SRY gene

sex determining region Y

Normal Function

The *SRY* gene provides instructions for making a protein called the sex-determining region Y protein. This protein is involved in male-typical sex development, which usually follows a certain pattern based on an individual's chromosomes. People usually have 46 chromosomes in each cell. Two of the 46 chromosomes, known as X and Y, are called sex chromosomes because they help determine whether a person will develop male or female sex characteristics. Girls and women typically have two X chromosomes (46,XX karyotype), while boys and men typically have one X chromosome and one Y chromosome (46,XY karyotype).

The *SRY* gene is found on the Y chromosome. The sex-determining region Y protein produced from this gene acts as a transcription factor, which means it attaches (binds) to specific regions of DNA and helps control the activity of particular genes. This protein starts processes that cause a fetus to develop male gonads (testes) and prevent the development of female reproductive structures (uterus and fallopian tubes).

Health Conditions Related to Genetic Changes

Swyer syndrome

Variants (also called mutations) in the *SRY* gene have been identified in approximately 15 percent of individuals with Swyer syndrome, also known as 46,XY complete gonadal dysgenesis or 46,XY pure gonadal dysgenesis. Swyer syndrome is a condition that affects sex development. Individual with this condition have a male-typical chromosome pattern (46,XY karyotype), but they develop female-typical sex characteristics.

SRY gene variants that cause Swyer syndrome prevent production of the sex-determining region Y protein or result in the production of a nonfunctioning protein. Without functional sex-determining region Y protein, a fetus will not develop testes but will develop a uterus and fallopian tubes, despite having an X and a Y chromosome.

46,XX testicular difference of sex development

Changes affecting the *SRY* gene have been found to cause 46,XX testicular difference of sex development. Individuals with this condition have a female-typical chromosome

pattern (46,XX karyotype) but develop male sex characteristics, including testes, though they may be small and undescended.

In most individuals with 46,XX testicular difference of sex development, the condition results from an abnormal exchange of genetic material (translocation) between the Y chromosome and another chromosome, most often the X chromosome. This exchange occurs as a random event during the formation of sperm cells in the affected person's father. In this condition, the *SRY* gene (which is on the Y chromosome) is misplaced, almost always onto an X chromosome. A fetus with an X chromosome that carries the *SRY* gene will develop male sex characteristics despite not having a Y chromosome.

Other disorders

SRY gene variants that impair the function of the sex-determining region Y protein have been identified in a small number of people with 46,XY difference of sex development, or partial gonadal dysgenesis. The effects of these variants on the function of the sex-determining region Y protein is likely less severe than those of variants that cause Swyer syndrome (described above). Individuals with 46,XY difference of sex development have a male-typical chromosome pattern (46,XY karyotype), but they have external genitalia that do not look clearly male or clearly female or other abnormalities of the genitals and reproductive organs.

Translocations that misplace the *SRY* gene onto an X chromosome cause about 10 percent of cases of a condition called ovotesticular difference of sex development. Individuals with this condition have a female-typical chromosome pattern (46,XX karyotype) and tissue from both female and male reproductive organs (ovarian and testicular tissue).

Other Names for This Gene

- essential protein for sex determination in human males
- sex determining region protein
- sex-determining region on Y
- SRY_HUMAN
- TDF
- TDY
- testis-determining factor

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of SRY (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=6736[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28SRY%5BTI%5D%29+OR+%28sex+determining+region+Y%5BTI%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1080+days%22%5Bdp%5D)

Catalog of Genes and Diseases from OMIM

- SEX-DETERMINING REGION Y; SRY (https://omim.org/entry/480000)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/6736)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=SRY[gene])

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Genomic Location

The *SRY* gene is found on the Y chromosome (https://medlineplus.gov/genetics/chromosome/y/).

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