Androgen insensitivity syndrome

Description

Androgen insensitivity syndrome is a condition that affects sexual development before birth and during puberty. People with this condition have one X chromosome and one Y chromosome in each cell, which is typical for males. In people with androgen insensitivity syndrome, the body's cells and tissues are unable to respond to certain male sex hormones (called androgens) that are important for normal male sexual development before birth and during puberty. As a result, affected individuals may have external sex characteristics that are typical for females or have features of both male and female sexual development.

There are three forms of androgen insensitivity syndrome: complete, partial, and mild.

Complete androgen insensitivity syndrome occurs when the body does not respond to androgens at all. People with this form of the condition have external sex characteristics that are typical of females. Affected individuals do not have a uterus. They have male internal sex organs (testes) that are undescended, which means they are located in the pelvis or abdomen instead of outside the body. As such, affected individuals do not menstruate and are unable to conceive a child (infertile). People with complete androgen insensitivity syndrome also have sparse or absent hair in the pubic area and under the arms.

The partial and mild forms of androgen insensitivity syndrome occur when the body's tissues are partially sensitive to the effects of androgens.

People with partial androgen insensitivity can have genitalia that look typical for females, genitalia that have both male and female characteristics, or genitalia that look typical for males.

People with mild androgen insensitivity are born with male-typical sex characteristics, but they are often infertile and tend to experience breast enlargement at puberty.

Frequency

Complete androgen insensitivity syndrome affects 2 to 5 in 100,000 newborns who are assigned female at birth. Partial androgen insensitivity is thought to be at least as common as complete androgen insensitivity. Mild androgen insensitivity is much less common.

Causes

Variants (also called mutations) in the *AR* gene cause androgen insensitivity syndrome. This gene provides instructions for making a protein called an androgen receptor. Androgen receptor proteins interact with androgen hormones, such as testosterone, and help direct male sexual development. Specifically, the androgen receptor attaches (binds) to androgen .cf0{font-family:Segoe UI;font-size:9pt;}hormones to form an androgen-receptor complex. This complex then binds to DNA to regulate the activity of certain genes that play a role in male sexual development. Androgens and androgen receptors also have other important functions in both males and females, such as regulating hair growth and sex drive.

Variants in the *AR* gene prevent androgen receptors from working properly, which makes them less able to bind to testosterone and regulate gene activity. If androgen receptors cannot bind to androgens, the body cannot use androgens, even if there are normal levels of these hormones in the body.

Learn more about the gene associated with Androgen insensitivity syndrome

- AR

Inheritance

This condition is inherited in an X-linked recessive pattern. The gene associated with this condition is located on the X chromosome, which is one of the two sex chromosomes. In individuals who have only one X chromosome (typical for males), one altered copy of the gene in each cell is sufficient to cause the condition. In people who have two X chromosomes (typical for females), a variant would have to occur in both copies of the gene to cause the disorder. Because it is unlikely that both copies of a gene would be altered, people with one X chromosome are affected by X-linked recessive disorders much more frequently than those with two. A characteristic of X-linked inheritance is that fathers cannot pass X-linked traits to their sons.

About 70 percent of all cases of androgen insensitivity syndrome are inherited from people who carry an altered copy of the*AR* gene on one of their two X chromosomes. The remaining 30 percent of cases result from new (*de novo*) variants in the gene that occur in the egg cell before the child is conceived or during early embryonic development.

Other Names for This Condition

- AIS
- Androgen receptor deficiency
- Androgen resistance syndrome
- AR deficiency

- DHTR deficiency
- Dihydrotestosterone receptor deficiency

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Androgen resistance syndrome (https://www.ncbi.nlm.nih.gov/gtr/conditions/C0039585/)
- Genetic Testing Registry: Partial androgen insensitivity syndrome (https://www.ncbi.nlm.nih.gov/gtr/conditions/C0268301/)

Genetic and Rare Diseases Information Center

- Androgen insensitivity syndrome (https://rarediseases.info.nih.gov/diseases/5803/index)
- Androgen insensitivity syndrome, mild (https://rarediseases.info.nih.gov/diseases/10596/index)
- Complete androgen insensitivity syndrome (https://rarediseases.info.nih.gov/diseases/10597/index)
- Partial androgen insensitivity syndrome (https://rarediseases.info.nih.gov/diseases/5692/index)

Patient Support and Advocacy Resources

- National Organization for Rare Disorders (NORD) (https://rarediseases.org/)

Clinical Trials

- ClinicalTrials.gov (https://clinicaltrials.gov/search?cond=%22Androgen insensitivity syndrome%22)

Catalog of Genes and Diseases from OMIM

- ANDROGEN INSENSITIVITY SYNDROME; AIS (https://omim.org/entry/300068)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28Androgen-Insensitivity+Syndrome%5BMAJR%5D%29+AND+%28androgen+insensitivity+syndrome%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1080+days%22%5Bdp%5D)

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