ARG1 gene

arginase 1

Normal Function

The *ARG1* gene provides instructions for producing the enzyme arginase. This enzyme participates in the urea cycle, a series of reactions that occurs in liver cells. The urea cycle processes excess nitrogen, which is generated when proteins and their building blocks (amino acids) are used by the body. Through the urea cycle, excess nitrogen is made into a compound called urea that is excreted by the kidneys. Excreting the excess nitrogen prevents it from accumulating in the form of ammonia, which is toxic.

Arginase controls the last step of the urea cycle, a reaction in which nitrogen is removed from the amino acid arginine and processed into urea for excretion from the body. A compound called ornithine is also produced in this reaction; it is needed for the urea cycle to repeat.

Health Conditions Related to Genetic Changes

Arginase deficiency

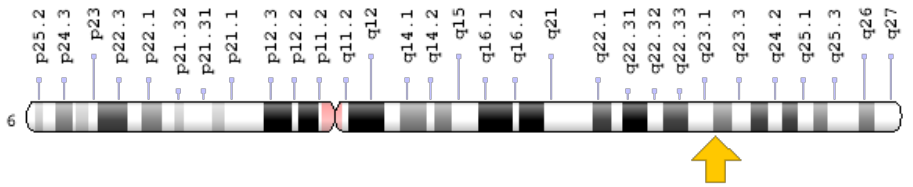
Approximately 12 mutations have been identified in the *ARG1* gene. A mutated *ARG1* gene may result in an arginase enzyme that is unstable, shorter than usual or the wrong shape, or may prevent the enzyme from being produced at all.

The shape of an enzyme affects its ability to control a chemical reaction. If the arginase enzyme is misshapen or missing, it cannot fulfill its role in the urea cycle. Excess nitrogen is not converted to urea for excretion, and ammonia and arginine accumulate in the body. Ammonia is toxic, especially to the nervous system, and the accumulation of ammonia and arginine are believed to cause the neurological problems and other signs and symptoms of arginase deficiency.

Chromosomal Location

Cytogenetic Location: 6q23.2, which is the long (q) arm of chromosome 6 at position 23.2

Molecular Location: base pairs 131,573,159 to 131,584,332 on chromosome 6 (Homo sapiens Annotation Release 109, GRCh38.p12) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- A-I
- ARGI1_HUMAN
- arginase, liver
- arginase, type I

Additional Information & Resources

Educational Resources

- Biochemistry (5th edition, 2002): Ammonium Ion is Converted into Urea in Most Terrestrial Vertebrates.
  https://www.ncbi.nlm.nih.gov/books/NBK22450/

Clinical Information from GeneReviews

- Arginase Deficiency
  https://www.ncbi.nlm.nih.gov/books/NBK1159

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28ARG1%5BTIAB%5D%29+OR+%28arginase,+liver%5BTIAB%5D%29%29+OR+%28%28arginase,+type+I%5BTIAB%5D%29+OR+%28A-I%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+360+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- ARGINASE 1
  http://omim.org/entry/608313

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_ARG1.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=ARG1%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:663
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:383
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/383
- UniProt
  https://www.uniprot.org/uniprot/P05089

Sources for This Summary

- OMIM: ARGINASE 1
  http://omim.org/entry/608313
- Iyer R, Jenkinson CP, Vockley JG, Kern RM, Grody WW, Cederbaum S. The human arginases and arginase deficiency. J Inherit Metab Dis. 1998;21 Suppl 1:86-100. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/9686347
- Iyer RK, Yoo PK, Kern RM, Rozengurt N, Tsoa R, O'Brien WE, Yu H, Grody WW, Cederbaum SD. Mouse model for human arginase deficiency. Mol Cell Biol. 2002 Jul;22(13):4491-8.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12052859
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC133904/
- Vockley JG, Goodman BK, Tabor DE, Kern RM, Jenkinson CP, Grody WW, Cederbaum SD. Loss of function mutations in conserved regions of the human arginase I gene. Biochem Mol Med. 1996 Oct;59(1):44-51.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/8902193

Reprinted from Genetics Home Reference:
https://ghr.nlm.nih.gov/gene/ARG1

Reviewed: October 2006
Published: May 14, 2019

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