Congenital Adrenal Hyperplasia (CAH)

What is congenital adrenal hyperplasia (CAH)?
Congenital adrenal hyperplasia (CAH) is an inherited condition, which causes an enzyme deficiency (most commonly 21-hydroxylase). The lack of this enzyme results in the inability of the adrenal glands to make hormones (cortisol and aldosterone) necessary to maintain life. The adrenal glands are located on top of the kidneys, in the area of the back near the waistline. Cortisol is responsible for maintaining the body's energy supply, blood sugar, and control of the body's reaction to stress. Aldosterone is necessary for maintaining a normal balance of salt and water in the body. There are three main forms of congenital adrenal hyperplasia (CAH): the severe salt-wasting (lack of cortisol and aldosterone), non-salt wasting forms (lack of cortisol), and a milder form. An infant with the salt-wasting form may have any or all of the following symptoms within the first few weeks of life: vomiting, poor weight gain, poor feeding, drowsiness, diarrhea and dehydration. Without proper treatment, an infant can go into shock and can die.

About one baby in 19,000 is born with CAH in the United States. The condition can be found in all ethnic groups; however, certain ethnic groups (Ashkenazi Jews and Hispanics) are at higher risk for the milder form of CAH.

How does CAH affect a child?
Salt Wasting Form Female newborns with the salt-wasting form of CAH have ambiguous genitals, which may make the infant appear partially or very much like a male. Male newborns with the salt wasting form of CAH will have no outward physical signs except possible increased pigmentation around the genitals. There can also be vomiting, poor weight gain, poor feeding, drowsiness, diarrhea and/or dehydration in the first few weeks of life.

Non-Salt Wasting Form The non-salt wasting form of CAH does not generally cause severe illness in newborns. The external genitals of females with the non-salt wasting form of CAH are also ambiguous. Other symptoms of the non-salt wasting form of CAH develop with age in both males and females, including rapid growth in early childhood and early sexual development with pubic hair growth.

Milder Form A milder form of CAH may appear anytime between early childhood and puberty. In early childhood, the mild form causes rapid growth and early pubic hair growth. At puberty, girls with the mild form generally develop excess body hair growth, acne, menstrual irregularity and sometimes infertility. Infertility may also occur in males with this milder form of CAH, although it is not common.

What Causes CAH? CAH is a genetic condition caused by a change in the CYP21 (Cytochrome P450 21-hydroxylase) gene. The CYP21 gene is responsible for making an enzyme called 21-hydroxylase. The 21-hydroxylase enzyme is important in the making of cortisol and aldosterone. When there is a change in both copies of the CYP21 gene, the 21-hydroxylase enzyme is absent, and cortisol and aldosterone are not produced.

CAH is inherited is an autosomal recessive pattern, which means two copies of the CYP21 gene must be changed for a person to have CAH. Most often, the parents of a child with an
autosomal recessive condition are not affected because they are “carriers”, with one copy of the changed gene and one copy of the normal gene.

When both parents are carriers, there is a one-in-four (or 25 percent) chance that both will pass the changed CYP21 gene on to a child, causing the child to be born with the CAH. There also is a one-in-four (or 25 percent) chance that they will each pass on a normal CYP21 gene, and the child will be free of the condition. There is a two-in-four (or 50 percent) chance that a child will inherit a changed CYP21 gene from one parent and a normal CYP21 gene from the other, making them a carrier like their parents. These chances are the same in each pregnancy with the same parents.

Is there a test for CAH?
Yes. Babies are tested (newborn screening) for CAH before they leave the hospital. The baby’s heel is pricked and a few drops of blood are taken. The blood is sent to the state laboratory to find out if it has more than a normal amount of 17-OHP (17-hydroxyprogesterone, a precursor to cortisol and aldosterone).

Can CAH symptoms be prevented?
Yes. Regardless of whether the newborn is male or female, early diagnosis and medical treatment of CAH is important. Without treatment a newborn with the salt-wasting form of CAH is in a life-threatening position. In the salt-wasting form of CAH, replacement of cortisol, aldosterone, and extra salt are necessary. Generally, in the non-salt wasting form of CAH, only cortisol replacement is necessary. Synthetic cortisol (hydrocortisone) and synthetic aldosterone (florinef) are given to supplement the body, since it cannot produce these important hormones.

The ambiguous genitals of a female will require corrective surgery as an infant and possibly again later in life. However treatment started early in the pregnancy may reduce the degree of ambiguity and may also reduce the risk or need for surgery later.

Treatment of CAH is life-long, however periodic medical check-ups would allow for a full and otherwise normal healthy life. Consult with your endocrinologist and/or regional genetic center to determine what tests and follow up are needed.

DISCLAIMER: The information contained on this page is not intended to replace the advice of a genetic metabolic medical professional.

Resources:
CARES Foundation
P.O. Box 264
Short Hills, NJ 07078
Kelly R. Leight, Executive Director
Phone: 1-973-912-3895 (in New Jersey)
Phone: 1-866-227-3737 (toll free)
Email: Kelly@caresfoundation.org
http://www.caresfoundation.org/index.html

Congenital Adrenal Hyperplasia.org Education and Support Network
http://www.congenitaladrenalhyperplasia.org/
References:

  (http://aappolicy.aappublications.org/cgi/reprint/pediatrics;106/6/1511.pdf)

• GeneTests (21-Hydroxylase Deficiency)) http://www.geneclinics.org


• Online Mendelian Inheritance in Man (OMIM topic 201910)  