

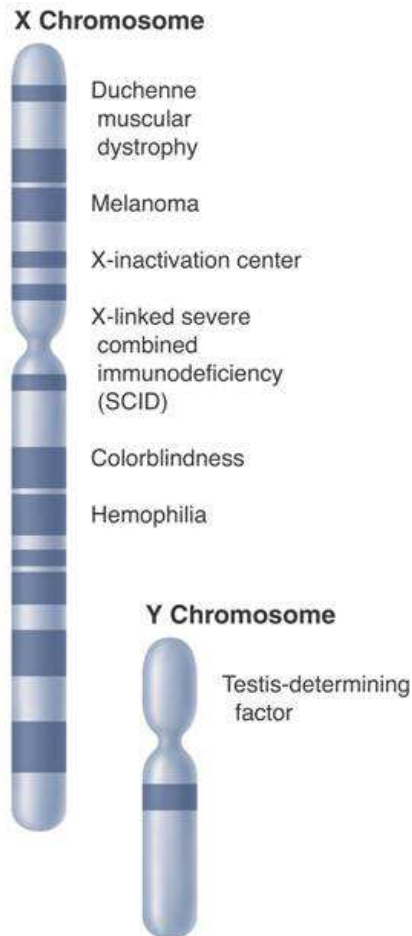
Sex-Linked Genes

The X chromosome and the Y chromosomes determine sex.

Genes located on these chromosomes are called **sex-linked genes**.

More than 100 sex-linked genetic disorders have now been mapped to the X chromosome.

The Y chromosome is much smaller than the X chromosome and appears to contain only a few genes.



Why are sex-linked disorders more common in males than in females?

For a recessive allele to be expressed in females, there must be two copies of the allele, one on each of the two X chromosomes.

Males have just one X chromosome. Thus, all X-linked alleles are expressed in males, even if they are recessive.

Colorblindness

Three human genes associated with color vision are located on the X chromosome.

In males, a defective version of any one of these genes produces colorblindness.

Hemophilia

The X chromosome also carries genes that help control blood clotting. A recessive allele in either of these two genes may produce hemophilia.

In hemophilia, a protein necessary for normal blood clotting is missing.

Hemophiliacs can bleed to death from cuts and may suffer internal bleeding if bruised.

Duchenne Muscular Dystrophy

Duchenne muscular dystrophy is a sex-linked disorder that results in the weakening and loss of skeletal muscle. It is caused by a defective version of the gene that codes for a muscle protein.

X-Chromosome Inactivation

British geneticist Mary Lyon discovered that in female cells, one X chromosome is randomly switched off. This chromosome forms a dense region in the nucleus known as a Barr body.

Barr bodies are generally not found in males because their single X chromosome is still active.