Medical Xpress

Automated screening process may eventually reduce additional breast cancer surgeries

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A team of researchers at the University of California, San Diego (UCSD) and the Moores UCSD Cancer Center have developed a rapid, automated image screening process to distinguish breast cancer cells from normal cells. The technique, which is based on the density of cells seen on a microscope slide, may eventually lead to better ways for surgeons to determine if they have removed all of the cancer during breast-conserving cancer surgery and cut down on the number of needed second operations.

One of the biggest dilemmas in breast-conserving "lumpectomies" is whether or not all of the cancer has been removed. To find out, pathologists examine the tissue, looking for cancer cells from the outer margins. But this process is slow, taking up to a week. All too often - between 20 and 50 percent of the time - some disease remains, meaning more surgery.

"The majority of women are good candidates for breast conservation surgery," said breast surgeon Sarah Blair, MD, associate clinical professor of surgery at the UC San Diego School of Medicine, who led the work. "The problem is getting negative margins - meaning the edge of what we remove has no cancer - the first time we operate because we are dealing sometimes with small tumors that can be difficult to see or feel. Right now there is no good way during the operation to make sure that we have removed every cancer cell. We'd like to reduce the need for second operations, which will spare the patient the trauma of surgery again and reduce costs."

Reporting in the *Annals of Surgical Oncology*, Blair and her co-workers examined samples of normal breast tissue from 10 women and tumor samples from 24 women with cancer. They showed that a technique called automated microscopy, with the help of specially designed computer software, could correctly identify invasive breast cancer cells in 83 percent of the tumor specimens, whereas a normal microscope only identified cancer in 65 percent of the cancer specimens.

The researchers used a method called "touch prep" to collect the cancer cells for evaluation, which entails gathering cells to be stained and then examined and which normally requires a specialized pathologist to subjectively interpret. But in this case, the scientists used the center of the tumor, rather than the outer tissue edges, where it is more difficult to identify cancer cells, to confirm that the technique actually worked.

"We compared manual microscopy, looking at the tissue cells on a slide under the microscope, with automated programs, in which we taught a computer how to look at the slides with a microscope, and they correlated pretty well," Blair said. A camera connected to the microscope takes photos of the slide, which are then analyzed for cancer. "We thought that if we automated it, we could teach the computer what to look for and have the pathologist quickly correlate the computer findings with their findings. We're hoping that the method makes the process more objective."

According to Blair, the automated technique is still too slow to be used in real time during breast surgery. Each slide of breast tissue cells takes about two hours to be analyzed, she said, and six slides are typically examined during breast conservation surgery. They would like to reduce the analysis time to as little as five minutes per slide, and based on the results, know whether or not the patient needs further surgery while she is still in the operating room.

As the researchers continue to refine the technique, they will be able to eventually test its use in examining breast tissue margins. Because it is difficult to identify preinvasive cancer cells, she said, they also want to look at cell surface markers and cell nucleus characteristics to better identify cancer cells and help speed up the identification process. The findings are still preliminary, and Blair and her co-workers are planning to conduct a larger, multicenter trial of the automated technique.

Source: University of California - San Diego