MCM6 gene

minichromosome maintenance complex component 6

Normal Function

The *MCM6* gene provides instructions for making a protein that is part of the MCM complex, a group of proteins that functions as a helicase. Helicases attach to particular regions of DNA and temporarily unwind the two spiral strands of these molecules. When a cell prepares to divide to form two cells, helicases unwind the DNA so that it can be copied. The DNA that makes up the chromosomes is duplicated (replicated) so that each new cell will get a complete set of chromosomes. Helicases are also involved in the production of RNA, a chemical cousin of DNA.

Health Conditions Related to Genetic Changes

Lactose intolerance

A specific DNA sequence within the *MCM6* gene called a regulatory element helps control the activity (expression) of a nearby gene called *LCT*. The *LCT* gene provides instructions for making an enzyme called lactase. This enzyme helps to digest lactose, a sugar found in milk and several other dairy products. Lactose intolerance in adulthood is caused by the gradually decreasing expression of the *LCT* gene after infancy, which occurs in most humans.

A few variants (also called mutations) have been identified in the regulatory element of *MCM6* that controls *LCT* gene expression. These variants change single DNA building blocks (nucleotides) in the regulatory element. Each of the variants results in sustained lactase production in the small intestine and the ability to digest lactose throughout life. People without these changes have a reduced ability to digest lactose as they get older, resulting in the signs and symptoms of lactose intolerance.

Other Names for This Gene

- MCM6_HUMAN
- minichromosome maintenance deficient 6

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of MCM6 (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4175[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28MCM6%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+1800+days%22%5Bdp%5D)

Catalog of Genes and Diseases from OMIM

- MINICHROMOSOME MAINTENANCE COMPLEX COMPONENT 6; MCM6 (https://omim.org/entry/601806)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/4175)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=MCM6[gene])

References

- Harvey CB, Wang Y, Darmoul D, Phillips A, Mantei N, Swallow DM.Characterisation of a human homologue of a yeast cell division cycle gene, MCM6,located adjacent to the 5' end of the lactase gene on chromosome 2q21. FEBS Lett.1996 Dec 2; 398(2-3):135-40. doi: 10.1016/s0014-5793(96)01189-1. Citation on PubMed (https://www.ncbi.nlm.nih.gov/pubmed/8977093)
- Holthoff HP, Baack M, Richter A, Ritzi M, Knippers R. Human protein MCM6 onHeLa cell chromatin. J Biol Chem. 1998 Mar 27;273(13):7320-5. doi:10.1074/jbc.273.13.7320. Citation on PubMed (https://www.ncbi.nlm.nih.gov/pubmed/9516426)
- Liebert A, Lopez S, Jones BL, Montalva N, Gerbault P, Lau W, Thomas MG, Bradman N, Maniatis N, Swallow DM. World-wide distributions of lactasepersistence alleles and the complex effects of recombination and selection. HumGenet. 2017 Nov;136(11-12):1445-1453. doi: 10.1007/s00439-017-1847-y. Epub 2017Oct 23. Citation on PubMed (https://www.ncbi.nlm.nih.gov/pubmed/29063188)
- Shastri VM, Subramanian V, Schmidt KH. A novel cell-cycle-regulatedinteraction of the Bloom syndrome helicase BLM with Mcm6 controlsreplication-linked processes. Nucleic Acids Res. 2021 Sep 7;49(15):8699-8713.doi: 10.1093/nar/gkab663. Citation on PubMed (https://www.ncbi.nlm.nih.gov/pubmed/34370039)

Genomic Location

The *MCM6* gene is found on chromosome 2 (https://medlineplus.gov/genetics/chromosome/2/).

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