FLT3

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Fms related tyrosine kinase 3

genes

1. Normal Function

The *FLT3* gene provides instructions for making a protein called fms-like tyrosine kinase 3 (FLT3), which is part of a family of proteins called receptor tyrosine kinases (RTKs). Receptor tyrosine kinases transmit signals from the cell surface into the cell through a process called signal transduction. The FLT3 protein is found in the outer membrane of certain cell types where a specific protein called FLT3 ligand, or FL, can attach (bind) to it. This binding turns on (activates) the FLT3 protein, which subsequently activates a series of proteins inside the cell that are part of multiple signaling pathways. The signaling pathways stimulated by the FLT3 protein control many important cellular processes such as the growth and division (proliferation) and survival of cells, particularly of early blood cells called hematopoietic progenitor cells.

2. Health Conditions Related to Genetic Changes

2.1 Core Binding Factor Acute Myeloid Leukemia

2.2 Cytogenetically Normal Acute Myeloid Leukemia

Changes in the *FLT3* gene are involved in a form of blood cancer known as cytogenetically normal acute myeloid leukemia (CN-AML). While large chromosomal abnormalities can be involved in the development of acute myeloid leukemia, about half of cases do not have these abnormalities; these are classified as CN-AML.

The *FLT3* gene mutations involved in CN-AML are called somatic mutations; they are found only in cells that become cancerous and are not inherited. Two types of *FLT3* gene mutations are found in CN-AML. The most common, which occurs in up to 34 percent of CN-AML cases, is called the *FLT3* internal tandem duplication (*FLT3*-ITD). In this type of mutation, a short sequence of DNA is copied and inserted directly following the original sequence. The duplicated DNA sequence can vary in size, but all *FLT3*-ITD mutations result in alterations in the region of the protein that spans the cell membrane, known as the juxtamembrane domain. The altered juxtamembrane domain allows the FLT3 receptor to activate signaling pathways without binding of FL; the receptor

is always turned on and is said to be constitutively activated. Constant signaling leads to uncontrolled proliferation of abnormal, immature white blood cells, a hallmark of acute myeloid leukemia.

The other type of *FLT3* gene mutation is found in about 14 percent of people with CN-AML. These mutations are referred to as *FLT3*-TKD mutations because they change single protein building blocks (amino acids) in a region of the protein known as the tyrosine kinase domain (TKD). The most commonly changed amino acid is asparagine at position 835; it is typically replaced by the amino acid tyrosine. This mutation is written as Asp835Tyr or D835Y. Like *FLT3*-ITD mutations, *FLT3*-TKD mutations result in a constitutively activated FLT3 receptor and constant signaling, leading to acute myeloid leukemia.

3. Other Names for This Gene

- CD135
- CD135 antigen
- fetal liver kinase 2
- FL cytokine receptor
- FLK-2
- FLK2
- FLT3_HUMAN
- fms-like tyrosine kinase 3
- fms-related tyrosine kinase 3
- growth factor receptor tyrosine kinase type III
- receptor-type tyrosine-protein kinase FLT3
- stem cell tyrosine kinase 1
- STK-1
- STK1

The entry is from https://medlineplus.gov/genetics/gene/flt3

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