

Alterations That Lead to Cancer

Alterations including the types of genetic mutation known to lead to cancer include:

SINGLE BASE CHANGES

Deletion, insertion, or substitution of a single base (designated A, T, G, C) can result in new proteins, altered versions of normal proteins, loss of protein function, or changed amount of the protein produced, which can lead to cancer.



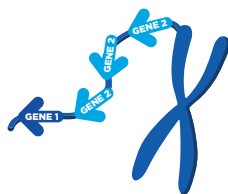
GENE FUSION

This occurs when two separate genes become joined together leading to the production of a new protein or different amount of protein. Gene fusions can occur when two different chromosomes break, and the pieces connect or fuse with each other.



EXTRA COPIES OF GENES (GENE AMPLIFICATION)

Higher quantities of certain proteins can result in enhanced cell survival and growth, leading to cancer.



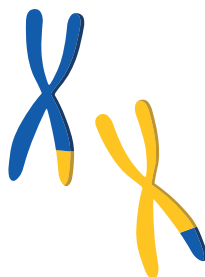
DELETIONS

Loss of DNA can result in loss of genes necessary to regulate the processes that control normal cell growth, division, and life span, leading to cancer development.



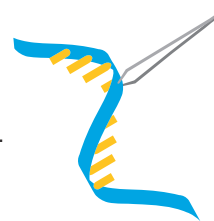
STRUCTURAL VARIATIONS

Exchange of DNA between chromosomes can alter multiple genes at once. It can sometimes lead to the fusion of two separate genes, generating entirely new proteins that can drive the development of cancer.



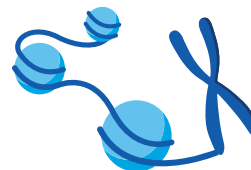
CANCER-RELATED ALTERNATIVE SPLICING

Normal cells copy the message from DNA in pieces of RNA that are assembled in a process called splicing to complete the message. In cancer cells, this process can be altered to generate abnormal proteins, that fuel uncontrolled cell proliferation and growth.



MUTATIONS THAT ALTER THE EPIGENOME

Several proteins read, write, or erase epigenetic marks on DNA or the histones around which DNA is packaged. Mutations in these reader and writer proteins can lead to cancer by altering the activation or silencing of genes needed to control cell growth and division processes.



Of note, cells acquire mutations over time, but not all mutations cause cancer. In addition, not all mutations found in a cancer cell drive cancer development.