CONGENITAL ADRENAL HYPERPLASIA

In Lithuania, newborn screening for congenital adrenal hyperplasia (CAH) (adrenogenital syndrome (AGS)) has been implemented since 2015. All neonates are tested for 17-hydroxyprogesterone (17OHP) levels in dry blood samples.

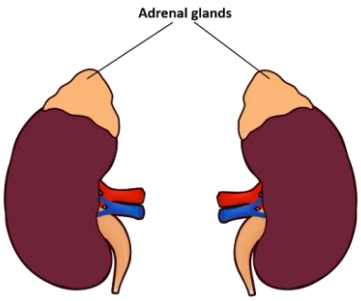
What is congenital adrenal hyperplasia?

Congenital adrenal hyperplasia is a condition characterized by impaired adrenal production of corticosteroids. Adrenal glands are unable to produce enough cortisol and/or aldosterone, but produce an excess of testosterone.

What is the incidence rate of congenital adrenal hyperplasia?

In Lithuania incidence of CAH is 1 in 6,500 newborns.

What causes congenital adrenal hyperplasia?

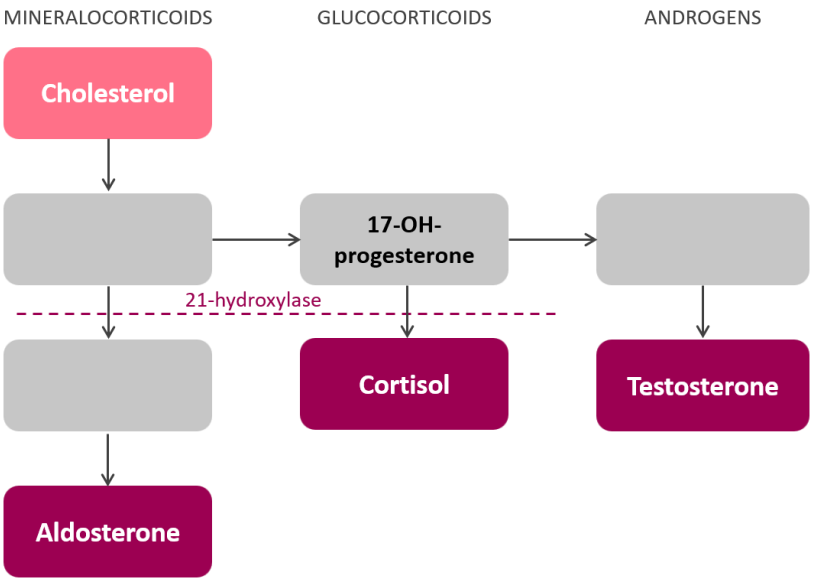


Adrenal glands are a triangular glands located above both kidneys. Their activity is regulated by pituitary gland.

Adrenal glands use cholesterol to produce 3 types of hormones:

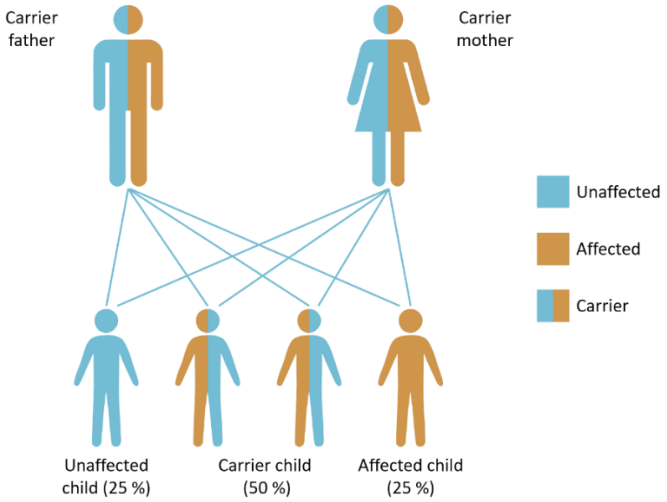
- Cortisol: helps organism to adjust and cope with illness or stress. It is also important in maintaining normal blood pressure and blood glucose levels.
- Aldosterone: regulates electrolyte and water balance.
- Testosterone: responsible for development of male reproductive tissues, as well as promoting secondary sexual characteristics.

There are several forms of CAH, each of which is associated with a lack of particular enzyme required for cortisol synthesis. Most common (90–95% of cases) is a deficiency of enzyme 21-hydroxylase, which leads to a decrease in mineralocorticoids, glucocorticoids, an increase in androgens and adrenal hyperplasia. Elevated levels of 17-hydroxyprogesterone are detected in blood.



How is congenital adrenal hyperplasia inherited?

CAH is inherited in autosomal recessive manner. Usually both parents are healthy carriers of a disease-causing mutation. If child receives an altered gene from both parents, he or she is born with CAH. Each pregnancy holds 25 percent chance of having a healthy child who will not be a carrier of the disease, 50 percent probability that a child will be a healthy carrier of the disease and 25 percent chance of having a child with CAH.



How does the congenital adrenal hyperplasia manifest?

How congenital adrenal hyperplasia manifests is highly dependent on what gender the patient is as well as whether hormone deficiency is severe or mild.

Severe hormone deficiency

- Males look healthy right after birth. First signs of congenital adrenal hyperplasia are feeding difficulties, weight loss and vomiting that occur in the first or second week of life. These symptoms are caused by loss of electrolytes and water due to lack of aldosterone.
- Females are exposed to elevated concentrations of male hormone in womb, causing virilisation of external genitals (they look similar to boys). Internal genitals (uterus, vagina and ovaries) are completely normal. If diagnosis of congenital adrenal hyperplasia is not made immediately after birth, girls experience same symptoms due to electrolyte and water loss as boys.

This classical form of congenital adrenal hyperplasia in both genders is sometimes referred to as the “classical salt wasting form”.

Newborns with total deficiency of enzyme 21-hydroxylase die in the first weeks of life if left untreated.

Mild hormone deficiency

Disease usually manifests later (around 2 to 4 years of age).

- Males are tall, have enlarged external genitalia, pubic hair may appear early. These symptoms are caused by an excessive amount of male sex hormones.
- In girls, symptoms also occur due to excess of male sex hormones. They are tall, pubic hair may appear early, clitoris is enlarged.

In both genders with mild adrenal hormone deficiency, adrenal hyperplasia is termed “non-classical”.

Although in early childhood these children are relatively tall, growing soon ceases and they remain very short as adults. Male sex hormones promotes bone maturation, consequently growth ends faster than it should.

In particularly mild non-classical congenital forms of adrenal hyperplasia, symptoms manifest in young women by excessive body hair and irregular menstruation cycle.

How is congenital adrenal hyperplasia treated?

Pharmacological treatment

To compensate for hormone deficiency, hydrocortisone tablets are prescribed. Fludrocortisone tablets are also given to children who lack aldosterone. Electrolytes are administered for 'classical salt wasting form'. Doses and frequency of use in children may vary.

Surgical treatment

Surgical treatment is only needed for some females. Surgery is performed at about one year of age and extent of procedure depends on degree of virilization. Aim is to reduce clitoris while preserving surrounding nerves and blood vessels. Occasionally vaginal opening is also formed. At the onset of puberty these girls should be re-examined by the same surgeon or gynecologist. Specialist evaluates and decides if additional surgical procedure is required.