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OREGON PUBLIC HEALTH DIVISION • OREGON HEALTH AUTHORITY

BEYOND ANGELINA JOLIE: INHERITED BREAST AND OVARIAN CANCER

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 contribution of mutations in BREast CAncer susceptibility (*BRCA*) genes 1 and 2 to breast and ovarian 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,[1] 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[2]

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 Affordble 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*]

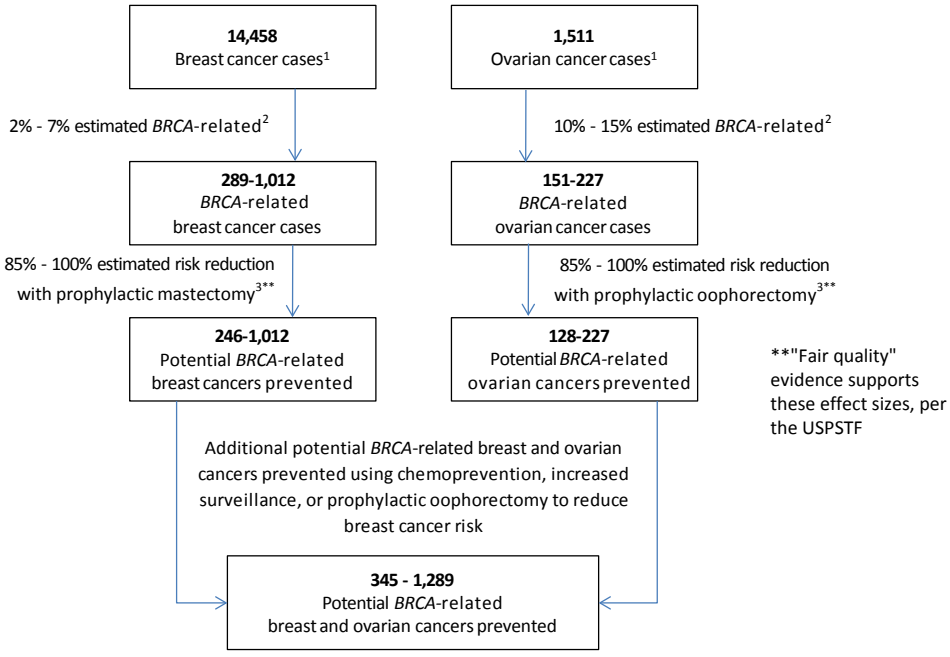
- 2 first-degree relatives with breast cancer, 1 of whom received the diagnosis at ≤50 years of age
- A combination of 3 or more first- or second degree relatives with breast cancer regardless of age at diagnosis
- A combination of both breast and ovarian cancer among first- and second degree relatives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



* Oregon Cancer Statistics, National Program of Cancer Registries, 2001–2010, See CDC WONDER, http://wonder.cdc.gov

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

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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.[4] 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
- "My Family Health Portrait", a tool from the U.S. Surgeon General: https://familyhistory.hhs.gov
- CDC Office of Public Health Genomics: www.cdc.gov/genomics/famhistory/index.htm

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

Prophylactic surgery ¶Note: "Fair-quality" evidence supports these effect sizes, per the USPSTF.	• Bilateral mastectomy. Surgery to remove the at-risk tissues of both breasts may reduce breast cancer risk by 85%–100%.[2¶] • Oophroectomy. Surgery to remove the ovaries and fallopian tubes may reduce the ovarian cancer risk by 85%–100% and reduce breast cancer risk by 53%–68%.[2¶]
Chemoprevention (medications)	• Tamoxofin 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-netative breast cancers, and most *BRCA* 1 breast cancers are estrogen-receptor-negative.[1] • Oral contraceptives may be used to decrease the risk of ovarian cancer.[3]
Enhanced surveillance	• Increased frequency of clnical breast exam and breast imaging (breast MRI and mammogram) may be used in those with increased risk of breast cancer.[3] • Increased frequency of pelvic exams for those with increased risk of ovarian cancer.[3]

REFERENCES

1. Bowen, et al. Public health action in genomics is now needed beyond newborn screening. Public Health Genomics 2012; 15: 327–34.
2. United States Preventive Services Task Force, Genetic Risk Assessment and BRCA Mutation Testing for Breast and Ovarian Cancer Susceptibility (2005) www.uspreventiveservicestaskforce.org/uspstf/uspsbrgen.htm Accessed: 6 Dec 2013. (*Editors' Note*: An update is expected by 2014, but the recommendation is not expected to change.)
3. National Comprehensive Cancer Network, "Genetic Mutations and Cancer Risk", www.nccn.com/index.php?option=com_content&view=article&id=934:gene-mutations
4. National Cancer Institute at the National Institutes of Health, "Breast Cancer Prevention", www.cancer.gov/cancertopics/pdq/prevention/breast/HealthProfessional

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