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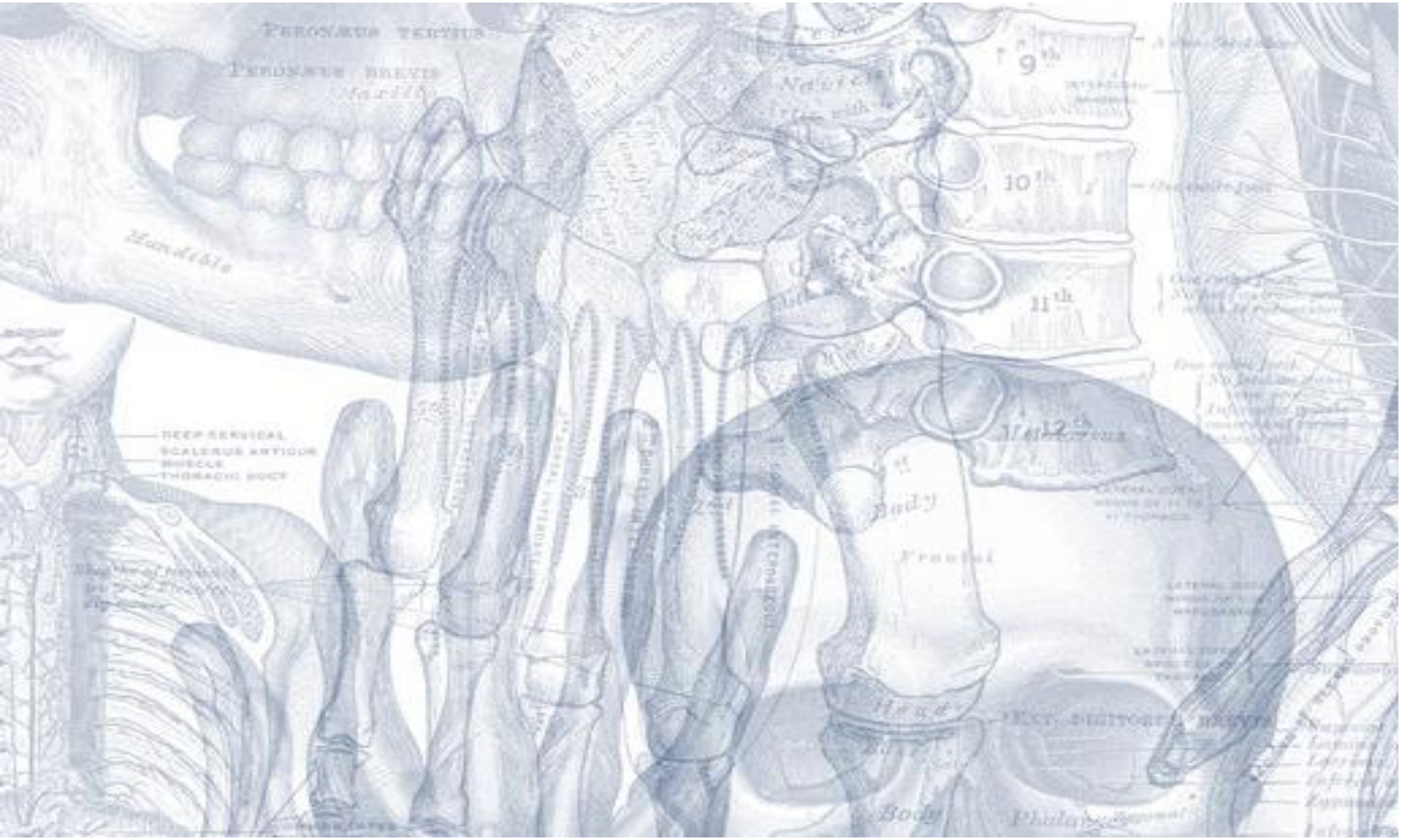


ANATOMY
TEAM 436

436
MEDICINE
KING SAUD UNIVERSITY

تمت المراجعة
شوق الأحمري & عبدالعزيز العنقري

Anatomy of Adrenal Glands

Please view our Editing File before studying this lecture to check for any changes.

Color Code

- **Important**
- **Doctors Notes**
- **Notes/Extra explanation**

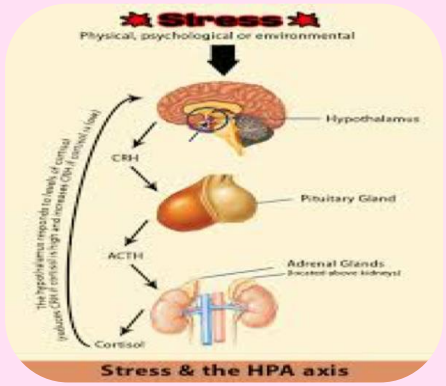
Objectives

At the end of the lecture, the students should be able to describe the:

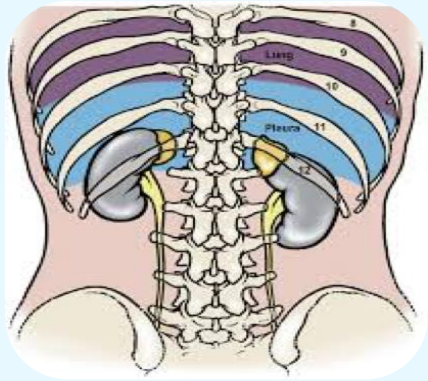
- ✓ Location, shape and relations of the right and left adrenal glands.
- ✓ Blood supply, lymphatic drainage and nerve supply of right and left adrenal glands
- ✓ Parts of adrenal glands and function of each part.
- ✓ Development of adrenal gland and common anomalies.

This objective (and its corresponding slides) will be covered by the Embryology team.

Suprarenal gland (also called adrenal gland: الغدة الكظرية)



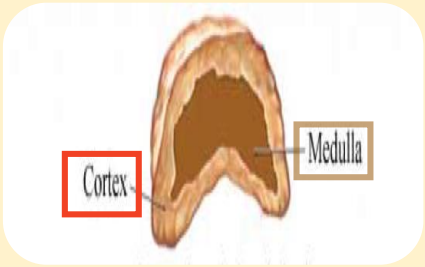
The **suprarenal (adrenal) gland** is a component of the *hypothalamic-pituitary-suprarenal axis* also called "stressed axis " that is responsible for coordinating **stress response** and **metabolism**.



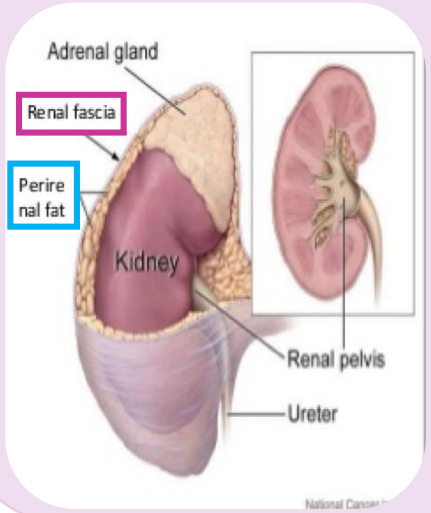
They are **yellowish retroperitoneal*** organs that lie on the upper poles of the kidneys, At the level of the last thoracic vertebra (**T12**) The kidney extends from T12 to L3.

* retroperitoneal: lying posterior to the peritoneum (covers it anteriorly only)

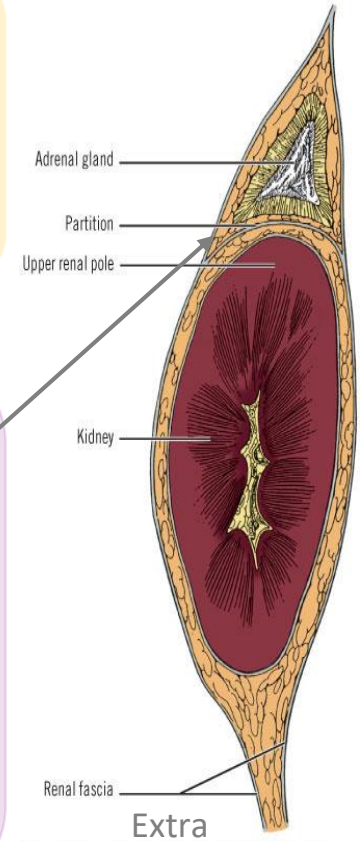
Suprarenal gland (also called adrenal gland: الغدة الكظرية)



Each gland has an outer yellow **cortex** and an inner dark brown **medulla.**



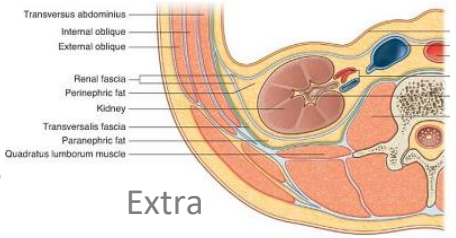
- The suprarenal gland is enclosed within the renal fascia with the kidney but in a **separate compartment**, that allow the two organs to be separated easily during surgery*.
- It is separated from the kidney by the **perirenal fat****



Extra

*يعني الجراح لما يشتغل على الكلى ما راح يأثر على الغدة والعكس صحيح لان كل وحد في حجرة منفصله

**recall the kidney is covered by 4 layers: capsule, perirenal fat, renal fascia, pararenal fat.

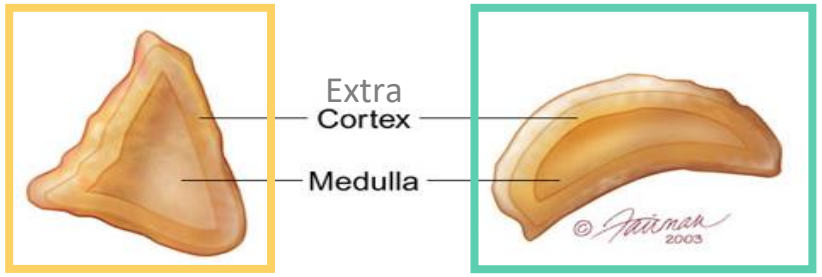


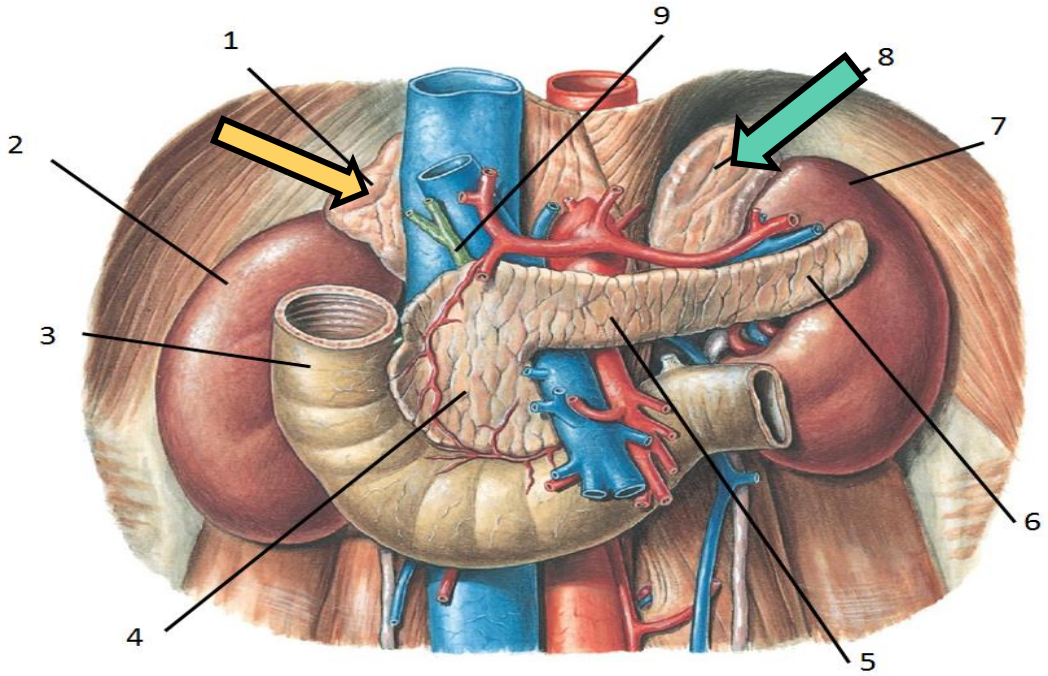
Extra

Right and Left Suprarenal Glands

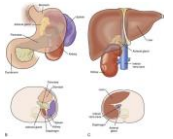
*The relations are always important.
Anatomy = relations.

		Right Suprarenal Gland	Left Suprarenal Gland
Shape		**pyramidal** (or triangular) shape	**crescentic** (هلالي) or semilunar shape
Location		Caps* the **upper pole** of the right kidney. So it is at the level of **T12** *صايره زي القبعه فوق الكليه	Extends along the medial border of the left kidney from the **upper pole** to the **hilus**. Its level is from **T12 to L2**
*Relations**	*Anterior*	1. **Right** lobe of liver 2. Inferior vena cava	1. Pancreas 2. Lesser sac 3. Stomach *It is a part of the stomach bed*
	Posterior	Diaphragm	Diaphragm
	Medial	Celiac plexus and ganglia	Celiac plexus and ganglia





A really nice picture showing the relations →

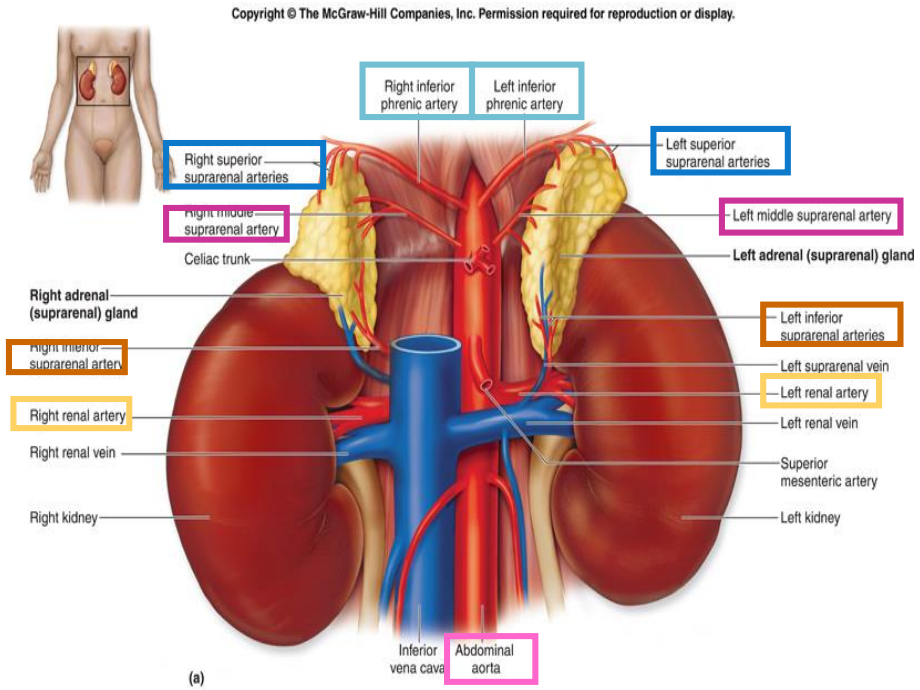


Suprarenal Glands: **Supply**

Arterial blood supply: **IMPORTANT**

- The arteries supplying each gland are **three** in number:
  1. Superior suprarenal from inferior phrenic artery.
  2. Middle suprarenal from abdominal aorta
  3. Inferior suprarenal from renal artery.

The inferior phrenic and renal arteries are branches of the abdominal aorta.
The inferior phrenic is paired on each side and supplies the diaphragm mainly.

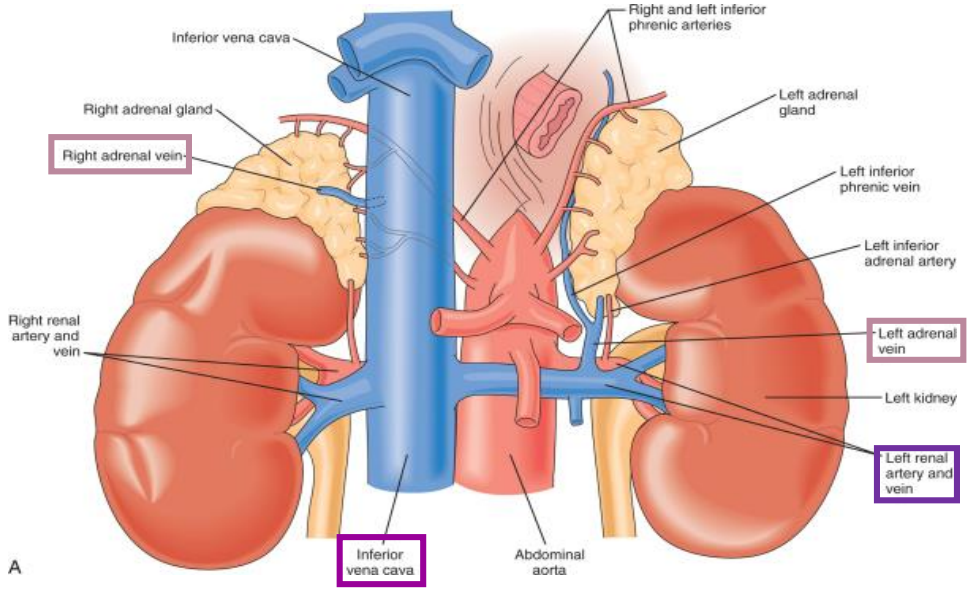


Venous Drainage: **IMPORTANT** (right vs left)

- A **single vein** (adrenal vein) emerges from the hilum of each gland and drains into :
  - the inferior vena cava (directly) on the **right** side and
  - the left renal vein (then to the IVC) on the **left** side.

Right adrenal vein → inferior vena cava
Left adrenal vein → left renal vein → inferior vena cava

On the left side the renal vein receives left suprarenal vein and left gonadal vein.
While on the right side the right suprarenal and right gonadal immediately drain into inferior vena cava



Suprarenal Glands:

Supply

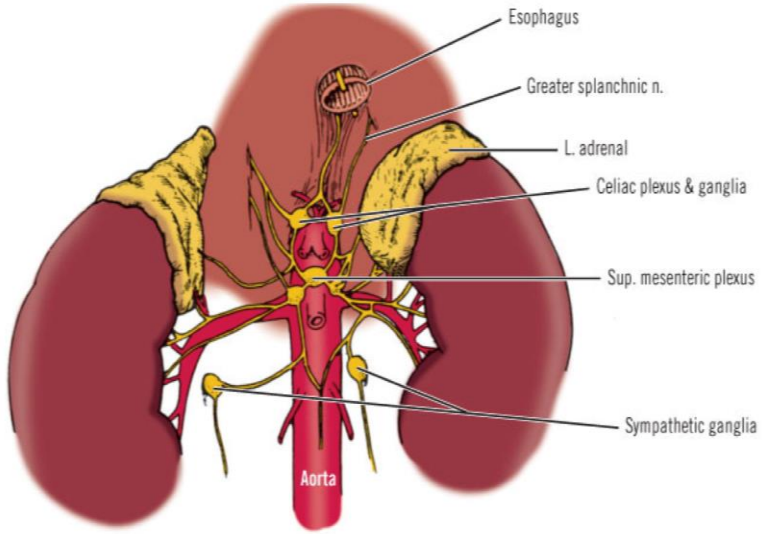
Nerve supply

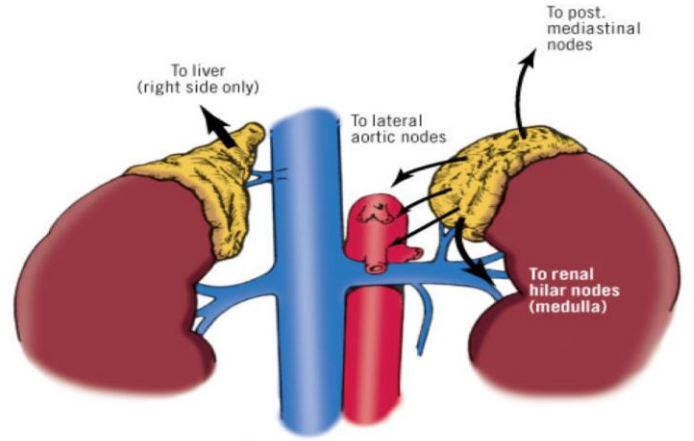
- **Preganglionic sympathetic** fibers derived from the **splanchnic** nerves supply the glands
- Most of the nerves (postganglionic) end in the medulla of the gland.

Lymph Drainage

- The lymph drains into the **lateral aortic*** lymph nodes.

*Also called paraaortic or lumbar lymph nodes.



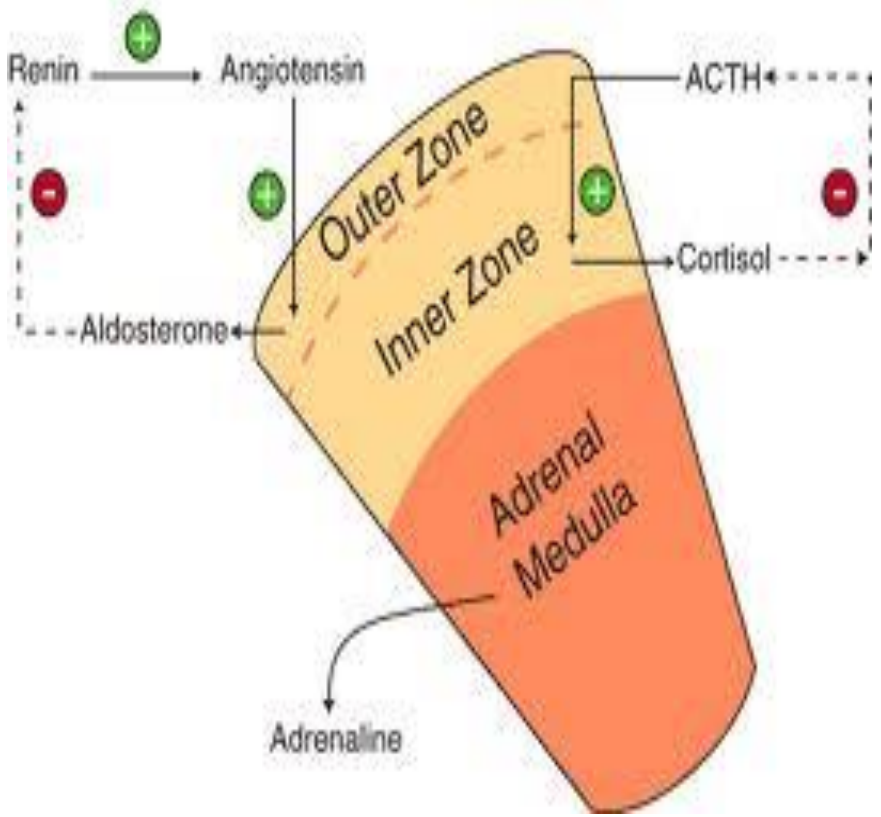


Suprarenal Glands

Function

- The Cortex of the suprarenal glands secretes hormones that include: related to metabolism
  - **Mineral corticoids**, which are concerned with the control of **fluid and electrolyte balance**
  - **Glucocorticoids**, which are concerned with the control of the **metabolism** of carbohydrates, fats, and proteins
  - Small amounts of **Sex hormones**, which probably play a role in the **prepubertal development** of the sex organs.

- The Medulla (related to stress) of the suprarenal glands secretes the **catecholamines: epinephrine and norepinephrine**



SUMMARY

<table>
<tr><th colspan="4">Adrenal gland</th></tr>
<tr><td colspan="4">• retroperitoneal.
• At the level of the last thoracic vertebra (T12).
• Enclosed within the renal fascia.</td></tr>
<tr><td></td><td colspan="2">Right suprarenal gland</td><td>Left suprarenal gland</td></tr>
<tr><td>Shape</td><td colspan="2">Pyramidal</td><td>Crescentic</td></tr>
<tr><td>Location</td><td colspan="2">Caps upper pole of the right kidney</td><td>Along the medial border from upper pole to hilus</td></tr>
<tr><td rowspan="3">Relation</td><td>Anterior</td><td>1. right lobe of liver
2. IVC</td><td>1. Pancreas
2. Lesser sac
3. Stomach</td></tr>
<tr><td>Posterior</td><td colspan="2">diaphragm</td></tr>
<tr><td>inferior</td><td colspan="2">celiac plexus & ganglia</td></tr>
<tr><td>Blood supply</td><td colspan="3">1. Superior suprarenal from inferior phrenic artery.
2. Middle suprarenal from abdominal aorta
3. Inferior suprarenal from renal artery.</td></tr>
<tr><td>Lymph drainage</td><td colspan="3">Lateral aortic lymph nodes.</td></tr>
<tr><td>Venous drainage</td><td colspan="2">Right adrenal vein drain into IVC</td><td>Left adrenal vein drain into left renal artery</td></tr>
<tr><td>Nerve supply</td><td colspan="3">Preganglionic sympathetic fibers from splanchnic nerve</td></tr>
</table>

MCQ

1. The hypothalamic--pituitary-- suprarenal axis is responsible for :

A. Control stress
B. Control stress and metabolism
C. Control lipid digestion
D. Control metabolism

2. The suprarenal gland is :

A. Greenish retroperitoneal
B. Reddish retroperitoneal
C. Brown retroperitoneal
D. Yellowish retroperitoneal

3. The suprarenal gland is at the level of :

A. T11
B. T12
C. L1
D. L2

4. The supra renal gland is separated from the kidney by:

A. Adrenal fascia
B. Renal fascia
C. Peritoneal fat
D. Perirenal fat

5. The right supra renal gland is:

A. Square in shape
B. Circular in shape
C. Crescentic in shape
D. Pyramidal in shape

6. Which of the following is anterior to the Right supra renal :

A. Pancreas
B. Diaphragm
C. Celiac plexus
D. Inferior vena cava

7. Which of the following play a role in the prepubertal development of sex organs?

A. Mineral corticoids
B. Glucocorticoids
C. Sex hormones

8. Nerve fibers that are supplying the adrenal gland are :

A. Preganglionic sympathetic
B. Postganglionic sympathetic
C. Preganglionic parasympathetic

9. Superior suprarenal artery is a branch of?

A. Superior phrenic artery
B. Inferior phrenic artery
C. Abdominal aorta

10. A lesion in the left renal vein may affect which of the following vinous drainage :

A. Left suprarenal gland
B. Right suprarenal gland
C. Both

11. Lymphatic drainage of adrenal glands :

A. Lateral Aortic lymph nodes
B. Lumbar lymph nodes
C. both

Answers:

1:B, 2:D, 3:B, 4:D, 5:D, 6:D 7: C, 8: A, 9: B, 10: A, 11: C

SAQ

1) What is the vertebral levels of each suprarenal gland?

- The right suprarenal gland: 12 thoracic
- The left suprarenal gland: T12 – L2

2) Identify the relations of right suprarenal gland:-

- Anterior : Right lobe of liver + inferior vena cava
- Posterior : Diaphragm
- Medial : celiac plexus and ganglia

3) Define the arterial supply of the adrenal glands, and the origin of each one :-

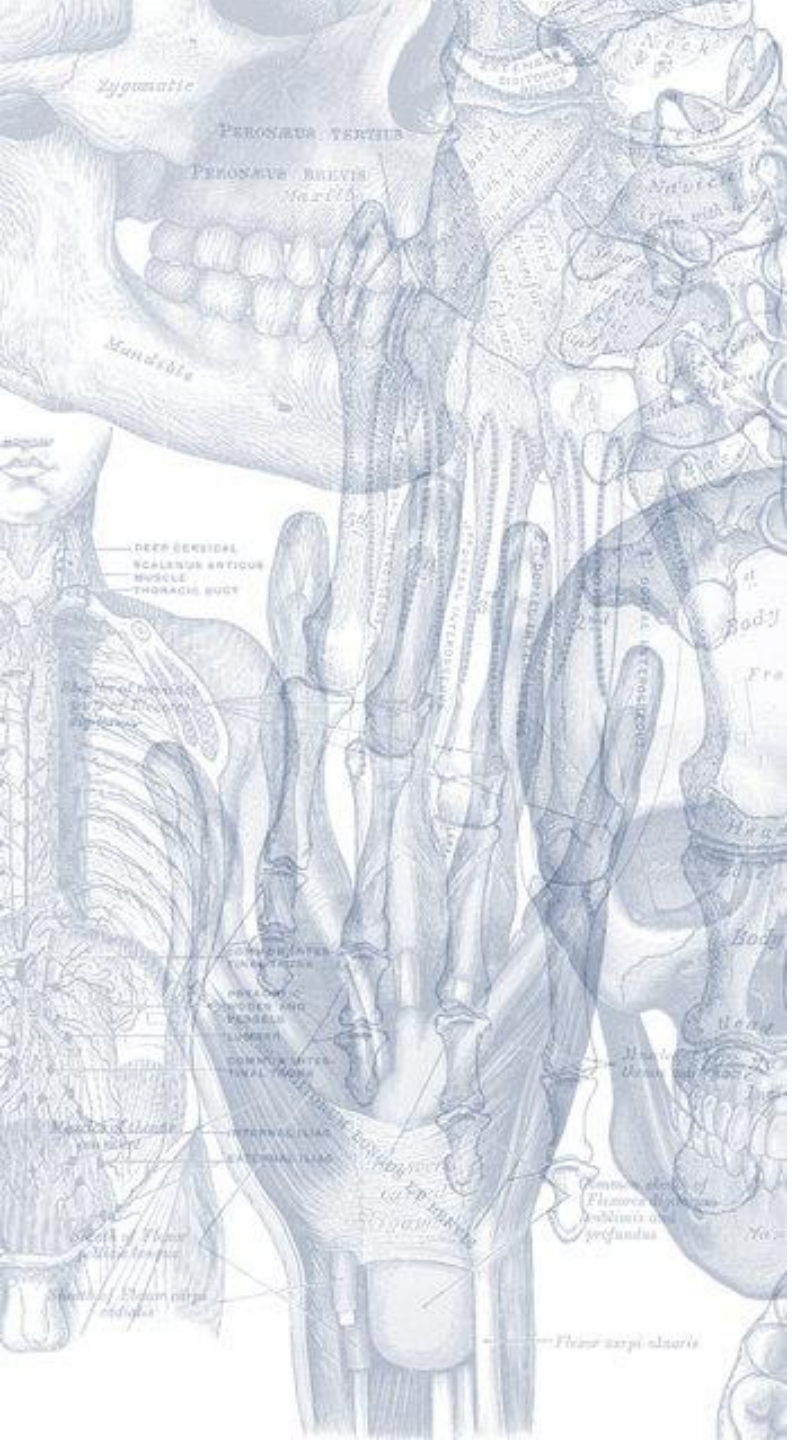
- Three arteries
  - Superior suprarenal artery from inferior phrenic
  - Middle suprarenal artery from abdominal aorta
  - Inferior suprarenal artery from renal artery

4) Describe the Venous drainage of adrenal glands :-

- Single vein in each gland, emerge from the hilum of each gland.

The right **adrenal vein** drains into the inferior vena cava

The left **adrenal vein** drains into the left renal vein



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3- TeachMeAnatomy.com