Supernumerary Chromosomes Encyclopedia Article

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Supernumerary Chromosomes

Supernumerary or B-chromosomes are small, extra chromosomes found in a large number of plant and animal **species**. They usually have a centromere and possibly coding **DNA**, but they usually produce no functional protein. They are not essential to normal cellular function, and do not follow normal patterns of **replication** and segregation during **cell division**. Supernumerary chromosomes may be unstable and lost from some cells, or accumulate in others. In some organisms, supernumerary chromosomes are normal variants in the population, but even in these situations, not all member of a species or all cells within a given individual will have the supernumerary chromosomes. An example of a positive effect of the presence of B-chromosomes has been reported in foxes. Male foxes with supernumerary chromosomes tend to eat better and be more fit overall than foxes lacking the extra chromosomes. In general, the origin and function of these structures are not well understood, but they appear to be more common in plants than in animals.

In higher organisms, small chromosomes derived from one **chromosome** of the normal set are often classed as supernumeraries. In humans, it has been estimated that supernumerary chromosomes exist in the population at a frequency of 1 in 2,000 to 1 in 3,500. he majority of these are bisatellited chromosomes probably derived from an error in the division of an acrocentric chromosome. As long as such structures do not carry any genes, they tend to be non-deleterious and do not affect the individual's physical appearance. However, if a bisatellited marker includes active genes, it can have negative consequences (partial trisomy or tetrasomy) if the extra copies of the genes are expressed.

Occasionally, a supernumerary chromosome is identified during a prenatal cytogenetic karyotype analysis. These may be bisatellited or have a single or no satellite. If one of the parents can be shown to have the same chromosome, it is unlikely that the child will be adversely affected. However, if the supernumerary is *de novo* (present for the first time in this child), the risk for abnormalities is higher since the extra chromosome could be due to an error resulting in a partial trisomy in the child. Genetic counseling is important to provide the family with the relative risks of the finding.