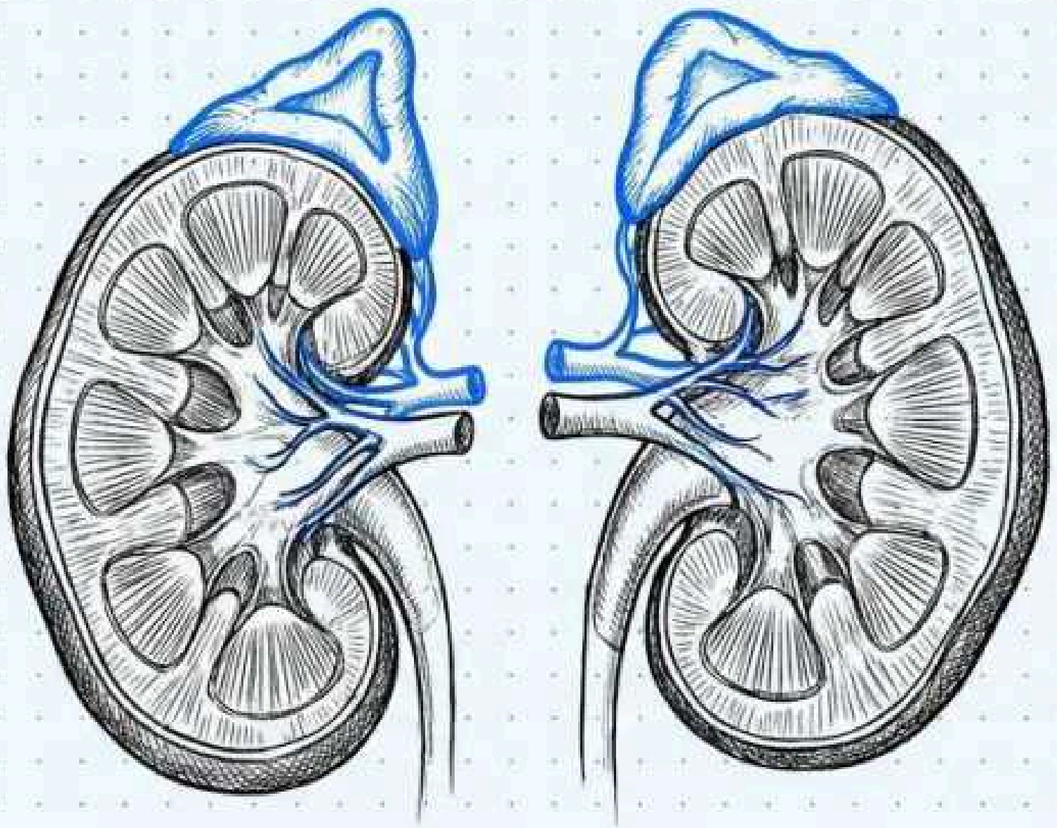
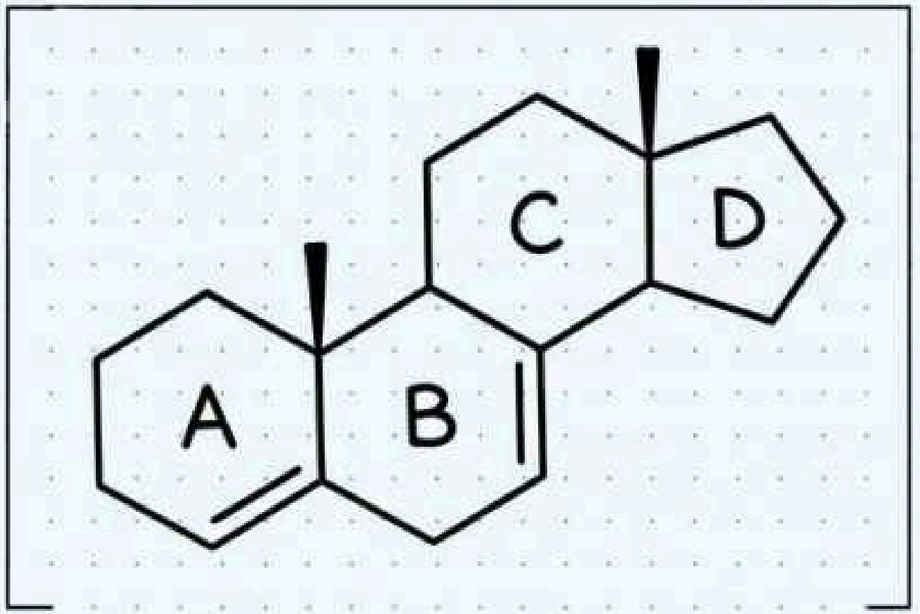





# MED 531 B Lecture 3: The Adrenal Glands

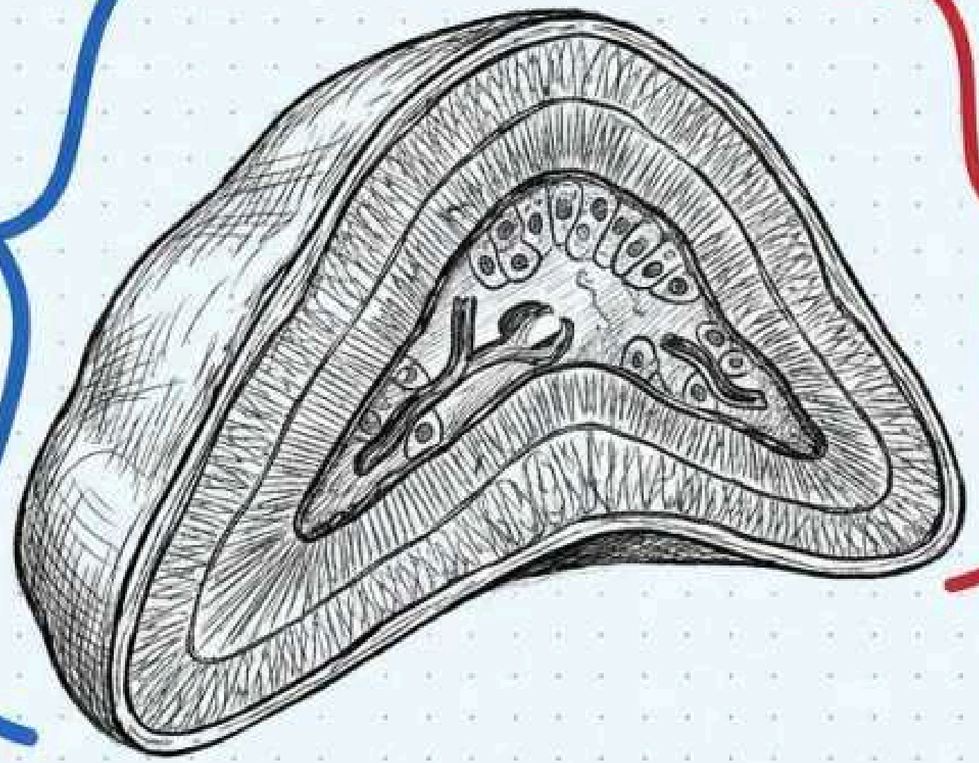
## A Clinical Overview of the Adrenal Cortex & Medulla

# ¶ 3.1

Outer Cortex: Makes Steroid Hormones

↓

Cortisol, Aldosterone, small amounts of Sex Hormones

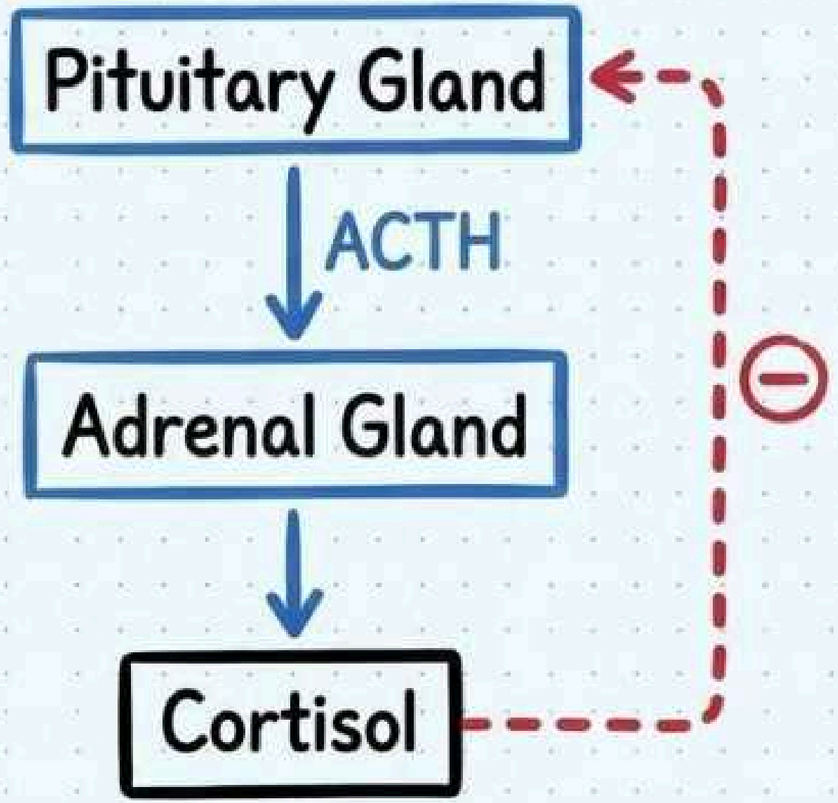


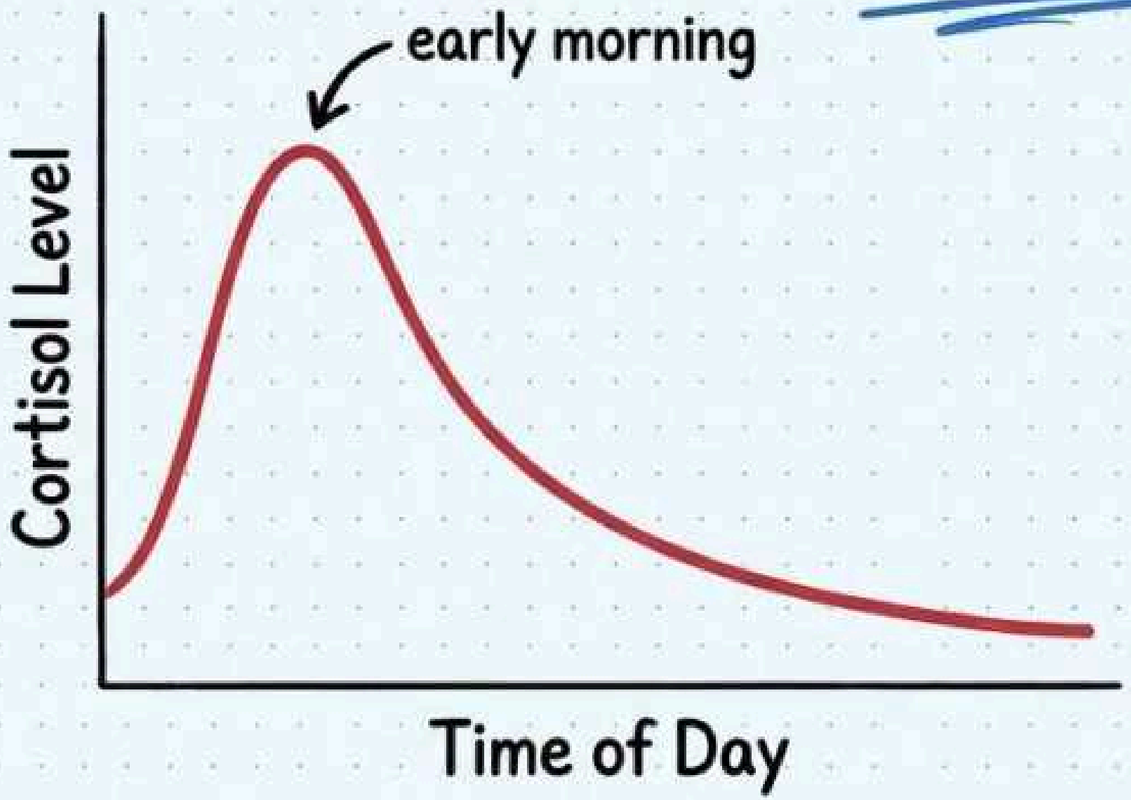
Inner Medulla: Fight-or-Flight Response

↓

Adrenaline and Noradrenaline

# ¶ 3.2




**Baseline Functions:**

- ↑ Blood sugar
- Maintains Blood Pressure

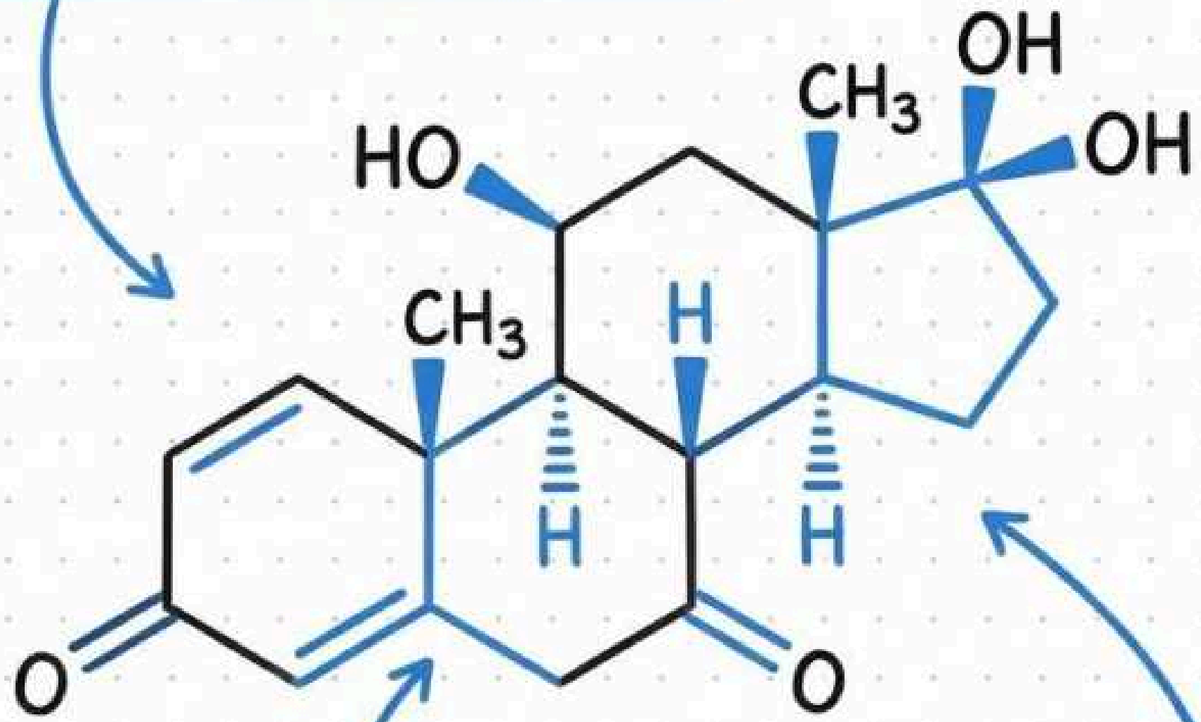
↓ Inflammation / Immune responses

Stress Response: Sharp spike during serious illness or injury to help the body cope.

# ¶ 3.3

**Drug Class**: Synthetic versions of cortisol (Corticosteroids / Steroids).

**Example**: Prednisolone.







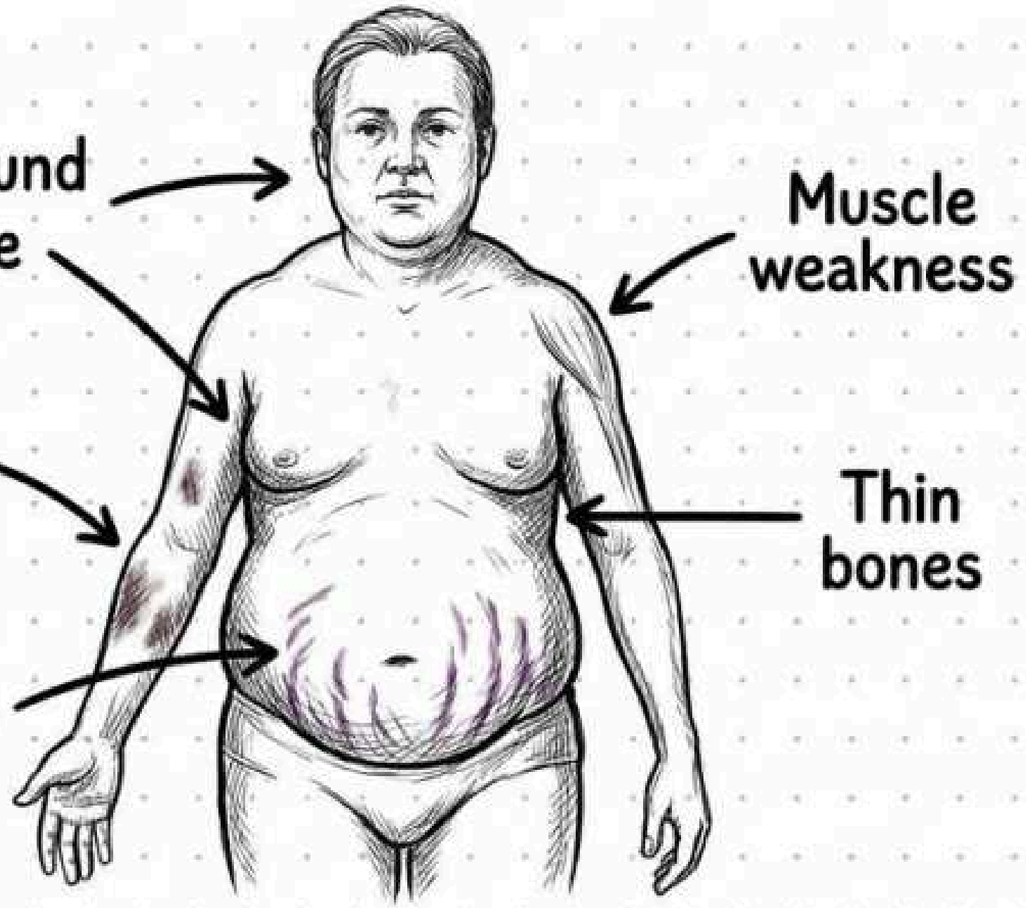
**Milestone**: 1950 Nobel Prize awarded to Philip Hench and colleagues after cortisone transformed rheumatoid arthritis treatment.

**Mechanism**: Powerfully suppress inflammation.

**Indications**: Asthma, Arthritis, Inflammatory Bowel Disease (IBD).

# Cushing's Syndrome (Excess Cortisol)

¶ 3.4




**Systemic**

- High blood pressure
- Diabetes
- Mood changes

**Etiology Matrix (Causes):**

1. Long-term steroid medication (Commonest by far)
2. Cushing's Disease (Pituitary tumor releasing excess ACTH)
3. Adrenal tumors

# The Brake

¶ 3.5




## Mechanism

Long-term steroid treatment completely suppresses natural cortisol production via feedback.

## The Danger

If tablets stop suddenly

→ Adrenal glands cannot respond

→ Patient becomes dangerously unwell.

## Clinical Rule

Steroids taken for > few weeks MUST be reduced gradually under medical guidance.

# Adrenal Insufficiency & Addison's Disease (Too Little Cortisol)

¶3.6

## General Insufficiency Symptoms

↓ Energy (Tiredness)

↓ Weight

↓ Blood pressure

Salt craving

## Addison's Disease (Specific)



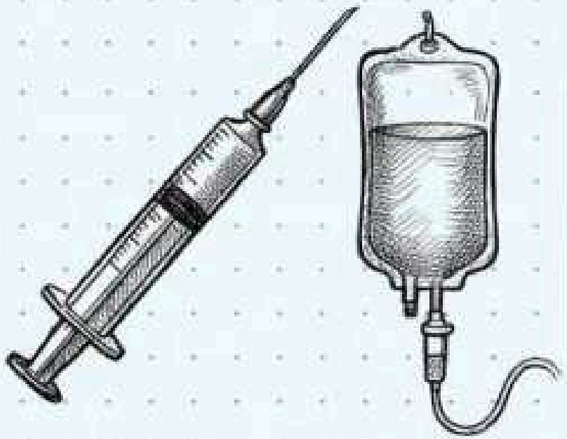
1855

Occurs when adrenal glands fail directly, usually via autoimmune destruction.

**Differentiating Feature:**
Addison's uniquely causes darkening (hyperpigmentation) of the skin.

# THE CRISIS

Severe illness, vomiting, or injury + Inability to make cortisol = Collapse, very ↓ BP, Death.



## IMMEDIATE Tx

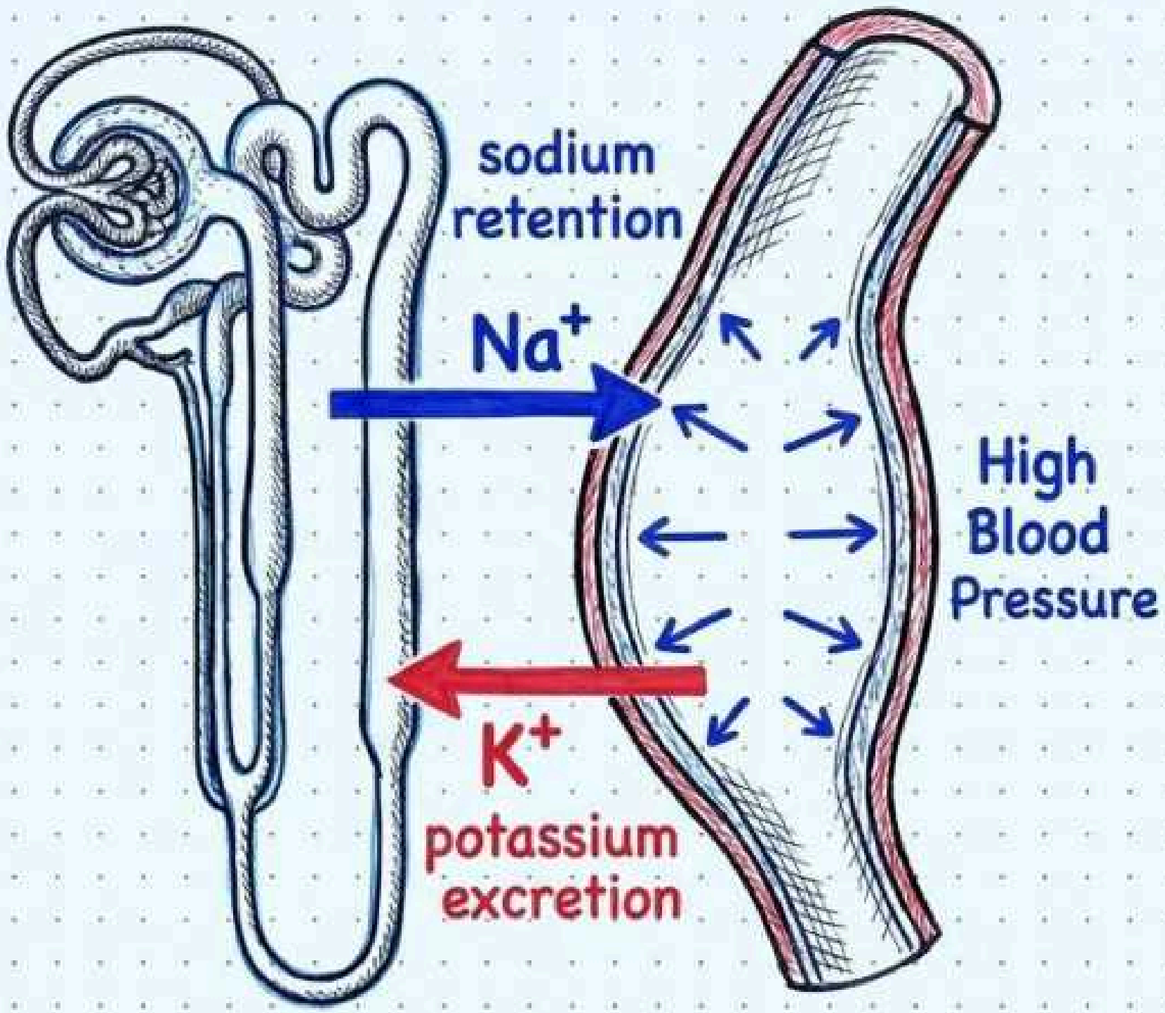
Urgent injected hydrocortisone + IV fluids.

## Daily Management Protocol (Patient Rules)

1. Take daily replacement. 
2. Sick Day Rules: Increase dose when ill. 
3. Always carry emergency injection & medical ID card/bracelet.



# ¶ 3.8




## Normal Physiology

Aldosterone retains sodium and excretes potassium → raises blood pressure.

## Pathology (Primary Aldosteronism)

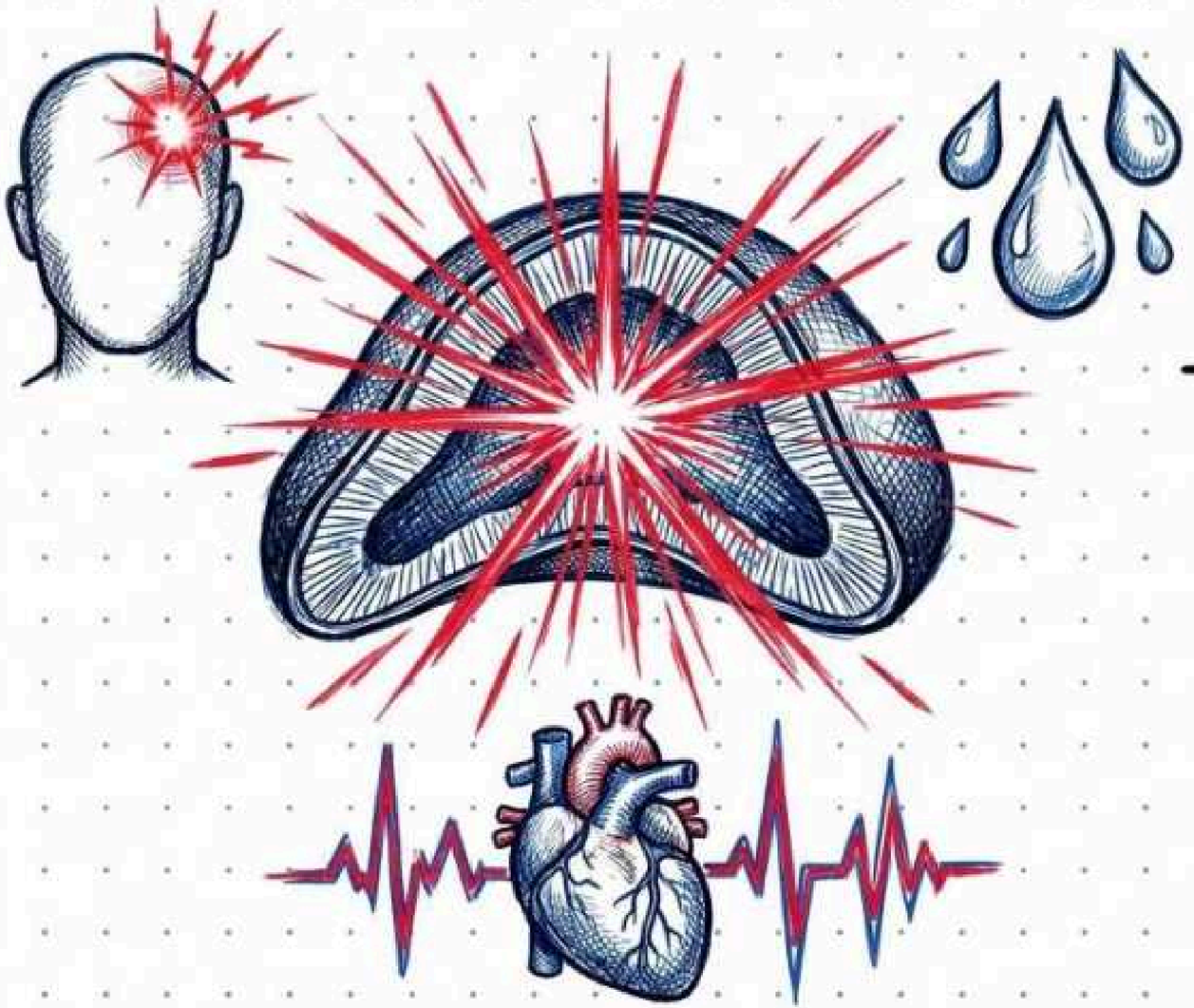
Excess aldosterone, usually from an adrenal nodule or overactivity of both glands.

## Clinical Flag

Hard-to-control high blood pressure (sometimes accompanied by ↓potassium). Much more common than once thought; warrants testing.

# Phaeochromocytoma
## (Adrenal Medulla Tumor)

¶ 3.9

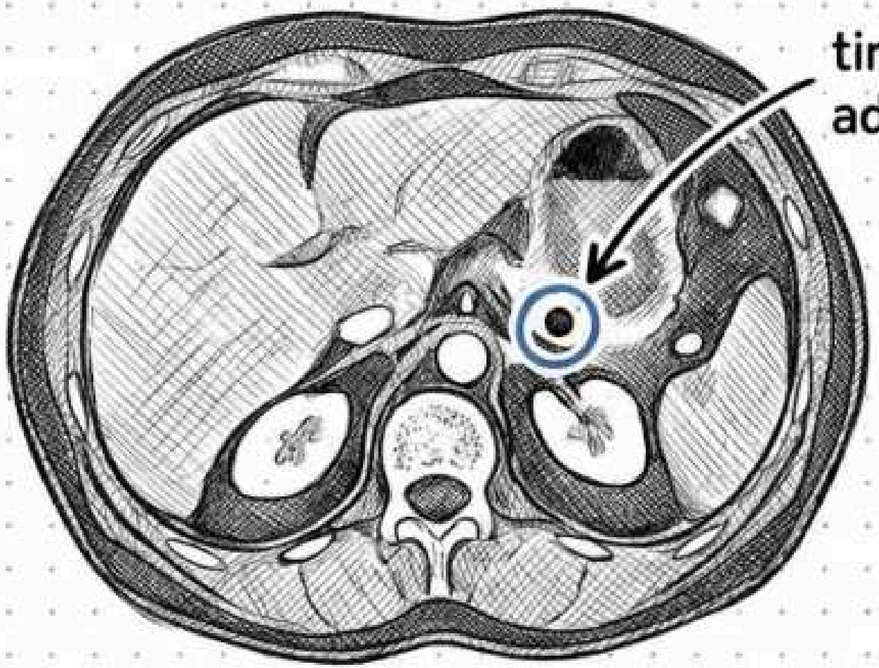


**Mechanism:**
Releases sudden bursts of adrenaline and noradrenaline.

**Episodic Triad:**
Pounding headache, Sweating, Racing heart + Very High BP.

**Diagnosis:**
Measuring hormone breakdown products in blood or urine.

**Treatment:** Surgery (Requires careful pharmacological blockade preparation first).




**Definition: Incidentalomas.**

Small lumps found accidentally on scans for other reasons; present in a few percent of adults; mostly harmless.

Does it make excess hormones? → Yes

No ↓

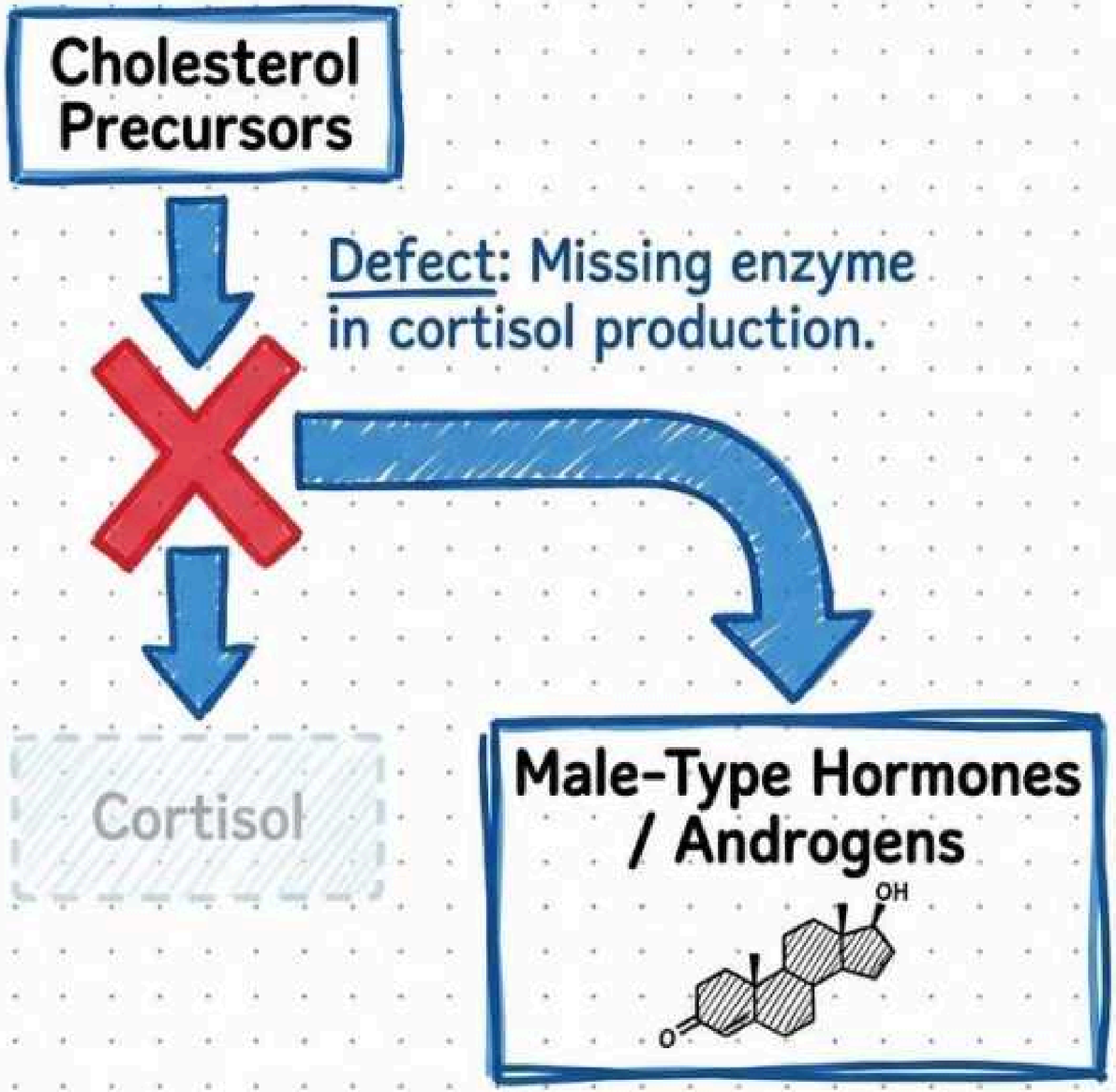
Does it have features suggesting cancer? → Yes

No ↓

**Goal:** Avoid unnecessary surgery for the vast majority that do neither.

# Congenital Adrenal Hyperplasia (CAH)

¶ 3.11




**Resulting Cascade**

Build-up is diverted to male-type hormones.

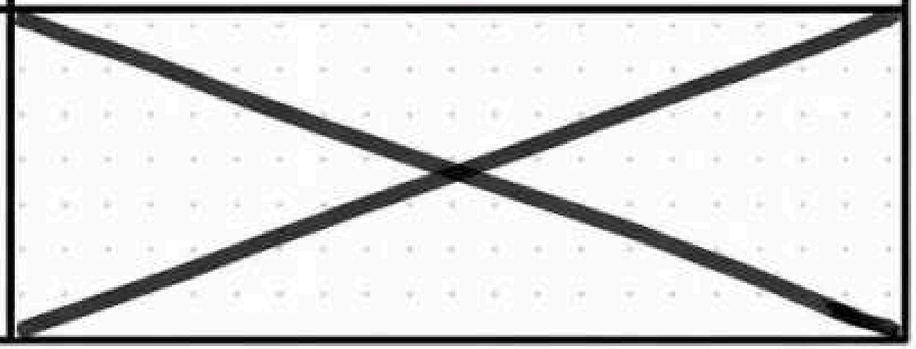
**Impacts**

Affects genital development in girls. Some forms cause dangerous salt loss in newborns.

**Action**

Routinely screened for at birth in many countries.

# ¶ 3.12

| | Excess | Deficit |
|---|---|---|
| **Cortex** | Cortisol → Cushing's Syndrome<br>Aldosterone → Primary Aldosteronism | Cortisol → Addison's Disease / Adrenal Crisis (Emergency) |
| **Medulla** | Adrenaline → Phaeochromocytoma |  |

**Every doctor must recognize adrenal crisis as a true emergency.**

→ Next lecture → Diabetes (the commonest endocrine disease)