L5 – Anatomy of the Endocrine Glands

-Be able to, in general terms, define what an endocrine structure is
-Describe and correlate with function the structure of the macroscopic endocrine glands and give their immediate relationships, nerve supply and blood supply: ▪ *Hypothalamus & Pituitary* ▪ *Thyroid gland & Parathyroid glands* ▪ *Adrenal glands* ▪ *Pineal gland*
-Draw, label and orientate, including their key components and relationships: ▪ *Sagittal & coronal section of the hypothalamus and pituitary* ▪ *Posterior & horizontal section of the thyroid* ▪ *Anterior & cross-sectional view of the adrenal gland*

The endocrine system is characterised by **groups of cells** → secrete **hormone** that alter the function of other cells at a distance

- Only some are evident macroscopically → hypothalamus, pituitary, thyroid gland, adrenal gland, parathyroid and pineal body
- Other glands are small/distributed more diffusely/located in compound structures containing an endocrine component
  - Islet of Langerhans (pancreas)
  - Juxtaglomerular apparatus (kidney)
  - Enteroendocrine cells (GIT and pancreas)

Endocrine system is involved in cell-to-cell signalling and has feedback mechanisms

- Important in maintaining **internal homeostasis, reproduction and growth**

Portal system = consists of 2 capillary beds, joined by an intermediate system of larger non-capillary vessels

- Allow for accurate, rapid and less dilated or metabolised delivery of molecules from one region to particular cells in another

Hypothalamus

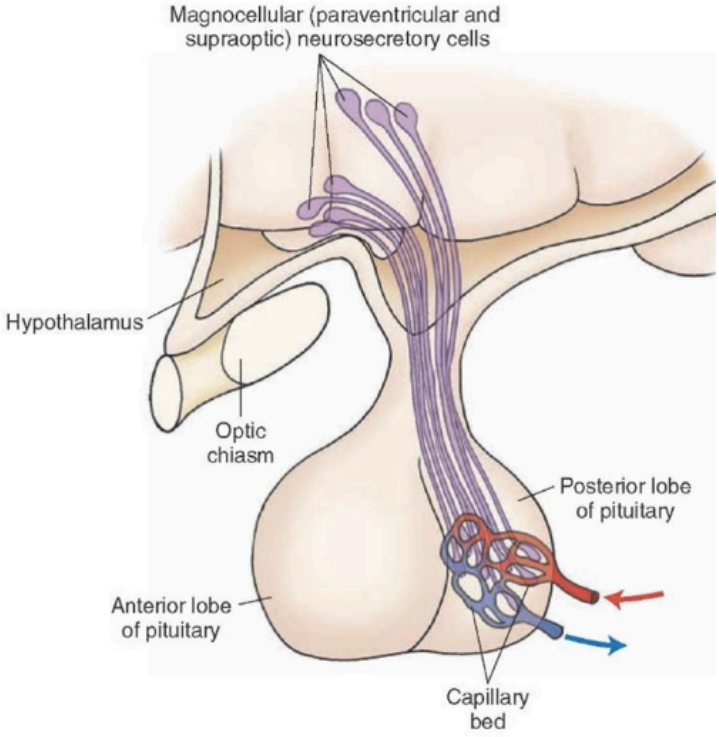
- Part of/inferior to the diencephalon
- Help form the walls of the 3rd ventricle
- Delineated form the thalamus by the hypothalamic sulcus
- Infundibulum continues inferiorly

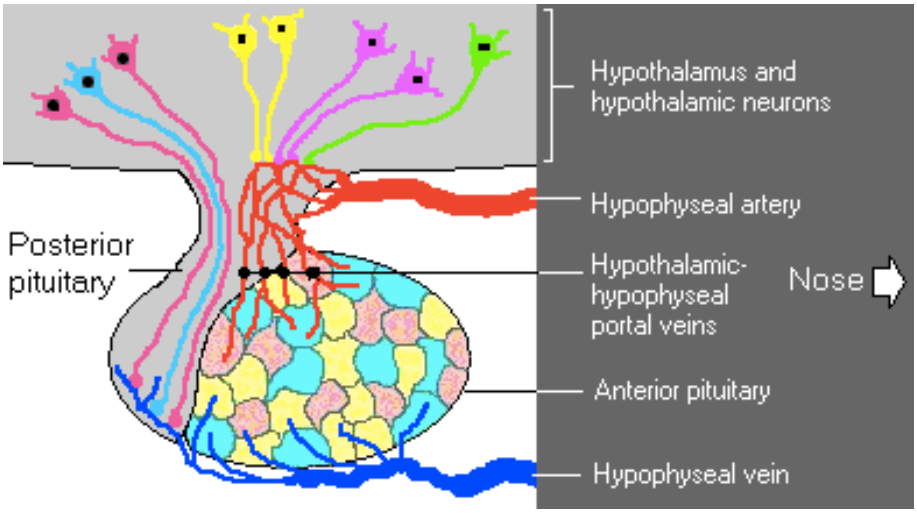
2 groups of neurosecretory cells located in the **anterior hypothalamus**

- Supraoptic nuclei
- Paraventricular

Via the **hypothalamo-hypophyseal tract**, send fibres to the **neurohypophysis**, secrete:

- Vasopressin
- Oxytocin

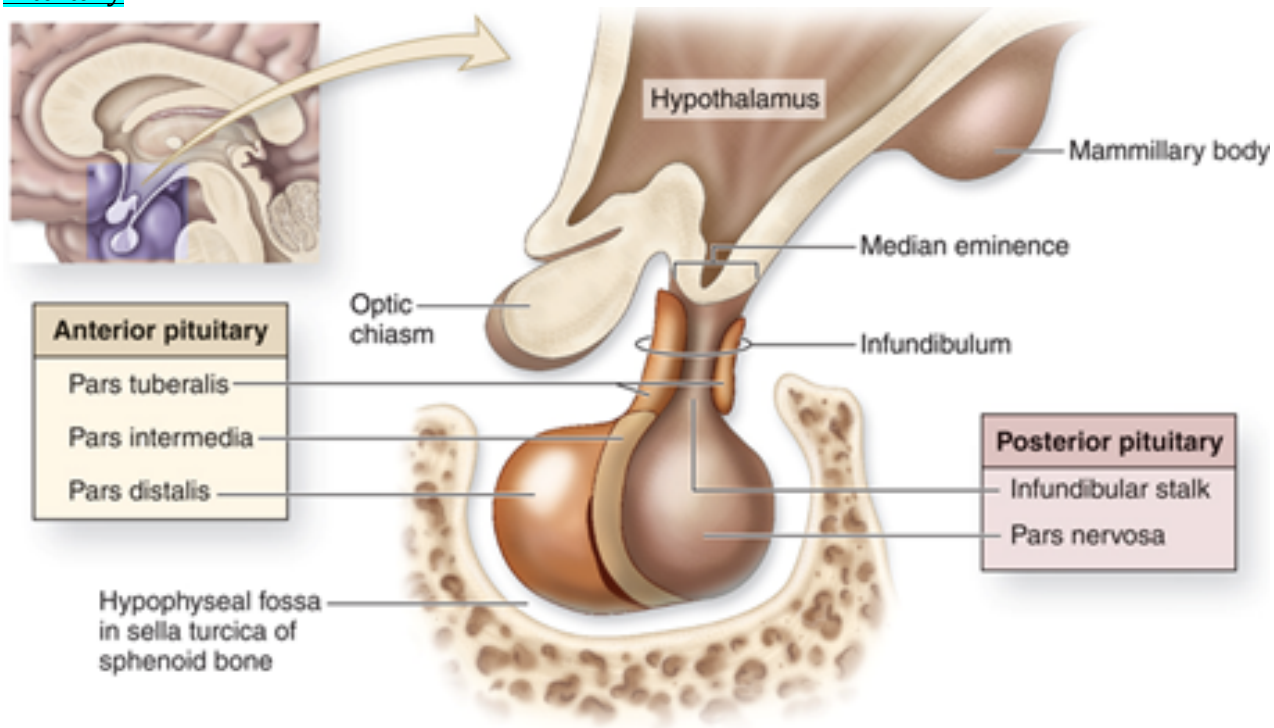




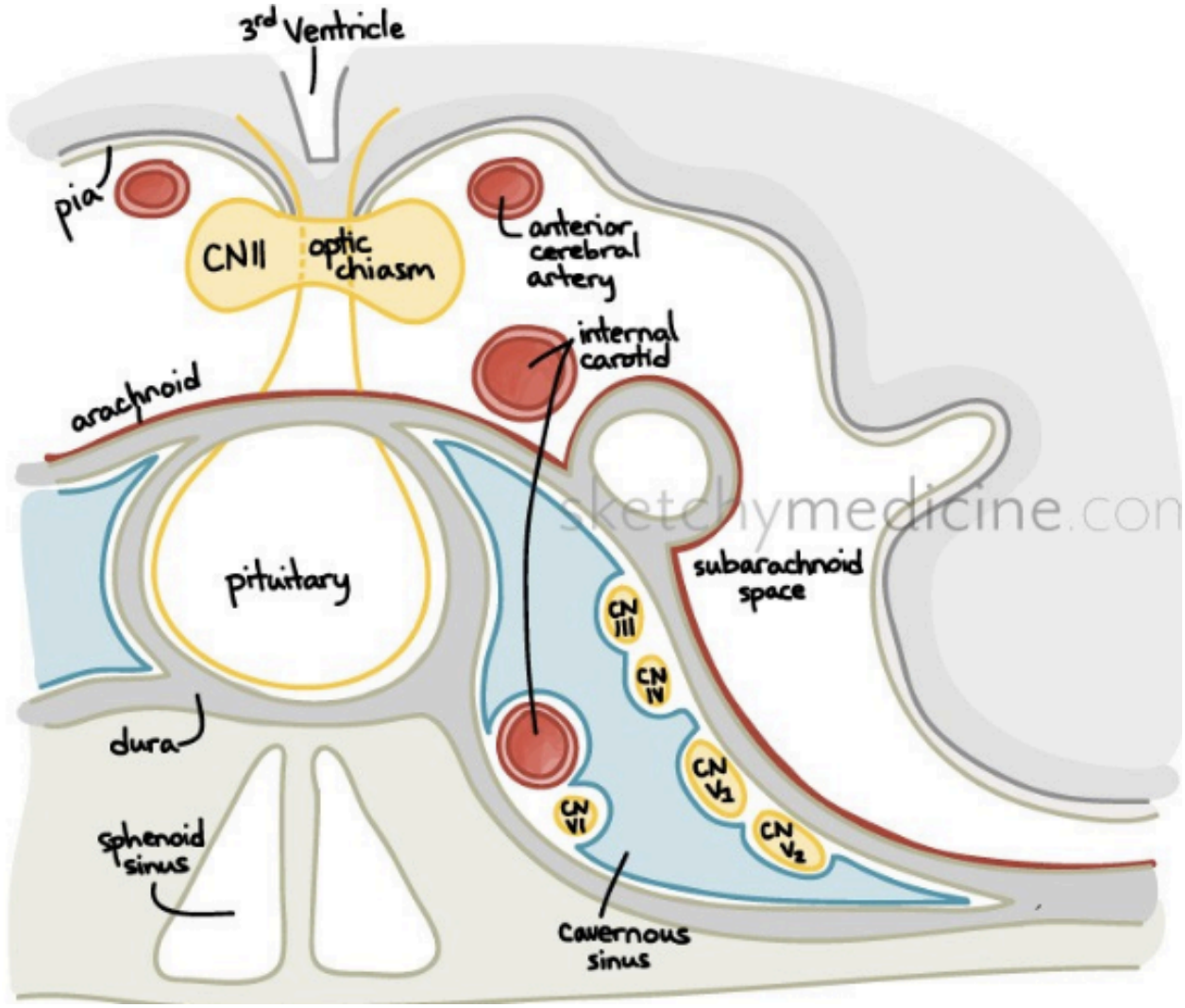
In the ventromedian parts → cells send fibres that end on the *proximal capillary* of the **hypophyseal portal system** → secrete hormones, which modulate the activity of the **adenohypophysis** hormone producing cells

- Superior hypophyseal artery → proximal capillary bed (base of hypothalamus)
- Portal veins
- Inferior capillary bed (in the adenohypophysis) → inferior hypophyseal vein

Pituitary



- ~1cm in diameter & weighs about 1 gram
- Located in the hypophyseal fossa (part of the sellae turcica of the sphenoid)



	Superior Hypothalamus & optic chiasma	
Lateral **Cavernous sinus** with internal carotid artery & several CNs	Anterior **Adenohypophysis** Posterior **Neurohypophysis** = extension of the hypothalamus via the infundibulum	Lateral **Cavernous sinus** with internal carotid artery & several CNs
	Inferior Sphenoid sinus	

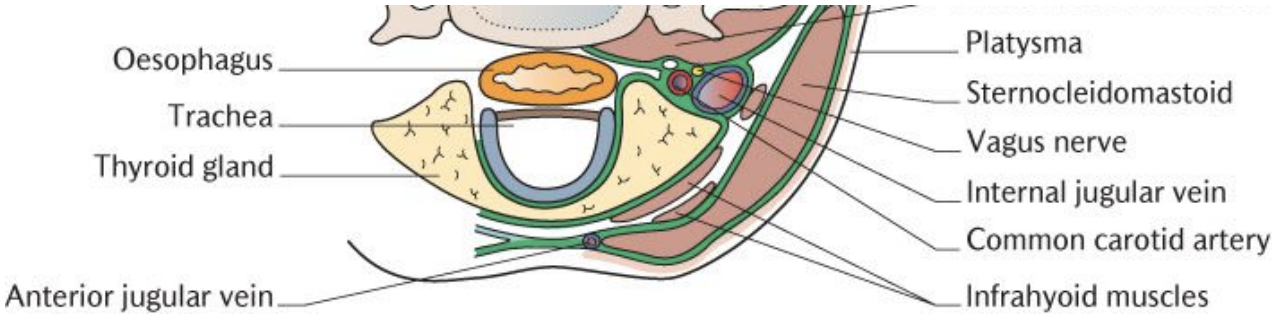
Arterial supply
Cerebral branch of the internal carotid a. → superior hypophyseal a. → adenohypophysis
Cavernous branch of the internal carotid a. → inferior hypophyseal a. → neurohypophysis

Venous drainage
Both lobes drained via hypophyseal veins → cavernous sinus → venous system

Thyroid Gland

- Located in the anterior neck region → wraps partly around the trachea (CV7)
- 2 lateral lobes connected by **isthmus**
- Surrounded by a **fibrous capsule**
- Secrete TH (T3/T4) & calcitonin

	Superior Larynx	
Posterolateral **Carotid sheath** • CCA • Internal jugular • Vagus	Anterior **Infrahyoid muscles** Posterior **4x parathyroid** Trachea Oesophagus **CV7**	Posterolateral **Carotid sheath** • CCA • Internal jugular • Vagus
	Inferior Aortic arch	



Arterial supply

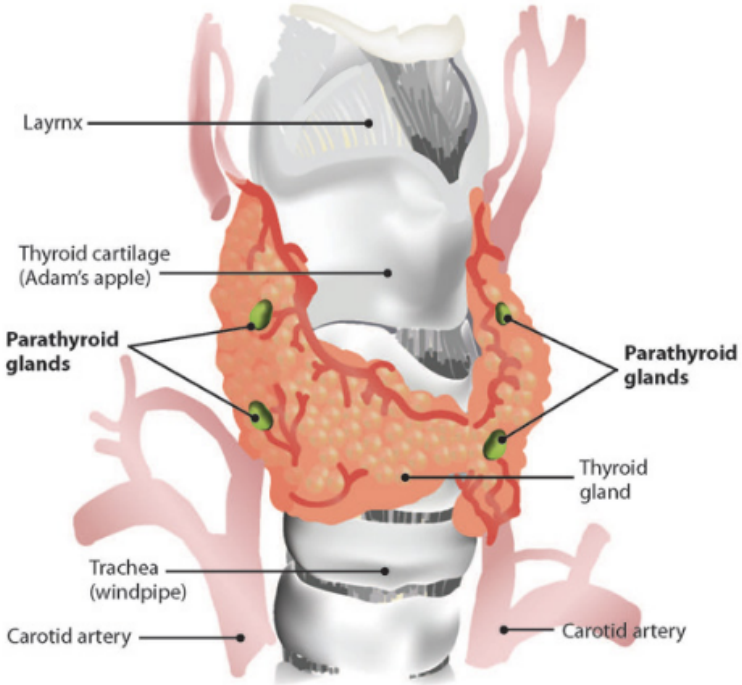
External carotid artery → superior thyroid artery
Subclavian artery → inferior thyroid artery

Venous drainage

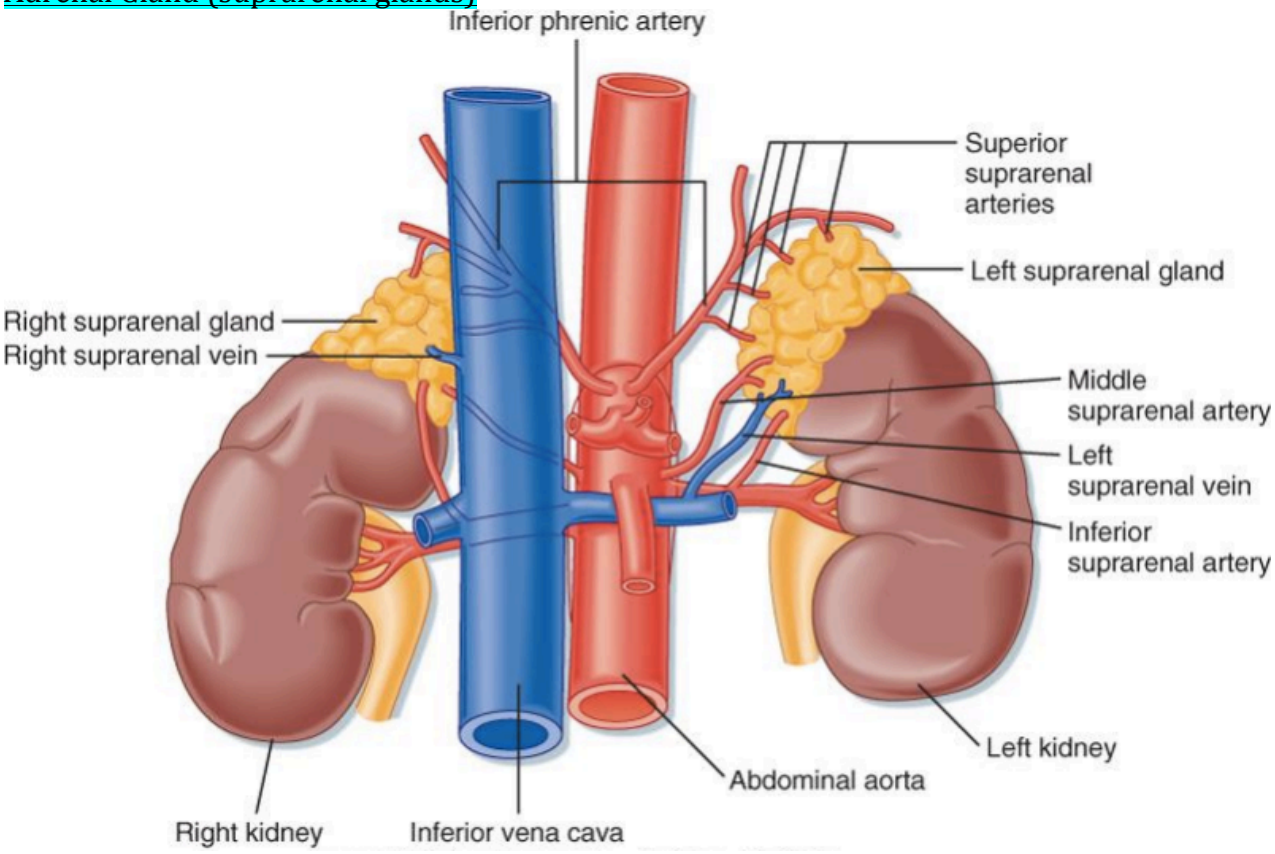
- Superior thyroid vein → IJV
- Middle thyroid vein → IJV
- Inferior thyroid vein → brachiocephalic vein

Parathyroid Glands

- 4x 3x6mm oval shaped glands embedded in the lower posterior aspect of the thyroid
  - Superior/inferior, right/left
- Secrete **PTH** (opposite effect of calcitonin → ↑ **Plasma Ca2+**)



Adrenal Gland (suprarenal glands)



- Located deep in the upper abdominal cavity → top of the superior pole of kidney
- Crescent shaped
- Surround by **fascial sheath/capsule** which separates them from the kidney
- Microscopically divided into **cortex (3 zones)** & **medulla**
  - Cortex secrete mineralocorticoids, glucocorticoids & gonadocorticoids
  - Medulla secrete adrenaline and noradrenaline

Superior Diaphragm		
Anterior (left) Pancreas Stomach	**Coeliac plexus and ganglia**	Anterior (right) Liver
Posterior Crura of the diaphragm		
Inferior Superior pole of the kidney		

Arterial supply

Each adrenal gland has 3 arteries supplying it

- Superior suprarenal artery
- Middle suprarenal artery
- Inferior suprarenal artery

Venous drainage

Each has single adrenal vein

- R. adrenal vein joins the IVC
- L. adrenal vein join the left renal vein → IVC

Nerve innervation

- Preganglionic sympathetic autonomic fibres via the **thoracic splanchnic nerves** and **coeliac plexus**

Pineal

- Single, small oval gland (5x8mm, 100-200mg) located in the midline of the superior posterior diencephalon
- Form part of the epithalamus
- Secrete **melatonin**
  - Biological rhythm
  - Onset of puberty