RAD51D

The *RAD51D* gene is a tumor suppressor gene. Tumor suppressor genes slow down cell division, repair DNA mistakes, or tell cells when to die. When they don't work properly, cells can grow out of control, which can lead to cancer. The primary role of *RAD51D* is to work together with the RAD51 family of genes to repair damaged DNA.

Like most genes, each person has two copies of the *RAD51D* gene: one inherited from each parent. A mutation in a single *RAD51D* gene inherited from either parent is known to increase risk of ovarian cancer over a lifetime. Some studies have suggested that women with RAD51D mutations have an increased risk for breast cancer, while other studies have shown no increase in breast cancer risk.[1,2,3] More studies are needed to clarify the possible association between breast cancer and *RAD51D* mutations.

How common are mutations in the *RAD51D* gene?

Mutations in the *RAD51D* gene are rare—the exact frequency is not yet known. Studies to establish the frequency of *RAD51D* mutations are ongoing.

How mutations in this gene impact risk

Women

If a woman has a mutation in the *RAD51D* gene, her chance of developing ovarian cancer is greater than that of the average US woman. This does not mean that she has a diagnosis of cancer or that she will definitely develop cancer in her lifetime

Cancer by age 80	Average US woman[4]	With *RAD51D* mutation
Ovarian	1%	Elevated (9%)[1]

Elevated: Risk is increased, but further research may clarify the exact risk figure.

Men

If a man has a mutation in the *RAD51D* gene, his chance of developing cancer is not known to be increased.

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[1] Loveday C, Turnbull C, Ramsay E, et al. Germline mutations in RAD51D confer susceptibility to ovarian cancer. *Nat Genet*. 2011;43(9):879-82.

[2] Osher DJ, De leeneer K, Michils G, et al. Mutation analysis of RAD51D in non-BRCA1/2 ovarian and breast cancer families. Br J Cancer. 2012;106(8):1460-3.

[3] Wickramanayake A, Bernier G, Pennil C et al. Loss of function germline mutations in RAD51D in women with ovarian carcinoma. *Gynecol Oncol*. 2012;127(3):552-5.

[4] Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute. 2010-2012. DevCan software (http://surveillance.cancer.gov/devcan) V 6.7.0, Accessed June 2015.

Screening guidelines

Below is a summary of screening guidelines from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) established by experts at the National Comprehensive Cancer Network.[5] They are for women who have a mutation in the *RAD51D* gene. If you have a mutation in this gene, your healthcare provider may use these NCCN Guidelines® to help create a customized screening plan for you.

Women

Ovarian cancer[6]

- **Starting at age 45-50, or earlier based on family history of ovarian cancer:** Your healthcare provider may discuss a risk-reducing salpingo-oophorectomy (the surgical removal of the ovaries and fallopian tubes) with you to lower the risk of developing ovarian cancer.

Useful resources

FORCE

Providing support, education, research, and resources for survivors and people at increased risk of cancer due to an inherited mutation or family history of cancer.
www.facingourrisk.org

Bright Pink

Focused on the prevention and early detection of breast and ovarian cancer in young women, while providing support for high-risk individuals.
www.brightpink.org

Susan G. Komen

Dedicated to reducing deaths from breast cancer by funding breast cancer research, ensuring access to care through community programs worldwide and supporting public health policies that help people facing breast cancer.
www.komen.org/

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[6] National Comprehensive Cancer Network. Genetic/Familial High-Risk Assessment: Breast and Ovarian. *NCCN Guidelines* Version 1.2017. Available at www.nccn.org. Published September 2016.