Oncology News for Patients

CASCADE SURGICAL ONCOLOGY, PC

.....More than medicine

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Comprehensive Cancer Care

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Behind Enemy Lines: The Tumor Genome Project

By Diana M. Seaders, PA-C

In *The Art of War*, Sun Tzu, Chinese general and military strategist, advised: "Know your enemy and know yourself and you can fight a hundred battles without disaster." In the ongoing battle against breast cancer, we are well on our way to having the ability to do this with genetic and genomic testing.

Genetic Vs Genomic

"Genetic" and "genomic" testing are terms that are often used interchangeably. However, in breast cancer diagnostic testing, genetic and genomic have very different meanings. Think of "genetic" testing as knowing ourselves: for example, whether or not we have the BRCA gene mutation that puts us at increased risk of breast cancer. Think of "genomic" testing as knowing our enemy: the cancer tumor. Genomic testing analyzes the activity of a group of genes, not just a single gene, and what is driving the growth of a cancer tumor. We are now able to perform genomic testing on the tumor itself, which provides us information we need to strategically fight it.

Dr. Tsongalis, PhD, director of Molecular Pathology at Dartmouth University's Norris Cotton Cancer Center (NCCC) in Lebanon, New Hampshire, recently co-authored a review, *Personalized Therapy for Breast Cancer*. Dr. Tsongalis affirms "a personalized approach [though genomic testing] increases the precision and success of breast cancer treatment. Molecular profiling exposes a tumor's Achilles' heel. We can see what messages the tumor cells are receiving and sending. It is a biological intelligence gathering mission in an attempt to interrupt the disease."

Categories of breast cancer

Molecular profiling has identified three major categories of breast cancer:

- **Estrogen receptor (ER)/ Progesterone receptor (PR) positive breast cancer**: Two-thirds of all breast cancers are hormone receptor positive (American Cancer Society). ER/ PR positive cancers are generally less aggressive than other types of breast cancer. These types of breast cancers possess receptors for the hormones estrogen and/ or progesterone, and they need hormones to grow and live. They are typically treated with selective estrogen receptor modulators (SERMs), such as Tamoxifen, or aromatase inhibitors (AIs), such as Arimidex. These medications basically cut off the "food" supply to the ER/ PR+ cancer cells.

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- **HER2 positive breast cancer**: 15-20 % of breast cancers contain human epidermal growth factor receptor 2 (HER2), which is a protein that helps cancer cells grow and multiply. This type of breast cancer tends to be more aggressive. HER2 positive breast cancer is typically treated with targeted therapy via antibodies such as Herceptin or Perjeta, which prevents receptor function of cancer cells and recruits immune "killer cells" to destroy them.
- **Triple negative breast cancer (ER-negative/ PR-negative/ HER2-negative):** 12-14% of breast cancers fall into the triple negative category, where the cancer cell have no estrogen or progesterone receptors, and do not have an excess of the HER2 protein on their surface. Triple negative breast cancer is particularly aggressive and has the poorest outcome for patients.

Chemotherapy Not Always Required

While triple negative and most HER2 positive breast cancer almost always requires chemotherapy treatment, the choice to administer chemotherapy in the setting ER+, PR+, and HER2 negative breast cancer is not always clear. Certain hormone receptor positive or HER2 negative breast cancers are more aggressive than others, and risk of recurrence widely varies depending on tumor make-up. Genomic testing not only tells us what kind of treatment is needed, but also assesses whether or not chemotherapy is even indicated with our patient's specific breast cancer. Genomic assays have been developed to inform us how likely a patient is to benefit from chemotherapy based on a risk score or risk category.

Below are a few genomic assays used for breast cancer to predict response to therapy:

Oncotype DX: Estimates risk of recurrence of early-stage hormone-receptor positive breast cancer, ductal carcinoma in situ (DCIS), and risk of new invasive cancer in same breast. The activity of 21 genes of the breast cancer tumor are analyzed with Oncotype DX.

MammaPrint: Estimates risk of recurrence of early-stage hormone-receptor positive or negative breast cancer. MammaPrint analyzes 70 genes of the breast cancer tumor.

Mammostrat: Estimates risk of recurrence of early-stage hormone-receptor positive or negative breast cancer. Mammostrat evaluates the level of 5 genes of breast cancer cells.

Genomic testing can tell us with a high degree of reliability how aggressive a particular patient's cancer is – how likely it is to recur or metastasize by stratifying patients into a "low," "intermediate," or "high" category. Those with risk above a certain threshold will usually benefit the most from chemotherapy.

Thanks to genomic testing, we are able to go "behind enemy lines" and offer a tailored and safer treatment plan for our patients in our battle against breast cancer.