EDARADD gene

EDAR associated death domain

Normal Function

The *EDARADD* gene provides instructions for making a protein called the EDAR-associated death domain protein. This protein is part of a signaling pathway that plays an important role in development before birth. Specifically, it is critical for interactions between two embryonic cell layers called the ectoderm and the mesoderm. In the early embryo, these cell layers form the basis for many of the body's organs and tissues. Ectoderm-mesoderm interactions are essential for the formation of several structures that arise from the ectoderm, including the skin, hair, nails, teeth, and sweat glands.

The EDARADD protein interacts with another protein, called the ectodysplasin A receptor, which is produced from the *EDAR* gene. This interaction occurs at a region called the death domain that is present in both proteins. The EDARADD protein acts as an adapter, which means it assists the ectodysplasin A receptor in triggering chemical signals within cells. These signals affect cell activities such as division, growth, and maturation. Starting before birth, this signaling pathway controls the formation of ectodermal structures such as hair follicles, sweat glands, and teeth.

Health Conditions Related to Genetic Changes

Hypohidrotic ectodermal dysplasia

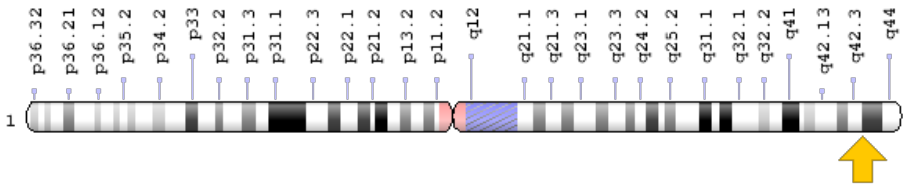
Fewer than 10 mutations in the *EDARADD* gene have been found to cause hypohidrotic ectodermal dysplasia, the most common form of ectodermal dysplasia. Starting before birth, ectodermal dysplasias result in the abnormal development of the skin, hair, nails, teeth, and sweat glands. Hypohidrotic ectodermal dysplasia is characterized by a reduced ability to sweat (hypohidrosis), sparse scalp and body hair (hypotrichosis), and several missing teeth (hypodontia) or teeth that are malformed. *EDARADD* gene mutations are an infrequent cause of hypohidrotic ectodermal dysplasia, accounting for only about 1 percent of all cases.

Most of the *EDARADD* gene mutations associated with hypohidrotic ectodermal dysplasia change single protein building blocks (amino acids) in the receptor protein. These changes occur in or near the death domain, preventing the EDARADD protein from interacting effectively with the ectodysplasin A receptor. As a result, the receptor cannot trigger the signals needed for ectoderm-mesoderm interactions in early development. Without these signals, hair follicles, teeth, sweat glands, and other ectodermal structures do not form properly, which leads to the characteristic features of hypohidrotic ectodermal dysplasia.

Chromosomal Location

Cytogenetic Location: 1q42.3-q43, which is the long (q) arm of chromosome 1 between positions 42.3 and 43

Molecular Location: base pairs 236,394,286 to 236,484,909 on chromosome 1 (Homo sapiens Updated Annotation Release 109.20190905, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ectodysplasia A receptor associated death domain
- ectodysplasin A receptor associated adapter protein
- EDAD_HUMAN
- EDAR-associated death domain

Additional Information & Resources

Educational Resources

- Madame Curie Bioscience Database: Eda/Edar Signaling https://www.ncbi.nlm.nih.gov/books/NBK6103/#A21779

Clinical Information from GeneReviews

- Hypohidrotic Ectodermal Dysplasia https://www.ncbi.nlm.nih.gov/books/NBK1112

Scientific Articles on PubMed

- PubMed https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28EDARADD%5BTIAB%5D%29+OR+%28EDAR-associated+death+domain%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D

Catalog of Genes and Diseases from OMIM

- EDAR-ASSOCIATED DEATH DOMAIN http://omim.org/entry/606603

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_EDARADD.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=EDARADD%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:14341
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:128178
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/128178
- UniProt
  https://www.uniprot.org/uniprot/Q8WWZ3

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