

Leeds Clinical Genomics Service

X-linked Inheritance

Information for patients

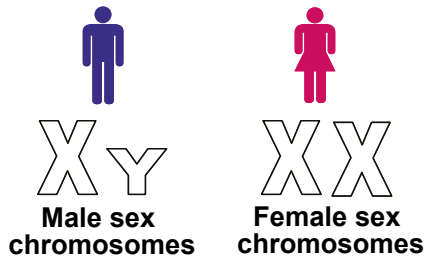


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Genes are the unique instructions which make each of us an individual. There are thousands of different genes, each carrying a different instruction. If a gene is altered (or 'mutated'), it can cause a genetic condition or disease.

Genes are found on tiny structures called chromosomes. Humans have 46 chromosomes in each cell and they come in pairs numbered 1 - 22. The final pair are the sex chromosomes and they determine our gender.

Women usually have two X chromosomes and men usually have one X and one Y chromosome as shown in the diagram below. The Y chromosome is much smaller than the X chromosome and contains fewer genes.



When we have children, we pass on only one copy of each chromosome pair. Women can only pass on an X chromosome. Men pass on either their X or Y chromosome. If the baby inherits the X chromosome, they will be female.

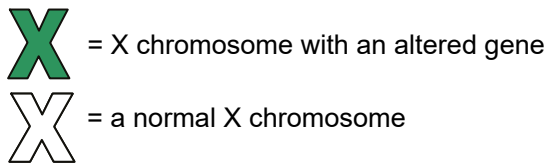
If the baby inherits the Y chromosome, they will be male.

X-linked inheritance describes a genetic condition or disease that is associated with a gene found on the X chromosome.

If a man has an altered gene on his X chromosome, then he will be affected with the genetic condition, as he has only one X chromosome so there is no working copy of the gene.

If a woman has an altered gene on one of her two X chromosomes, then she will be a carrier of that genetic condition. She is usually healthy because she has a second normal copy of the gene on her other X chromosome.

In certain X-linked conditions, some of the female carriers may have some mild symptoms of the condition.

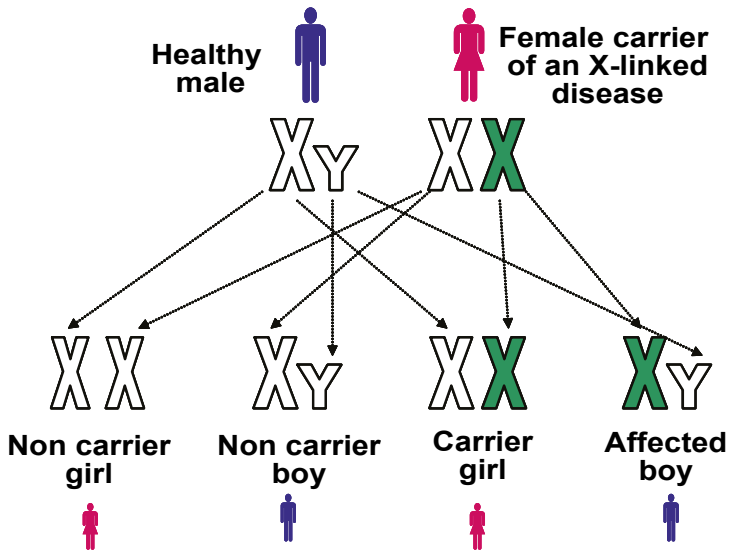


If a woman who is a carrier of an X linked condition has a **son**:

- There is a 50% chance that the boy will inherit the X chromosome with the altered gene and therefore, be affected with the condition.
- There is a 50% chance that the son would inherit the normal X chromosome and therefore, would not be affected with the condition.

If a woman who is a carrier has a **daughter**:

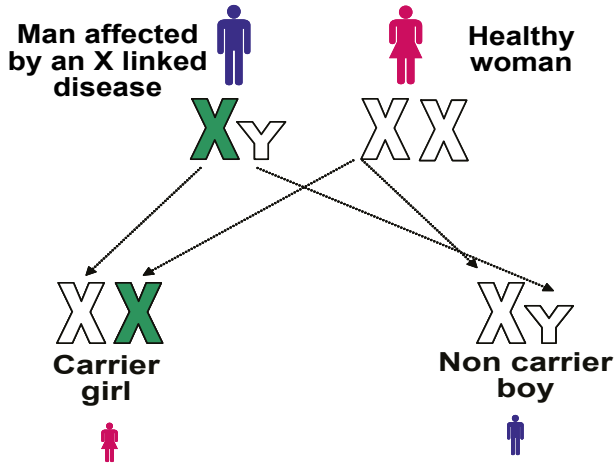
- There is a 50% chance that the girl will inherit the X chromosome with the altered gene. If this happens, she will be a carrier, like her mother.
- There is a 50% chance that the daughter would inherit the X chromosome without the altered gene and therefore, would not be a carrier of the condition.



Sometimes, boys are born with X-linked conditions even though their mothers are not carriers. When this happens, it is particularly important to get specialist advice about future pregnancies.

If men who are affected by X-linked conditions have children, we expect that all of their daughters will inherit the altered gene on their X chromosome and they will be carriers.

Men do not pass on their X chromosomes to their sons and therefore, none of the sons of an affected man would be affected by the X-linked condition; however, all of their daughters would be carriers.





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