

Difference Between XX and XY Chromosomes

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Key Difference - XX vs XY Chromosomes

Chromosomes are referred to as thread-like structures or molecules containing all the genetic information of organisms. The information is passed from one generation to the next generation via the genes of the sex cells. Genes are the structural and functional unit of heredity. In the context of living organisms, chromosomes are arranged in a pair wise pattern. They are located in the nucleus of the cell. In respect to humans, there are 22 pairs of chromosomes that are known as autosomes. But apart from this, humans possess an addition pair of chromosomes that makes the total of 46 chromosomes. That pair is known as sex chromosomes. The gender of a human is decided at the embryonic stage by the fusion of sperm cell and the egg cell of the mother. The sperm carries one sex chromosome where it can be either X or Y chromosome whilst the egg carries the X chromosome. Therefore, half of the embryo's DNA comes from the sperm and the other half from the egg. Accordingly, if the egg is fertilized by a sperm bearing an X chromosome, the embryo will contain two X chromosomes (XX), and if the egg is fertilized by a sperm bearing a Y chromosome, the embryo will contain X and Y chromosomes. Therefore, as a result of the combination of the sperm and egg, the gender of the embryo will be determined as either a male (XY) or a female (XX). **Females having the XX chromosomes are known as homogametic sex while the male having XY chromosomes are called as heterogametic sex.** This is the **key difference** between XX chromosomes and XY chromosome.

What is XX Chromosome?

Females usually consist of XX chromosomes. During the early embryonic stage of females, one of the X chromosomes of the two is inactivated randomly and permanently. This is usually called as X- inactivation. This phenomenon confirms that the females too have one functional X chromosome just as the males in the cells. As the X- inactivation is random, the X chromosome that is inherited from the mother becomes active in some cells while the X chromosome that is inherited from the father is being active in other cells.

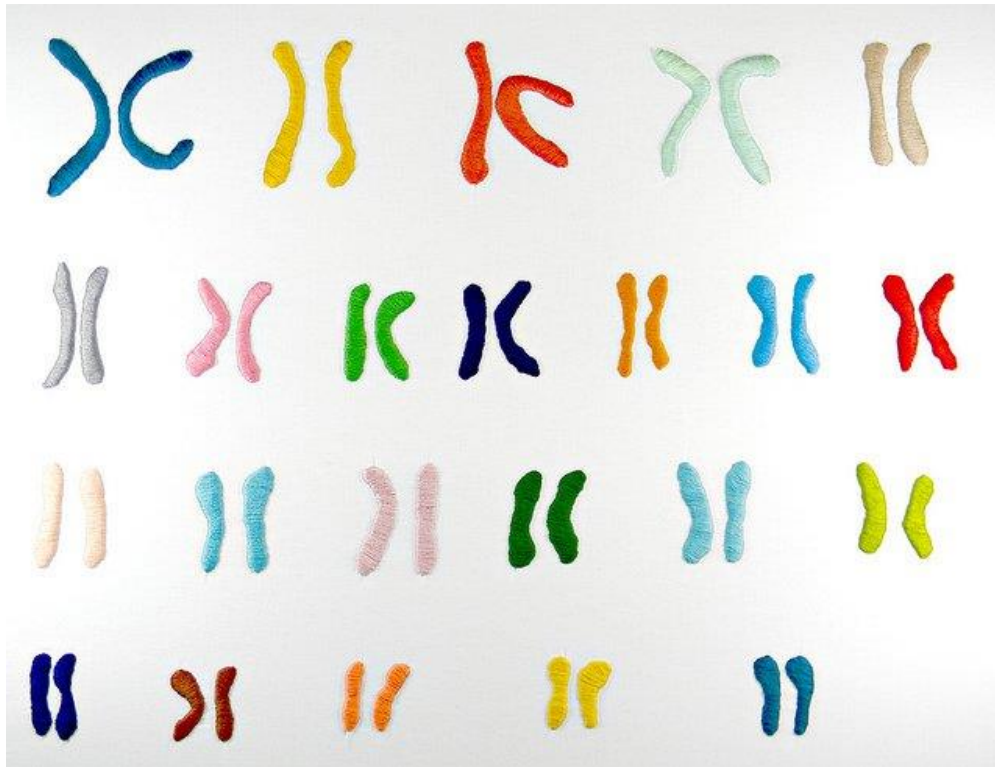


Figure 01: Female Karyotype Having XX Chromosomes

Several genes present at the ends of the arms of the X chromosomes escape X-inactivation. The areas where these genes are present are called as pseudoautosomal regions. These genes are located on both sex chromosomes. Thus, the male and female have two copies of these genes that are functional and are being important for the normal development of the individual. The X chromosomes usually consist of about 800 - 900 genes that produce instructions for the synthesis and the function of proteins in the human body. The X chromosomes that are inactivated remain inside a cell as a Barr body.

What is XY Chromosome?

The males usually consist of XY chromosomes where the X chromosome is obtained from the mother's egg, and either X or Y chromosome is obtained by the father's sperm. The X chromosome is similar to an autosomal chromosome consisting of a short and long arm while the Y chromosome consists of one very short arm and a long arm.

During the process of meiosis, the XY pair of chromosomes in males is separated and passed to separate gametes as an X or a Y. This results in the gamete formation where one-half of the gametes which is formed would contain an X chromosome while the other half would contain the Y chromosome. Half of the spermatozoa transfers X chromosomes and the other half transfers Y chromosomes in humans. Here, a single gene is known as SRY (testis determining gene) located on the Y chromosome triggers the male embryonic development and also helps to develop male characteristics (maleness) by acting as a signal. The process of virilization is also initiated by such genes. Virilization is an abnormality where females start developing masculine traits. It is usually caused by overproduction of androgens.

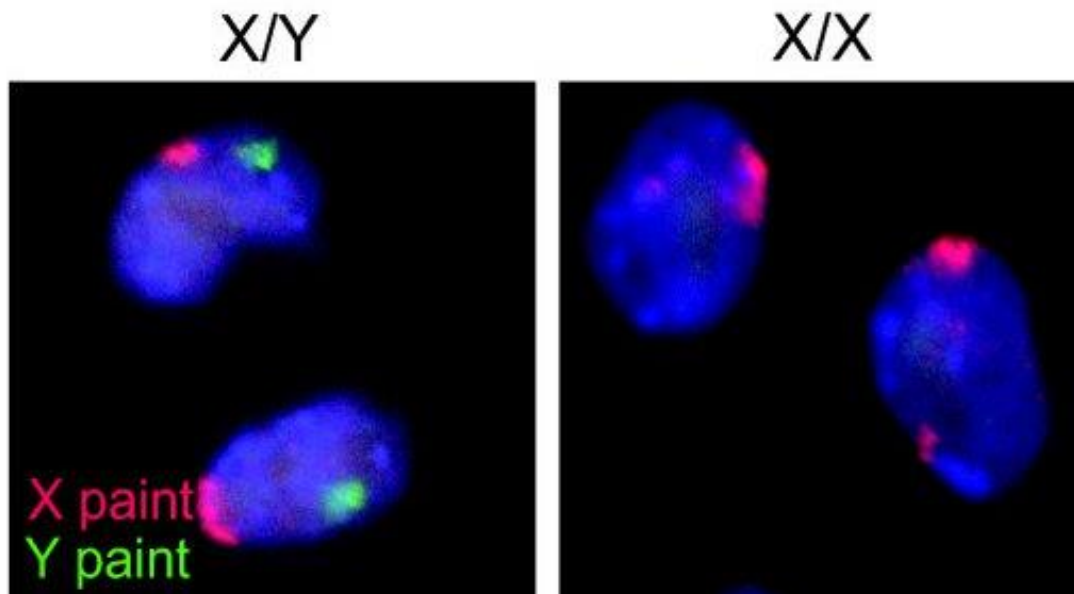


Figure 02: XY Chromosomes

Several syndromes are associated due to the presence of an abnormal number of sex chromosomes. Turner's syndrome is a condition where only one X chromosome is present. Klinefelter syndrome is a syndrome where two X chromosomes and a Y chromosome are present.

What are the Similarities Between XX and XY Chromosomes?

- Both XX and XY Chromosomes are types of sex chromosomes.
- Both males and females contain X chromosome.

What is the Difference Between XX and XY Chromosomes?

XX Chromosomes vs XY Chromosomes	
XX chromosomes are the pair of sex chromosomes that determines female sex.	XY chromosomes are the pair of sex chromosomes that determines male sex.

Summary - XX vs XY Chromosomes

Chromosomes are referred to as thread-like structures composed of tightly arranged DNA molecules. In humans, there are 22 pairs of autosomal chromosomes and one pair of sex chromosomes. The way in which these two sex chromosomes arrange, it determines the sex of the human being. Under normal conditions, the human females contain two X chromosomes (XX), and human males contain one X chromosome and one Y chromosome with a chromosome pairing of XY. Y chromosome contains the genes which are unique to males. This is the difference between XX and XY chromosomes.

Reference :

1. "X chromosome - Genetics Home Reference." U.S. National Library of Medicine, National Institutes of Health. [Available here](#)
2. Szalay, Jessie. "Chromosomes: Definition & Structure." LiveScience, Purch, 8 Dec. 2017. [Available here](#)

Image Courtesy:

1. 'Female Karyotype, 2014' by Hey Paul Studios ([CC BY 2.0](#)) via [Flickr](#)
2. 'X Y chromosome' By Janice Y Ahn, Jeannie T Lee - Janice Y Ahn, Jeannie T Lee
Retinoic acid accelerates downregulation of the Xist repressor, Oct4, and increases the likelihood of Xist activation when Tsix is deficient BMC Developmental Biology 2010, 10:90 doi:10.1186/1471-213X-10-90, ([CC BY 2.0](#)) via [Commons Wikimedia](#)

How to Cite this Article?

APA: Difference Between XX and XY Chromosomes.(2018 February 14). Retrieved (date), from <http://differencebetween.com/difference-between-xx-and-vs-xy-chromosomes/>

MLA: "Difference Between XX and XY Chromosomes" Difference Between.Com. 14 February 2018. Web.

Chicago: "Difference Between XX and XY Chromosomes." Difference Between.Com. <http://differencebetween.com/difference-between-xx-and-vs-xy-chromosomes/> accessed (accessed [date]).



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