

# Etiology of Chromosome Abnormalities

**Etiology of chromosome abnormalities** is pretty variable. The most often reason is mistake which occurs during the cell division. It is connected with wrong development of the sperm or ovum (female reproduction cell). We recognize two types of **cell division** - *mitosis* and *meiosis*. Another causes are **the maternal age** and the influence of the **environmental**.

Chromosome abnormalities are usually fatal. Each second first-trimester abortion is caused by them. Children who survive and get born suffer from very serious mental and physical problems. The screening for chromosome abnormalities is very important. The cytogeneticists use the karyotype testing.

## Problems in the Cell Division

We recognize two main types of the cell division. The first one is the **meiosis**. It is the process of division of reproduction cells. The result is a cell with 23 chromosomes (it is haploid). Fetus get 23 chromosomes from the mother and 23 chromosomes from the father. Cells of fetus are already diploid ( $2N$ ). Mistake during meiosis leads to incorrect number of the chromosomes in the egg or in the sperm. Child can get some extra chromosome (trisomy) or miss it (monosomy).

The second type of cell division is the **mitosis**. It occurs in all non-reproductive cells. It is a form of duplication of the genetic information, followed by the halving of material. The parent cell has 92 chromosomes ( $4N$ ), two subsidiary cells have 46 chromosome each ( $2N$ ). Mitosis starts immediately after fertilization and continues through whole life. When mistake occurs, the chromosomes may not be equal. Problems in mitosis leads to the mosaicism more often.

## Age of Parents

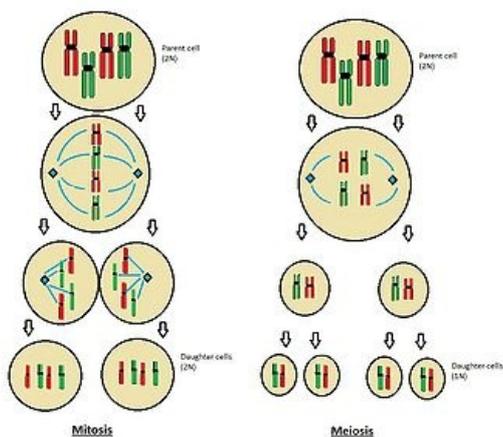
We are sure about the strong influence of **the maternal age** (especially in Down syndrome). **The paternal age** is less important, but still has its importance. The *difference is in cell division* of reproduction cells. The number of eggs (female's cells) is done by our birth. So eggs undergo meiosis many times. The later age of delivery means the higher risk of some abnormalities. It takes just 72 hours to the development of sperm cells. It is less probably to make a mistake during this period.

To the older women is recommended to visit some **genetic counseling** centre. "The older women" means more than 35 years. The prenatal diagnosis is the best way to find some affected children. The method of prenatal diagnosis as an amniocentesis.

## Influence of the Environment

It is very hard to tell how important is the environmental. We can't find any significant differences between parents with child with a chromosome abnormality and parents with healthy child. They have usually very similar lifestyle or habits. But there are still some **dangerous influences** - *X-rays, medication or food*. Most of them have a cumulative character.

Because we are not sure about the origin of abnormalities, it is hard to recommend any prevention. Sometimes it is said that the folic acid has a positive role in prevention of congenital abnormalities. Pregnant women should also get vitamins to reduce risks.



Mitosis and meiosis

## Links

### Related articles

- Chromosomal Abnormalities
- Karyotype
- Autosomal Disorders
- Genetic Counseling
- Meiosis
- Mitosis

### External links

- How Chromosome Abnormalities Happen (<http://www.lpch.org/DiseaseHealthInfo/HealthLibrary/genetics/happen.html>)

## Bibliography

- KUMAR, ABBAS, FAUSTO, MITCHELL,. *Robbins Basic Pathology*. 8th edition edition. 2007. ISBN 978-0-8089-2366-4.