Artificial Hype

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Why embracing Artificial Intelligence is beneficial for all

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In many ways Artificial Intelligence (AI) may seem like a new concept in healthcare, mainly due in part to the recent traction the topic has made in the news in the last few years. It has even been falsely sensationalized, to further elevate buzz, as a tool that will one day replace clinicians altogether. The truth, though, is that companies like Hologic, Inc. have been working for many years to evolve processing capabilities in AI to benefit both patients and healthcare professionals alike. And, there are many advantages to using AI today, all of which are only optimal when such technology functions in tandem with clinicians—not in place of them. This can especially be seen in the radiology field and when looking at the role risk stratification plays in radiology.

Like with many cancers, knowing the risk factors for breast cancer is an important part of the breast screening and diagnostic process. Separating out patients who are at high risk of getting breast cancer, or whose mammograms reveal suspicious tissue that looks like breast cancer—a form of risk stratification in radiology—is of the utmost importance to get patients who are in need of clinical treatment on their therapy as soon as possible. AI allows radiologists to do just that, opening up opportunities for more personalized screening pathways as technology advances to be able to predict what a patient is in need of based on their "profile." In fact, data collected by Hologic from a global collection of clinicians at the Radiologic Society of North America (RSNA) Annual Meeting showed that AI will have the greatest impact in the long-term on personalized screening pathways through the creation of new risk models. In some ways, this has already begun.

Consider the growing importance of breast density assessment and the current process for it. Women with very dense breasts are four to five times more likely to develop breast cancer than women with less dense breasts, which means that having very dense breasts is an important risk factor for patients to be aware of. [1,2] Today, the only way a woman can know how dense her breasts are is to get a mammogram. From there, radiologists will look at her images to categorize her into one of four categories according to the Breast Imaging Reporting and Data System (BI-RADS), which includes fatty, scattered fibroglandular, heterogeneously dense, and extremely dense. While this visual assessment process can certainly work for some patients, classifications are open to interpretation since other radiologists may look at the same images and categorize the patient differently based on their own subjective view. This can create inconsistencies in breast density assessment, leading to confusion about what a woman's breast cancer risk actually is.

However, with the integration of AI technology, radiologists can work more consistently to assess breast density. The next-generation Quantra™ breast density assessment software from Hologic, for example, is powered by machine learning thanks to years of breast image case collection and identifying each image's breast density category according to the BI-RADS. Having this AI technology in place enables quick and accurate breast density assessments across the entire patient population, elevating the standard of care and standardizing reporting across an entire radiology practice.

As a result of implementing breast density assessment consistency, women can know whether or not their breast density puts them at high-risk for breast cancer, which can potentially help those with very dense breasts

maintain screening compliance. Additionally, since different screening modalities can be used to detect breast cancer, by integrating AI into breast density assessment, clinicians can advise women with more confidence on how they should be screened for breast cancer in the future to have the most effective results. Tomosynthesis, for example, should be recommended for women with dense breasts. This is because only the Hologic 3D Mammography™ exam is proven to be superior for women with dense breasts compared to 2D alone, which only further demonstrates the need for consistent, accurate breast density assessment.[3] Thus, with AI analytics, patients can be assigned a screening pathway that makes most sense for them, hopefully improving patient outcomes.

Although at first glance AI breast density assessment may seem like work is being taken away from radiologists, in reality it is more so simply being redistributed. Clinicians are still in tune with each patient's unique profile, such as their body habitus and positioning during screening, which can be necessary context in some cases to supplement AI analysis. Similarly, in order for AI algorithms to be effective, the deep learning machines must be asked the right questions. This, too, comes from clinicians. Thus, while AI can help standardize an important part of radiology, it is most effective when it works alongside radiologists who can insert clinical expertise in cases that are necessary, while they can then focus the duration of their time on other high priorities for their patients.

Aside from breast density assessment, AI is making a positive impact on radiology in other ways, especially workflow efficiency in tomosynthesis. In an era when streamlining workflow must be balanced with improving patient outcomes, capitalizing on methods that allow clinicians to work more quickly while also providing high quality care is crucial. AI now makes this possible. On Hologic's 3Dimensions™ mammography system, for example, clinicians can expedite 3D™ exam read times with the Intelligent 2D™ imaging technology's built-in mapping capability. The Intelligent 2D imaging technology uses advanced machine-learning algorithms and high-resolution 3D data, and it creates 2D images that are well-correlated to the 3DTM data, which may not be seen in conventional 2D images. The smart mapping enables radiologists to instantly move from suspicious areas detected on the 2D image, to the point of interest on the 3DTM slice, saving valuable read time.[4] In this case, AI is once again not replacing radiologists but rather giving them the information necessary to be able to move on to more high priority areas of work while still providing the confidence required to make informed clinical decision for patients.

Looking to the future, Hologic is continuing to collect as many tomosynthesis images as possible to train AI to target only the tissue that seems suspicious, or high-risk, for radiologists to hone in on and address.

It's clear from analyzing current breast density assessment and image reading processes that AI can have a very positive role in radiology, especially for separating out high-risk cases and tailoring screening pathway options. Radiologists should embrace AI as a supplemental tool to their expertise, making them more efficient and confident at their jobs and allowing them to focus on high-risk cases, to truly benefit from the next generation of AI technology that is undoubtedly on the horizon. Those who do will find that they are best equipped to make a real positive impact on breast screening and patient outcomes as risk models and personal screening pathways become the standard of patient care. ■

REFERENCES

[1] Boyd NF, Guo H, Martin LJ, et al. (2007) Mammographic density and the risk and detection of breast cancer. N Engl J Med. 356(3):227-36.

[2] Yaghjyan L, Colditz GA, Collins LC, et al. (2011) Mammographic breast density and subsequent risk of breast cancer in postmenopausal women according to tumor characteristics. J Natl Cancer Inst. 103(15):1179-89.

[3] FDA submissions P080003, P080003/S001, P080003/S004, P080003/S005.

[4] Feature is used in combination with SecurView® DX diagnostic review workstation mapping tool in v9.0.1 and above.