

Dominant Inheritance

A patient information leaflet

What is Dominant Inheritance?

What are genes?

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.

What does dominant inheritance mean?

Some genetic conditions are passed on in the family in a dominant way. These conditions are caused by an alteration in one copy of a gene. They are called dominant because the altered copy of the gene is dominant over the other copy of the gene.

Having children

If a parent carries an altered gene for a dominant condition, each of their children has a 50%, or 1 in 2 chance of inheriting the altered gene and being affected by the condition. For each child, regardless of their sex, the risk is the same = 50%.

In some dominant conditions, it is possible to inherit an altered gene without showing any symptoms of the condition. Even within a family, some individuals may be affected by the same dominant condition in different ways.

Some dominant conditions are known as "late onset disorders". In other words, they only affect individuals in adulthood.

In some families, an isolated case of a dominant disorder may be the result of a new mutation (a change which arises for the first time) in either the egg or the sperm that went to make that child.

Recessive Inheritance

A patient information leaflet

What is Recessive Inheritance?

What are genes?

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.

What does recessive inheritance mean?

Some conditions are inherited in a recessive way. In recessive conditions, individuals who have only one altered copy of a gene are completely healthy. They are known as carriers, because they carry one altered copy of a gene. Their normal copy of the gene keeps them healthy and compensates for the altered copy of the gene.

Having children

If both healthy parents carry the same altered recessive gene, then each child they have has a 25% (1 in 4) risk of inheriting the altered gene from both parents and therefore being affected. For each child, regardless of their sex, the risk is the same = 25%.

Children of couples who are both carriers of the same altered recessive gene have a 50% (1 in 2) chance of inheriting one copy of the altered gene from one of their parents. If this happens, they are healthy carriers themselves. There is also a 25% (1 in 4) chance that a child of a carrier couple will inherit two normal copies of the gene. These children will be completely normal.

If only one parent is a carrier of the altered gene, then each of their children has a 50% chance of being a healthy carrier, but will not be affected.

Parents who are closely related to each other, such as first cousins, are more likely to have children with recessive conditions.

X-linked Inheritance

A patient information leaflet

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. Women have two X chromosomes and men 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 woman 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 man has an altered gene on his X chromosome, then he will be affected as he has only one X chromosome.

Having children

If a woman carrier has a boy, there is a 50% (1 in 2) risk that the boy will be affected by condition caused by the altered gene that she carries.

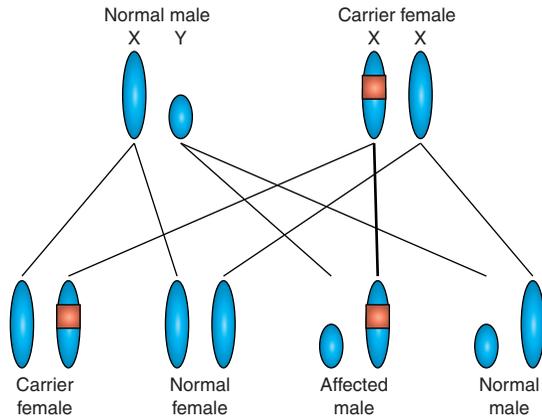
If a woman carrier has a girl, there is a 50% (1 in 2) risk that the girl will inherit the altered gene. If this happens, she will be a healthy carrier, like her mother.

When men 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 healthy carriers.

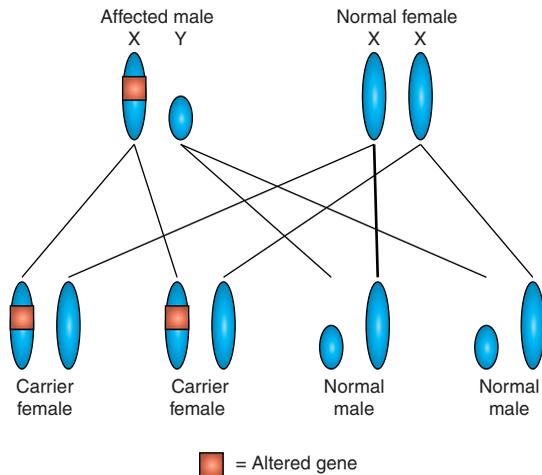
Men do not pass on their X chromosomes to their sons. Therefore, all the sons of men with X-linked conditions are completely normal.

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.

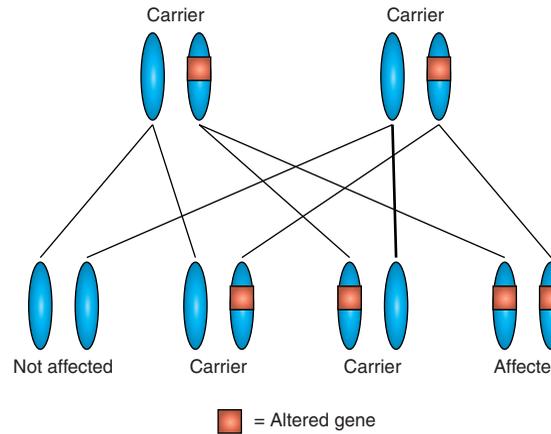
X-linked recessive inheritance (A)



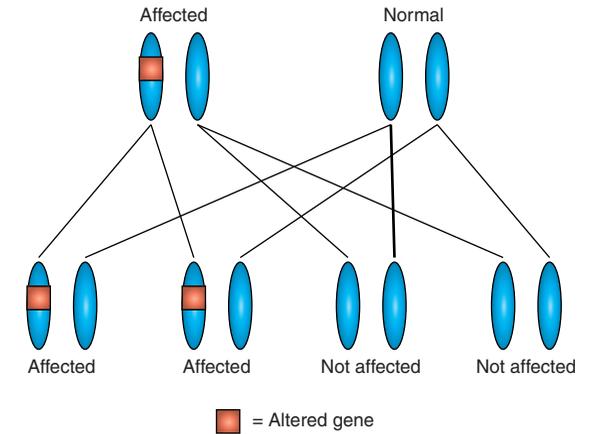
X-linked recessive inheritance (B)



Autosomal recessive inheritance



Autosomal dominant inheritance



For more information:

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

Clinical Genetics Departments

Northern Scotland (main base Aberdeen)
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(Borders, Lothian, South West Fife)

West of Scotland (main base Glasgow)
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Written by Clinical Genetics Guys. Updated by Genetic Interest Group Scotland.

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