Breast cancer is the most common cancer, and the second leading cause of cancer death, among women in Oregon and nationally. In Oregon in 2011, 497 women died from breast cancer, and another 225 died from ovarian cancer. This CD Summary will describe the contributions of mutations in BRCA genes 1 and 2 to breast and ovarian cancer cases in Oregon, criteria for referral to genetic counseling and possible testing, and interventions that can reduce the risks of breast and ovarian cancer for those who are found to have BRCA 1 or 2 mutations.

OREGON DATA

Each year, about 3,100 Oregon women are diagnosed with breast or ovarian cancer (about 2,800 with breast cancer and 300 with ovarian cancer). About 2%-7% of breast cancer cases and 10%-15% of ovarian cancer cases are due to mutations in BRCA 1 or 2, meaning that about 85 to 250 cases of breast and ovarian cancer per year in Oregon are likely attributable to BRCA mutations. Many of these cases are potentially preventable if they are detected early enough with a thorough family history, followed by referral to genetic counseling and testing, as appropriate.

USPSTF RECOMMENDATION

To assess cancer risk and evaluate the appropriateness of genetic testing, the United States Preventive Services Task Force (USPSTF) recommends referral to genetic counseling for patients who have not been diagnosed with breast or ovarian cancer but have an increased risk family history consistent with a possible BRCA mutation (Box). Genetic counseling and testing using USPSTF criteria must be covered by insurance as a preventive service under the Affordable Care Act (ACA).


GENETIC COUNSELING REFERRAL

In 2011, about 9% of adult women in Oregon (about 137,000 women) were found to have an increased risk family history using USPSTF criteria; of these women, 96% (~132,000) reported that their health care provider had specifically asked about family history of breast or ovarian cancer. However, 70% (~96,000) had never heard of BRCA genetic testing, and only 10% (~14,000) reported that they had received genetic counseling.

Box. USPSTF increased risk family history for BRCA 1 and 2 mutations

| 2 first-degree relatives with breast cancer, 1 of whom received the diagnosis at ≤50 years of age |
| A combination of 3 or more first- or second degree relatives with breast cancer regardless of age at diagnosis |
| A combination of both breast and ovarian cancer among first- and second degree relatives |
| A first-degree relative with bilateral breast cancer |
| A combination of 2 or more first- or second-degree relatives with ovarian cancer regardless of age at diagnosis |
| A first-or second-degree relative with both breast and ovarian cancer at any age |

Definitions of degrees of relation

- First degree—Parents, brothers, sisters, children
- Second degree—Aunts, uncles, nieces, nephews, grandparents, grandchildren, half-siblings
- Third degree—First cousins, great-grandparents, great-grandchildren

For people with Ashkenazi Jewish ancestry, an increased risk family history can include any first-degree relative with breast or ovarian cancer, or two second-degree relatives on the same side of the family with breast or ovarian cancer.

Figure. Potentially preventable BRCA-related breast and ovarian cancers, Oregon, 2006–2010

| 14,458 Breast cancer cases
| 298-1,012 BRCA-related breast cancer cases |
| 458-1,012 Potential BRCA-related breast cancers prevented |
| 1,511 Ovarian cancer cases
| 151-227 BRCA-related ovarian cancer cases |
| 128-227 Potential BRCA-related ovarian cancers prevented |

85% - 100% estimated risk reduction with prophylactic mastectomy

Additional potential BRCA-related breast and ovarian cancers prevented using chemoprevention, increased surveillance, or prophylactic oophorectomy to reduce breast cancer risk


† 2011 Oregon Behavior Risk Factor Surveillance System (BRFSS).

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Telephone 971-673-1111
Fax 971-673-1100
cd.summary@state.or.us
http://healthoregon.org/cdsummary
If you need this material in an alternate format, call us at 971-673-1111.

To assure that patients are appropriately referred for genetic counseling, family history collection should include three generations of biological relatives and:
- their relationship to patient (including maternal/paternal lineage)
- the age at diagnosis and known details of disease
- the age and cause of death of deceased family members

Early and accurate identification of patients at-risk for hereditary breast or ovarian cancer can reduce cancer incidence and mortality through a variety of interventions for individuals with clinically significant mutations (Table). In addition to the interventions in this table, exercising strenuously for >4 hours per week, decreasing alcohol consumption, and preventing obesity reduces the risk for BRCA-related cancers. The Figure (verso) shows the number of breast and ovarian cancer cases that could be prevented over a 5-year period.

RESOURCES
Health care providers and patients can find information to facilitate collection of family history, contact information for genetics clinics in Oregon, and information on the role of genetics in many leading causes of death and illness at the following web sites:
- Oregon Genetics Program web site: [www.healthoregon.org/genetics](http://www.healthoregon.org/genetics)
- “My Family Health Portrait”, a tool from the U.S. Surgeon General: [https://familyhistory.hhs.gov](https://familyhistory.hhs.gov)

### Table. Treatments and interventions for reducing BRCA-related cancer incidence and mortality

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prophylactic surgery</td>
<td>Bilateral mastectomy. Surgery to remove the at-risk tissues of both breasts may reduce breast cancer risk by 85%–100%.21</td>
</tr>
<tr>
<td>Chemoprevention (medications)</td>
<td>Tamoxifen is an estrogen-receptor modulator that can reduce the occurrence of breast cancer. There are potential adverse effects, including pulmonary embolism, deep vein thrombosis, and endometrial cancer. Tamoxifen cannot prevent estrogen-receptor-negative breast cancers, and most BRCA 1 breast cancers are estrogen-receptor-negative.1</td>
</tr>
<tr>
<td>Enhanced surveillance</td>
<td>Increased frequency of clinical breast exam and breast imaging (breast MRI and mammogram) may be used in those with increased risk of breast cancer.3</td>
</tr>
</tbody>
</table>

REFERENCES

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