

Difference Between Male and Female Karyotypes

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Key Difference - Male vs Female Karyotypes

Karyotype is a technique performed for genetic analysis and is defined as an image of an individual's collection of chromosomes. Karyotyping of a [genome](#) is done to identify the defects in [chromosomes](#) which are referred to as chromosomal aberrations. In Karyotype testing, a wide snapshot of the individual's chromosomes is taken in order to observe the pairing and ordering of chromosomes. Karyotypes are prepared using standardized staining procedures. The most common stain used in karyotyping is [Giemsa](#). The field of chromosome analysis is known as [Cytogenetics](#), and these chromosomal pictures reveal information about important genetic diseases such as Down's syndrome, Klinefelter's Syndrome and different ploidy conditions, etc.

Karyotypes can be mainly of two types. The male karyotypes and the female karyotypes. **The male karyotype testing is done to identify the chromosomal aberrations present in males which is characterized by the 23rd chromosome pair consisting of [an X and a Y chromosome](#) and the female karyotypes reveal information on chromosomal aberrations of females which is characterized by the 23rd chromosome pair having two X chromosomes in it.** This is the key difference between male and female karyotypes.

What is Male Karyotype?

The male karyotype is the chromosomal picture of a male characterized by the 23rd chromosome pair. The 23rd pair which is the sex chromosome pair has a long X chromosome and a shorter Y chromosome. Male karyotypes are used to identify chromosomal defects in males. The karyotyping test is done for the growing fetus to confirm the gender of the fetus. And also to identify chromosomal defects in males at an early development stages of life.

Karyotypes are prepared from chromosomes extracted from a specific cell during the [meta phase](#) or the prometaphase. This is mainly due to the fact that the chromosomes are found in their most condensed form which makes the chromosomes much visible under the microscope after staining.

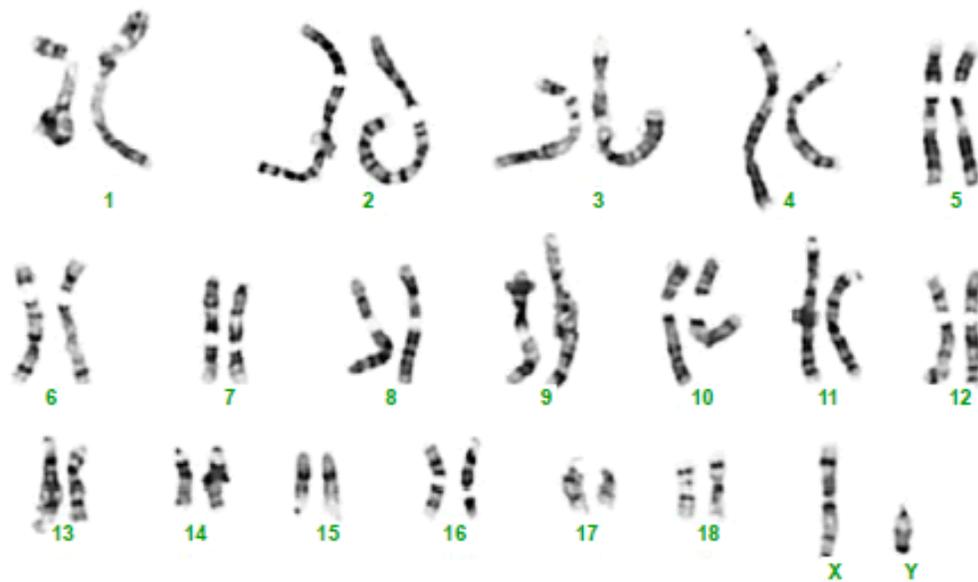


Figure 01: Male Karyotype

The process of developing a karyotype involved basic steps including [cell culturing](#), [propagation](#), staining and observation. The procedure begins with the short-term culture of cells derived from a specimen, which is most often a blood cell sample. The cells are then allowed to grow in a particular media, and the resulting cells are harvested. The cells are arrested in the metaphase. This is done by addition of colchicine, which poisons the mitotic spindle. The cell nuclei are allowed to swell and burst using a hypotonic solution. The nuclei are then treated with a chemical fixative, dropped on a glass slide, and treated with various stains such as Giemsa. The chromosomal structures are then revealed via microscope observations.

What is Female Karyotype?

Female Karyotypes are pictures of the chromosome patterns of females. These pictures are identified to be of female type by observing the 23rd chromosome pair. In female karyotypes, the 23rd pair contains two X chromosomes. Female karyotypes are used to identify chromosomal aberrations in females. Similar to male karyotyping, female karyotyping is done for the growing fetus, to confirm the gender and identify chromosomal defects in females at the early development stages of the life.

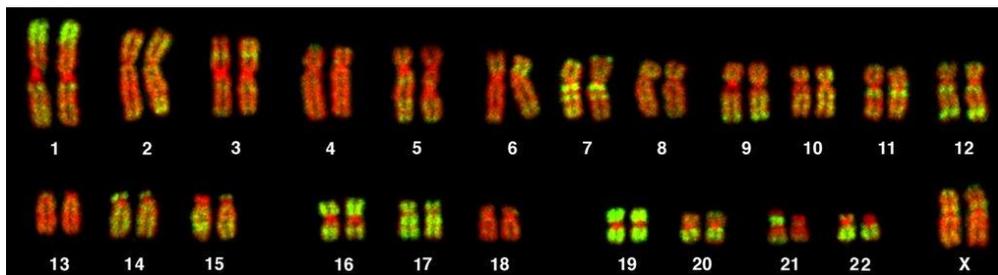


Figure 02: Female Karyotype

The procedure of obtaining a female karyotype is similar to that of a male karyotype which includes the steps, extraction of cells from the specimen, culturing and propagation of the cells, arresting the cells at metaphase, swelling and bursting of the nuclei, staining of the chromosomes and observation under a microscope.

What are the Similarities Between Male and Female Karyotypes?

- Male and Female karyotypes are pictures of an individual's chromosomes obtained after complex staining procedures.
- Male and female karyotyping can be performed on different specimens including placental fluid etc.
- Basic steps of obtaining a karyotype include extraction, culturing and propagation of the cells, arresting the cells at metaphase, swelling and bursting of the nuclei, staining of the chromosomes and observation.
- Stains used to identify chromosomes in male and female karyotypes are Giemsa and Quinacrine.
- The main purpose of a male or female karyotype is to identify the sex of an individual and to determine defects in chromosomes.
- Defects in male or female karyotypes result in physiological and clinical manifestations.

What is the Difference Between Male and Female Karyotypes?

Male Karyotypes vs Female Karyotypes	
An image of the chromosome pattern in males is known as a male karyotype.	An image of the chromosome pattern in females is known as a female karyotype.
Characteristic feature	
The 23 rd pair of the karyotype consists of a long X chromosome and a short Y chromosome in male karyotype.	The 23 rd pair of the karyotype consists of two X chromosomes in female karyotype.

Summary - Male vs Female Karyotypes

Karyotyping is a type of genetic diagnostic test performed to identify the gender of an organism and the genetic mutations of an organism. The mutations resulting in the change of chromosomal number or structure are characterized by a karyotype. Picture of the chromosome pattern in males is known as a male karyotype. An image of the chromosome pattern in females is known as a female karyotype. This is the difference between male and female karyotypes. Both male and female karyotypes involve the same procedure and are widely performed the test by cytogeneticists across

the globe. These tests allow early diagnosis of genetic disorders thus, these patients can be subjected to treatment at an early stage of the disease.

Image Courtesy:

1.'Karyotype of normal male pig' By Yu-Jing Liao, Chia-Hsin Liao, Jiunn-Wang Liao, Kuo Yuan, Yu-Zhan Liu, Yi-Shiou Chen, Lih-Ren Chen and Jenn-Rong Yang - Liao YJ, Liao CH, Liao JW, Yuan K, Liu YZ, et al. (2014) [Establishment and Characterization of Novel Porcine Induced Pluripotent Stem Cells Expressing hrGFP](#). J Stem Cell Res Ther 4:208. doi:10.4172/2157-7633.1000208 ([CC BY 4.0](#)) via [Commons Wikimedia](#)

2.'PLoS Biol 3.5.Fig7ChromosomesAluFish'By Andreas Bolzer, Gregor Kreth, Irina Solovei, Daniela Koehler, Kaan Saracoglu, Christine Fauth, Stefan Müller, Roland Eils, Christoph Cremer, Michael R. Speicher, Thomas Cremer - Bolzer et al., (2005) Three-Dimensional Maps of All Chromosomes in Human Male Fibroblast Nuclei and Prometaphase Rosettes. PLoS Biol 3(5): e157 DOI: 10.1371/journal.pbio.0030157, Figure 7a, ([CC BY 2.5](#)) via [Commons Wikimedia](#)

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