STAMBP gene

STAM binding protein

Normal Function

The *STAMBP* gene provides instructions for making a protein called STAM binding protein. Although its exact function is not well understood, within cells this protein interacts with large groups of interrelated proteins known as endosomal sorting complexes required for transport (ESCRTs). ESCRTs help transport proteins from the outer cell membrane to the interior of the cell, a process known as endocytosis. In particular, they are involved in the endocytosis of damaged or unneeded proteins that need to be broken down (degraded) or recycled by the cell. ESCRTs help sort these proteins into structures called multivesicular bodies (MVBs), which deliver them to lysosomes. Lysosomes are compartments within cells that digest and recycle many different types of molecules.

Through its association with ESCRTs, STAM binding protein helps to maintain the proper balance of protein production and breakdown (protein homeostasis) that cells need to function and survive. Studies suggest that the interaction of STAM binding protein with ESCRTs is also involved in multiple chemical signaling pathways within cells, including pathways needed for overall growth and the formation of new blood vessels (angiogenesis).

Health Conditions Related to Genetic Changes

Microcephaly-capillary malformation syndrome

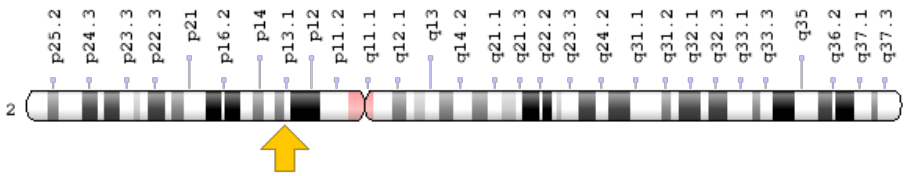
At least 13 mutations in the *STAMBP* gene have been identified in people with microcephaly-capillary malformation syndrome, an inherited disorder characterized by an abnormally small head size (microcephaly), profound developmental delay and intellectual disability, recurrent seizures (epilepsy), and abnormalities of small blood vessels in the skin called capillaries (capillary malformations).

The known *STAMBP* gene mutations reduce or eliminate the production of STAM binding protein. This shortage allows damaged or unneeded proteins to build up inside cells instead of being degraded or recycled, which may damage cells and cause them to self-destruct (undergo apoptosis). Researchers suspect that abnormal apoptosis of brain cells starting before birth may cause microcephaly and the underlying brain abnormalities found in people with microcephaly-capillary malformation syndrome. A lack of STAM binding protein also alters multiple signaling pathways that are necessary for normal development, which may underlie the capillary malformations and other signs and symptoms of the condition.

Chromosomal Location

Cytogenetic Location: 2p13.1, which is the short (p) arm of chromosome 2 at position 13.1

Molecular Location: base pairs 73,828,911 to 73,873,661 on chromosome 2 (Homo sapiens Updated Annotation Release 109.20190607, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- AMSH
- associated molecule with the SH3 domain of STAM
- endosome-associated ubiquitin isopeptidase
- STABP_HUMAN
- STAM-binding protein

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): The Endocytic Pathway From the Plasma Membrane to Lysosomes (figure) https://www.ncbi.nlm.nih.gov/books/NBK26870/figure/A2402/

Clinical Information from GeneReviews

- Microcephaly-Capillary Malformation Syndrome https://www.ncbi.nlm.nih.gov/books/NBK174452

Scientific Articles on PubMed

- PubMed https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28STAMBP%5BTIAB%5D%29+OR+%28STAM+binding+protein%5BTIAB%5D%29+OR+%28AMSH%5BTI%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- STAM-BINDING PROTEIN
  http://omim.org/entry/606247

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_STAMBP.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=STAMBP%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:16950
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:10617
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/10617
- UniProt
  https://www.uniprot.org/uniprot/O95630

Sources for This Summary

- Carter MT, Mirzaa G, McDonell LM, Boycott KM. Microcephaly-Capillary Malformation Syndrome. 2013 Dec 12. In: Pagon RA, Adam MP, Ardinger HH, Wallace SE, Amemiya A, Bean LJH, Bird TD, Ledbetter N, Mefford HC, Smith RJH, Stephens K, editors. GeneReviews® [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2017. Available from http://www.ncbi.nlm.nih.gov/books/NBK174452/
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/24354023
- Davies CW, Paul LN, Das C. Mechanism of recruitment and activation of the endosome-associated deubiquitinase AMSH. Biochemistry. 2013 Nov 5;52(44):7818-29. doi: 10.1021/bi401106b. Epub 2013 Oct 23.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/24151880
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3972757/
- McDonell LM, Mirzaa GM, Alcantara D, Schwartzentruber J, Carter MT, Lee LJ, Clericuzio CL, Graham JM Jr, Morris-Rosendahl DJ, Polster T, Acsadi G, Townshend S, Williams S, Halbert A, Isidor B, David A, Smyser CD, Paciorkowski AR, Willing M, Woulfe J, Das S, Beaulieu CL, Marcadier J; FORGE Canada Consortium, Geraghty MT, Frey BJ, Majewski J, Bulman DE, Dobyns WB, O'Driscoll M, Boycott KM. Mutations in STAMBP, encoding a deubiquitinating enzyme, cause microcephaly-capillary malformation syndrome. Nat Genet. 2013 May;45(5):556-62. doi: 10.1038/ng.2602. Epub 2013 Mar 31.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/23542699
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4000253/
- Tsang HT, Connell JW, Brown SE, Thompson A, Reid E, Sanderson CM. A systematic analysis of human CHMP protein interactions: additional MIT domain-containing proteins bind to multiple components of the human ESCRT III complex. Genomics. 2006 Sep;88(3):333-46. Epub 2006 May 30.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16730941

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