



ABCA3 gene

ATP binding cassette subfamily A member 3

Normal Function

The *ABCA3* gene provides instructions for making a protein involved in surfactant production. Surfactant is a mixture of certain fats (called phospholipids) and proteins that lines the lung tissue and makes breathing easy. Without normal surfactant, the tissue surrounding the air sacs in the lungs (the alveoli) sticks together after exhalation (because of a force called surface tension), causing the alveoli to collapse. As a result, filling the lungs with air on each breath becomes very difficult, and delivery of oxygen to the body is impaired.

The *ABCA3* protein is found in the membrane that surrounds lamellar bodies, which are the cellular structures in which the phospholipids and proteins that make up surfactant are packaged. The *ABCA3* protein transports phospholipids into the lamellar bodies where they interact with surfactant proteins to form surfactant. The *ABCA3* protein also appears to be involved in the formation of normal lamellar bodies. In addition to packaging, lamellar bodies are important for the correct processing of surfactant proteins, which is necessary for the proteins to mature and become functional.

Health Conditions Related to Genetic Changes

surfactant dysfunction

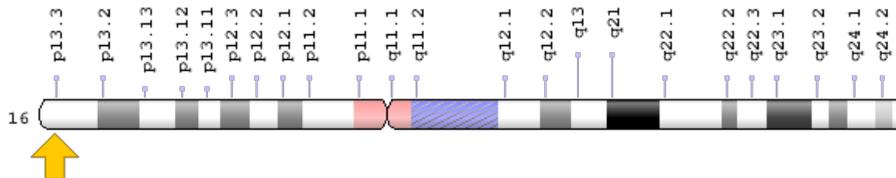
More than 100 *ABCA3* gene mutations that cause surfactant dysfunction have been identified. Surfactant dysfunction due to mutations in this gene (often called *ABCA3* deficiency) can cause severe, often fatal breathing problems in newborns or gradual onset of milder breathing problems in children or adults.

Some mutations in the *ABCA3* gene lead to the production of a protein that is not inserted into the lamellar body membrane. Other mutations lead to the production of an abnormal protein that is found in the lamellar body membrane but has little or no function. Without *ABCA3* protein function, the transport of surfactant phospholipids is decreased. In addition, lamellar body formation is impaired, which causes abnormal processing of surfactant proteins. *ABCA3* gene mutations result in abnormal surfactant composition and function. The loss of functional surfactant raises surface tension in the alveoli, causing difficulty breathing and collapse of the lungs. It has been suggested that mutations that eliminate *ABCA3* protein function cause severe forms of surfactant dysfunction, and mutations that leave some residual *ABCA3* activity cause milder forms of the condition.

Chromosomal Location

Cytogenetic Location: 16p13.3, which is the short (p) arm of chromosome 16 at position 13.3

Molecular Location: base pairs 2,275,878 to 2,340,746 on chromosome 16 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ABC-C
- ABC-C transporter
- ABC transporter 3
- ABC3
- ABCA3_HUMAN
- ATP-binding cassette sub-family A member 3
- ATP-binding cassette transporter 3
- ATP-binding cassette, sub-family A (ABC1), member 3
- SMDP3

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): Adjacent Cell Types Collaborate in the Alveoli of the Lungs
<https://www.ncbi.nlm.nih.gov/books/NBK26875/#A4114>
- The Human ATP-Binding Cassette (ABC) Transporter Superfamily: ABCA Genes
<https://www.ncbi.nlm.nih.gov/books/NBK3/#A166>

Genetic Testing Registry

- GTR: Genetic tests for ABCA3
<https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=21%5Bgeneid%5D>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28ABCA3%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>

OMIM

- ATP-BINDING CASSETTE, SUBFAMILY A, MEMBER 3
<http://omim.org/entry/601615>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_ABCA3.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=ABCA3%5Bgene%5D>
- HGNC Gene Family: ATP binding cassette subfamily A
<http://www.genenames.org/cgi-bin/genefamilies/set/805>
- HGNC Gene Symbol Report
http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=33
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/21>
- UniProt
<http://www.uniprot.org/uniprot/Q99758>

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