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Commentary

Beyond Flip-Of-A-Coin Breast Cancer Diagnosis

Edward Flynn, Ph.D., 07.27.10, 11:00 AM ET

An article last week in *The New York Times*, "Prone to Error: Earliest Steps to Find Cancer," stated some disturbing facts about the detection--and misdiagnosis--of an early form of breast cancer called ductal carcinoma in situ (DCIS). According to the piece, a study by the breast cancer survivors' organization, Susan G. Komen for the Cure, estimated that in 90,000 cases, women who receive a diagnosis of DCIS either did not have the disease or their pathologist made an error that resulted in incorrect treatment. Worst of all, prominent experts went on the record in characterizing the diagnosis of certain breast lesions as a "flip of a coin."

Much of the problem centers on the so-called gold standard of breast cancer detection: mammograms. While mammograms have been used for 40 years--and have improved in terms of their overall imaging capabilities plus reduced the amount of radiation used--they remain fallible when diagnosing very small, early growths or abnormalities. As the *Times* noted, there are no nationally mandated standards for diagnosing DCIS--nor is there a requirement that pathologists performing the work have any specialized expertise or certification in determining DCIS. This means the chances of getting an accurate diagnosis vary from hospital to hospital.

Given all of this, it's unfortunate that the medical industry largely continues to ignore the need to focus on emerging technologies that can be used earlier. These technologies may help avoid the misdiagnosis issues plaguing mammograms and give a DCIS (or other breast cancer) diagnosis with 100% specificity.

The reality is that some of these technologies already exist. For example, a new test undergoing trials at the University of Connecticut is based on the knowledge that breast tumors require more hemoglobin than surrounding tissue, because hemoglobin provides the oxygen to grow. Called optical tomography, the test combines ultrasound with two frequencies of infrared light to survey a suspicious area and determine the presence of high oxygen consumption, indicating the presence of cancer.

In a recently completed trial involving 178 women, when optical tomography suggested an area wasn't cancer, 97% of the time it was also confirmed by the biopsy. The downside is that, like mammograms, ultrasound requires a mass of millions of cells or more in order for effective detection and the optical tomography is affected by irregularities in breast tissue.

Another interesting approach involves using nanotechnology. This work--which I've become involved with over the last 10 years--was in part motivated when my wife was diagnosed with breast cancer, as well as my strong belief that there are better technologies available than mammograms.

Nanotechnology and the emerging field of nanomedicine promise to change how--and when--we can detect breast cancer. In development now is a non-radiation diagnostic that uses magnetic, nano-sized "breast cancer targeting antibodies," which bind *only* to cancer, and can detect and localize a tumor with only 50,000-100,000 cells involved--1/1000th of what a mammogram needs. Because these antibodies only bind with known breast cancers, there are no false positives; nor is the test affected by the presence of scar tissue from surgeries and implants.

At present, using an animal model in which human breast cancer tumors are grown, this test detects breast cancers with known antibodies with 100% specificity, high sensitivity, good localization and two to three years earlier than a mammogram.

Clearly, pathologists reading hundreds of thousands of mammograms each year make a major contribution in reducing breast cancer deaths. But to continue to only focus on mammograms as the gold standard detection technology neglects important emerging technologies, and causes undue physical and emotional harm.

There are simply too many women who need the benefit of newer and more accurate early breast cancer detection

technologies than mammograms--or a flip of a coin--can provide.

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