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Upgrading Breast Cancer Screening with Digital Breast Tomosynthesis

Announcer:
Welcome to Medical Breakthroughs from Penn Medicine, Advancing Medicine Through Precision Diagnostics and Novel Therapy.

Dr. Caudle:
This is Medical Breakthroughs from Penn Medicine on ReachMD. I'm your host, Dr. Jennifer Caudle, and joining me on this episode is Dr. Emily Conant, Professor of Radiology and Division Chief of Breast Imaging at the Hospital of the University of Pennsylvania.

Dr. Conant, welcome to the program.

Dr. Conant:
Thank you.

Dr. Caudle:
Dr. Conant, can you start by telling us what digital breast tomosynthesis, or DBT, is and how it differs from current mammographic imaging?

Dr. Conant:
Definitely. It's building on digital technology, and most mammograms right now are digitally acquired, but most of them are just a 2D image, and tomosynthesis instead takes multiple low-dose x-ray images from different angles that are then reconstructed digitally into thin sections or slices that we can scroll through and see the different layers of the breast making it almost like a 3D image of the breast. And the real benefit of that is that we can have significant things like cancers hiding behind areas of glandular tissue on a 2D mammogram, but having this more 3D-like format allows us to uncover those areas, and that's very important. That can lead us to find cancers earlier than we might by just using 2D mammography.

Dr. Caudle:
Absolutely. That makes a lot of sense. How do you respond when you see or hear DBT being described as a new imaging test?

Dr. Conant:
Well, that's interesting. We were incredibly fortunate that we were doing research with this kind of digital reconstruction tomosynthesis for a while before it went to market. FDA approval was obtained in 2011, but we were already doing some research before that so that we sort of hopped on it early at Penn and began screening all of our women that came into our center at the university hospital in September 2011 with tomosynthesis because we really felt it was the better test. So, it's new meaning in the last 10 years, but it's been out for a little while, and we were lucky just to implement it early.

Dr. Caudle:
It definitely sounds like it. In a JAMA article that you coauthored in 2019, you asked whether breast cancer screening with DBT was associated with improved cancer detection rates across all age and breast density groups compared with digital mammography. Why is this important?

Dr. Conant:
Well, that's very important because, I'm sure as you've read in the newspaper, screening is controversial. When we screen women for breast cancer, we find a lot of benign things, things that are just normal variations or just normal hormonal or physiologic changes in the

breast, but sometimes we can't tell the difference and we end up doing extra imaging, calling a woman back for ultrasound and more special pictures, and all of that is anxiety-producing. And even sometimes those pictures lead to a biopsy to prove that the area isn't cancer, just a benign change, and all of that is what we call the risks of screening. And there's always a balance in these things. There's the benefits of finding cancers earlier when they're curable, certainly more treatable, but then there's the risk of finding things that cause false alarms and anxiety, and even costs to the medical system, so there's always a balance of these things.

And screening mammography has been controversial, particularly in younger women, in women between the age of 40 and 49. Women in that age period have less cancer than older women because, as we get older, the likelihood of developing cancer increases with age, so there are less cancers in younger women, but certainly, a woman who has a cancer at a young age, it can often be more aggressive, faster growing, and she has many, many years potentially to live, so we want to find those. So that balance, that risk-benefit balance, is very important in younger women. What we found with this study is that tomosynthesis, because it tips that risk-benefit balance more towards benefit by finding more cancers and at the same time decreasing those false-positives, that the women from 40–49 had the same sort of outcomes as women we accept screening regularly in the 50-year-old age group, so we thought that was a real win-win. It's a controversial group of women to screen because of the concern of false-positives, but with tomosynthesis we are cutting those down and we are finding clinically significant cancers that make a difference for these young women.

Dr. Caudle:
Absolutely, and that's very exciting. To continue the conversation about the JAMA article that you recently coauthored, what is the significance in the reports finding that DBT has the capacity to detect smaller, node-negative, invasive cancers?

Dr. Conant:
Yes, so cancers run a gamut of biology and sizes and stages, and the goal of screening is really to find cancers before they're symptomatic, before a woman can feel them and certainly before they've gone beyond the breast itself because that's when we have better treatment options and certainly a much, much better chance of curing the cancer entirely.

So, in our study we found that particularly in this younger group of women we were finding smaller cancers, cancers with better prognosis, less often involving the lymph nodes of the axillae, so cancers that really are considered quite treatable, and we prefer to find them that way than wait until they're presenting as a lump and perhaps gone beyond the breast itself.

Dr. Caudle:
And on the flipside, what are some of the challenges or limitations of DBT?

Dr. Conant:
Mammography is an x-ray technology, so it's really looking at anatomy, and sometimes with breast cancer we really can't see it because it looks very similar to the normal anatomy. And even with tomosynthesis there can be areas of very dense breast tissue that can look like cancer or can hide cancers and we can't detect them. There are tests such as MRI that actually use an injection and a contrast—that can show the vascularity or the blood vessel flow to the different tumors that have a higher rate of cancer detection. Unfortunately, they also have a higher rate of false-positives, seeing things that aren't cancer. They are also more expensive technology.

So we want a technology that is readily available to many women, that is low cost to the health system, that makes a difference in finding cancers that can be curable in women. So this is a better mammogram than what we used to have. I think as we move forward in time perhaps we'll be better stratifying who needs what and how often, but right now this is a definite step forward, and I think people are really accepting this as a new, better mammogram.

Dr. Caudle:
And finally, before we wrap up, Dr. Conant, how and when should physicians refer their patients to breast specialists?

Dr. Conant:
So that's a really important question. I think that women who are undergoing screening and then have a mammogram that requires additional imaging and a biopsy and a biopsy yields even not cancer but something atypical or a risky lesion, it puts them in a situation where they are at higher risk of developing cancer, and certainly, women who are diagnosed with cancer after their mammogram should be referred to a breast specialist, a breast surgeon, perhaps a medical oncologist, so certainly in those cases. And women who have symptoms that aren't easily explained by the imaging that we provide that are persistent and worrisome should be, I think, referred to a breast specialist.

Dr. Caudle:
Well, I'd like to thank my guest, Dr. Emily Conant, for sharing her insights on this innovative breast imaging to help improve patients' outcomes.

Dr. Conant, it was a pleasure speaking with you.

Dr. Conant:
Thank you so much for having me.

Announcer:
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