Chromosome 10

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Humans normally have 46 chromosomes in each cell, divided into 23 pairs. Two copies of chromosome 10, one copy inherited from each parent, form one of the pairs.

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1. Introduction

Chromosome 10 spans more than 133 million DNA building blocks (base pairs) and represents between 4 and 4.5 percent of the total DNA in cells.

Identifying genes on each chromosome is an active area of genetic research. Because researchers use different approaches to predict the number of genes on each chromosome, the estimated number of genes varies. Chromosome 10 likely contains 700 to 800 genes that provide instructions for making proteins. These proteins perform a variety of different roles in the body.

2. Health Conditions Related to Chromosomal Changes

2.1. 10q26 deletion syndrome

10q26 deletion syndrome is a condition that results from the loss (deletion) of a small piece of chromosome 10 in each cell. The deletion occurs on the long (q) arm of the chromosome at a position designated 10q26.

The signs and symptoms of 10q26 deletion syndrome vary widely, even among affected members of the same family. Affected individuals may have distinctive facial features, growth problems, mild to moderate intellectual disability, developmental delay, genital abnormalities in males, or skeletal or heart defects.

People with 10q26 deletion syndrome are missing between 3.5 million and 17 million DNA building blocks (base pairs), also written as 3.5 and 17 megabases (Mb), at position q26 on chromosome 10. The exact size of the deletion varies, and it is unclear what exact region needs to be deleted to cause the condition. In many affected individuals, the 10q26 deletions include the tip of the q arm of chromosome 10; however, some smaller deletions occur within the arm of the chromosome.

The signs and symptoms of 10q26 deletion syndrome are probably related to the loss of one or more genes in the deleted region. However, it is unclear which missing genes contribute to the specific features of the disorder.

2.2. Cancers

Changes in the number and structure of chromosome 10 are associated with several types of cancer. For example, a loss of all or part of chromosome 10 is often found in brain tumors called gliomas, particularly in aggressive, fast-growing gliomas. The association of cancerous tumors with a loss of chromosome 10 suggests that some genes on this chromosome play critical roles in controlling the growth and division of cells. Without these genes, cells could grow and divide too quickly or in an uncontrolled way, resulting in cancer. Researchers are working to identify the specific genes on chromosome 10 that may be involved in the development and progression of gliomas.

A complex rearrangement (translocation) of genetic material between chromosomes 10 and 11 is associated with several types of blood cancer known as leukemias. This chromosomal abnormality is found only in cancer cells. It fuses part of a specific gene from chromosome 11 (the *KMT2A* gene) with part of another gene from chromosome 10 (the *MLLT10* gene). The abnormal protein produced from this fused gene signals cells to divide without control or order, leading to the development of cancer.

2.3. Other chromosomal conditions

Other changes in the number or structure of chromosome 10 can have a variety of effects. Intellectual disability, delayed growth and development, distinctive facial features, and heart defects are common features. Changes to chromosome 10 include an extra piece of the chromosome in each cell (partial trisomy), a missing segment of the chromosome in each cell (partial monosomy), and an abnormal structure called a ring chromosome 10. Ring chromosomes occur when a chromosome breaks in two places and the ends of the chromosome arms fuse together to form a circular structure. Translocations or inversions (breakage of a chromosome in two places) can also lead to extra or missing material from chromosome 10.

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