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## Annals of Biological Research

### Abstract

[How can a person with two X chromosomes develop into a man?](#)

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A gene has now been discovered that, when mutated, turns girls into boys. The finding advances, but also complicates, our understanding of how sex is determined by our genes. In people, almost all men carry two different sex chromosomes (XY) and women are XX. But there are some (extremely rare) exceptions to this rule. It is possible to have XX men, for example. This female-to-male sex reversal almost always happens when a certain gene called SRY, usually carried on the Y chromosome, accidentally ends up on the X chromosome inherited from the father. Other genes have been found to muddle up sexual identity, making the resulting child neither fully male nor fully female. But in most cases of anatomically complete XX men — who have functional testes, but without a Y are infertile — SRY is involved. For this reason, it has long been called the gene that defines 'maleness'. But now researchers have found another gene that is equally important to the process. It seems that sex is determined in humans by a cascade of genes. At a crucial junction in this process lies a gene called SOX9, which in males is switched on by SRY, causing testis development. In females, the researchers now suggest, SOX9 might be typically switched off by RSPO1, which, via other genes in the cascade, leads to the development of ovaries. In the brothers, it seems the mutated RSPO1 gene could not fulfil its switching-off role, leaving SOX9 on and leading to male development.

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