RAD51 gene

RAD51 recombinase

Normal Function

The *RAD51* gene provides instructions for making a protein that is essential for repairing damaged DNA. Breaks in DNA can be caused by natural and medical radiation or other environmental exposures, and also occur when chromosomes exchange genetic material in preparation for cell division. The RAD51 protein binds to the DNA at the site of a break and encases it in a protein sheath, which is an essential first step in the repair process.

In the nucleus of many types of normal cells, the RAD51 protein interacts with many other proteins, including BRCA1 and BRCA2, to fix damaged DNA. The BRCA2 protein regulates the activity of the RAD51 protein by transporting it to sites of DNA damage in the nucleus. The interaction between the BRCA1 protein and the RAD51 protein is less clear, although research suggests that BRCA1 may also activate RAD51 in response to DNA damage. By helping repair DNA, these three proteins play a role in maintaining the stability of a cell's genetic information.

The RAD51 protein is also thought to be involved in the development of nervous system functions that control movement, but its role in this development is unclear.

Health Conditions Related to Genetic Changes

Congenital mirror movement disorder

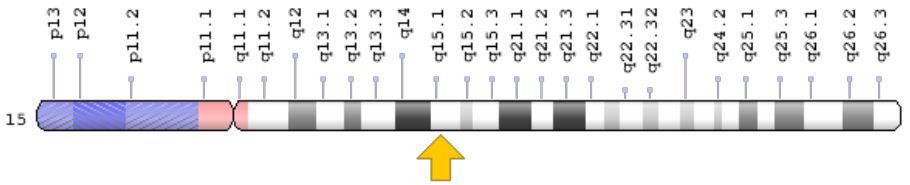
At least four *RAD51* gene mutations have been identified in people with congenital mirror movement disorder, a condition in which intentional movements of one side of the body are mirrored by involuntary movements of the other side. These mutations change single protein building blocks (amino acids) in the RAD51 protein sequence, or introduce a premature stop signal in the instructions for making the protein, resulting in an impaired or missing protein. It is unknown how this shortage of functional RAD51 protein affects nervous system development and results in the signs and symptoms of congenital mirror movement disorder.

Breast cancer

Chromosomal Location

Cytogenetic Location: 15q15.1, which is the long (q) arm of chromosome 15 at position 15.1

Molecular Location: base pairs 40,694,774 to 40,732,340 on chromosome 15 (Homo sapiens Updated Annotation Release 109.20190905, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- BRCC5
- DNA repair protein RAD51 homolog 1
- HRAD51
- HsRAD51
- RAD51 homolog (RecA homolog, E. coli) (S. cerevisiae)
- RAD51 homolog (S. cerevisiae)
- RAD51_HUMAN
- RAD51A
- RECA
- RecA-like protein
- RecA, E. coli, homolog of
- recombination protein A

Additional Information & Resources

Clinical Information from GeneReviews

- Congenital Mirror Movements
  https://www.ncbi.nlm.nih.gov/books/NBK279760

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28RAD51%5BTI%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+720+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- RAD51 RECOMBINASE
  http://omim.org/entry/179617

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_RAD51.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=RAD51%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:9817
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:5888
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/5888
- UniProt
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