Adrenal Gland

Adrenal androgens

(Lecture-3)

Dr. Hayam Gad

Associate Prof. of Physiology

Objectives

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

- Adrenal androgens (17-ketosteroids DHEAS)
  - Mechanism of action
  - Functions
  - Metabolism
- Control of adrenal androgens secretion
- Disorders of androgens secretion (Adrenogenital syndrome)
  - Pseudo-hermaphroditism (females)
  - Precocious psudopuberty (males)
  - Virilism

Keywords: Adrenogenital syndrome, 17-ketosteroids DHEAS, pseudo-hermaphroditism, precocious psudopuberty, hirsutism, virilism.

Adrenal Androgens

- Several moderately active male sex hormones called adrenal androgens (the most important of which is dehydroepiandrosterone) are continually secreted by the adrenal cortex, especially during fetal life. Adrenal androgens have less than 20% of testosterone activity.
- Also, progesterone and estrogens are secreted in minute quantities.
- The adrenal androgen, androstenedione is converted to testosterone and to estrogens (aromatized) in fat and other peripheral tissues. This is an important source of estrogens in men and postmenopausal women.

Functions of adrenal androgens

Androgens exert very little masculinizing effect when secreted in normal amounts. However, they can produce appreciable masculinization when secreted in excessive amounts. Also they promote protein anabolism and growth.

Normally, the adrenal androgens have only weak effects in humans:

- ✓ The onset of puberty.
- ✓ Part of the early development of the male sex organs and secondary sex characteristics results from childhood secretion of adrenal androgens.
- ✓ Much of the growth of the pubic and axillary hair in the female results from the action of these hormones.
- ✓ Sex drive in females

Control of adrenal androgens secretion

Secretion of the adrenal androgens is controlled acutely by ACTH and not by gonadotropins. However, the concentration of dehydroepiandrosterone sulfate (DHEAS) increases until it peaks in the early 20s, then falls to very low values in old age. These long-term changes are not due to changes in ACTH secretion and appear to be due instead to a rise and then a gradual fall in the activity of 17 -

hydroxylase. All but about 0.3% of the circulating DHEA is conjugated to sulfate (DHEAS).

Disorders of androgens secretion

Adrenogenital Syndrome

An occasional adrenocortical tumor secretes excessive quantities of androgens that cause intense masculinizing effects throughout the body.

Female pseudo-hermaphroditism

If excessive secretion of adrenal androgens occurs in a female, she develops virile characteristics including:

- Growth of a beard.
- A much deeper voice.
- Occasionally baldness if she also has the genetic trait for baldness.
- Masculine distribution of hair on the body and the pubis.
- Growth of the clitoris to resemble a penis.
- Deposition of proteins in the skin and especially in the muscles to give typical masculine characteristics.

Precocious pseudopuberty

In the prepubertal male it causes precocious pseudopuberty, a virilizing adrenal tumor causes the same characteristics as in the female plus rapid precocious development of the male sexual organs without testicular growth.

Virilism

In the adult male, the virilizing characteristics of adrenogenital syndrome are usually obscured by the normal virilizing characteristics of the testosterone secreted by the testes. It is often difficult to make a diagnosis of adrenogenital syndrome in the adult male.

Diagnosis of adrenogenital syndrome

The excretion of 17-ketosteroids (which are derived from androgens) in the urine may be 10 to 15 times normal.