KAT6B gene
lysine acetyltransferase 6B

Normal Function

The KAT6B gene provides instructions for making a type of enzyme called a histone acetyltransferase. These enzymes modify histones, which are structural proteins that attach (bind) to DNA and give chromosomes their shape. By adding a small molecule called an acetyl group to particular locations on histones, histone acetyltransferases control the activity of certain genes.

Little is known about the function of the histone acetyltransferase produced from the KAT6B gene. It is active in cells and tissues throughout the body, where it interacts with many other proteins. It appears to regulate genes that are important for early development, including development of the skeleton and nervous system.

Health Conditions Related to Genetic Changes

Genitopatellar syndrome

At least eight mutations in the KAT6B gene have been identified in people with genitopatellar syndrome, a rare condition characterized by genital abnormalities, missing or underdeveloped kneecaps (patellae), intellectual disability, and abnormalities affecting other parts of the body. The mutations that cause genitopatellar syndrome occur near the end of the KAT6B gene in a region known as exon 18. These mutations lead to the production of a shortened histone acetyltransferase enzyme. Researchers suspect that the shortened enzyme may function differently than the full-length version, altering the regulation of various genes during early development. Because the altered enzyme takes on a different function, these mutations are described as “gain-of-function.” However, it is unclear how these changes lead to the specific features of genitopatellar syndrome.

Ohdo syndrome, Say-Barber-Biesecker-Young-Simpson variant

More than 10 mutations in the KAT6B gene have been found to cause the Say-Barber-Biesecker-Young-Simpson (SBBYS) variant of Ohdo syndrome. This condition has signs and symptoms that overlap with those of genitopatellar syndrome (described above), although some of the specific developmental abnormalities differ between the two conditions. Mutations that cause the SBBYS variant of Ohdo syndrome have been identified throughout the KAT6B gene, although many of them occur in exon 18. Studies suggest that these mutations likely prevent the production of functional histone acetyltransferase from one copy of the KAT6B gene in each cell. A shortage of this enzyme impairs the regulation of various genes during early development. Because these mutations lead to a reduction in the enzyme, they are
described as "loss-of-function." However, it is unclear how these changes lead to the specific features of the condition.

Coloboma

Cancers

Genetic changes involving the KAT6B gene have been associated with certain types of cancer. These mutations are somatic, which means they are acquired during a person’s lifetime and are present only in certain cells. The genetic changes are chromosomal rearrangements (translocations) that disrupt the region of chromosome 10 containing the KAT6B gene. Researchers have found a translocation that attaches this region of chromosome 10 to part of chromosome 16 in some people with a cancer of blood-forming cells called acute myeloid leukemia (AML). This translocation has also been identified in some people with therapy-related myelodysplastic syndrome, a blood disorder that can occur after a person has undergone chemotherapy for another form of cancer.

It is unclear how translocations involving the KAT6B gene are related to the development of cancer. These changes likely alter histone modification, which could prevent normal regulation of gene activity. Impaired gene regulation may contribute to the growth of cancers by allowing abnormal cells to grow and divide uncontrollably.

Tumors

Somatic changes involving the KAT6B gene have also been identified in some people with uterine leiomyomas, which are noncancerous growths in the uterus that are also known as uterine fibroids. Uterine leiomyomas are common in adult women. These growths can cause pelvic pain and abnormal bleeding, and, in some cases, lead to an inability to have biological children (infertility). The genetic change associated with uterine leiomyomas is a translocation between the region of chromosome 10 containing the KAT6B gene and a particular region of chromosome 17. It is unclear how this translocation is related to tumor development. Changes in histone modification that impair normal gene regulation may allow certain cells to divide in an uncontrolled way, leading to the growth of a tumor.
Chromosomal Location

Cytogenetic Location: 10q22.2, which is the long (q) arm of chromosome 10 at position 22.2

Molecular Location: base pairs 74,824,927 to 75,032,624 on chromosome 10 (Homo sapiens Updated Annotation Release 109.20200522, GRCh38.p13) (NCBI)

Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- GTPTS
- histone acetyltransferase KAT6B
- histone acetyltransferase MORF
- histone acetyltransferase MOZ2
- histone acetyltransferase MYST4
- K(lysine) acetyltransferase 6B
- KAT6B_HUMAN
- monocytic leukemia zinc finger protein-related factor
- MORF
- MOZ-related factor
- MOZ2
- MYST-4
- MYST histone acetyltransferase (monocytic leukemia) 4
- MYST4
- qkf
- querkopf
- ZC2HC6B
Additional Information & Resources

Educational Resources

• Epigenomics Help (2010): Histone Modification "Writers"
  https://www.ncbi.nlm.nih.gov/books/NBK45788/#epi_sci_bkgrd.HistoneModification_writer

Clinical Information from GeneReviews

• KAT6B Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK114806

Scientific Articles on PubMed

• PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28KAT6B%5Btiab%5D%29+OR+%28MORF%5Btiab%5D%29+OR+%28MOZ2%5Btiab%5D%29+OR+%28MYST4%5Btiab%5D%29+OR+%28querkopf%5Btiab%5D%29+AND+%28%28Genes%5BMh%5D%29+OR+%28Genetic+Phenomena%5BMh%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D

Catalog of Genes and Diseases from OMIM

• LEIOMYOMA, UTERINE
  http://omim.org/entry/150699

• LEUKEMIA, ACUTE MYELOID
  http://omim.org/entry/601626

• LYSINE ACETYLTRANSFERASE 6B
  http://omim.org/entry/605880

• MYELODYSPLASTIC SYNDROME
  http://omim.org/entry/614286

Research Resources

• Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/MYST4ID41488ch10q22.html

• ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=KAT6B%5Bgene%5D

• HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#/hgnc_id/HGNC:17582

• Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:23522
Sources for This Summary

- Campeau PM, Kim JC, Lu JT, Schwartzentruber JA, Abdul-Rahman OA, Schlaubitz S, Murdock DM, Jiang MM, Lammer EJ, Enns GM, Rhead WJ, Rowland J, Robertson SP, Cormier-Daire V, Bainbridge MN, Yang XJ, Gingras MC, Gibbs RA, Rosenblatt DS, Majewski J, Lee BH. Mutations in KAT6B, encoding a histone acetyltransferase, cause Genitopatellar syndrome. Am J Hum Genet. 2012 Feb 10;90(2):282-9. doi: 10.1016/j.ajhg.2011.11.023. Epub 2012 Jan 19. Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/22265014 Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3276659/

- Campeau PM, Lu JT, Dawson BC, Fokkema IF, Robertson SP, Gibbs RA, Lee BH. The KAT6B-related disorders genitopatellar syndrome and Ohdo/SBBYS syndrome have distinct clinical features reflecting distinct molecular mechanisms. Hum Mutat. 2012 Nov;33(11):1520-5. doi: 10.1002/humu.22141. Epub 2012 Jul 12. Review. Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/22715153 Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3696352/

- Champagne N, Bertos NR, Pelletier N, Wang AH, Vezmar M, Yang Y, Heng HH, Yang XJ. Identification of a human histone acetyltransferase related to monocytic leukemia zinc finger protein. J Biol Chem. 1999 Oct 1;274(40):28528-36. Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/10497217

- Clayton-Smith J, O'Sullivan J, Daly S, Bhaskar S, Day R, Anderson B, Voss AK, Thomas T, Biesecker LG, Smith P, Fryer A, Chandler KE, Kerr B, Tassabehji M, Lynch SA, Krajewska-Walasek M, McKeel S, Smith J, Sweeney E, Mansour S, Mohammed S, Donnai D, Black G. Whole-exome-sequencing identifies mutations in histone acetyltransferase gene KAT6B in individuals with the Say-Barber-Biesecker variant of Ohdo syndrome. Am J Hum Genet. 2011 Nov 11;89(5):675-81. doi: 10.1016/j.ajhg.2011.10.008. Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/22077973 Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3213399/

- Kojima K, Kaneda K, Yoshida C, Dansako H, Fujii N, Yano T, Shinagawa K, Yasukawa M, Fujita S, Tanimoto M. A novel fusion variant of the MORF and CBP genes detected in therapy-related myelodysplastic syndrome with t(10;16)(q22;p13). Br J Haematol. 2003 Jan;120(2):271-3. Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12542485

- Moore SD, Herrick SR, Ince TA, Kleinman MS, Dal Cin P, Morton CC, Quade BJ. Uterine leiomyomata with t(10;17) disrupt the histone acetyltransferase MORF. Cancer Res. 2004 Aug 15;64(16):5570-7. Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15313893

- Panagopoulos I, Fioretos T, Isaksson M, Samuelsson U, Billström R, Strömbeck B, Mitelman F, Johansson B. Fusion of the MORF and CBP genes in acute myeloid leukemia with the t(10;16)(q22; p13). Hum Mol Genet. 2001 Feb 15;10(4):395-404. Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11157802
• Simpson MA, Deshpande C, Dafou D, Vissers LE, Woollard WJ, Holder SE, Gillessen-Kaesbach G, Derks R, White SM, Cohen-Snuijf R, Kant SG, Hoefsloot LH, Reardon W, Brunner HG, Bongers EM, Trembath RC. De novo mutations of the gene encoding the histone acetyltransferase KAT6B cause Genitopatellar syndrome. Am J Hum Genet. 2012 Feb 10;90(2):290-4. doi: 10.1016/j.ajhg.2011.11.024. Epub 2012 Jan 19. 
   Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/22265017
   Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3276665/

• Yang XJ, Ullah M. MOZ and MORF, two large MYSTic HATs in normal and cancer stem cells. Oncogene. 2007 Aug 13;26(37):5408-19. Review.
   Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17694082

Reprinted from Genetics Home Reference:
   https://ghr.nlm.nih.gov/gene/KAT6B

Reviewed: February 2013
Published: June 23, 2020

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services