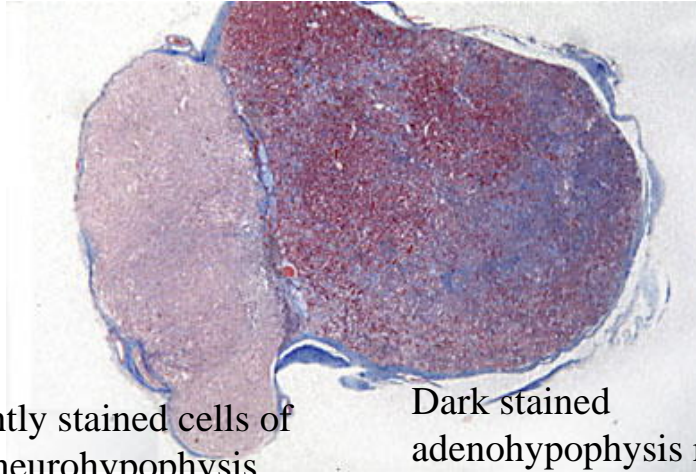
Pituitary Gland



3

The **pituitary (hypophysis)** is composed of two separate glands which are attached together as seen here. Blood vessels and neurons connect these glands with the hypothalamus through the **infundibulum**.

The Pituitary Gland



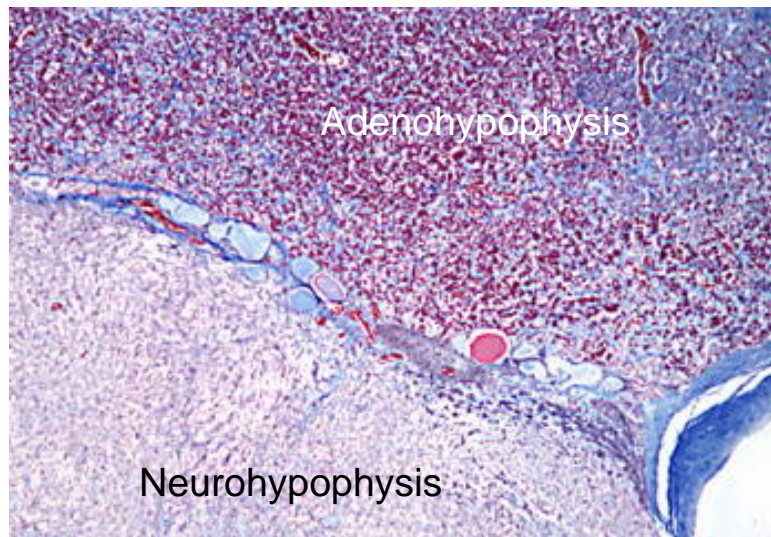
Lightly stained cells of the neurohypophysis reflects the neural nature of this gland.

Dark stained adenohypophysis reflects the epithelial secretory cells of this gland.

4

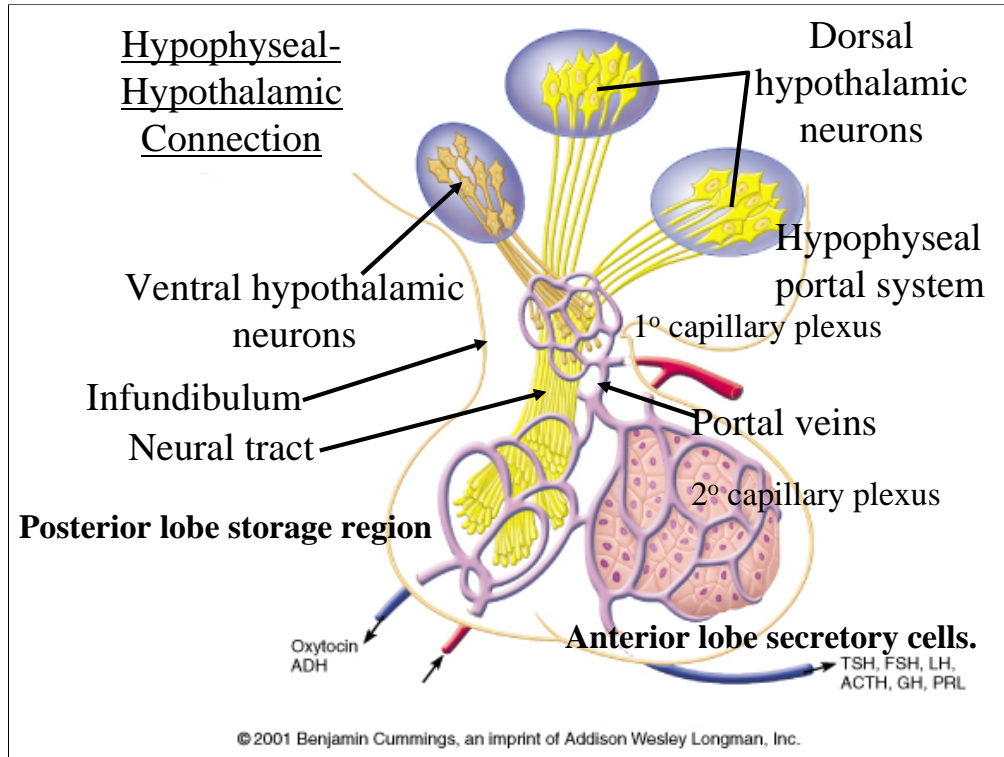
Note the distinct difference between the **anterior** and **posterior pituitary** glands, reflecting their different structure and functions.

Hypophysis



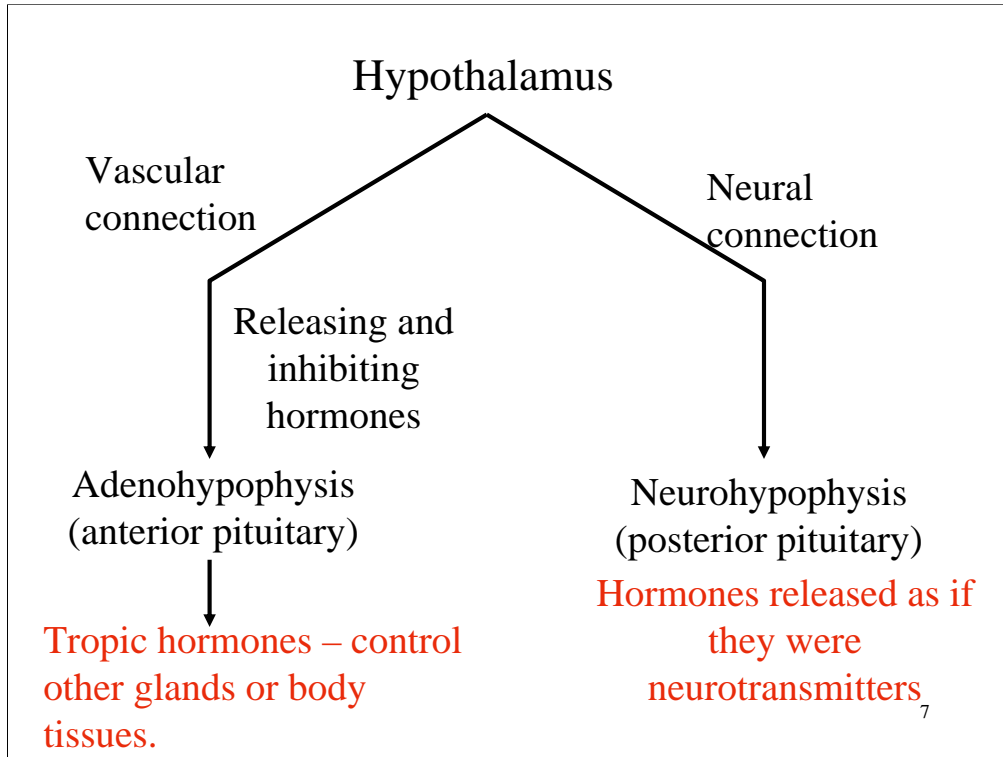
5

This slide shows the junction of the anterior and posterior pituitary, and demonstrates the difference in their composition. Note the density of the anterior pituitary, reflecting its concentration of secretory cells. The posterior gland, however, is very open reflecting its consistency, storage spaces and the terminals of neuron fibers.

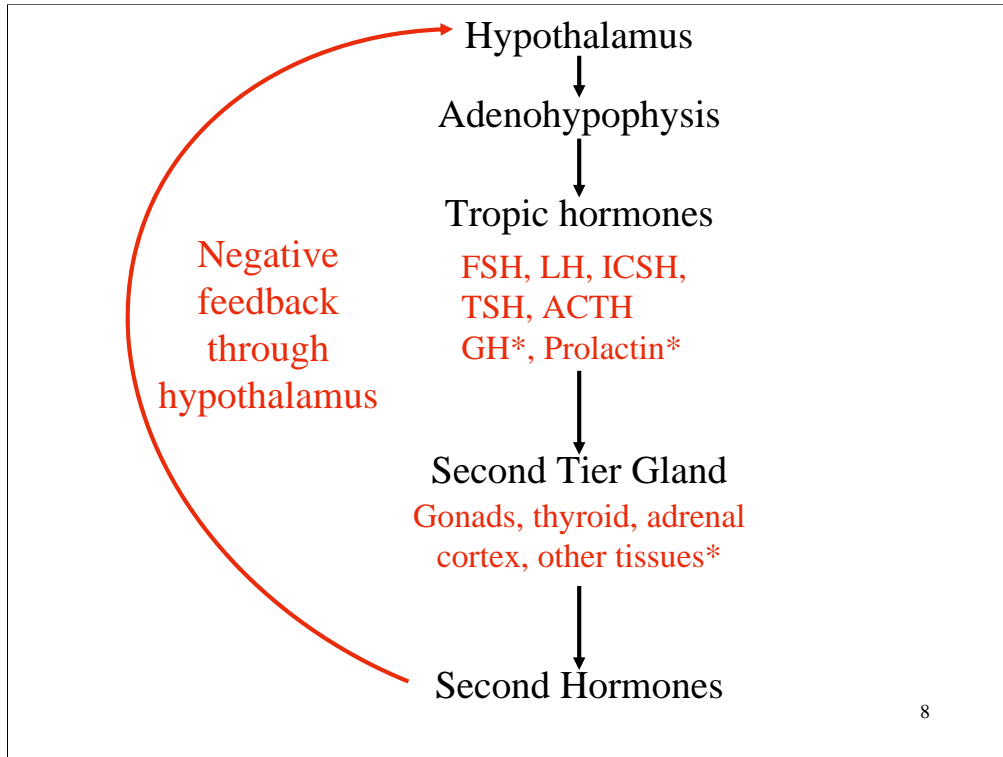


Neurons from the dorsal nucleus of the hypothalamus lead to the posterior pituitary. These neurons release **ADH** and **oxytocin** which are stored in the posterior pituitary.

Neurons from the ventral hypothalamic nucleus lead to the **primary capillary plexus** of the **hypophyseal portal system**. These neurons secrete **releasing and inhibiting hormones** which are carried by the portal veins to the **secondary capillary plexus** in the **anterior pituitary**. The releasing or inhibiting hormones then regulate the secretion of hormones by the **adenohypophysis**.

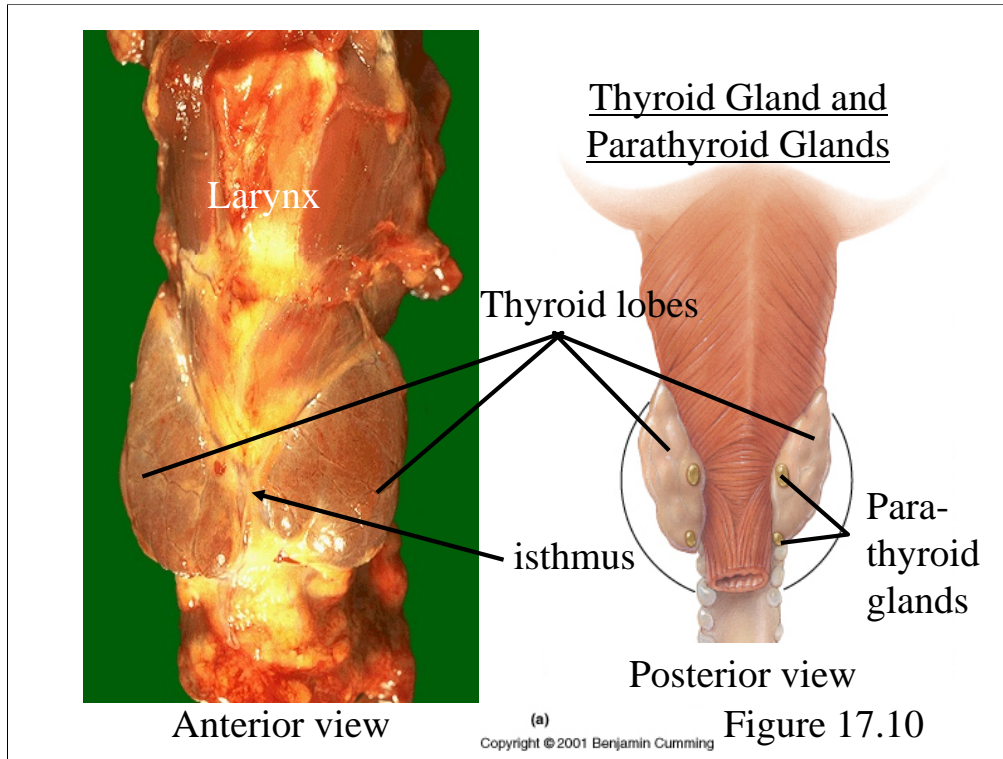


Here you see the connections between the **hypothalamus** and **hypophysis**. This connection is through the **infundibulum**.



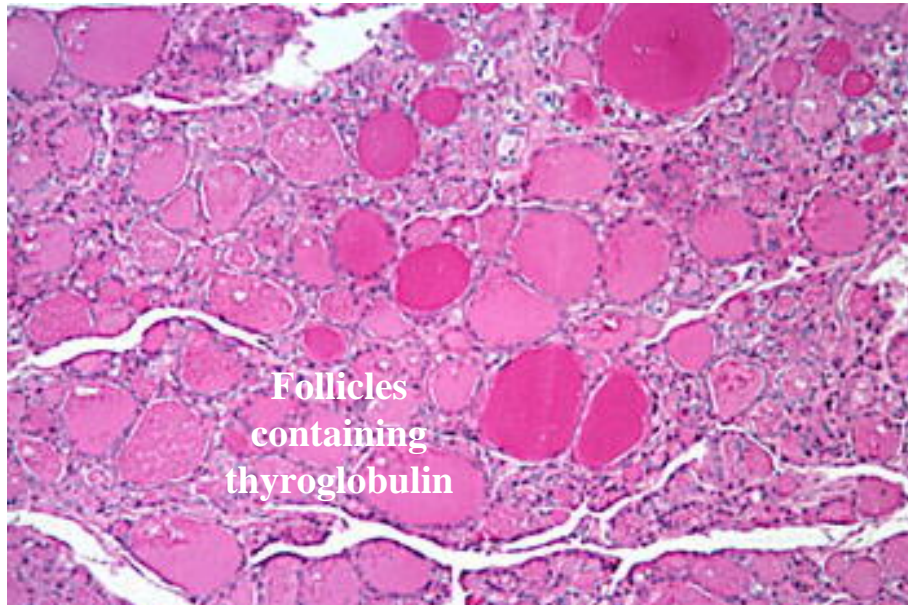
The anterior pituitary is also called the **adenohypophysis**. **Adeno** means **gland** and is given to this organ because it actually secretes a group of hormones known as the **tropic** hormones. These hormones control other glands or act on other tissues. The glands controlled by the tropic hormones are also endocrine glands and represent a **second tier gland** in the control mechanism. They secrete a second hormone which has actions on specific body tissues or organs **and** has a feedback effect on the hypothalamus to control its secretion. The hypothalamus controls the adenohypophysis through releasing and/or inhibiting hormones. These hormones either stimulate release of the tropic hormone or inhibit it as part of feedback control.

Growth Hormone (GH) and Prolactin (PTH) are not considered tropic hormones proper because they do not stimulate second tier endocrine glands, but rather stimulate other types of body tissues.



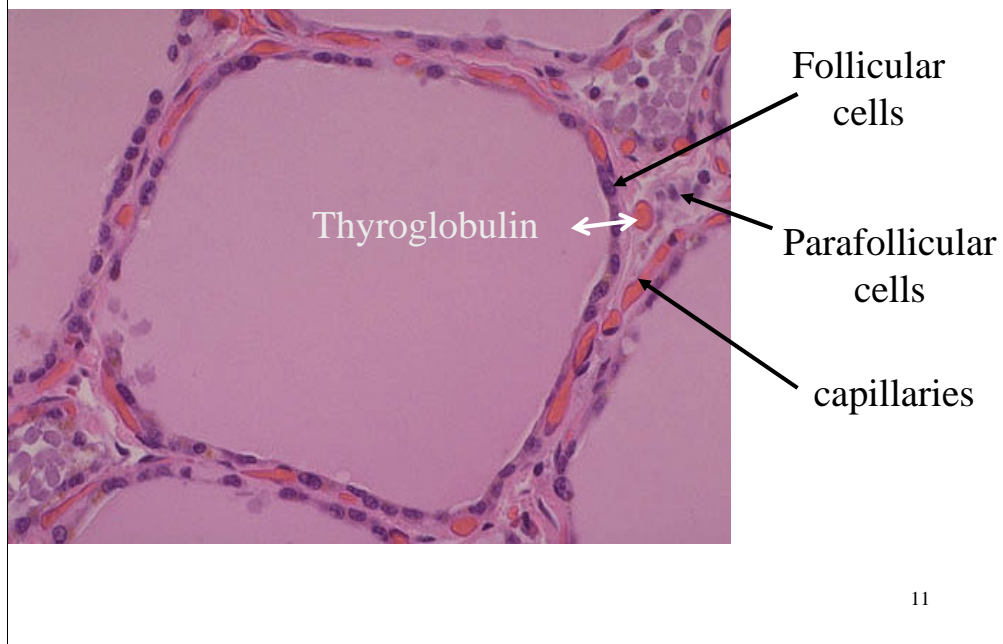
Location of the **thyroid** and **parathyroid** glands. The major lobes of the thyroid lie at the lateral lower margin of the larynx, connected by an isthmus. The parathyroid glands are tiny, bean-shaped glands embedded in the posterior portion of the thyroid. They are often difficult to find on gross examination.

Thyroglobulin is Stored in the
Follicles of the Thyroid



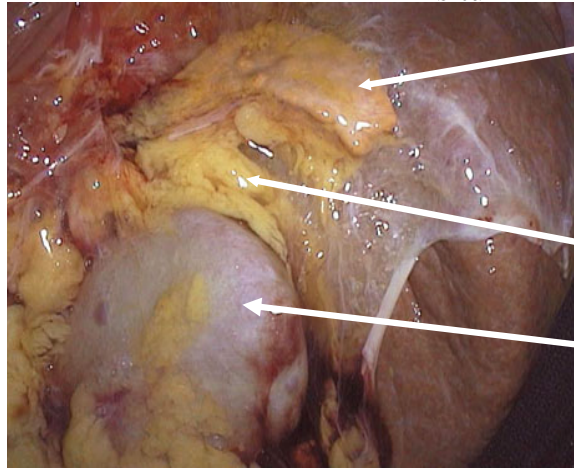
Each of the round structures seen in the thyroid gland is a follicle. The thyroid hormones T4 and T3 are stored as **thyroglobulin** in the follicles of the thyroid.

Thyroid Follicles



The follicular cells produce and regulate the storage of thyroglobulin, as well as its breakdown and the release of T4 and T3 into the bloodstream.

Adrenal Gland,
in situ



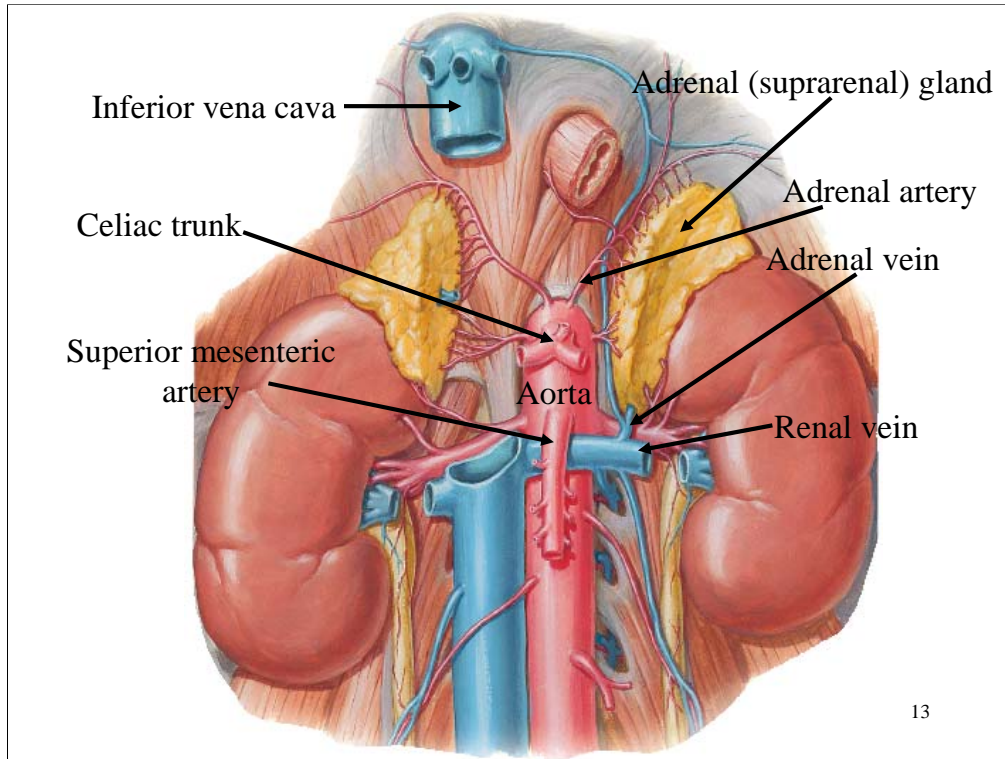
Adrenal gland

Adipose pad

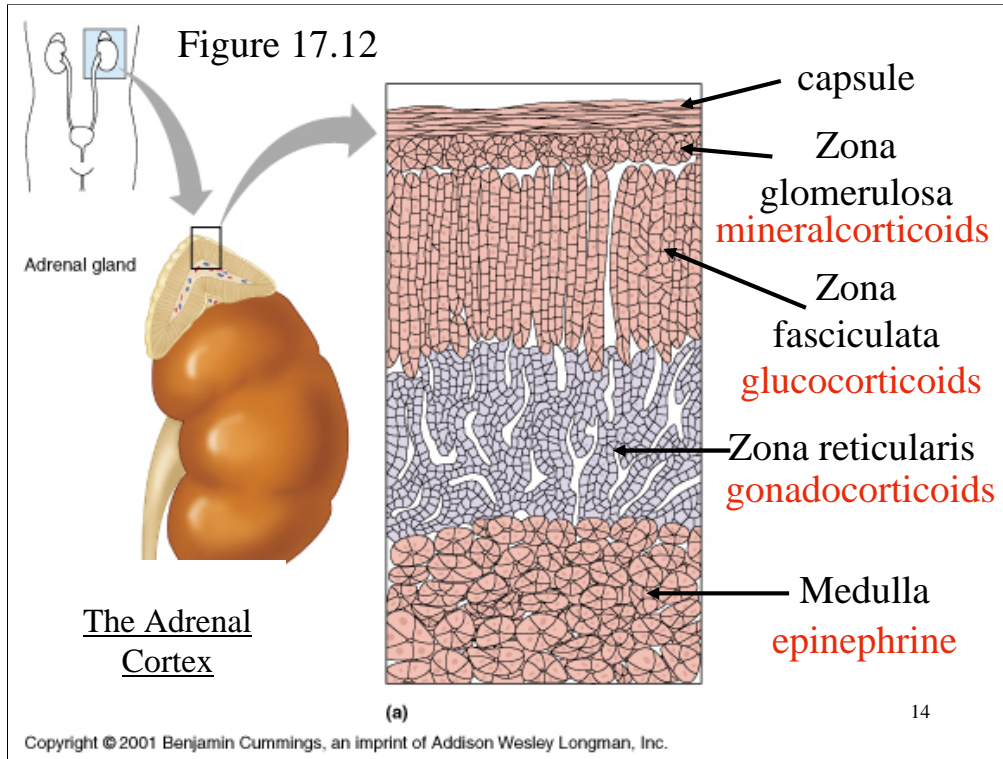
Kidney

12

The normal adrenal gland is a “cap shaped” structure lying atop the kidney (*adrenal* means *next to the kidney*).



The external anatomy of the kidney and adrenal gland, from *Netter*.



Location of the **adrenal** (a.k.a. **suprarenal gland**) and its **cortex** and **medulla**, as well as the hormones each produces.

Adrenal Gland,
gross specimen

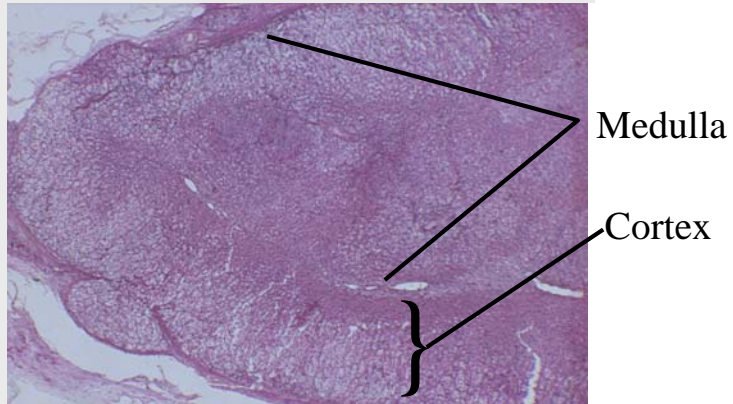


Here are normal
adrenal glands.
Each adult adrenal
gland weighs from
4 to 6 grams

15

Here you can see the cap shape which allows the gland to articulate with the top of the kidney.

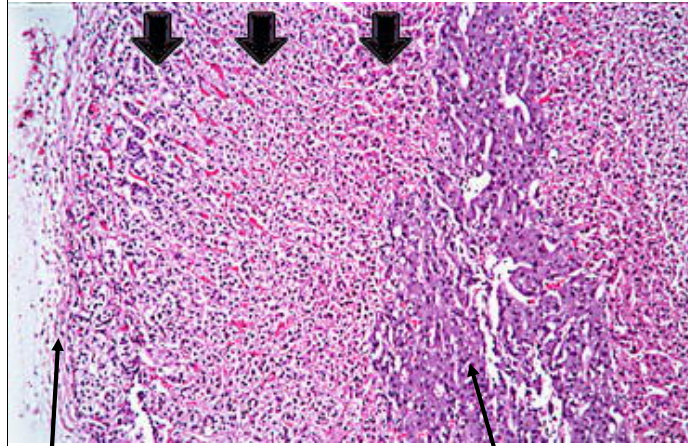
The Adrenal Gland



16

The medulla is the large inner portion of the gland (*medulla* means *middle*). The cortex is the outer layer, which is in turn composed of several sub-layers.

Layers of the Adrenal Cortex



The three layers of the adrenal cortex from left to right: Zona Glomerulus, Zona Fasciculata, Zona Reticularis (mnemonic - GFR)

Capsule

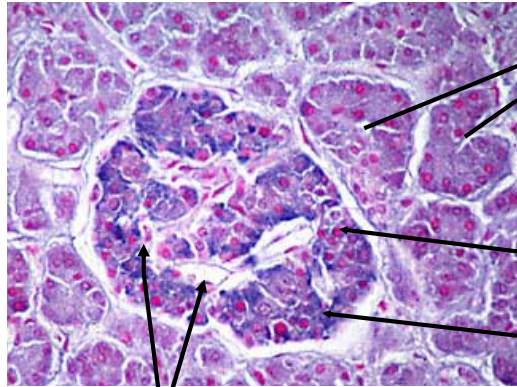
Medulla

17

These layers subtle and are often difficult to distinguish in microscopic examination.

Pancreatic Islets

(Islets of Langerhans)



Exocrine acini

Endocrine cells:
Glucagon-secreting
alpha cells stain red
insulin-secreting beta
cells stain blue

capillaries

18

The pancreatic islets are groups of cells which are islands within the exocrine portions of the pancreas.

Lab Protocol

1. Identify endocrine glands seen in models and in cadaver dissection.
2. Identify the hormones produced by each gland.
3. Recognize the histological characteristics of each gland.
4. Prepare for a quiz next week on **urinary** and **endocrine** systems.