WDR19 gene

WD repeat domain 19

Normal Function

The *WDR19* gene (also known as *IFT144*) provides instructions for making a protein that is involved in the formation and maintenance of cilia, which are microscopic, finger-like projections that stick out from the surface of cells. Cilia participate in signaling pathways that transmit information within and between cells and are important for the development and function of many types of cells and tissues, including cells in the kidneys and liver and the light-sensitive tissue at the back of the eye (the retina). Cilia also play a role in the development of the bones, although the mechanism is not well understood.

The movement of substances within cilia and similar structures called flagella is known as intraflagellar transport. This process is essential for the assembly and maintenance of these cell structures. During intraflagellar transport, cells use molecules called IFT particles to carry materials to and from the tips of cilia. Each IFT particle is made up of two groups of IFT proteins: complex A and complex B. The protein produced from the *WDR19* gene forms part of IFT complex A (IFT-A). During intraflagellar transport, this complex carries materials from the tip to the base of cilia.

The IFT-A complex is essential for proper regulation of the Sonic Hedgehog signaling pathway, which is important for the growth and maturation (differentiation) of cells and the normal shaping (patterning) of many parts of the body, especially during embryonic development. The exact role of the complex in this pathway is unclear.

Health Conditions Related to Genetic Changes

Cranioectodermal dysplasia

At least two mutations in the *WDR19* gene have been found in individuals with cranioectodermal dysplasia. This condition is characterized by an elongated head (dolichocephaly) with a prominent forehead and other distinctive facial features; short bones; and abnormalities of certain tissues known as ectodermal tissues, which include the teeth, hair, nails, and skin. Cranioectodermal dysplasia can also cause a variety of other problems, including a kidney condition called nephronophthisis and eye abnormalities.

The *WDR19* gene mutations involved in cranioectodermal dysplasia reduce the amount of functional WDR19 protein. A shortage or reduction in activity of this component of the IFT-A complex impairs the function of the entire complex, disrupting transport of proteins and materials from the tips of cilia. As a result, assembly and maintenance of cilia is impaired, which leads to a smaller number

of cilia and abnormalities in their shape and structure. Although the mechanism is unclear, a loss of normal cilia impedes proper development of bone and other tissues, leading to the features of cranioectodermal dysplasia. Some researchers suggest that disrupted intraflagellar transport prevents signaling through the Sonic Hedgehog pathway, which could impact cell growth and other functions in several tissues throughout the body.

Asphyxiating thoracic dystrophy

Nephronophthisis

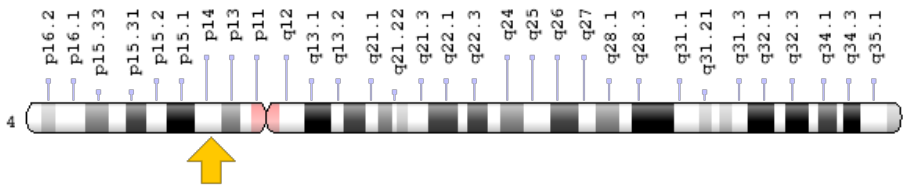
Retinitis pigmentosa

Senior-Løken syndrome

Chromosomal Location

Cytogenetic Location: 4p14, which is the short (p) arm of chromosome 4 at position 14

Molecular Location: base pairs 39,182,404 to 39,285,810 on chromosome 4 (Homo sapiens Annotation Release 109, GRCh38.p12) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ATD5
- CED4
- DYF-2
- FLJ23127
- IFT144
- intraflagellar transport 144 homolog
- KIAA1638
- NPHP13

- ORF26
- Oseg6
- PWDMP
- WD repeat-containing protein 19
- WD repeat membrane protein PWDMP
- WDR19_HUMAN

Additional Information & Resources

Educational Resources

- Molecular Cell Biology (fourth edition, 2000): Cilia and Flagella: Structure and Movement
  https://www.ncbi.nlm.nih.gov/books/NBK21698/

Clinical Information from GeneReviews

- Cranioectodermal Dysplasia
  https://www.ncbi.nlm.nih.gov/books/NBK154653

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28WDR19%5BTIAB%5D%29+OR+%28%28ATD5%5BTIAB%5D%29+OR+%28CED4%5BTIAB%5D%29+OR+%28DYF-2%5BTIAB%5D%29+OR+%28IFT144%5BTIAB%5D%29+OR+%28NPHP13%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+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- WD REPEAT-CONTAINING PROTEIN 19
  http://omim.org/entry/608151

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_WDR19.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=WDR19%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:18340
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:57728

- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/57728
- UniProt
  https://www.uniprot.org/uniprot/Q8NEZ3

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