Liverpool Women's
NHS Foundation Trust

X-Linked Inheritance
What is X-Linked Inheritance?

What are genes and chromosomes?

Genes are the unique set of instructions inside our bodies which make each of us an individual. There are many thousands of different genes, each carrying a different instruction. If a gene is altered, it can cause a genetic condition or disease. This gene alteration is sometimes known as a mutation.

We have two copies of each gene. One copy is inherited from each of our parents. When we have children, we pass on only one copy of each of our genes. Genes lie on tiny structures called chromosomes. Females have two X chromosomes and males have one X and one Y chromosome. The Y chromosome is much smaller than the X chromosome and contains fewer genes.

What does X-linked inheritance mean?

X-linked conditions occur when an altered gene is located on the X chromosome.

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

If a male has an altered gene on his X chromosome, then he will be affected as he has only one X chromosome.

Having children

Carrier Females - If a female carrier has a boy, there is a 50% (1 in 2) risk that the boy will be affected by a condition caused by the altered gene that she carries on her X chromosome.

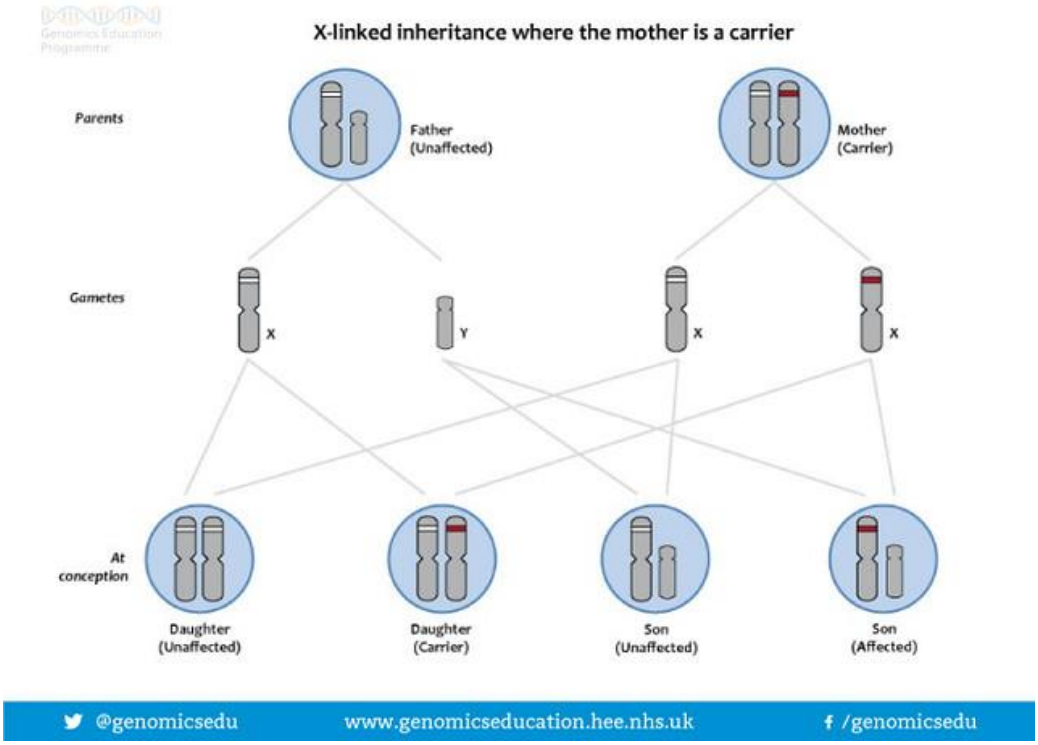
If a female carrier has a girl, there is a 50% (1 in 2) risk that the girl will inherit the X chromosome altered gene, If this happens she will most likely be a healthy carrier, like her mother.

Affected Males (diagram B) - When males who are affected by X-linked conditions have children, all of their daughters inherit the altered gene on their X chromosome. These daughters will all be carriers.

Men do not pass on their X chromosomes to their sons. Therefore, all the sons of men with X-linked conditions are completely unaffected (diagram B).

Note - 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.

X-linked inheritance (Diagram A)



X-linked inheritance (Diagram B)

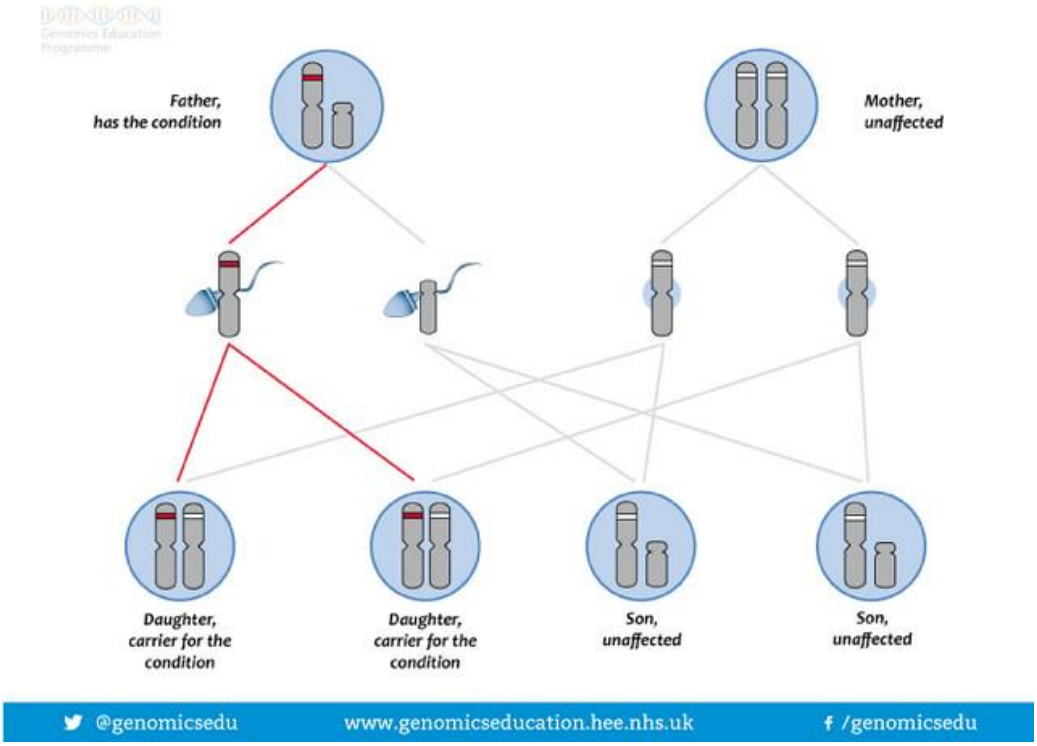


Image source: https://www.genomicseducation.hee.nhs.uk/image-library/

Liverpool Women's
NHS Foundation Trust

If you need more advice about any aspect of X-linked Inheritance, you are welcome to contact:

Liverpool Centre for Genomic Medicine
Liverpool Women's Hospital NHS Foundation Trust
Crown Street
Liverpool
L8 7SS
Telephone: 0151 802 5001 or 5008 Email: lwft.clingen@nhs.net

This leaflet can be made available in different formats on request. If you would like to make any suggestions or comments about the content of this leaflet, then please contact the Patient Experience Team on 0151 702 4353 or by email at pals@lwh.nhs.uk

Liverpool Women's NHS Foundation Trust
Crown Street
Liverpool
L8 7SS
Tel: 0151 708 9988
Ref: Cli_2020-43
Issue Date: 01/10/2017
Review Date: 15/10/2023