



SAPIENZA
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Adrenal tumors

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- The adrenal glands were first described by the Italian anatomist Bartolomeo Eustachi in 1563
- **The adrenals are among the most highly perfused organs in the body,** receiving 2000 mL/kg/min of blood, after only the kidney and thyroid. In most respects
- The **cortex** arises from the **coelomic mesodermal tissue**
- The **adrenal medulla** arises from the **ectodermal tissues** of the embryonic neural crest
 - From their original position adjacent to the neural tube, neural crest cells migrate ventrally to assume a para-aortic position near the developing adrenal cortex. There, they differentiate into chromaffin cells that make up the adrenal medulla

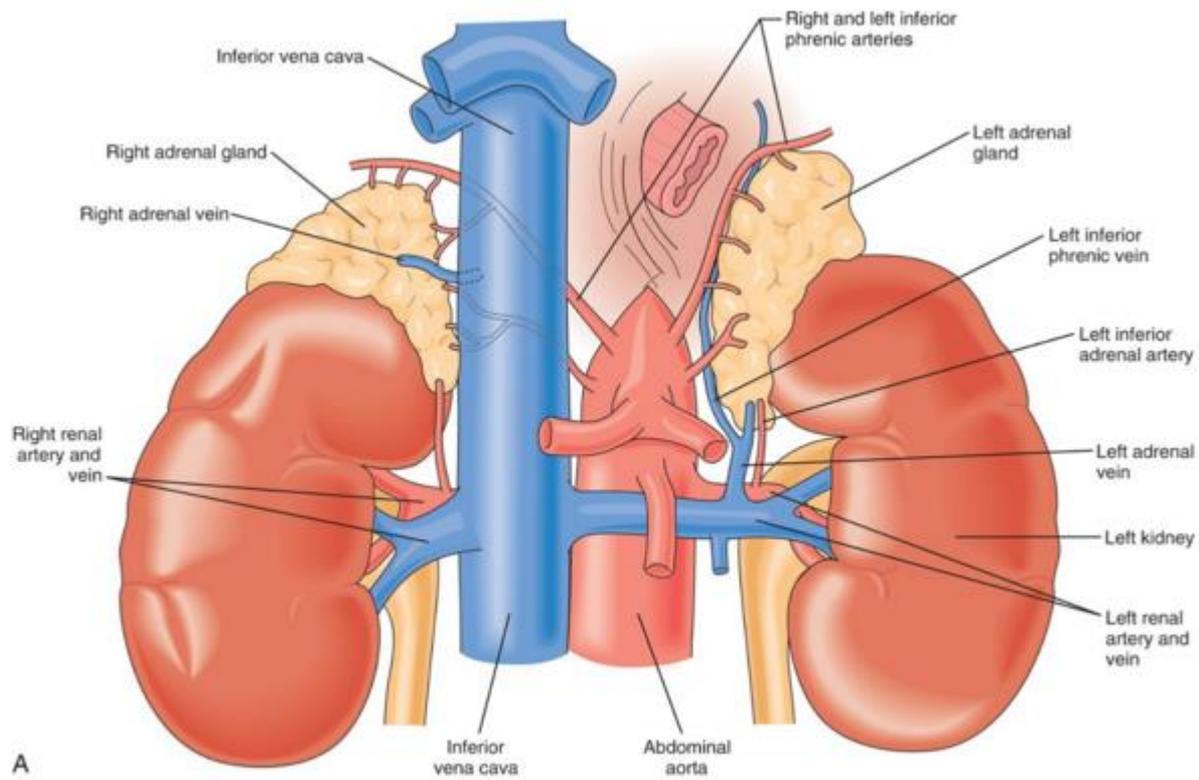
- **Both cortical and medullary tissue can be found at extra-adrenal location .** Pheochromocytomas may arise in extra-adrenal sites. When extra-adrenal, pheochromocytomas are also termed *paragangliomas*

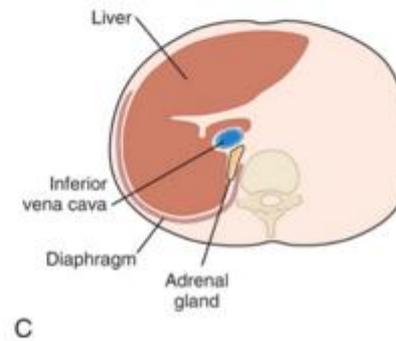
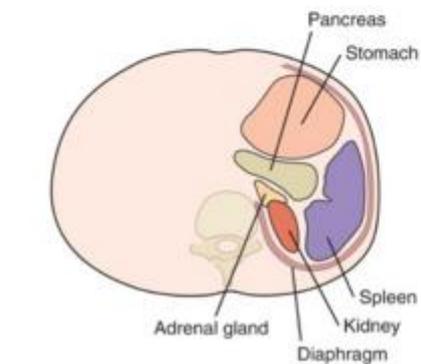
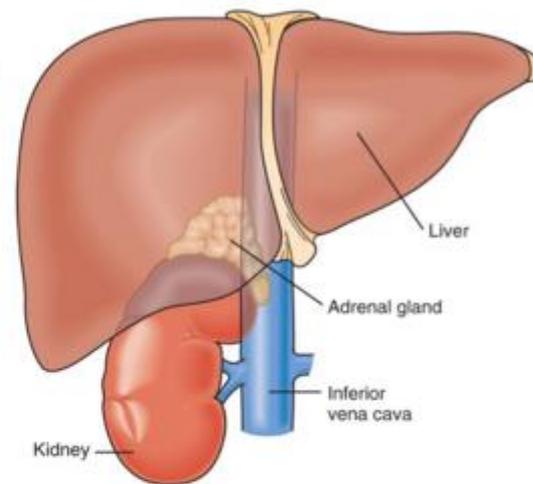
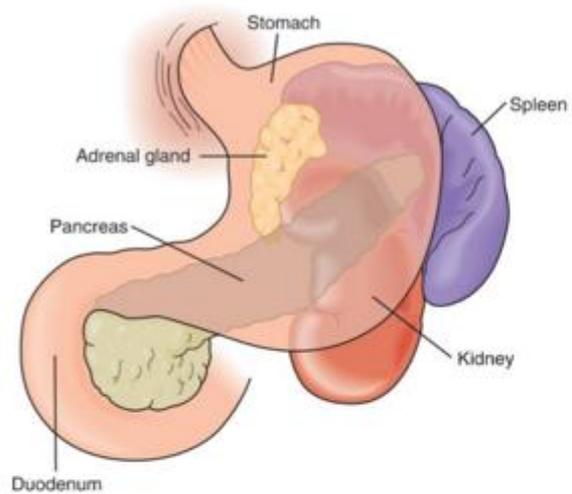
Relationship

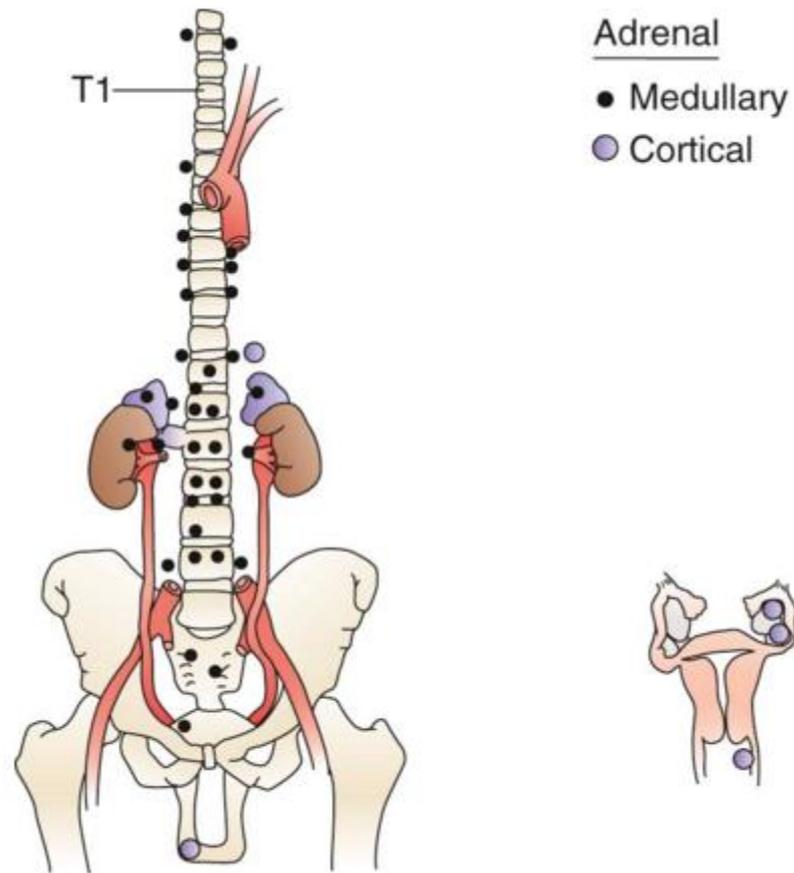
- **The right adrenal gland**
 - abuts the posterolateral surface of the retrohepatic vena cava.
 - The right adrenal fossa is bounded by the right kidney inferolaterally, diaphragm posteriorly, and bare area of the liver anterosuperiorly
- **The left adrenal gland** lies between the left kidney and aorta; the diaphragm posteriorly and the tail of the pancreas and splenic hilum anteriorly.
- **Each adrenal gland is enveloped by its proper capsule**, in addition to sharing Gerota's fascia with the kidneys

The arterial supply is diffuse while the venous drainage of each gland is usually solitary

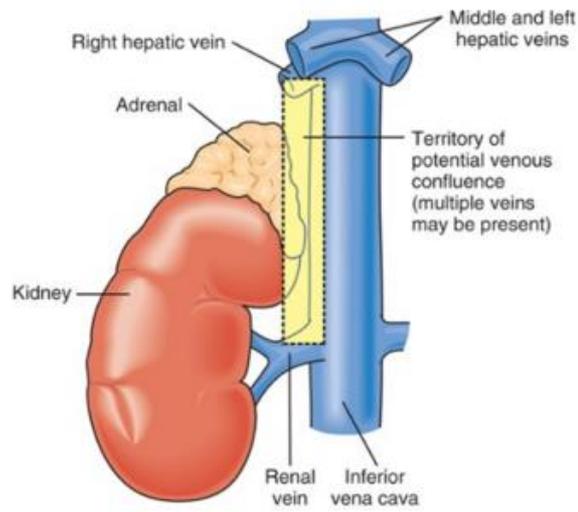
- **The arterial supply** arises from three distinct vessels
 - the superior adrenal arteries from the **inferior phrenic arteries**
 - small middle adrenal arteries from **the aorta**
 - inferior adrenal arteries from the **renal arteries**
 - Of these, the inferior is the most prominent and is commonly a single identifiable vessel
- **The left adrenal vein** is approximately 2 cm long and drains into the left renal vein
- **The right adrenal vein** is short as it is wide (0.5 cm) and drains directly into the vena cava.
- In up to 20% of cases, the **right adrenal vein** may drain into an **accessory right hepatic vein**





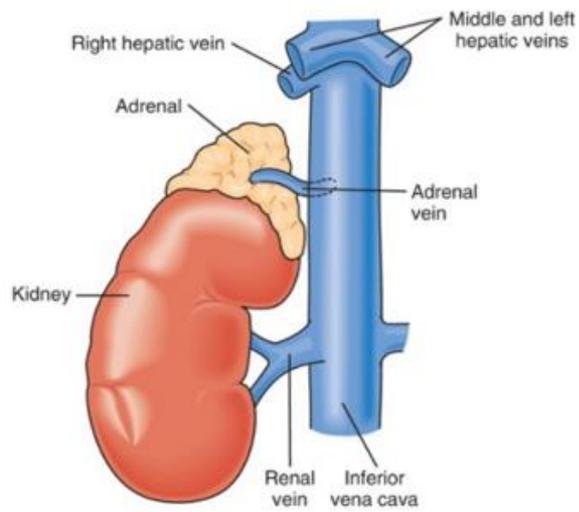


Sites of extra-adrenal cortical and medullary tissue.



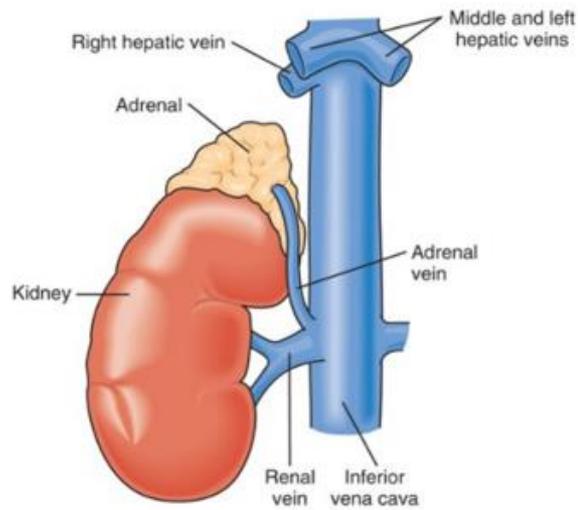
A

Territory



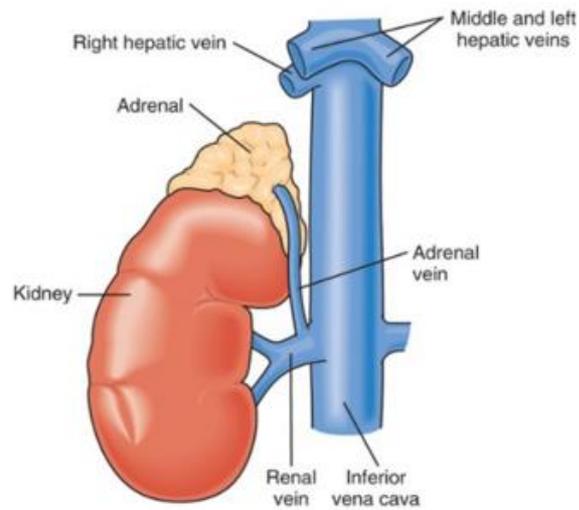
B

Normal
(single vein
directly into IVC)



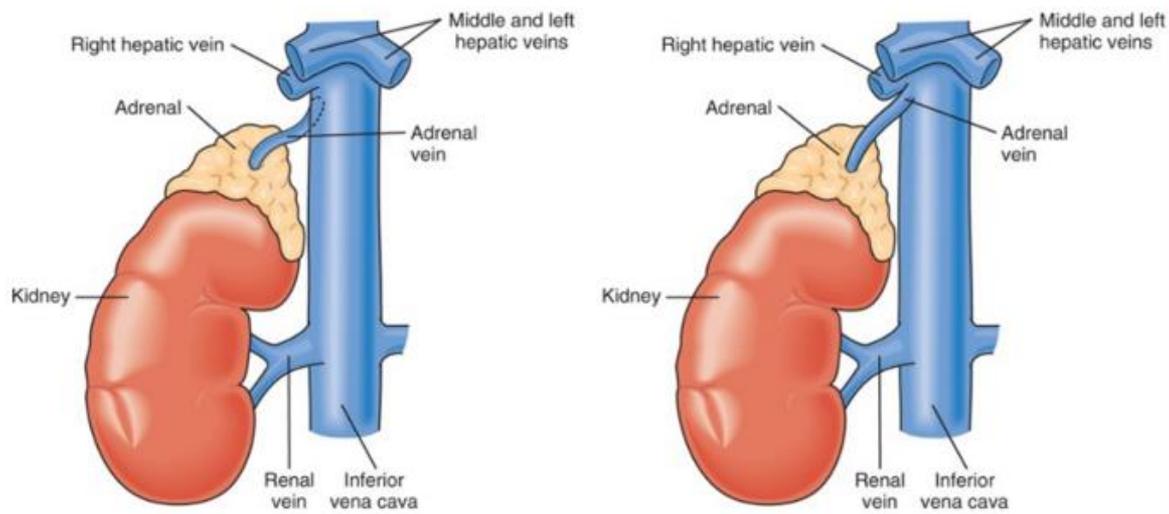
C

IVC/renal vein
"trifurcation"



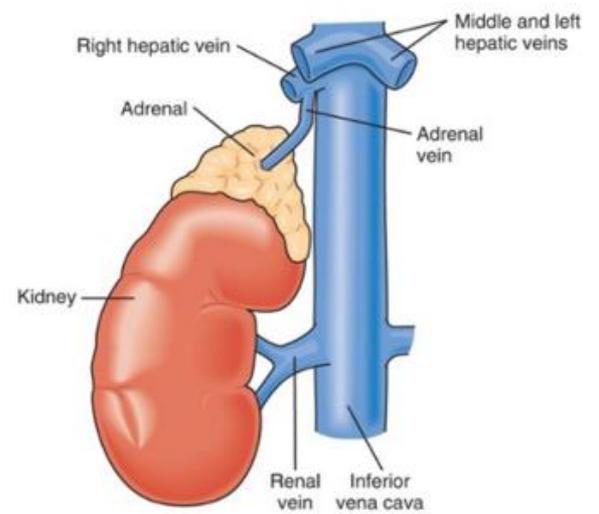
D

Renal vein
confluence



E High single vein

F IVC/right hepatic vein "trifurcation"



G Right hepatic vein confluence

Adrenal Steroid Biosynthesis

- It begins with the **transport of cholesterol** to the inner mitochondrial membrane
- **Cholesterol** undergoes a series of oxidative reactions catalyzed by the **cytochrome P450 (CYP)** family
- **Cleavage of the cholesterol** side chain yields the hormonally inactive compound **pregnenolone**, the immediate **precursor to the adrenal steroid hormones**
- **Steroid hormones:** low-molecular-weight, lipophilic signaling molecules that act by entering cells and binding to intracellular receptors
- **Hormone binding** results in **alterations in gene expression**
- **Serum levels of steroid hormones** can be altered by **pregnancy, nephrotic syndrome, and cirrhosis**



INCIDENTALLY DISCOVERED ADRENAL MASS (INCIDENTALOMA)

Epidemiology and Differential Diagnosis

- **Incidentally discovered adrenal masses** are discovered through imaging performed for unrelated non-adrenal disease
- Their existence as a clinical entity is a byproduct of advanced medical imaging
- **Incidentalomas** have been found in 2.1% of autopsies and 1% to 4% of abdominal imaging studies. The prevalence has increased to **more than 4%** in patients older than 60 years
- **The differential diagnosis** of adrenal incidentaloma is wide and includes secreting and non-secreting neoplasm
- In patients with a **history of malignancy, metastatic disease** is the most likely cause of adrenal masses

INCIDENTALLY DISCOVERED ADRENAL MASS (INCIDENTALOMA)

Epidemiology and Differential Diagnosis

- In those without a clear history of malignancy, at least 80% of incidentalomas will turn out to **be nonfunctioning cortical adenomas** or other benign lesions, which do not require surgical management
- Thus, in most patients, the most important aspect of management is to distinguish the subset of adrenal masses that are likely to have a clinical impact from the large proportion that are not.