

## **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

MedlinePlus Genetics provides information about Breast cancer

## 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, E. coli, homolog of
- RecA-like protein
- recombination protein A

## Additional Information & Resources

### Tests Listed in the Genetic Testing Registry

- Tests of RAD51 ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=5888\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=5888[geneid]))

### Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?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; RAD51 (<https://omim.org/entry/179617>)

### Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/5888>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=RAD51\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=RAD51[gene]))

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## Genomic Location

The *RAD51* gene is found on chromosome 15 (<https://medlineplus.gov/genetics/chromosome/15/>).

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