ROR2 gene

receptor tyrosine kinase like orphan receptor 2

Normal Function

The *ROR2* gene provides instructions for making a protein whose function is not well understood. The ROR2 protein is part of a family of proteins known as receptor tyrosine kinases (RTKs), which play a role in chemical signaling within cells. RTKs are involved in many cell functions, including cell growth and division (proliferation), the process by which cells mature to carry out specific functions (differentiation), cell survival, and cell movement (motility).

Researchers believe that the ROR2 protein plays an essential role in development starting before birth. It is involved in chemical signaling pathways called Wnt signaling, which affect many aspects of development. These pathways control the activity of genes needed at specific times, and they regulate the interactions between cells as organs and tissues are forming. In particular, the ROR2 protein appears to be critical for the normal formation of the skeleton, heart, and genitals.

Health Conditions Related to Genetic Changes

Robinow syndrome

At least 20 mutations in the *ROR2* gene have been found to cause the autosomal recessive form of Robinow syndrome, a condition that affects the development of many parts of the body, particularly the bones. Autosomal recessive inheritance means both copies of the gene in each cell have mutations. Some of these mutations change single protein building blocks (amino acids) in the ROR2 protein, while others lead to the production of an abnormally short, nonfunctional version of the protein. Because these genetic changes prevent any functional ROR2 protein from being made, they are described as "loss-of-function" mutations. Loss of ROR2 protein function impairs chemical signaling pathways that are important for normal development, particularly the formation of bones in the face, spine, and limbs. These changes lead to the skeletal abnormalities characteristic of Robinow syndrome. A lack of this protein during early development also underlies the other features of Robinow syndrome, including genital abnormalities and heart defects.

Other disorders

More than 10 mutations in the *ROR2* gene have been identified in people with a disorder called brachydactyly type B1. This condition is characterized by abnormally short fingers and toes, particularly the fourth and fifth digits, and malformed or absent fingernails and toenails. (The term "brachydactyly" is from the Greek words for "short digits.") Brachydactyly type B1 has an autosomal dominant pattern of inheritance, which means one altered copy of the gene in each cell is sufficient to cause the disorder. Unlike the mutations that cause Robinow syndrome (described above), the *ROR2* gene mutations that cause brachydactyly type B1 are described as "gain-of-function" because they appear to cause the ROR2 protein to be continuously active. It is unclear how the overactive protein disrupts the development of bones in the hands and feet.

Other Names for This Gene

- BDB1
- brachydactyly type B1 gene
- neurotrophic tyrosine kinase receptor-related 2 gene
- NTRKR2
- receptor tyrosine kinase-like orphan receptor 2
- ROR2_HUMAN

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of ROR2 (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4920[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28ROR2%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

- BRACHYDACTYLY, TYPE B1; BDB1 (https://omim.org/entry/113000)
- RECEPTOR TYROSINE KINASE-LIKE ORPHAN RECEPTOR 2; ROR2 (https://omim.org/entry/602337)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/4920)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=ROR2[gene])

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Genomic Location

The *ROR2* gene is found on chromosome 9 (https://medlineplus.gov/genetics/chromosome/9/).

Last updated February 1, 2018