SHANK3 gene

SH3 and multiple ankyrin repeat domains 3

Normal Function

The *SHANK3* gene provides instructions for making a protein that is found in many of the body's tissues but is most abundant in the brain. The SHANK3 protein plays a role in the functioning of synapses, which are the connections between nerve cells (neurons) where cell-to-cell communication occurs. Within synapses, the SHANK3 protein acts as a scaffold that supports the connections between neurons, ensuring that the signals sent by one neuron are received by another.

The SHANK3 protein is also involved in the formation and maturation of dendritic spines. Dendrites are specialized extensions from neurons that are essential for the transmission of nerve impulses. Dendritic spines are small outgrowths from dendrites that further help transmit nerve impulses and increase communication between neurons.

Health Conditions Related to Genetic Changes

22q13.3 deletion syndrome

The characteristic signs and symptoms of 22q13.3 deletion syndrome, which is also commonly known as Phelan-McDermid syndrome, are caused by a deletion near the end of the long (q) arm of chromosome 22. The chromosomal region that is typically deleted is thought to contain many genes, including the *SHANK3* gene. As a result of the deletion, people with this condition have only one copy of the *SHANK3* gene in each cell instead of the usual two copies.

Researchers believe that a deletion of the *SHANK3* gene and a reduction in the amount of SHANK3 protein produced is responsible for many of the features of 22q13.3 deletion syndrome. A decrease in the functioning of synapses and cell-to-cell communication between neurons caused by a lack of SHANK3 protein is thought to contribute to the developmental delay, intellectual disability, and absent or severely delayed speech characteristic of people with 22q13.3 deletion syndrome.

Autism spectrum disorder

At least 43 *SHANK3* gene mutations have been found in people who have autism

spectrum disorder (ASD), which is a varied condition characterized by impaired communication and socialization skills, as well as repetitive behaviors. Most of these mutations disrupt the function of the SHANK3 protein or prevent the protein from being produced. It is unclear how changes in the *SHANK3* gene are related to the risk of developing ASD. Researchers suspect that a disruption in communication between neurons contributes to the development of this condition. Variations in other genes and environmental factors are also thought to affect the risk of this complex disorder.

Other Names for This Gene

- proline-rich synapse-associated protein 2
- ProSAP2
- SPANK-2

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of SHANK3 (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=85358[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28SHANK3%5BTIAB%5D%29+OR+%28PROSAP2%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+2520+days%22%5Bdp%5D)

Catalog of Genes and Diseases from OMIM

- SH3 AND MULTIPLE ANKYRIN REPEAT DOMAINS 3; SHANK3 (https://omim.org/entry/606230)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/85358)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=SHANK3[gene])

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Genomic Location

The *SHANK3* gene is found on chromosome 22 (https://medlineplus.gov/genetics/chromosome/22/).

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