MTTP gene
microsomal triglyceride transfer protein

Normal Function

The *MTTP* gene provides instructions for making a protein called microsomal triglyceride transfer protein. This protein helps produce beta-lipoproteins, which are molecules that are made up of proteins (including one called apolipoprotein B), cholesterol, and particular types of fats called phospholipids and triglycerides.

Different types of beta-lipoproteins are made in the intestine and liver. In the intestine, beta-lipoproteins include chylomicrons, which are formed as food is digested after a meal to carry dietary fats and cholesterol from the intestine to the bloodstream. Chylomicrons are also necessary for the absorption of certain fat-soluble vitamins, such as vitamins E, A, and K. In the liver, beta-lipoproteins include low-density lipoproteins (LDL) and very low-density lipoproteins (VLDL). These lipoproteins transport fats, cholesterol, and fat-soluble vitamins in the bloodstream to tissues throughout the body. Sufficient levels of fats, cholesterol, and vitamins are necessary for normal growth, development, and maintenance of the body’s cells and tissues.

Health Conditions Related to Genetic Changes

Abetalipoproteinemia

More than 60 mutations in the *MTTP* gene have been found to cause abetalipoproteinemia. This condition impairs the normal absorption of fats and fat-soluble vitamins from the diet and primarily affects the gastrointestinal system, eyes, nervous system, and blood.

Most *MTTP* gene mutations lead to the production of microsomal triglyceride transfer protein with reduced or absent function, preventing the formation of beta-lipoproteins. One particular mutation is common in affected individuals of Ashkenazi (eastern and central European) Jewish descent; this mutation replaces the protein building block (amino acid) glycine with a premature stop signal at position 865 (written as Gly865Ter or G865X) in the instructions used to make the microsomal triglyceride transfer protein. As a result of this change, an abnormally small, nonfunctional version of the protein is made. All *MTTP* gene mutations that cause abetalipoproteinemia impair beta-lipoprotein formation and result in a severe shortage of chylomicrons, LDLs, and VLDLs. A lack of these lipoproteins prevents dietary fats and fat-soluble vitamins from being absorbed from the diet and transported through the bloodstream to the body’s tissues. These nutritional deficiencies lead to health problems in people with abetalipoproteinemia.
Chromosomal Location

Cytogenetic Location: 4q23, which is the long (q) arm of chromosome 4 at position 23

Molecular Location: base pairs 99,564,078 to 99,623,997 on chromosome 4 (Homo sapiens Updated Annotation Release 109.20191205, GRCh38.p13) (NCBI)

Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ABL
- microsomal TG transfer protein
- microsomal triglyceride transfer protein (large polypeptide, 88kD)
- microsomal triglyceride transfer protein large subunit
- MTP
- MTP triglyceride carrier
- MTP_HUMAN

Additional Information & Resources

Educational Resources

- Biochemistry (fifth edition, 2002): Lipoproteins Transport Cholesterol and Triacylglycerols Throughout the Organism
  https://www.ncbi.nlm.nih.gov/books/NBK22336/#A3634

Clinical Information from GeneReviews

- Abetalipoproteinemia
  https://www.ncbi.nlm.nih.gov/books/NBK532447

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28MTTP%5BTIAB%5D%29+OR+%28microsomal+triglyceride+transfer+protein%5BTIAB%5D%29+AND+%28Genes%5BMH%5D+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D
Catalog of Genes and Diseases from OMIM

- MICROSONAL TRIGLYCERIDE TRANSFER PROTEIN
  http://omim.org/entry/157147

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_MTTP.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=MTTP%5Bgene%5D
- HGNC Gene Symbol Report
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:4547
- NCBI Gene
- UniProt
  https://www.uniprot.org/uniprot/P55157

Sources for This Summary

- Benayoun L, Granot E, Rizel L, Allon-Shalev S, Behar DM, Ben-Yosef T. Abetalipoproteinemia in
  Israel: evidence for a founder mutation in the Ashkenazi Jewish population and a contiguous gene
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17275380

- Gündüz M, Özaydin E, Atar MB, Koç N, Kırıncıoğlu C, Köse G, Cefalù AB, Averna M, Tarugi P.
  Microsomal triglyceride transfer protein gene mutations in Turkish children: A novel mutation and
  Epub 2016 May 10.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/27160094

- Hooper AJ, van Bockxmeer FM, Burnett JR. Monogenic hypocholesterolaemic lipid disorders and
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16390683

  multifunctional protein. Front Biosci. 2003 May 1;8:s500-6. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12700048

- OMIM: MICROSONAL TRIGLYCERIDE TRANSFER PROTEIN
  http://omim.org/entry/157147

- Swift LL, Kakkad B, Boone C, Jovanovska A, Jerome WG, Mohler PJ, Ong DE. Microsomal
  triglyceride transfer protein expression in adipocytes: a new component in fat metabolism. FEBS
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15922333
Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/27487388

Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/27690713

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