

More than half of all miscarriages during the first 13 weeks of pregnancy are caused by problems in the fetal chromosomes. Chromosomes are tiny structures inside body cells that carry the basic identity of heredity. Each chromosome contains genes that determine a person's appearance, sex, and blood type. Problems in the number or structure of the chromosomes or the genes can lead to miscarriage. Most chromosomal problems occur by chance and are not likely to recur in later pregnancies. But in a few cases chromosomal problems can cause repeated miscarriages. Recurrent spontaneous miscarriages affects up to 1 percent of the population, with approximately 90% presenting as missed abortions in the first trimester.

Errors of chromosome segregation in mitosis and meiosis may possibly be due to spindle defects resulting in Aneuploidy. The paternal contribution to fetal aneuploidy is less clear. It seems that the proportion of aneuploid cell in men is not a reliable indicator of the tendency to meiotic and somatic non disjunction. Most chromosomally unbalanced abortions are the result of maternal non-disjunction. Among the individuals with a high proportion of sporadic aneuploid cells in their lymphocytes, 65% were women. It has been shown that during meiosis, 62% of non-disjunction events occur as a result of an error in the first maternal meiotic division, 15% in the second maternal meiotic division, 12% in the first paternal meiotic division, and 11% in the second paternal meiotic division. Advanced maternal age (after 35 years) has been recognized as a contributing factor, increasing the risk of producing aneuploid gametes. In males, the rate of aneuploidy increases significantly after the age of 55.

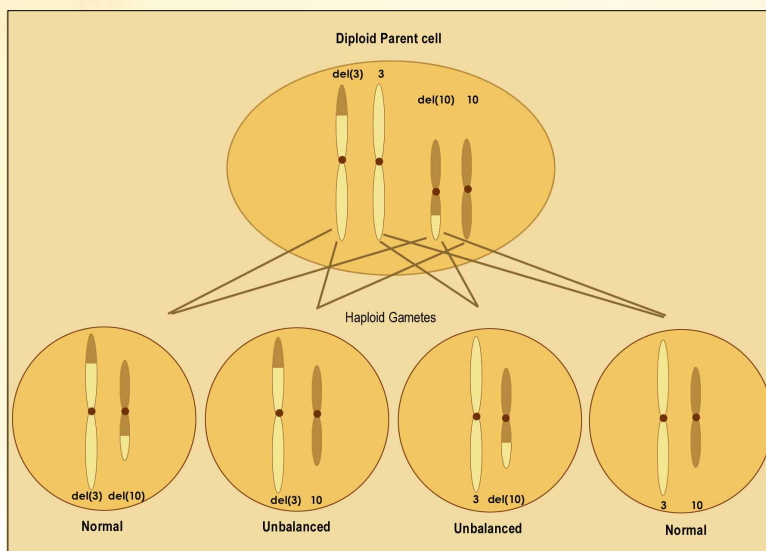
Numerous factors that describe to causes spontaneous abortions such as:
❖ Uterine abnormalities
❖ Endocrinological imbalance
❖ Immunological factors
❖ Infectious diseases
❖ Genetic factors.

Chromosomal Defect	Frequency
Triploidy	10%
Tetraploidy	5%
Trisomy	30%
Turner syndrome (45 X)	10%
Other	5%
Total	60%

Three major types of numerical chromosomal aberrations found in the abortus

1. Complete numerical abnormality: Trisomies, monosomies, triploidies etc., account for approximately 95% of the chromosome abnormalities involved in fetal demise. Numerical abnormalities could result from abnormal meiosis.
2. Mosaic chromosomal abnormality: Mosaicism means that only a percentage of cell population has the abnormality, which could result from one of two mechanisms:
  - a) Mitotic non-disjunction in a chromosomally normal conceptus or,
  - b) A meiotic error. Most mosaics originate from trisomic conceptions.
3. Hormonal influence: An increased proportion of sporadic aneuploid cells can result due to mitotic non disjunction during fetal development, influenced by the maternal hormonal profile. The estrogen/progesterone balance may influence lymphocyte proliferation and mitotic behavior.

In about 5 % of couples, a chromosome abnormality found in one of the parents explains recurrent miscarriage. Chromosomal aberrations such as aneuploidy account for approximately 50% of sporadic fetal losses prior to 15 weeks. Most cases of aneuploidy arise from non-disjunction at meiosis in one of the parents, leading to an abnormal gamete. Other chromosomal abnormalities such as centromere abnormalities may also predispose to meiotic non-disjunction leading to abortion. It is accepted that a balanced translocation carried by one of the parents, can cause repeat spontaneous abortion. Additionally, a balanced translocation occurs in one of the parents of 2-3% of couples who have experienced 2 or more pregnancy losses.



Parent with 3 and 10 Balanced Translocation