BRIP1 Mutations

Brought to you by the *National Society of Genetic Counselors, Cancer Special Interest Group*

What you should know about *BRIP1* Mutations

BRIP1 mutations moderately increase the likelihood for a woman to develop ovarian cancer. It is unclear at this time whether *BRIP1* mutations increase the risk for other types of cancer, such as breast cancer. Based on current understanding, men don't appear to have increased cancer risks due to *BRIP1* mutations. However, men can carry the mutation and pass it on to their children. Rarely, a person may have two *BRIP1* mutations. This can lead to a childhood-onset genetic condition called Fanconi Anemia, which affects bone marrow health and cancer risk. This fact sheet only covers the risks and management associated with having a single *BRIP1* mutation. Not everyone with a *BRIP1* mutation will develop cancer.

Cancer Risks and Features Associated with *BRIP1* Mutations

	Lifetime Risk (Females)*	
Cancer	**Without *BRIP1* Mutation**	**With *BRIP1* Mutation**
Ovarian	1.3% (1 in 77)	3.6 – 9.1% (1 in 11 to 1 in 28)
Breast	12.5% (1 in 8)	Undetermined, possibly increased

*While men don't appear to have increased cancer risks due to *BRIP1* mutations, this information could change as more research is done to understand *BRIP1* mutations.

Genetics and Inheritance of *BRIP1* Mutations

Genes are our body's instructions. They provide our body with information about how to grow and develop. When there is a mutation in a gene, it can cause the gene to no longer function correctly. Each person has two copies of every gene. One copy is inherited from their mother and the other copy is inherited from their father.

The *BRIP1* gene helps to repair damaged DNA in a person's cells. When one copy of the *BRIP1* gene isn't working properly, DNA damage can build up more quickly, increasing the risk for cancer in those cells.

Cancer risks associated with *BRIP1* mutations are inherited in an autosomal dominant manner. This means that children, siblings and parents of individuals with a *BRIP1* mutation have a 50% (1 in 2) chance of having the mutation as well. Both males and females can inherit a *BRIP1* mutation and can pass it on to their children.

If two individuals with *BRIP1* mutations have a child together, there is a 25% (1 in 4) chance that the child will inherit both *BRIP1* mutations. When an individual inherits two *BRIP1* mutations, this causes a childhood-onset genetic condition called Fanconi Anemia. Fanconi anemia is associated with physical abnormalities, bone marrow failure, childhood leukemia and other cancers.

Managing Cancer Risks

- **Screening**
  - Ovarian cancer: Some methods for ovarian cancer screening are available (e.g. blood tests and ultrasound), although the benefit is uncertain. These screening options can be discussed with a doctor.
  - Other cancers: At this point, there is no evidence that people with *BRIP1* mutations need to undergo additional screening beyond what is recommended for the general population, unless warranted by their personal or family medical history.
- **Risk-Reducing Surgery**
  - Women can consider a bilateral salpingo-oophorectomy (surgery to remove the ovaries and fallopian tubes) beginning around age 45-50 years. If a woman has family members with ovarian cancer, it may be appropriate to discuss this option before age 45.

Genetic Counseling

In many families, the cancer history may be due to a combination of genetic and environmental factors. In addition, other genetic conditions (i.e. other gene mutations) may appear clinically similar to *BRIP1* mutations**.** For this reason, a detailed review of the family history by a genetics professional is important before pursuing genetic testing. A genetic counselor can help determine which, if any, genetic tests may be helpful for a family and review the benefits, risks and limitations of genetic testing. Genetic testing is usually performed through a blood or saliva sample.

Genetic test results can be complicated and are most useful when interpreted by a genetics professional in the context of an individual's personal and family history. To locate a genetic counselor near you, please visit www.nsgc.org and click on the 'Find a Genetic Counselor' link.

Genetic Discrimination

The Genetic Information Nondiscrimination Act (GINA) was signed into federal law in 2008. GINA prohibits health insurers and most employers from discriminating against individuals based on genetic information (including the results of genetic tests and family history information). According to GINA, health insurance companies cannot consider genetic information to be a preexisting condition, nor can they use it to make decisions regarding coverage or rates. GINA also makes it illegal for most employers to use genetic information in making decisions about hiring, firing, promotion, or terms of employment. It is important to note that GINA does not offer protections for life insurance, disability insurance, or long-term care insurance. More information about GINA can be found by contacting a local genetic counselor or by visiting www.ginahelp.org.

Resources

- Facing Our Risk of Cancer Empowered (FORCE) - https://www.facingourrisk.org/understanding-brca-and-hboc/information/hereditary-cancer/other-genes/basics/brip1.php
- My Support 360 - https://mysupport360.com/associations/genes/brip1-gene-mutations/
- Cancer Support Community - https://www.cancersupportcommunity.org/ovarian-cancer

References

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- Ramus SJ, Song H, Dicks E, et al. Germline Mutations in the BRIP1, BARD1, PALB2, and NBN Genes in Women With Ovarian Cancer. *J Natl Cancer Inst*. 2015;107(11):djv214. Published 2015 Aug 27. doi:10.1093/jnci/djv214