The Cost-Effectiveness of Preventive Strategies for Breast and Ovarian Cancer for Women with *BRCA1* or *BRCA2* Mutations

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The full report is titled "Cost-Effectiveness of Preventive Strategies for Women with a *BRCA1* or a *BRCA2* Mutation." It is in the 21 March 2006 issue of *Annals of Internal Medicine* (volume 144, pages 397-406).
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What is the problem and what is known about it so far?

Mutations on breast cancer suppressor genes (*BRCA1* and *BRCA2*) have been shown to increase the risk for breast and ovarian cancer. Genetic testing identifies women who might consider cancer screening or treatments to prevent developing cancer. However, not all women with one of these mutations will develop cancer, so identification of mutations may also needlessly expose women to unnecessary interventions to prevent cancer. Interventions to prevent cancer include oral contraceptives to reduce ovarian cancer risk, the drug tamoxifen to reduce breast cancer risk, and surgical removal of the ovaries (bilateral salpingo-oophorectomy) or the breasts (bilateral mastectomy). The balance among the costs, harms, and benefits of these various options is unclear.

Why did the researchers do this particular study?

To evaluate the costs, harms, and benefits of strategies that are currently available to women who have *BRCA1* or *BRCA2* mutations.

Who was studied?

Instead of studying actual patients, the researchers used a computer model to simulate what would happen to a virtual group of women with *BRCA1* or *BRCA2* mutations if they chose different preventive strategies.

How was the study done?

The researchers collected information about the risk for cancer in women with the mutations and their likely outcomes. They also collected information about the benefits, harms, and costs of 6 different strategies: oral contraceptives, tamoxifen, bilateral salpingo-oophorectomy, bilateral mastectomy, both surgeries, or surveillance. Surveillance meant careful follow-up with yearly mammography and breast examinations with breast ultrasonography, if needed, and gynecologic examinations with pelvic ultrasonography and blood tests every 6 months. The researchers used this information to develop a computer model that simulated what would happen to women with *BRCA1* or *BRCA2* mutations who chose each of the 6 options. The computer model considered costs, harms, and benefits in weighing the various options. The model also considered the value of certain outcomes over others. For example, the model assumed that women valued survival with their breasts intact higher than survival after mastectomy.

What did the researchers find?

Oophorectomy alone or with mastectomy resulted in the best balance between costs and benefits for 35-year-old women at high risk for cancer because of a *BRCA* mutation. The model showed that mastectomy becomes more favorable as women become older.

What were the limitations of the study?

These results depend on the accuracy of the computer model and may differ from what would happen in real life. In addition, how a particular woman values certain outcomes over others may differ from the values that the researchers used in their model.

What are the implications of the study?

Oophorectomy and oophorectomy with mastectomy seem to be the most cost-effective strategies to prevent breast and ovarian cancer in women at high risk for cancer because of *BRCA1* or *BRCA2* mutations. However, many factors will go into women's decisions about whether to have genetic testing and what to do if they have positive test results. It is hoped that this paper will help make policymakers and insurance companies more willing to pay for these preventive treatments when women want to have them.