

Clinical note

- Disorders of the adrenal cortex can be hypofunctional or hyperfunctional
- Patients treated with corticoids for a prolonged period of time shouldn't suddenly stop taking them; secretion of ACTH is inhibited, so the cortex will not produce corticoids, causing severe drops in Na^+/K^+

Cushing syndrome

- Tumour of adrenal cortex - increased production of glucocorticoids
- Usually due to a pituitary adenoma (>90%); excessive ACTH
- Precocious puberty in boys, and hirsutism and virilisation in girls

Conn syndrome

- Tumour producing excessive aldosterone

Addison disease

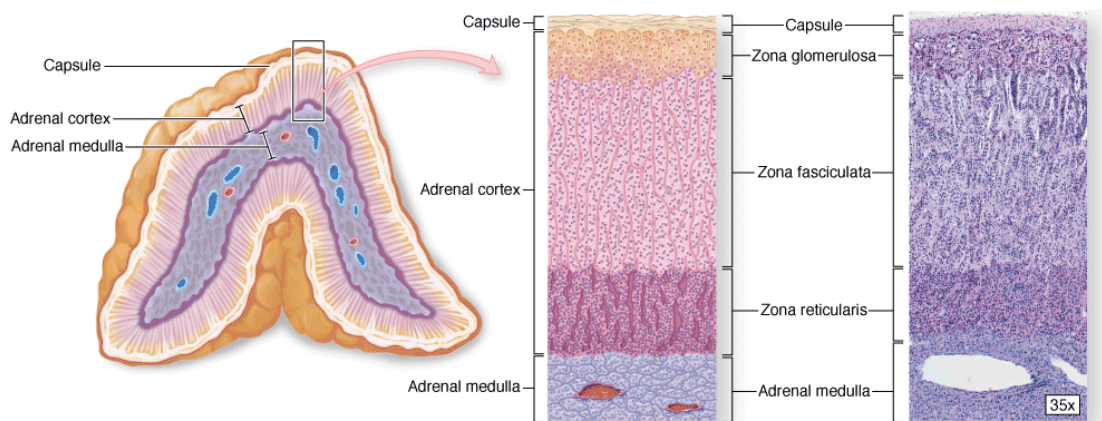
- Destruction of adrenal cortex; adrenocortical insufficiency
- Failed secretion of glucocorticoids and mineralocorticoids

Carcinomas of the adrenal cortex

Very rare; 90% produce steroids associated with endocrine glands

Adrenal medulla

- Innervated, developed from neural tissue – direct from spinal cord, synapse directly on the Chromaffin cells
- Large cells arranged in **cords**, supported by reticular fibre network
- **Sympathetic capillaries** between each cord, **parasympathetic ganglion cells**
- The parenchymal cells are **chromaffin cells**; these are **modified sympathetic postganglionic neurons** (no axons or dendrites, specialised in secretion)
- **Chromaffin cells** contain electron-dense granules containing **catecholamines** – either **epinephrine** or **norepinephrine**
- Catecholamines within the granules are bound to proteins called **chromatogranins**



Taken from Mescher, Junqueira's Basic Histology: Text and Atlas, Twelfth Edition.

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Iodine deficiency goitre

- Low iodine diet prevents thyroid hormone synthesis, causing increased TSH production and inc growth of the thyroid gland

Foetal hypothyroidism

- Can cause cretinism (retarded physical and/or mental development)

Adult hypothyroidism

- From disease of thyroid gland (e.g. autoimmune disease, Hashimoto disease, impairing function) or secondary due to pituitary/hypothalamic failure
- Cold intolerance, weight gain, lose outer third of eyebrow, hair thinning, lethargy constipation, mental fog

Hyperthyroidism

- **Graves disease** – autoimmune response, Abs to TSH receptors
- Inflammation and growth of the extraocular adipose tissue – bulging eyes (exophthalmos; antibodies cross-react on extraocular nuclei), also decreased body weight, tachycardia, heat intolerance

Parathyroid glands

- **Four small glands** located behind the thyroid gland (but not attached), embedded in the thyroid gland capsule
 - **Some people can have up to eight**
- Same blood supply as the thyroid
- Two types of cells present
 - **Chief (principal) cells:** cytoplasm filled with granules of **parathyroid hormone (PTH)**, which regulates Ca^{2+} levels
 - **Oxyphil cells:** smaller, clustered cells, abnormal shaped mitochondria
- PTH targets **osteoblasts**, which respond by producing osteoclast-stimulating factor (RANK-L) to increase the number and activity of **osteoclasts** – promotes **resorption of Ca^{2+}** into the blood (negative feedback to reduce PTH)
 - Also stimulates Vit D synthesis in GI tract, which promotes Ca^{2+} absorption
- So PTH and calcitonin have opposing roles in regulating Ca^{2+} levels
- PTH also targets renal tubule cells to increase Ca^{2+} reabsorption