Pancreas and blood glucose regulation

Duodenum (first part of small intestine)

Pancreas duct

Common bile duct from liver

Pancreatic duct

Exocrine portions of pancreas (secrete enzymes that move through the ducts to the small intestine)

Pancreatic islet

Alpha cell (secretes glucagon)

Beta cell (secretes insulin)

To pancreatic duct

To bloodstream

Image of histological section of pancreas islet.
Name the Gland and the structure at the Arrow
Pancreas: Pancreatic Islets (Islets of Langerhans)
Name the Gland and the structure at the Arrow
Pancreas: Pancreatic Islet (Islet of Langerhans)
Identify Alpha and Beta Cells
Immunoperoxidase staining can help identify the nature of the cells present in the islets of Langerhans. On the right, antibody to insulin has been employed to identify the beta cells. On the left, antibody to glucagon identifies the alpha cells.
Pituitary Gland and Hypothalamus
Name the Gland and the structures indicated by the arrows
Pituitary Gland

Anterior Lobe (darker-stained adenohypophysis); Posterior Lobe (lightly-stained neurohypophysis)
Name the Gland and the structures indicated by the arrows.
Anterior lobe is the upper portion; Posterior Lobe is the lower portion
Name the Gland and important structures
Thyroid Gland: Thyroglobulin (in the follicles) is a glycoprotein. The PAS stain reacts with the carbohydrate components of thyroglobulin and produces a deep red appearance. Bar = 250 Microns
Name the Gland and important structures
Thyroid gland, human - H&E
Identify the follicles of the thyroid gland. Notice the capillaries in the interstices between the thyroid follicles. C cells are very difficult to identify.
Name the Gland and important structures
The simple cuboidal epithelium lining the **follicles** produces the **thyroglobulin** which is stored *in* the colloid follicles. Later it is taken back up by these same cells, cleaved, and released as **T3 & T4**.
Name the Gland and the structure indicated by the arrow. What does this structure at the arrow produce?
The C-cells secrete calcitonin which helps lower calcium levels. Recall that this hormone antagonizes the effect of PTH from the parathyroids. These C-cells are actually named for being "clear" (as in lighter staining).
Name the Gland and the structures indicated by the lines.
Parathyroid Gland

- Chief cell
- Blood vessel
- Oxyphil cell
- Left subc
- Left com
Name the Gland and the structures indicated by the lines.
Parathyroid gland, human - H&E
Your first task, which may not be that easy, is to find the parathyroid glands. The glands are small and usually occupy only a small fraction of the tissue on the slide. Identify chief cells and oxyphilic cells.
Name the Gland indicated by the arrow. What does this gland produce?
Parathyroid Gland: Arrow

Parathyroid hormone raises blood calcium levels
Adrenal Glands

- **Adrenal glands** (suprarenal glands) are paired glands, located superior to each kidney.
- Have two distinct regions that function as separate endocrine glands:
  - An outer part: the **adrenal cortex**
  - An inner part: the **adrenal medulla**
Capsule
Adrenal cortex
Adrenal medulla

(b) Section through left adrenal gland

Adrenal medulla chromaffin cells secrete epinephrine and norepinephrine (NE)
Zona reticularis secretes androgens
Zona fasciculata secretes glucocorticoids, mainly cortisol
Zona glomerulosa secretes mineralocorticoids, mainly aldosterone

(c) Anterior view of adrenal gland and kidney

(d) Subdivisions of the adrenal gland
Name the Gland and the structures indicated by the lines.
The Adrenal Gland

The adrenal gland consists of a medulla which secretes epinephrine and the cortex which secretes the corticosteroids.
Name the Gland and the structures indicated by the lines.
Capsule

Adrenal cortex:

Zona glomerulosa secretes mineralocorticoids, mainly aldosterone

Zona fasciculata secretes glucocorticoids, mainly cortisol

Zona reticularis secretes androgens

Adrenal medulla chromaffin cells secrete epinephrine and norepinephrine (NE)
Name the Gland and the important structures.
Name the Gland and the important structures.
Adrenal Cortex

adrenal cortex

z. glomerulosa

z. fasiculata

z. reticularis

medulla
Name the gland and the structures indicated by the brackets
Identify the three layer of the adrenal cortex from left to right: Zona Glomerulus, Zona Fasiculata, Zona Reticularis (mnemonic - GFR). Also notice the dark medulla and the surrounding capsule. Bar = 250 MM
Name the gland, what it produces, and the dark round structures
The pineal gland (in the brain) **secretes melatonin**, but its function in man is largely unknown. It is best identified by the distinctive dark globules known as **brain sand** that can be observed in the glands of older individuals.
Pineal Gland: Lots of brain sand

This is the brain sand of the same person after a grueling semester of anatomy and physiology. Obviously this is a digitally manipulated image, but do remember that this mineralization has no clinical manifestation.