**RAD51C Gene Information**

The **RAD51C** gene plays a role in preventing people from developing tumors or cancer. Everyone has two copies of the **RAD51C** gene – one copy of the gene inherited from each parent. If you are born with one copy of a **RAD51C** gene with a mutation (likely pathogenic/pathogenic variant) that prevents the gene from working properly, this leads to increased chances to develop cancer. Medically significant changes in the genetic code are called “mutations” or “pathogenic variants.” Not everyone who is born with a **RAD51C** mutation will develop cancer.

### Cancer Risks

The table below shows the risks of cancer for people with **RAD51C** mutations compared to people in the general population. These are cancer risk estimates over a lifetime and do not reflect yearly risks. Certain interventions may be able to lower these risks.

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Gene-Associated Risk</th>
<th>General Population Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovarian Cancer</td>
<td>10-15%</td>
<td>1-2%</td>
</tr>
<tr>
<td>Female Breast Cancer</td>
<td>20-40%</td>
<td>12-13%</td>
</tr>
</tbody>
</table>

Female and male refer to sex assigned at birth, and these risks are based on data from mostly cisgender populations. In addition, general population cancer risks may vary by ancestry and other factors.

- Male breast cancer has *not* been associated with inherited mutations in **RAD51C**.

The information about cancer risks associated with **RAD51C** could change over time as we learn more about this gene.

### Medical Recommendations

The recommendations below are meant as general guidelines and may change based on other personal risk factors or family history. To make an appointment to discuss personal recommendations with a Cancer Genetics Physician at Dana-Farber, please call **617-632-2178**.
• **Ovarian cancer** is very hard to find in the early stages, and available screening tests are not able to reliably find ovarian cancer when it is most treatable. Because of this, it is recommended that individuals have surgery to remove the ovaries and fallopian tubes around ages 45-50. This surgery is called risk-reducing salpingo-oophorectomy (RRSO). This surgery reduces the risk for ovarian cancer by about 90%.

• **Female breast cancer** screening is recommended to begin at age 40 with annual mammograms, with consideration of annual breast MRI imaging as well. Screening may be considered at earlier ages, especially if there is a family history of breast cancers at a young age, and should be discussed individually.

These recommendations are based on our current understanding of the RAD51C gene and may change over time. Recommendations are also influenced by other factors, including but not limited to: cancer treatments, family history of cancer, personal preference and gender affirming care. You should discuss personalized recommendations with your physician.

**Meaning for Your Relatives**

It is important that you share your test results with your biological (blood-related) relatives. Parents, siblings, and children each have up to a 50%, or 1 in 2 chance, to also have the RAD51C gene mutation. Any person with a RAD51C mutation can pass it on to any of their children. Mutations in RAD51C do not skip a generation. If someone in your family does not have the RAD51C mutation, they cannot pass it on to their children.

We recommend that young adults wait until they are at least 18 years old before seeking genetic testing. However, people may wait to do testing until the age their medical care would change if they have the RAD51C mutation, and/or they feel emotionally ready to learn this information.

**Family Planning**

Rarely, a child can inherit two mutations in the RAD51C gene, one from each parent. Children who are born with two non-working RAD51C genes may have a condition called Fanconi anemia. Fanconi anemia can be a serious childhood condition associated with multiple issues including physical differences and an increased risk for childhood cancer. Fanconi anemia is a rare condition, and the RAD51C gene is not a common cause for this disorder. We recommend that if a parent is found to have a RAD51C mutation, that their reproductive partner also consider genetic testing. A child can only inherit two copies of a RAD51C mutation if both parents carry a mutation in this gene.

Further information about this, including options for lowering the chance of having a child with Fanconi anemia, can be discussed with a genetic counselor.

**Glossary of Cancer Genetics Terms**

- **Early detection**: The process of finding cancer when it is just starting to develop.
- **Carrier**: A person who has a single mutation in a gene.
- **Gene**: A small piece of DNA that gives instructions for a specific trait.
● **Heterozygous**: Having a single mutation in a gene.

● **Inherited**: Passed from biological parent to child (through egg and/or sperm).

● **Lifetime cancer risk**: The chance that a person will develop cancer in their life. This is sometimes defined as the chance of developing cancer by the age of 75 or 80.

● **Mutation**: A change in a gene that prevents it from working correctly. Also called likely pathogenic/pathogenic variant.

● **Risk-reducing surgery**: Surgery to remove healthy tissue or organs before cancer develops. Also called prophylactic surgery.

● **Surveillance**: Screening tests or procedures to look for early signs of cancer development or cancer returning (recurrence).

● **Female**: Refers to sex assigned at birth.

● **Male**: Refers to sex assigned at birth.

● **Cisgender**: A person whose sex assigned at birth matches their gender.