Do We Know What Causes Breast Cancer?

Although many risk factors may increase your chance of developing breast cancer, it is not yet known exactly how some of these risk factors cause cells to become cancerous. A woman's hormones somehow stimulate breast cancer growth. Just how this comes about has not yet been figured out.

Researchers are beginning to understand how certain changes in DNA can cause normal breast cells to become cancerous. DNA is the chemical that carries the instructions for nearly everything our cells do. We usually resemble our parents because they are the source of our DNA. However, DNA affects more than our outward appearance.

Some **genes** (parts of DNA) contain instructions for controlling when our cells grow, divide, and die. Certain genes that promote cell division are called **oncogenes**. Others that slow down cell division, or cause cells to die at the right time, are called **tumor suppressor genes**. It is known that cancers can be caused by DNA **mutations** (changes) that "turn on" oncogenes or "turn off" tumor suppressor genes.

The BRCA genes (BRCA1 and BRCA2) are tumor suppressor genes. When they are mutated, they no longer function to suppress abnormal growth and cancer is more likely to develop. Certain inherited DNA changes (you are born with these) can cause an increased risk for developing cancer in people who carry these changes and are responsible for the cancers that run in some families.

Most DNA mutations related to breast cancer, however, occur in single breast cells during a woman's life rather than having been inherited. These acquired mutations of oncogenes and/or tumor suppressor genes may result from radiation or cancer-causing chemicals. So far, studies have not been able to identify any chemical in the environment or in our diets that is likely to cause these mutations, or a subsequent breast cancer. The cause of most acquired mutations remains unknown.

Women have already begun to benefit in several ways from recent advances in understanding the genetic basis of breast cancer. The section, "What Are the Risk Factors for Breast Cancer?" explains how genetic testing can identify some women who have inherited abnormal BRCA1, BRCA2, CHEK-2, or p53 tumor suppressor genes. These women can then take steps to reduce their risk of developing breast cancers and to monitor changes in their breasts carefully to find cancer at an earlier, more treatable stage. (For more information see the American Cancer Society documents, "Medicines to Reduce Breast Cancer Risk" and "Breast Cancer Early Detection.")

Most breast cancers have several gene mutations that are acquired. That means that these mutations are not inherited. They develop as part of the cancer.

Tests to identify other acquired changes in oncogenes or tumor suppressor genes (such as p53) may help doctors more accurately predict the survival outcome of some women with breast cancer. But with the exception of the HER2 oncogene, these tests have not yet been shown to be useful in making decisions about treatment and are used only for research purposes.