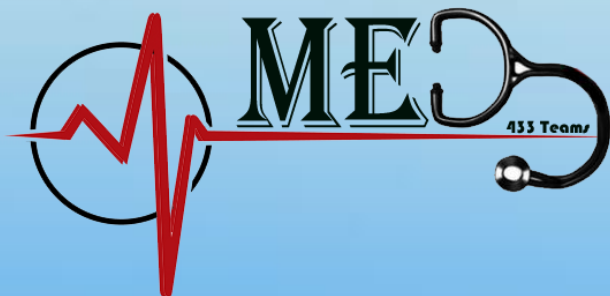
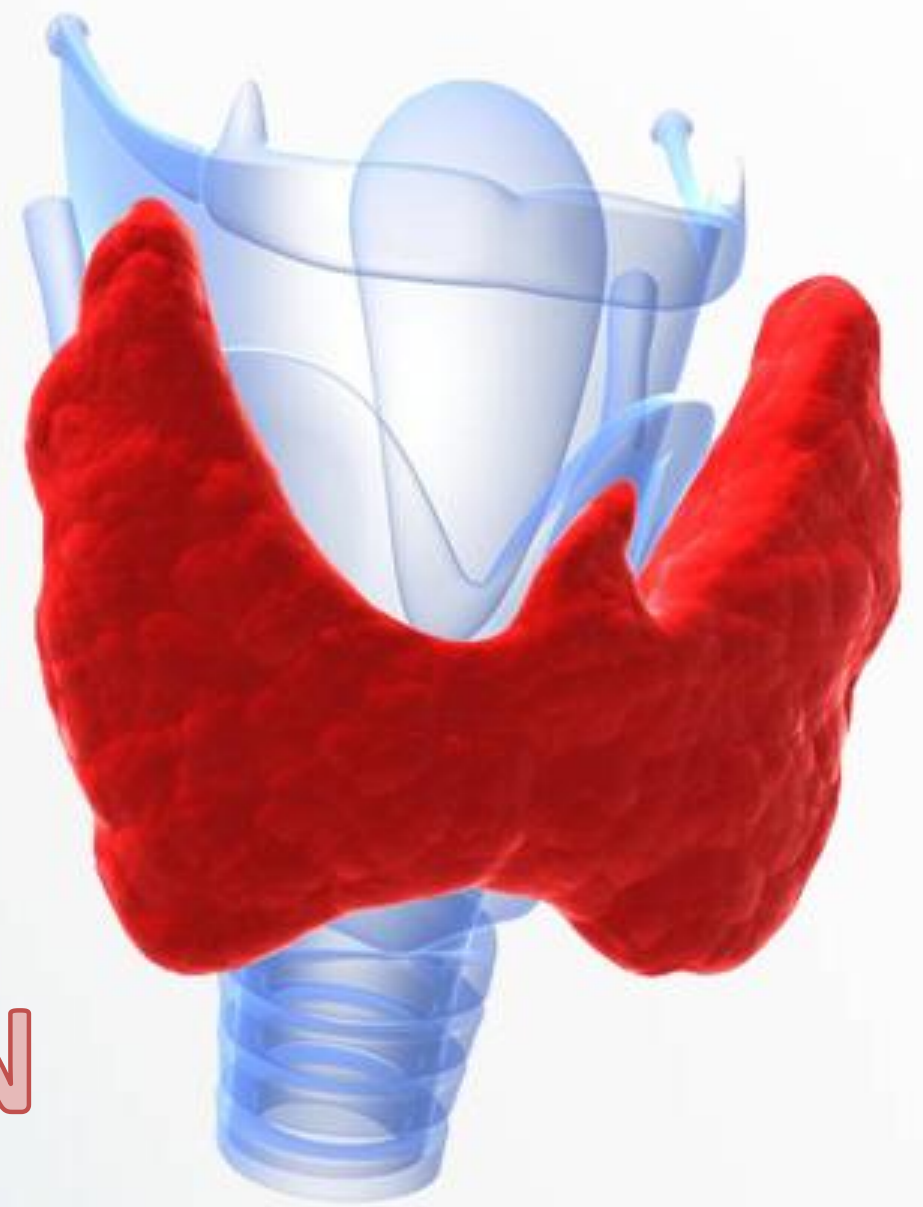




Physiology team

# 13 ADRENAL ANDROGEN



**Sources:  
female slides**

# INTRODUCTION

## Androgens:

- Androgens are the hormones that exert masculinizing effects. They promote anabolism and growth.
- Testosterone from the testis is the major active androgen. The adrenal androgens have less than 20% of its activity.

## Endocrine activity of the Adrenal Cortex:

### Zona reticularis:

Produces small amounts of androgens, mostly **dehydroepiandrosterone (DHEA)**, DHEA may be converted into estrogens

### Hormone Control:

**ACTH**

### Target tissue:

**General body cells**

## Subset of adrenal androgens:

- **dehydroepiandrosterone (DHEA)**
- **androstenedione**

# Adrenal androgens

1. The adrenal cortex produces both **androgens** i.e. “male sex hormones” and **estrogens** or “female sex hormones.
2. The adrenal cortex in both sexes **produces small amounts of sex hormone of the opposite sex.**
3. Additional small amounts of sex hormones come from nonadrenal sources. Some testosterone in males is converted into estrogen by the enzyme **aromatase found in adipose tissues.**
4. In females, ovaries produce androgen as **an intermediate step in estrogen production.** Little of this androgen is released in the blood instead of being converted into estrogen.

## Dehydroepiandrosterone (DHEA):

A steroid hormone produced in the adrenal cortex from cholesterol. It is the primary precursor of natural estrogens.

- **It is the most abundant adrenal androgen**

## Androstenedione:

- An androgenic steroid produced by the testes, adrenal cortex, and ovaries.
- Androstenediones are converted metabolically to testosterone and to estrogens in the fat and other peripheral tissues. **It is an important source of estrogen in men and postmenopausal women.**
- **Androstenedione were used as an athletic or body building supplement.**

## Effects of adrenal androgens:

- Control androgen-dependent processes **in the female** as:
  - 1- growth of pubic and axillary hair
  - 2- pubertal growth spurt
  - 3- development and maintenance of female sex drive.
- **In pre-pubertal males** It causes the rapid develop of secondary sexual characters.

## Production of androgen in women:

ACTH regulates adrenal production of androgen precursors → luteinizing hormone (LH) regulates ovarian androgen production → Ovarian thecal cells/stroma (Controlled by LH).

- Precursors DHEA and androstenedione are produced by the **ovaries and adrenal cortices**,
- The Adrenal cortex **produces the majority of DHEA (80%)** and its sulfate, DHEAS (> 90%).
- Direct ovarian secretion is thought to account for **one third of testosterone production**, whereas the remainder is accounted for by conversion of **androstenedione in peripheral or extragonadal sites**, including adipose tissue and skin.
- Dihydrotestosterone is produced mainly by **target tissues**.
- Most androgens in postmenopausal women, produced by the **adrenal cortex**. whereas testosterone is believed to originate primarily from the ovaries.



# Congenital adrenal hyperplasia

## Causes:

1- inherited as **autosomal recessive** diseases and can affect both boys and girls.

2-**lack of an enzyme (21-hydroxylase)** needed by the adrenal gland to make the major steroid hormones of the adrenal cortex: **cortisol and aldosterone**. Due to the block in synthesis of these hormones, there is abnormal 'feedback' and steroids are 'diverted' to becoming androgens, a form of male sex hormones.

## Effects:

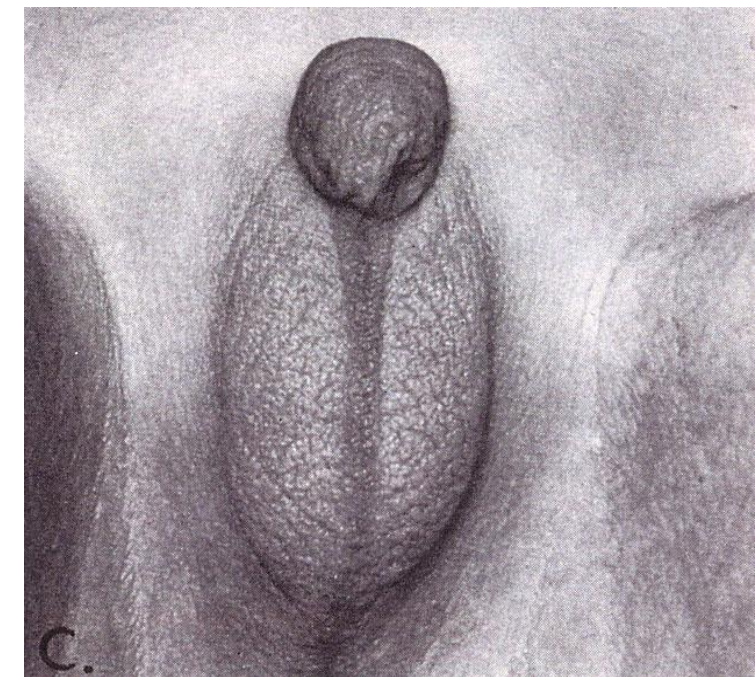
In **pre-pubertal males:**

It causes the rapid develop of secondary sexual characters.

**in females:**

**(Adrenogenital Syndrome)**

It causes beard growth, deeper voice, masculine distribution of body hair, and growth of the clitoris to resemble a penis.



Virilizing adrenal hyperplasia in a newborn female baby, **DHEA was converted to testosterone**

# MCQs

**1- The major active androgen that comes from testis is:**

- A-Testosterone
- B-Corticosterone
- C-Aldosterone
- D-Prednisone

**2- Which of the following hormones can be converted to estrogen:**

- A-TSH
- B-ADH
- C-DHEA
- D-GH

**3- Which of the following enzyme will convert testosterone to estrogen in adipose tissue?**

- A- Inhibin
- B- Dihydrophosphatase
- C- mutase
- D- aromatese

**4- the major androgen that comes from adrenal cortex is:**

- A-Testosterone
- B- DHEA
- C- Androstenedione
- D- Estrogen

**5- Which of the following is an effect of androgen in females:**

- A-growth of pubic and axillary hair
- B-Increase release of glucose
- C-Increase release adrenal hormones
- D-B&C

**6- In postmenopausal women, the major source of androgens is :**

- A- Adrenal medulla
- B- Ovaries
- C- Adipose tissue
- D- Adrenal cortex

**7-the major cause of Congenital adrenal hyperplasia is :**

- A- Adrenal hyperplasia
- B- Pheochromocytoma
- C- lack of an enzyme (21-hydroxylase)
- D- non of above

1- A 2- C 3- D 4- B 5- A 6- D 7- C



**@PhysiologyTeam**



**Pht433@gmail.com**



Physiology team

**Done by :**

**Abdullah Al Rsheed**

**Revised by:**

**Alaa Alzulfi**

**Endocrine Block**