

# Breast Cancer Risk: Using Real Medical Histories to Rank Genetic and Environmental Influences



by

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## Introduction

Breast cancer is the leading cause of cancer death for women in the United States (American Cancer Society, <http://www.cancer.org>). At the present time, the overall lifetime risk for a woman in the United States to develop breast cancer is one in eight (this means that approximately 13% of women in the U.S. will develop breast cancer in their lifetime). It is thus important for us to understand some of the risk factors for breast cancer, as well as some of the screening tests for breast cancer.

During this activity you are going to learn about some risk factors for breast cancer, evaluate the medical histories of several women with respect to their breast cancer risk, then make some recommendations for how they might reduce their risk.

In order to be prepared to evaluate the medical histories, please consult the resources on the following webpage from the American Cancer Society: <https://www.cancer.org/cancer/breast-cancer/risk-and-prevention.html>.

## Questions

1. How do age at menarche and age at menopause affect breast cancer risk?
2. What are the genes that are most commonly mutated in hereditary breast cancer? Approximately what percent of all breast cancers are hereditary?
3. How does a woman's weight influence her breast cancer risk?
4. If you were a physician taking a family history to assess breast cancer risk in a patient, what information would you want to know? Why would you want to know it?
5. How do pregnancy and HRT influence breast cancer risk?

## Profiles

For the profile assigned to your group, discuss whether each aspect of her medical history decreases her risk for breast cancer, increases her risk for breast cancer or has no impact on breast cancer risk.

### Ana

- |  |   |   |   |
|--|---|---|---|
| • Ana is a 64-year-old woman in generally good health.   | ↓ | ↑ | — |
| • She had her first child when she was 20.   | ↓ | ↑ | — |
| • She entered menopause at the age of 58.  | ↓ | ↑ | — |
| • She has been on hormone replacement therapy since entering menopause (for the past 6 years). | ↓ | ↑ | — |
| • She has gained some weight since menopause.  | ↓ | ↑ | — |
| • Her mother had breast cancer diagnosed at age 37.  | ↓ | ↑ | — |

### Paula

- |  |   |   |   |
|--|---|---|---|
| • Paula is 71 years of age, and currently has a urinary bladder tumor, with metastases in the ovaries and possible involvement of one lymph node.  | ↓ | ↑ | — |
| • Paula had breast cancer at 22 years of age. She was treated with chemotherapy and bilateral (both breasts) mastectomy. At the time of her initial diagnosis and work-up, four positive lymph nodes were found. | ↓ | ↑ | — |
| • Paula's sister was diagnosed with breast cancer three years ago, then ovarian cancer two and a half years ago.   | ↓ | ↑ | — |
| • Paula's mother died of lung cancer.  | ↓ | ↑ | — |
| • Two maternal uncles had pancreatic cancer.   | ↓ | ↑ | — |
| • Her maternal aunt had myeloma.   | ↓ | ↑ | — |
| • Her maternal grandmother has uterine cancer.   | ↓ | ↑ | — |
| • Paula's sister had genetic testing, and was found to have a BRCA1 mutation.  | ↓ | ↑ | — |
| • Paula's sister has one daughter (Paula's niece).   |   |   |   |
| • After her sister's genetic testing, Paula had genetic testing, and the same BRCA1 mutation as her sister was detected in Paula.  | ↓ | ↑ | — |
| • Paula has one daughter.  | ↓ | ↑ | — |

## **June**

- June is 58 years old. ↓ ↑ —
- She has been having “regular” mammograms (at two to three year intervals). ↓ ↑ —
- Her first period was at age 13. ↓ ↑ —
- She has had two pregnancies, resulting in two children, the first of which was at age 27. ↓ ↑ —
- She experienced menopause at age 51. She did not take hormone replacement therapy (HRT), but she used oral contraceptives for a total of four years in the past. ↓ ↑ —
- She has high blood pressure and high cholesterol. ↓ ↑ —
- She has low levels of thyroid hormones. ↓ ↑ —
- She also has “weak bones.” ↓ ↑ —
- Her maternal aunt died of breast cancer in her 30’s. ↓ ↑ —
- Her mother died of a brain tumor at age 39. ↓ ↑ —
- Her father is alive and well at age 84. ↓ ↑ —

## **Nora**

- Nora is a 51-year-old, pre-menopausal woman. ↓ ↑ —
- Her last bilateral mammogram showed no evidence of a mass. ↓ ↑ —
- She had her first period at the age of 13. ↓ ↑ —
- She has had two pregnancies, each resulting in the birth of a child, the first of which was at age 32. ↓ ↑ —
- She used oral contraceptives for six years. ↓ ↑ —
- She has not taken any hormone-replacement therapy (HRT). ↓ ↑ —
- She smoked until age 26. ↓ ↑ —
- She consumes between 1 and 4 alcoholic drinks per week. ↓ ↑ —
- Her mother had breast cancer at 48 years of age, and now has lymphoma (at age 72). ↓ ↑ —
- Her maternal grandmother had breast cancer at age 47, and died of lung cancer. ↓ ↑ —
- Her paternal first cousin presently has breast cancer. ↓ ↑ —
- Her paternal aunt died “at a young age” from breast cancer. ↓ ↑ —
- Her father was of Ashkenazi Jewish heritage, and died of colon cancer at 66 years of age. ↓ ↑ —