SETBP1 Gene

Subjects: Genetics
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Definition

SET binding protein 1

1. Normal Function

The *SETBP1* gene provides instructions for making a protein called SET binding protein 1 (SETBP1), which is found in cells throughout the body. The SETBP1 protein is part of a group of proteins that attaches (binds) to certain regions of DNA to increase gene activity (expression). The protein primarily binds to sections called promoter regions, which control (regulate) the production of proteins.

SETBP1 protein levels are highest during brain development before birth. During this time, nerve cells grow and divide (proliferate) and move (migrate) to their proper location in the brain. The SETBP1 protein is thought to control genes that are involved in these developmental processes.

2. Health Conditions Related to Genetic Changes

2.1. Schinzel-Giedion syndrome

At least 16 mutations in the *SETBP1* gene have been identified in children with Schinzel-Giedion syndrome, a severe condition apparent at birth that is characterized by distinctive facial features and abnormalities in many body systems. The gene mutations in affected individuals typically occur in a region of the gene known as exon 4. All of these mutations result in the change of single protein building blocks (amino acids) in the SETBP1 protein. These mutations are described as "gain-of-function" mutations because they increase the activity of the SETBP1 protein. Increased SETBP1 protein activity probably alters the expression of other genes, particularly genes involved in development before birth, and likely contributes to the many features of Schinzel-Giedion syndrome. However, the exact mechanism that causes this condition is still unclear.

2.2. SETBP1 disorder

SETBP1 gene mutations have been found to cause a condition called SETBP1 disorder. This condition is not as severe as Schinzel-Giedion syndrome (described above) and is characterized by speech and language problems, intellectual disability, and distinct facial features.

SETBP1 disorder can be caused by insertions or deletions of small amounts of DNA within the *SETBP1* gene. In some cases, SETBP1 disorder results from the loss of a small piece of chromosome 18 that contains the *SETBP1* gene. It is unclear whether the type of mutation influences the severity of the condition as the signs and symptoms of SETBP1 disorder vary among affected individuals, even among those with similar mutations.

In contrast to the *SETBP1* gene mutations that cause Schinzel-Giedion syndrome, the mutations that cause SETBP1 disorder are known as "loss-of-function" because they prevent the production of any functional SETBP1 protein. It is unclear how the loss of SETBP1 protein leads to the specific features of SETBP1 disorder. A shortage of this protein probably impairs the expression of certain genes in the brain, disrupting development. Abnormalities in certain brain regions likely underlie the speech, intellectual, and behavioral problems that can occur in SETBP1 disorder.

2.3. Cancers

Mutations in the *SETBP1* gene have been associated with cancers of blood-forming cells, including juvenile myelomonocytic leukemia, acute myeloid leukemia, chronic myeloid leukemia, and myelodysplastic syndrome. These mutations are somatic, which means they are acquired during a person's lifetime and are present only in cells that give rise to cancer.

The mutations associated with these conditions are likely "gain-of-function," which means that they lead to production of an overactive SETBP1 protein. Researchers believe that the overactive SETBP1 protein increases the activity of certain genes. The increase in gene activity likely promotes the growth of cancers by allowing abnormal blood cells to grow and divide uncontrollably, although the exact mechanism is unknown.

3. Other Names for This Gene

- KIAA0437
- SEB
- SET-binding protein
- SET-binding protein isoform a
- SET-binding protein isoform b
- SETBP_HUMAN

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Keywords

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