



## Chromosome 10

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. Chromosome 10 spans more than 135 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.

### Health Conditions Related to Chromosomal Changes

The following chromosomal conditions are associated with changes in the structure or number of copies of chromosome 10.

#### 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, formerly called *MLL*) 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.

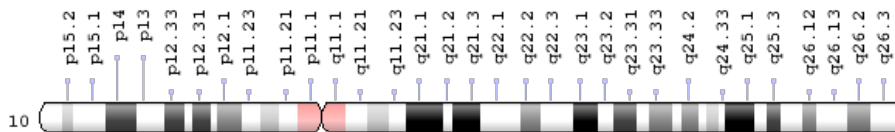
#### Other chromosomal conditions

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. Rearrangements (translocations) of genetic material between chromosomes can also lead to extra or missing material from chromosome 10.

## Chromosome Diagram

Geneticists use diagrams called idiograms as a standard representation for chromosomes. Idiograms show a chromosome's relative size and its banding pattern, which is the characteristic pattern of dark and light bands that appears when a chromosome is stained with a chemical solution and then viewed under a microscope. These bands are used to describe the location of genes on each chromosome.



Credit: Genome Decoration Page/NCBI

## Additional Information & Resources

### Health Information from MedlinePlus

- Encyclopedia: Chromosome  
<https://medlineplus.gov/ency/article/002327.htm>

### Additional NIH Resources

- National Human Genome Research Institute: Chromosome Abnormalities  
<https://www.genome.gov/about-genomics/fact-sheets/Chromosome-Abnormalities-Fact-Sheet>

### Educational Resources

- Genome News Network: Human Chromosomes 9 and 10 Are Complete (May 26, 2004)  
<http://www.genomenewsnetwork.org/articles/2004/05/26/chromosomes.php>

### Scientific Articles on PubMed

- PubMed  
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28Chromosomes,+Human,+Pair+10%5BMAJR%5D%29+AND+%28Chromosome+10%5BTI%5D%29+AND+english%5BIa%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D>

### Catalog of Genes and Diseases from OMIM

- CHROMOSOME 10q26 DELETION SYNDROME  
<http://omim.org/entry/609625>
- GLIOMA SUSCEPTIBILITY 1  
<http://omim.org/entry/137800>
- MYELOID/LYMPHOID OR MIXED LINEAGE LEUKEMIA, TRANSLOCATED TO, 10  
<http://omim.org/entry/602409>

### Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology: t(10;11)(p12;q23)  
<http://atlasgeneticsoncology.org/Anomalies/t1011ID1025.html>
- Cancer Genetics Web  
<http://www.cancerindex.org/geneweb/clinkc10.htm>
- Database of Genomic Variants: Chromosome 10  
[http://projects.tcag.ca/variation/cgi-bin/tbrowse/tbrowse?source=hg17&table=Locus&show=table&keyword=&flop=AND&fcol=\\_C19&fcomp==&fkwd=chr10&cols=](http://projects.tcag.ca/variation/cgi-bin/tbrowse/tbrowse?source=hg17&table=Locus&show=table&keyword=&flop=AND&fcol=_C19&fcomp==&fkwd=chr10&cols=)
- Ensembl Human Map View: Chromosome 10  
[http://www.ensembl.org/Homo\\_sapiens/Location/Chromosome?chr=10;r=10:1-133797422](http://www.ensembl.org/Homo_sapiens/Location/Chromosome?chr=10;r=10:1-133797422)
- The DNA sequence and comparative analysis of human chromosome 10. Nature. 2004 May 27;429(6990):375-81.  
<https://www.nature.com/articles/nature02462.pdf>
- U.S. Department of Energy: Human Genome Project Information Archive  
[https://web.ornl.gov/sci/techresources/Human\\_Genome/posters/chromosome/chromo10.shtml](https://web.ornl.gov/sci/techresources/Human_Genome/posters/chromosome/chromo10.shtml)

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