Breast Ultrasound in Sub-Saharan Africa
Editor’s Note

The first randomized controlled trial of screening mammography was performed in the United States. The SBI was founded and remains headquartered here. The ACR is our ally and accredits our programs. The USPSTF challenges our stance. Tomosynthesis was invented here. The largest radiology meeting in the world happens in the United States. Considering this list, we might easily be lulled into an Americentric mentality. Local struggles that deserve our attention may consume all our resources. But if we aren’t careful, we may misplace our membership in the larger global community. As we fight to preserve access to screening mammograms for American women, we must acknowledge that we provide this service to only a fraction of women around the globe. Consider the female populations of China and India alone. This issue of the Newsletter contains excellent articles that illuminate many aspects of our participation in breast imaging from rural America to national controversy to international cancer care.

At the local level, Jiyon Lee, MD, shares the perspective of breast imagers from all 50 states that might surprise us. Having utilized SBI mechanisms to complete a research survey of radiologists, Dr. Lee now shares candid comments about breast imaging from our colleagues in practices with highly diverse geography, facilities, and patient populations. The picture that is painted reminds us of our own heterogeneity.

Rob Gutierrez, MD, FSBI, provides an excellent summary of breast imaging of minority populations in this country. The latest USPSTF guidelines threaten to disenfranchise 40–49 year old women who cannot afford to pay for mammograms. Unfortunately, these groups are often one and the same. Dr. Gutierrez reminds us to advocate for the patients that are absent from our daily lists.

Our Screening Leadership Group supplies two articles regarding fundamental data on the effects of mammography. One critical review, at the North American level, details the serious flaws in the infamous Canadian trial, now decades old, that opponents of screening stand behind. The second article, at the international level, summarizes recent population trials that confirm the benefits of widely instituted state-of-the-art screening programs. Both are beautifully written and provide fundamental talking points for any of us defending or promoting screening during grand rounds, curbside consults, television interviews, and cocktail party conversations.
At the international level, Jean Seely, MD, describes the current status of breast imaging in India where mortality from breast cancer approaches 50%. Dr. Seely describes the challenges of providing high quality care to a massive population with limited resources, variable education quality, and frequent emigration of qualified physicians.

Ann Polin, RDMS, paints a vivid picture of ultrasound and breast imaging in Ghana. This is a fascinating firsthand account of the challenges, potential, and evolution of breast care in a developing country with high incidence of triple negative invasive cancers in young women. It begs the question—if infrastructure won’t support dependable mammography—while ultrasound can show us these masses, is cheaper and more widely available, but lacks the support of randomized trials, what should we do?

The European Society of Breast Imaging (EUSOBI), http://www.eusobi.org/cms/website.php, the European equivalent and active partner of the SBI, held its 5th international meeting in London on October 2 and 3. Elizabeth Morris, MD, FACR, FSBI, and Murray Rebner, MD, FACR, FSBI, present and past SBI presidents, respectively, represented us. If you can’t spend the weekend in London, consider joining EUSOBI for a mere €50.00.

In closing, I don’t mean to imply that we have forgotten the rest of the world or that we aren’t doing enough for our patients. Rather, this issue reminds us of the global community—from our own backyard to distant continents—and the differences each of us can make through active participation. What else do you want to do?�
# Table of Contents

2 | President’s Column: Our Society, Our Future  
By Elizabeth A. Morris, MD, FACR, FSBI

4 | Benefits of Screening Mammography: Data from Population Service Screening  
By Mary Newell, MD, and Peter R. Eby, MD, FSBI, and the Breast Screening Leadership Group

6 | Limitations of the Canadian National Breast Screening Studies  
By Jay Baker, MD, FSBI, Dana Smethermen, MD, Jessica Leung, MD, FACR, FSBI, and the Breast Screening Leadership Group

8 | What I’ve Learned: Marcia Jensen, RT(R)(M)(BS)  
By Christine Puciato, RT(R)(M)(BS)

10 | A Brief Explanation of the Physics of Breast Tomosynthesis for Radiologists  
By Robert Nishikawa, PhD, FSBI

14 | Interesting Case: Can a Negative MRI Trump a Suspicious Mammogram?  
By Tanya W. Moseley, MD

17 | Our Patients in Absentia  
By Robert L. Gutierrez, MD, FSBI

19 | Twitter 101  
By Paula Gordon, OB, MD, FRCPC, FSBI

21 | RSNA 2015 Preview  
By Shadi A. Shakeri, MD

23 | Will Cloud Computing Revolutionize the Way We Share Mammograms?  
By Kristina Jong, MD, and Jafi Lipson, MD

25 | How to Train a Breast Sonographer  
By Xuan-Loc Nguyen, BS, DMS

27 | Breast Imaging and Education in India  
By Jean M. Seely, MD

30 | Breast Ultrasound in Sub-Saharan Africa: One Sonographer’s Experiences in Ghana  
By Ann C. Polin, MSc, RDMS, RDCS, RVT

34 | Breast Imagers’ Expert Opinions Research via SBI: Tribute to All Breast Radiologists  
By Jiyon Lee, MD

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President’s Column:
Our Society, Our Future

Our mission is saving lives and making the world a better place. This newsletter reminds us that we have a global responsibility to champion ALL women’s lives. We aspire to be a global community of breast imagers who practice patient-centered medicine. We are lucky that our specialty attracts bright minds and dedicated physicians who want to make a difference. It bodes well for the future that members-in-training represent the fastest growing portion of our society. Our Membership Committee, under the guidance of Bobby Maxwell, MD, has really opened the doors and is welcoming international members, making it much easier to join the SBI. We hope to attract many international members so that we become a truly international society. As the SBI recognizes its role in the world, we have started, with the guidance of Murray Rebner, MD, FACR, FSBI, an International Education Outreach Committee and are excited to announce that our first foray will be to South Africa next May, organized by Mike Linver, MD, FACR, FSBI. Five very dedicated and passionate SBI members will travel to Capetown and participate in a two-day course while creating ties with the newly formed Breast Imaging Society of South Africa (BISSA). In the future we hope to expand this program and partner with other newly formed breast societies in other reaches of the world in order to share knowledge and practices. Our responsibility does not end at our borders.

If we are to be the global voice for breast imaging, communication is absolutely crucial. As a specialty, we are learning to communicate science more effectively. We need to tell the story of how women’s lives matter so that society as a whole will value our work. Stories that emotionally connect people to our science are needed. Our communications team, headed by Rita Zuley, MD, FSBI, has been hard at work. We changed the face of our website in September so that information is more easily accessible to breast imagers as well as our patients. Our goal is to be the trusted website for breast imaging. On the renovated site there will be a patient portal containing relevant information specifically for patients and patient groups. One such example is the “End the Confusion” campaign that the SBI has started along with the ACR under the guidance of our media advisors, as there is so much contradictory information surrounding screening currently in the media. Additionally, the Forum has undergone an overhaul under the guidance of Jay Baker, MD, FSBI, and we are hoping that this may become a mechanism for sharing ideas and information for our diverse practices. Once the web re-do is finished, I encourage you all to access it and see what it has to offer!

Sharing ideas, stories, articles, and blogs is a way that we can tell our story. Using social media such as Twitter and Facebook has become more important so that we have a voice in the conversation and advocate for our patients. We are fortunate to have such dedicated committed advocates here in the United States who think beyond themselves and are not beaten down by the naysayers. We have strong unstoppable scientists who keep getting up and pointing out the truth.
President’s Column, continued from previous page

and facts such as Dan Kopans, MD, FACR, FSBI. We need to get this information out to the global community. We need to rapidly adapt and be at the forefront of the technology revolution to spread our message both nationally and globally. It’s not too late to sign up for Twitter and learn how to use it! You can be a voice for your patients—whatever practice you are involved in—be it rural, urban, or underserved. Paula Gordon, MD, FSBI, is heading our Social Media Committee. Help her increase Twitter traffic! An added benefit of getting connected is the annual conference which will be on-line with up-to-the-minute updates.

I have seen what Wendy DeMartini, MD, FSBI, is cooking up for our annual conference and it will prove to be another fantastic course. Abstract submission is open. It will be the first time we will be in Austin, TX, where many people are looking forward to the music and good food (as well as the scintillating lectures)! Don’t forget our weekend courses on DBT and the online offerings under the direction of Mimi Newell, MD, Kate Appleton, MD, Heidi Umphrey, MD, and Debbie Monticciolo, MD, FACR, FSBI. Lots of good stuff!

As I work with the SBI team in Reston, VA—Yasmeen Fields, Andrea Craddock, Kesha Willis, and Karen Hodgens—as well as the volunteer membership, I am amazed at the breadth and depth of our society as well as the passion to do the best thing for the women and men of the world. It is no wonder we are a thriving society. You all give meaning to our mission.

In appreciation to our members and staff,

Elizabeth A. Morris, MD, FACR, FSBI
President, Society of Breast Imaging
While randomized controlled trials (RCTs) are the most stringent way to assess whether a certain test or treatment decreases death from a disease, there are other data that can be used to further understand the effect of a test as well. Delivering screening mammograms to the community, i.e., service screening, provides an opportunity to evaluate the effect the test has on the general population when widely used by women.

After RCTs showed that screening mammography saves lives, population-based national screening programs were put in place in the 1980s and 90s throughout the world. Screening mammography is now a routine part of health care in at least 26 countries (1). Data from many of these programs have been analyzed to see if they confirm the RCT results—that invitation to mammography screening, and more directly, exposure to mammography screening, decreases breast cancer deaths.

There are several ways of studying the effect of screening. Trend studies compare death rates from breast cancer in a population in two time periods, before and after screening programs were put in place, to see if there is a difference. Cohort studies compare death rates from breast cancer among women who underwent screening mammography versus those who did not within a single time period. Case-control studies compare the frequency of screening between patients who died of breast cancer (called a “case”) and those who did not (called a “control”). Controls are randomly selected from the population but are similar to case patients in age, location of residence, socioeconomic status, risk factors, and other important parameters. A comparison between a large number of cases and controls can measure the effect of screening mammography on breast cancer deaths (2).

Trend, cohort, and case-control studies have advantages and disadvantages that may appear to increase or decrease the real benefit of screening mammography. For example, trend studies are subject to biases caused by other changes that could occur between the periods before and after screening is introduced, such as improved treatment or increased breast cancer awareness. A major shortcoming of trend studies is lack of data on exposure to screening, and contamination in the screening era from deaths linked to incident cancer before the screening program began. Cohort and case-control studies generally provide more accurate results about how a screening mammography program performs in real life.
The results of cohort studies and case-control studies of service screening confirm the results of RCTs: deaths from breast cancer decrease when widespread screening programs are introduced. In a case-control trial in Western Australia by Nickson and colleagues, death from breast cancer decreased by 52% among women choosing to be screened compared to women who did not (3). A meta-analysis (summary of many different studies) of Australian and European case-control trials showed that breast cancer deaths decreased by 49% in groups of women who used screening mammography compared to those who did not (3). A cohort study published by Coldman and associates reported that groups of women who participated in Canadian service screening programs had a 40% lower death rate from breast cancer than women who did not (4). A different analysis of cohort studies found that breast cancer deaths were reduced by 43% in populations of women who were screened with mammography (5).

Service studies demonstrate that the benefit of screening mammography in terms of lives saved is even higher than RCTs indicated. This is in part because they measure the effect of screening on women who actually had mammograms, not just those who were invited to have a mammogram. Service screening studies also tend to measure the effect of more recent screening practices that have benefited from improved mammography technology, better breast positioning techniques, and improved interpretive skills. While RCTs laid the foundation decades ago, data from recent studies of the effects of widespread screening programs confirm that mammograms save lives.

REFERENCES

Limitations of the Canadian National Breast Screening Studies

By Jay Baker, MD, FSBI, Dana Smethermen, MD, Jessica Leung, MD, FACR, FSBI, and the Breast Screening Leadership Group

Of the randomized controlled trials (RCT) designed to study screening mammography, the Canadian National Breast Screening Study (CNBSS) is certainly the most problematic. The CNBSS, which took place from 1980–1985, is actually two separate studies. CNBSS1 included approximately 50,000 volunteer women age 40–49, and determined the mortality benefit in the experimental group assigned to annual screening mammography plus clinical breast exam (CBE) versus the control group assigned to usual care (1). CNBSS2 had almost 40,000 volunteer women age 50–59, and compared the benefit of annual mammography plus CBE to yearly CBE alone (2).

From the time the results were first published in 1992 (1,2) and again in follow-up in 2000, 2002 and 2014 (3-5), the CNBSS has been controversial, because it is the only RCT that found essentially no decrease in mortality associated with an invitation to screening. In fact, among women in their 40s at the 7-year report, there were 36% more deaths due to breast cancer in the screening group (1).

There are a number of explanations for these counterintuitive findings, most of which relate to vulnerabilities and shortcomings in the execution of the study. The problems in the study execution have been well-documented, and include flaws in the randomization process, lack of statistical power, non-generalizable results, poor quality imaging, suboptimal interpretation, and inconsistent threshold for interpretation (6-9).

The flaws in the randomization process principally arose from three features. First, unlike all other RCTs, potential participants in the Canadian trials initially underwent a careful physical exam. Second, women with physical exam findings including palpable lumps, skin or nipple retraction, and even palpable axillary adenopathy were not excluded from this “screening” trial (10). Finally, the randomization was unblinded and decentralized. Because almost 80% of women with advanced palpable cancers were assigned to the screening arm in the first round of the study, there has been speculation that concerned clinicians did not follow the randomization process, but rather “allocated” some symptomatic women to the study group so that they would get a mammogram. While there is no proof that this occurred, there is circumstantial evidence that it did (11). Moreover, whether the imbalance was due to intentional tampering or occurred by chance alone, the net effect is the same, i.e., a failure to produce two equal cohorts of patients for comparison.

Other problems also contribute to the controversial nature of the study. Although the average 5-year survival for women in the United States and Canada diagnosed with breast cancer in the 1980s was 75–80%, women in the control arm of CNBSS1 had a better than 90% 5-year survival (9). This is likely due to the fact that the study subjects were volunteers and likely to be healthier on average than the average Canadian woman. Thus, it was a greater challenge for screening to sufficiently improve outcomes for women in the study arm and show a statistically significant advantage of early detection.
The Canadian trial was criticized at the time of the trial for poor quality mammography, even compared to mammographic imaging of that era (6,7). In order to reduce radiation dose, mammography for the trial was performed without the benefit of scatter-reducing grids that were already in routine use. Standard imaging for much of the trial utilized a straight lateral view and not a mediolateral-oblique view which images more tissue. The combination of poor quality imaging and the investigators’ resistance to taking corrective action led two advisors to resign in protest (10).

Finally, technologists participating in the trial received no special training in performing mammograms. Radiologists new to mammography also received no training in interpretation. After a radiologist’s recommendation for biopsy, a surgeon ultimately decided whether to move forward with a biopsy. Fully 25% of recommended biopsies were ultimately not performed (10).

All told, the Canadian trials were a missed opportunity to measure the efficacy of mammography and clinical breast examination in women ages 40–49, and mammography alone in women ages 50–59. The CNBSS trials are an excellent demonstration of the need to carefully consider all facets of a large screening trial before accepting its results as scientifically valid. The numerous design and execution flaws described above explain in large part why the results of the Canadian National Breast Screening Study are dramatically different than all other RCTs.

REFERENCES


The field of mammography has changed rapidly over the last 30–40 years and continues to improve significantly to this day. The insight from veteran mammographers can prove to be an invaluable tool when evaluating where we were and how far we can reach in the future as an imaging community. The following interview with Marcia Jensen, RT(R)(M)(BS), offers an interesting look back into mammography’s infancy and also gives us a humble reminder of how important our work is to all of our patients.

Marcia, in what ways have you seen mammography change since you started in this field 30 years ago?

Back when I started it was not the huge, widespread imaging tool it has become today with dedicated centers and sophisticated equipment that can detect the smallest and earliest forms of breast cancer. It was more of an adventure into the unknown world of breast care. In the beginning, I did two or three exams a day, in between other x-ray exams, on old cardboard cassettes sealed in a black bag in the darkroom. We thought they were top of the line until xeromammography came along. Ah, the days of blue powder, laying patients on a table and trying to compress for the MLOs with a plastic paddle held steady by suction cups, forever failing equipment and repairs, and beautiful rib views. We again thought we were top of the line. But then the big breast care era really hit us.

What was most rewarding about being a mammographer?

In my work with mobile mammography, I have been rewarded many times by women saying they would not have taken the time to get their well care done if we had not made it so easy by coming to them. By taking the services to women at their places of business and to smaller rural areas with no services, helps women stay healthy or at least to find a problem earlier. Therein lies the real justification or reward for my job. Helping patients through the process and comforting them, and their families, makes me feel like I am giving something back.
What I’ve Learned: Marcia Jensen, RT(R)(M)(BS), continued from previous page

What was your best moment while working in mammography?

I’m not sure there has been one best moment. There have been many. Every time I hear good news of someone’s successful treatment or when I see a breast cancer patient come in year after year knowing that that person is strong and well is a great moment. I tried to get all the training I could in the newest developments so I could take my patients from diagnostic to breast ultrasound and then on to biopsy, also trying to be their friend along the way. I always aimed to be the technologist that could be counted on to do a procedure right away in order to alleviate some of the worry that comes with waiting.

What advice do you have for any technologist or radiologist entering the field of breast imaging?

Make sure it is something you want to do. It takes compassion, guts, patience and understanding to help someone through troubled times. You need to enter a room with a smile and be willing to give more than you get. This is not a glamour job. It takes long hours on your feet and you are constantly engaged with the patient. You will either make their exam something to complain about or something pleasant so they will hopefully tell and encourage others. We do not know what tomorrow will bring, so be the best you can be today and lift another.

Moving forward, what would you like to see change in the field of breast imaging?

I would love to see the day when compression does not need to be used, thus, getting rid of the biggest complaint of mammography. I would love to see a cure for all cancers and I would love to see women have their well care without worrying about cost. Probably all the same things every mammo technologist wishes for. I would want older technologists to be valued for their wisdom as they enter their golden years and let the younger technologists benefit from their experience.

Marcia Jensen has been a mammography technologist for over 30 years and currently works at Mountain Medical Mobile in Murray, Utah. She has also worked in Colorado, New Mexico, California, and Idaho. She lives in Stansbury Park, Utah with her beloved husband and best friend. They raised organic beef and have an acre garden which keeps them busy and allows them to give service to their community. Marcia and her husband love spending time with their five children and fifteen grandchildren.
All existing digital breast tomosynthesis (DBT) systems are based on current full field digital mammography (FFDM) systems. Essentially, the tomosynthesis system is the FFDM system with the x-ray tube rotating about the breast. While the concept is simple, the engineering is not. There are many design considerations and no optimum solution exists. The purpose of this article is to explain the physics and describe strengths and weaknesses of different designs.

Scan Angle and Number of Projections

Perhaps the most important factor affecting image quality after the detector and readout system is the total scan angle. The scan angle dictates the depth resolution or in more practical terms, the amount of signal from adjacent slices that appears in a given slice. The advantage of tomosynthesis is the ability to reduce superimposition of normal tissue seen in a digital mammogram. In general, the larger the scan angle, the less contamination from adjacent slices. Scan angle can range from 0 degrees, as seen on a mammogram with complete overlap of tissue, up to 360 degrees, as seen on a CT that provides precise slices without overlap. Tomosynthesis scan angles range from 11–50 degrees (Table 1). Larger angles give less overlap and better rendition of the actual tissue composition which improve sensitivity and specificity.

However, there are two drawbacks to larger scan angles. First, the scan time increases thereby increasing the risk of patient motion. Second, the number of projections (ranging from 9–25) must increase with the scan angle to support image quality. As the number of projections increase, the dose to the detector per projection decreases to keep patient dose at acceptable levels. This can be problematic for detectors that have non-negligible electronic noise (i.e., noise inherent in the detector and readout system). In FFDM electronic noise is not significant, but at the low doses of individual DBT projections, electronic noise can significantly degrade the image.

Scan Time

Exposure times are usually much higher for DBT compared to FFDM, raising the risk of motion degradation. The scan time ranges from 3.7–20 seconds and is determined by a number of factors including: how many photons are needed to produce a high quality image, how the x-ray tube moves (continuous or step and shoot), how many projection images are acquired, and the output of the x-ray tube. To increase the tube output, tomosynthesis systems employ a tungsten anode and higher kVp than FFDM systems. For the same kVp and mA, a tungsten target tube has approximately twice the output of a molybdenum or rhodium tube. Further, for the same kVp, a tungsten anode can use a higher mA than molybdenum or rhodium because it has a higher heat loading limit. The tube output increases by kVp to the third power, and a higher energy beam will be less attenuated by the breast. So a higher kVp results in more photons produced per unit time and reaching the detector.
A Brief Explanation of the Physics of Breast Tomosynthesis for Radiologists, continued from previous page

Table 1. Summary of some of the characteristics of different DBT systems. Not all systems are currently available for sale in the United States. At the time of this writing (August, 2015) only the GE, Hologic and Siemens systems are FDA approved in the United States.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model</th>
<th>Detector</th>
<th>Detector pixel size (micron)</th>
<th>Scan Angle (degree)</th>
<th># of Projections</th>
<th>Detector-tube motion</th>
<th>Reconstruction Algorithm</th>
<th>Scan time(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fujifilm</td>
<td>Amulet</td>
<td>aSe 1 with TFT readout</td>
<td>50</td>
<td>15 (std mode); 40 (hi res mode) 2</td>
<td>15</td>
<td>Continuous tube motion with stationary detector</td>
<td>Non-Linear FBP</td>
<td>4 (std mode); 9 (hi res mode)</td>
</tr>
<tr>
<td>GE</td>
<td>Senographe SenoClaire 3D</td>
<td>a-Si/CsI with TFT readout</td>
<td>100</td>
<td>25</td>
<td>9</td>
<td>Tube moves in a step and shoot motion with a stationary detector</td>
<td>SART</td>
<td>10</td>
</tr>
<tr>
<td>Giotto*</td>
<td>2nd generation Tomo-synthesis</td>
<td>aSe</td>
<td>85</td>
<td>40</td>
<td>13 variable angle and dose</td>
<td>Step and shoot</td>
<td>Iterative</td>
<td>N/A</td>
</tr>
<tr>
<td>Hologic</td>
<td>Senoia Dimensions Tomo-synthesis</td>
<td>aSe with TFT-based readout</td>
<td>140</td>
<td>15</td>
<td>15</td>
<td>Continuous tube motion with detector constantly at 90 degrees to the central x-ray axis</td>
<td>FBP with iterative contrast adjustment</td>
<td>3.7</td>
</tr>
<tr>
<td>Philips</td>
<td>N/A</td>
<td>Si 3; photon counting</td>
<td>50</td>
<td>11</td>
<td>21</td>
<td>Detector and tube are mounted on a common arm and scan across the breast with a center of rotation below the patient support.</td>
<td>Iterative (ART)</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Planmed Oy</td>
<td>Clarity 3D</td>
<td>a-Si with TFT/PIN photodiode readout</td>
<td>83</td>
<td>30</td>
<td>15</td>
<td>Continuous Sync-and-Shoot 4</td>
<td>Iterative</td>
<td>18</td>
</tr>
<tr>
<td>Siemens</td>
<td>MammoMat Inspiration</td>
<td>aSe with TFT readout</td>
<td>85</td>
<td>50</td>
<td>25</td>
<td>Continuous tube motion with stationary detector</td>
<td>FBP</td>
<td>20</td>
</tr>
</tbody>
</table>

1. Uses hexagonal close pattern pixels as opposed to a square matrix of pixels.
2. There are two modes: standard and high-resolution.
3. The Si acts as both the detector and readout system. This is a multi-slit system.
4. The x-ray tube moves in a continuous arc. When the tube is on, the detector tilts to keep the detector perpendicular to the primary x-ray beam. Once the exposure is finished, the detector rotates back to its starting position. This will minimize focal spot blurring induced by motion of the x-ray tube.

* The data for the Giotto system have not been confirmed by the manufacturer.

FBP = Filtered Back Projection; SART = Simultaneous Algebraic Reconstruction Technique; TFT = Thin-Film Transistor; ART = Algebraic Reconstruction Technique. N/A = Not Available.

The drawback of a higher kVp is reduced subject contrast, but this tradeoff is considered favorable against reducing image noise, the chance of patient motion, and time a patient needs to be in compression.
Image Noise
Image noise is critical when evaluating microcalcifications, where noise can reduce their detectability. However, since microcalcifications are small and generally high contrast, superimposition is less likely to obscure a cluster or generate pseudo-calcifications. Therefore, there is an advantage to smaller scan angles, which decreases the number of projections, total exam time and risk of patient motion while increasing the photons per projection thereby decreasing the effects of electronic noise. This strategy of smaller angles and fewer images increases overall superimposition and image overlap which is a consideration when evaluating glandular tissue but not as important for calcifications.

Choice of Detector and Read-Out
The detector converts the photons to secondary particles, typically electrons or visible light, and the read-out device measures these secondary particles. First and foremost, the detector needs to convert photons efficiently. Higher efficiency translates to a lower photon dose needed to make the image. All detectors have excellent conversion efficiency. However, unlike in FFDM, where there are usually minutes between exposures, there is only one second or less between DBT exposures. This means the detector read-out needs to be fast with minimal lag and ghosting. If the detector is susceptible to lag or ghosting, a faint image of the previous exposure may appear in the next exposure. For example, a calcification that appeared brightly in one image may appear faintly in the next image. There are some situations where lag is inevitable and in a DBT reconstruction the lag may lead to artifact.

Detectors are also rated on pixel size (ranging from 50–140 microns) but this is less important in DBT than in FFDM. The resolution in the single slice of a DBT exam is determined primarily by the reconstruction algorithm rather than the size of the detector pixel. However, if the detector pixel is too large, the reconstructed image will look blurry.

Tube and Detector Scan Motion
To create a complete data set, the photon source in a DBT system must acquire multiple projections at different angles. In most systems, the x-ray tube moves through an arc either in continuous motion or a “step and shoot” pattern. A continuous system turns the tube on and off at increments of desired exposure time through the arc. Tube motion during the exposure creates a larger focal spot than when the tube is stationary. This may degrade spatial resolution, depending on how much the focal spot moves between acquisitions and how important other sources of resolution degradation are relative to the focal spot blurring. In step and shoot, the x-ray tube moves to desired angle, stops, the x-rays are turned on and a projection image is acquired. This process has the advantage of preserving the expected focal spot when the x-ray exposure is performed. However, in practice, it can be difficult to ensure the focal spot is not “vibrating” when the x-ray tube stops for each exposure.
Concluding Remarks

From an engineering perspective, a DBT system is much more complex than a FFDM system. There are many different approaches to building a clinical DBT system, and all designs have advantages and disadvantages. When comparing systems, pay attention to the spatial resolution near the top and bottom of the image set, where degradation compared to the middle may be apparent. Look for artifacts that can be caused by the reconstruction algorithm or deficiencies in the detector and readout systems. Check for consistent signs of patient motion.

Two important additional, and usually proprietary, aspects of DBT systems are image reconstruction and image processing/display. These factors can compensate for some of the compromises engineers have made when designing the system, so it is always imperative to compare final clinical images across platforms. In addition, radiation dose, larger file size, compatibility with existing PACS and workstations are also factors that need to be considered when making purchasing decisions. Oh, and of course price. Good luck!
Interesting Case: Can a Negative MRI Trump a Suspicious Mammogram?

By Tanya W. Moseley, MD

A 72-year-old woman with a history of excisional right breast biopsy for ADH presented for annual screening mammogram. She did not report any current concerns. When compared with mammography from two years prior, there was an enlarging mass associated with a biopsy clip at the 12 o’clock position of the left breast (Figure 1). The biopsy was performed 7 years earlier with benign histology. The images were interpreted as benign. Six months later the patient presented for a screening MRI.

The MRI showed susceptibility artifact but no definite suspicious enhancement at the site of the biopsy clip (Figure 2). The findings were assessed as benign and routine screening recommended.

Subsequent screening mammogram confirmed further growth of the mass (Figure 3). An ultrasound was ordered for additional evaluation. The ultrasound demonstrated a circumscribed hypoechoic oval mass with an associated biopsy clip (Figure 4).

Ultrasound guided biopsy and subsequent left segmentectomy

Figure 1: CC and MLO views from 2014 (a, b) and 2012 (c, d) show an enlarging mass at the 12 o’clock position of the left breast. There is an associated clip denoting a remote benign biopsy.
were performed. The final pathology showed invasive ductal carcinoma, Nottingham histologic grade 2.

Undiagnosed breast cancer on MRI may be secondary to a lack of enhancement or to missed or misinterpreted enhancement. The specificity of contrast-enhanced MRI for breast cancer is as high as 89% (1). The sensitivity is consistently higher than mammography and ultrasound, ranging between 90 and 100%. (1). Given this high sensitivity, the absence of enhancement makes the presence of breast cancer unlikely. Therefore, some may forego biopsy when MRI shows no suspicious enhancement, even with suspicious mammographic findings (2).

Enhancement on MRI is dependent on the vascularity of a lesion. Neovascularization with increased microvascular permeability leads to leakage of gadolinium into surrounding tissue and enhancement of malignant lesions. Tumor angiogenesis is generally thought to be detectable when cancers reach a diameter of 3 mm, which may explain the false-negative rate of MRI in cases of very small invasive cancers (3). The lack of enhancement has been noted in inflammatory carcinomas, which is believed to be due to
these carcinomas attaining nutrients through diffusion rather than neovascularization (4, 5).

As imagers, we must be mindful to confirm adequate contrast administration on MRI. Lack of contrast in the heart and absence of normal breast vascularity may reflect a missed contrast bolus. Intravascular contrast is clearly present in this case (Figure 2b). Perhaps the susceptibility artifact from the biopsy clip precluded the detection of enhancement.

A negative MRI study should not influence the management of a lesion considered suspicious on other breast imaging modalities or at physical examination. Lesions that are suspicious on other breast imaging modalities, particularly mammography and ultrasound, cannot be deemed benign based solely on a negative MRI. Missed or misinterpreted enhancement may occur in the setting of motion artifact, biopsy clip artifact, marked adjacent or surrounding parenchyma enhancement, or simply misidentification or misinterpretation of malignant enhancement.

Primary teaching point: A suspicious finding on imaging or physical exam should not be ignored if MRI fails to confirm an abnormality. A problem-solving MRI can be falsely reassuring in scenarios such as the one depicted here.

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As we tackle long lists of screening mammograms, complicated diagnostic workups, and busy procedure schedules, we naturally focus on providing the best care possible for the patients and images directly before us. After all, it’s the ability to concentrate on the task at hand that allows us to excel at what we do. However, at the end of the day, the same focus tends to give us tunnel vision and prevents us from asking some very important questions: Who is missing from my schedule? Which patients am I not reaching in my practice? Who is being left behind?

A recent patient presented at my institutional tumor board served as a wake-up call for me. A surgeon presented his case of an African-American woman with a self-detected breast cancer. He wanted to discuss the next management steps in the wake of widely positive margins following repeat lumpectomy. The surgeon, who routinely relies on breast MRI for surgical planning, recounted how he had foregone the exam because of numerous obstacles related to the patient’s non-private insurance that would have significantly delayed treatment. Two months and two surgeries later, she still faced the prospect of more surgery.

This case illustrates how women in our medically underserved communities are the ones who disproportionately face obstacles that produce disparities in screening, diagnostic, and treatment services. A recent study by George et al. found that, compared to white women, African-American women have a significantly higher risk of experiencing a delay of two months or more in diagnosis and surgical treatment for early-stage breast cancer (1). Additionally, they found that African-American women with non-private insurance were significantly more likely to experience delayed diagnosis compared to women with private insurance coverage. To exacerbate matters, the same patients are also more likely to suffer a delay in the initiation of treatment of more than two months which can adversely impact survival, making this particular racial disparity even more significant.

Multiple studies have documented similar findings of treatment delays for African-American women compared to white women. Over two decades of research regarding healthcare disparities have established higher breast cancer mortality rates in African-American women despite a lower incidence of breast cancer. Surveillance, Epidemiology, and End Result data demonstrate that relative to overall declining breast cancer-related mortality since the 1990s, the rate of decline for African-American women is significantly slower, further widening the survival rates for African-American women. Although the higher mortality has been attributed in part to a higher prevalence of triple-negative and more aggressive breast cancers among African-American women, studies like those by George et al. remind us that other important patient, provider, and health system factors contribute to ongoing disparities that must be addressed.

As individual radiologists, it is easy to become desensitized to messages regarding healthcare disparities. Terms such as underserved and disparities are buzzwords that may have all but lost their meaning. Although systemic problems related to social, economic, and public health policies in this
country may be blamed for many inequalities, there are ways we can make a difference in our own clinical practices. At the patient level, outreach efforts such as free screening mammogram events and health education events have been efficacious. Similarly, reminder letters, phone calls, and patient navigator services can effectively improve compliance with screening and diagnostic services among the medically underserved. At the provider level, we can educate our colleagues regarding the potential benefits of screening as well as when and how to appropriately order diagnostic workups. We can champion patient navigator programs at our institutions. These are just a few interventions we can feasibly offer as individual radiologists—efforts that may benefit our underserved patients as they navigate through a healthcare system that has sometimes failed to meet their needs. Let us all be aware and engaged. So, the next time you are scrutinizing mammograms or reviewing your daily work schedule, please remember the patients who aren’t on your list. 

REFERENCES


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**CALL FOR ABSTRACTS**

The Society of Breast Imaging welcomes the submission of original scientific abstracts related to breast imaging for the SBI/ACR Breast Imaging Symposium

April 7-10, 2016
Austin, Texas

Authors must submit abstracts using the online system.

For more information and guidelines for submission:


**SUBMISSION DEADLINE:** November 26, 2015 11:59 PM EDT
Mom you have to start tweeting."

"I don't have time to tweet. I can hardly keep up with my email!"

I thought Twitter was how Ashton Kutcher told the world what he'd eaten for breakfast. How could it be a good use of my time?

But the authors of the Canadian National Breast Screening Study had just published their 25-year update, and the press in Canada and the United States were disseminating the same old non-science: screening mammography doesn't save lives.

I wrote an op-ed in the Vancouver Sun in defense of screening. When it was published, my son tweeted it. I retweeted him—my first tweet.

Twitter is a social media platform, like Facebook. Its hallmark is brevity; each "tweet" must contain no more than 140 characters. A tweet can link to a website or include a photo, which allows more information to be shared.

Creating an account is free. You can join, stay anonymous, and never tweet. Your twitter name ("handle") starts with the @ sign. It can be your real name or something obscure. I first joined Twitter anonymously, but I started a second account with my real name to tweet about breast imaging. I follow the SBI, other organizations and individuals in the world of breast imaging, medical journalists, and general news outlets. I make an effort to log in and catch up a couple of times a week, and I tweet when I think a link is important or may be of interest to colleagues and patients.

Once you’ve set up a Twitter account, you can use the search box to find people or organizations to follow. Often, you’ll find them because people whom you follow "retweet" their tweets, or mention them in a tweet. For example, here’s a tweet from Nancy Cappello, PhD, the driving force behind dense breast reporting legislation in the United States:

Nancy Cappello, PhD @DrNancyCappello

Dense Breast Screening: Dense if We Do, Dense if We Don’t?

http://t.usnews.com/Zb5rw4 via @usnews @NBSaphierMD @ElaineSchattner @DrPaulaGordon

After the title of the article she tweeted about, she included a link to the article followed by four Twitter handles, including mine (@DrPaulaGordon). By including my handle, Nancy made sure her tweet would show up on my Twitter page. Tweets can also be sent and received with a smartphone like email and text messages.

Not only did I know that Nancy had tweeted at me, but her tweet led me to other profiles of potentially like-minded people that I can follow or not. When I follow someone, they receive a notification that I’ve done so. Sometimes, that prompts them to start following me as well.
I’ve “met” some interesting folks this way. I’ve also found, and now follow, organizations I might not otherwise have discovered. Perhaps most importantly, patients, fellow physicians, and journalists from around the world now follow me. We’re all teachers for our patients. Twitter lets you reach many patients far from your geographic base.

Another way to explore and expand your Twitter universe is with hashtags. These are words preceded by the # sign. For example, #breastcancer is a hashtag. Search for it or click on it in a tweet and you’ll find a list of recent tweets that also include it.

Often, conferences will have a designated hashtag (#SBIACR15). When colleagues include it in their tweets, you can follow highlights of the sessions, even when you can’t attend. Click on the hashtag in a tweet to see all the updates from the meeting. So when you see people like me looking at our cell phones during presentations we may be tweeting about what’s happening with a wider audience!

An important point: respect patient confidentiality; even a partial description might be enough to identify a patient. Unless you make your Twitter account “private”—restricting your tweets to individuals you select—every word will be in the public domain. If you aren’t comfortable publishing it under your name in a journal or a newspaper, then don’t tweet it.

And a heads-up: Beware of “trolls”. Trolls are individuals, often anonymous, who make silly or nasty comments on your tweets. Here’s an example:

Bill Ainsworth @ainsworthbill71
@DrPaulaGordon @ElaineSchattner continuing the war on fibroadenomas

If “trolling” crosses the line to harassment or abuse, “block” that person or report them to Twitter via their profile page and clicking the appropriate link.

Radiologists are rapid adopters of technology. So, have a look! As a start, check out my tweets @DrPaulaGordon, our president @DrLizMorris, and our society @BreastImaging. You’ll also find @RSNA, @ARRS_Radiology, @MammoSaves and many others.

Here are some links to articles with helpful information about Twitter:
http://www.kevinmd.com/blog/?s=twitter
http://www.kevinmd.com/blog/2012/10/physician-twitter-examining-data.html

And once you’re comfortable with Twitter, consider the possibilities. Tweets can share links to important articles, spread news about research at meetings, bring a virtual community together, announce success, find allies outside our field, and remind the general public and patients that we have their best interests at heart.

See you in the “Twitterverse.”

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**Twitter 101, continued from previous page**
RSNA 2015 Preview

By Shadi A. Shakeri, MD

It is hard to believe that another Radiological Society of North America (RSNA) meeting is already around the corner. The 101st Scientific Assembly and Annual Meeting will take place at McCormick Place in Chicago from November 29 to December 4, 2015. This year commemorates the 100th anniversary of the founding of RSNA with the theme “Innovation is the key to our future.” As always, the plenary sessions provide an impressive array of speakers with fascinating overviews and projections for radiology and medicine.

The Opening Session on Sunday will commence with the presentation of the Outstanding Educator and Outstanding Researcher awards followed by the President’s Address. RSNA president, Ronald Arenson, MD, FACR, Alexander R. Margolis, Distinguished Professor and chair of the Department of Radiology and Biomedical Imaging at the University of California, San Francisco, will speak directly to this year’s theme in his opening address “Going Boldly into Radiology’s Technological Future: Why Our Profession Must Embrace Innovation.” Guest speaker, Darrell G. Kirch, MD, president and chief executive officer (CEO) of the Association of American Medical Colleges, will then give the 2015 Special Lecture: “Radiology, Medicine, and Healthcare: Will Inaction or Innovation Determine Our Future?” This plenary session will highlight the need for innovations as the United States health care system faces enormous transformations for better health care delivery to individual patients and populations.

The Monday Plenary Session will feature Jeffrey R. Immelt, Chairman and CEO of General Electric, who will deliver the New Horizons Lecture entitled “Redefining Innovation.” He will discuss the need for innovations and technology to affect healthcare outcomes and advance the future of radiology. Tuesday afternoon will start with the presentation of this year’s RSNA Gold Medal Awards to Hedvig Hricak, MD, PhD, FACR, Robert A. Novelline, MD, FACR, and Steven E. Seltzer, MD, FACR. The session will conclude with the “Annual Oration in Diagnostic Radiology: Trends and Developments Shaping the Future of Radiology” to be delivered by James H. Thrall, MD, FACR, Chairman Emeritus of the Department of Radiology at Massachusetts General Hospital, Boston.

In addition to the plenary sessions, the huge breadth of options offered at the scientific sessions and educational courses will keep imaging professionals, novice and seasoned, sprinting from one end of McCormick Place to the other. Hundreds of oral and poster presentations will cover the gamut of topics in breast imaging along with daily scientific sessions promising to update the audience on cutting-edge research methodologies and results. With so many informative presentations to choose from, the daily dilemma is always which of the concurrent sessions to attend? Here is a brief listing of the breast imaging scientific sessions. Sunday morning scientific sessions in breast imaging will cover emerging technologies, namely contrast mammography and breast computed tomography as well as physics of mammography/ultrasound. On Monday afternoon, a session about using MRI to monitor therapy will occur concurrently with the session on screening issues. A breast-integrated...
science and practice session will take place on Tuesday morning at the same time as the breast imaging intervention and pathology correlation session. Tuesday afternoon offers two concurrent sessions as well, one on quantitative breast imaging and the other on nuclear medicine/molecular imaging. Wednesday morning’s choices will be between the density and risk assessment and ultrasound diagnostics programs. In the afternoon, the options are practice issues in breast imaging and advanced applications for ultrasound. Thursday and Friday morning sessions are on MR diagnostics and multimodality screening, respectively.

There are numerous fantastic educational sessions offered again this year in breast imaging, including the always popular hands-on sessions led by many SBI members on ultrasound and MRI-guided biopsy techniques. Many of the educational courses will be interactive and case-based. Other disease focused and multidisciplinary courses covering breast oncology and radiation therapy give us breast imagers the opportunity to learn from our colleagues in neighboring disciplines. The sheer variety of offerings makes choosing which sessions to attend challenging. For those looking to refresh and update their knowledge in other areas of radiology, interesting sessions outside of breast imaging are plentiful as well.

Continuing to emphasize international collaborations, two countries, Germany and Mexico, will be showcased at the 2015 RSNA meeting. On Monday, November 30th, “Germany Presents” will feature “Population-Based Imaging: How Broader Research Efforts Can Effect Everyday Care and Prevention.” There will also be opportunities to learn about the German radiology community and become familiar with technologies and manufacturers through the “Germany Presents” pavilion available throughout the week. Special programming is also planned for “Mexico Presents” with a featured session on Tuesday, December 1st entitled “The Challenges of Radiology Education in Mexico and Some Proposals for Mexico and Latin American Countries.”

Finally, if you are unable to travel to Chicago this year to attend the RSNA, there are many sessions available through the virtual meeting website. Otherwise, pack your walking shoes and pedometer—here we go!
Will Cloud Computing Revolutionize the Way We Share Mammograms?

By Kristina Jong, MD, and Jafi Lipson, MD

Cloud computing is a part of our everyday lives. Popular widely used cloud computing applications include Facebook, Apple iCloud, and Google Docs, all accessed via the internet. Cloud computing improves operational efficiency by centralizing IT resources and is also cost-efficient because users pay only for the services they need (1). This potent combination of improved access to large amounts of data and complex services at lower cost explains why industries worldwide are embracing cloud computing to gain a competitive advantage.

The healthcare industry has been slow to adopt cloud computing, in part due to concerns about privacy and security (2). Despite these hurdles, cloud computing in healthcare is burgeoning because it can increase efficiency and contain costs while potentially improving patient outcomes. Cloud computing is particularly well-suited to transform workflows in digital fields such as radiology. And while there are a number of applications of cloud computing in radiology, two in particular address recurring issues in breast imaging: the need to store increasingly larger datasets and the need to access prior studies wherever they may exist.

Imaging storage needs are climbing at a rate that exceeds the declining cost of storage. The datasets for a four-view digital breast tomosynthesis study can be 20-fold larger than the equivalent full field digital mammogram exam. Using cloud-based storage, a facility purchases space as needed from a cloud provider. The examinations are no longer archived on local or remote institutional servers, but instead on servers owned by the cloud provider. Studies archived in the cloud are accessible from any computer with an internet connection. Switching to cloud storage saves money in large part because maintenance costs, which can account for 50–80% of traditional storage costs, are shifted to the cloud provider and customers can purchase only the storage they need in small increments (3). Ultimately, cloud-based image storage facilitates cost savings and flexibility.

Another application of cloud computing is the cloud-based image exchange, which is particularly beneficial for breast imaging because we rely heavily on prior studies. A cloud-based image exchange platform allows instant examination sharing with anyone connected to the internet. An institution subscribing to an image exchange platform no longer has to use CDs or other physical media to transfer studies. Rather, an emailed or website-embedded link is used to exchange studies. Using a cloud to share imaging studies could mean an end to waiting days or weeks for a prior mammogram on CD to arrive in the mail, get routed to the film library, and uploaded into PACS. Using a cloud image exchange reduces delays in interpretations and unnecessary additional exams, improving patient care and reducing healthcare costs. Efficiency is increased even if a patient arrives with a study on CD. Instead of trekking around the facility to the proper file clerk, the disc can be simply inserted into any enterprise computer and uploaded by anyone with internet access. A patient could even upload her copy of a study from home.
Will Cloud Computing Revolutionize the Way We Share Mammograms?, continued from previous page

The use of image exchange platforms can also promote better patient care beyond the radiology department by improving a clinician’s access to external studies. This is accomplished by making cloud-shared exams accessible and viewable from an electronic medical record (EMR). The study is accessed by an embedded link in the patient’s chart and can be readily viewed from any computer with the vendor’s zero-footprint (i.e., nothing to install) viewer.

Other important features to consider when selecting an image-sharing product are listed below:

- Automatic query of multiple databases (for an existing patient) as studies are uploaded (e.g., PACS, EMR, RIS).
- Patient-accessible version of an exam is in a vendor neutral archive (VNA). VNA is a non-proprietary standard that can be read by any system thereby making an exam portable and transferrable.
- Simple, error-free workflow for facilities or patients to upload images to a branded website.

There are a number of image exchange products to choose from and the market is rapidly growing. Some of the better-known products and vendors include:

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<td>DG Suite</td>
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Another interesting product is Mammosphere, a mammography-only image exchange and storage product offered by a non-profit company of the same name. A breast imager, who sought to make mammography more effective by improving accessibility to prior studies, founded the company. Mammosphere allows patients and imaging facilities to store and transfer mammograms instantly anywhere in the country.

The choice of cloud computing product is important, but understanding and streamlining the workflows required to manage the studies uploaded into the cloud, and ensure accurate accessioning and association of images with patient records is an even larger challenge. This requires a team approach across the entire enterprise, including patients, film librarians, PACS managers, clinic staff, and radiologists.

Cloud computing is on the verge of transforming many of the processes in healthcare, including those in radiology. With the current rate of rapid growth of cloud computing products for radiology, you may find yourself spending a lot of time in the vendor hall at RSNA in November.

REFERENCES

How to Train a Breast Sonographer

By Xuan-Loc Nguyen, BS, DMS

Breast ultrasound is often dismissed as an easy procedure. Throughout the years, I have asked sonographers to share their first impressions of performing a breast sonogram with me; they frequently describe it as “a simple scan.” Is scanning, differentiating, and capturing breast disease by sonogram really an effortless endeavor? Since there is only one anatomical part to examine and learn, where is the complexity in scanning the breast? The sonographer has the opportunity, because of the real-time operator-dependent nature of breast ultrasound and patient awareness, to make any exam a simple dream or a complicated nightmare. In my humble opinion, formed through many years in training breast sonographers, a good breast ultrasound requires a compassionate and competent sonographer who has significant skill and knowledge in recognizing and differentiating a wide range of normal tissue appearances and breast pathology.

A breast sonographer requires close interaction with the radiologist to reach a proper diagnosis for the patient. Therefore, to ensure a sonographer performs high quality breast ultrasound requires great commitment by the trainee to learn breast anatomy, patient positioning, and imaging techniques. A personalized teaching plan with both short and long-term goals as well as detailed guidelines for the trainee are essential. Schedule routine one-on-one meetings to assess the progress of the trainee. Lastly, hands-on training with immediate constructive feedback plays a pivotal role in the training process.

At the University of Texas MD Anderson Cancer Center, the average time frame to train a breast sonographer is between three to six months regardless of previous experience. During the first few months of one-on-one instruction, all trainees begin learning the normal breast anatomy, regional nodal basins, imaging protocols, imaging techniques, patient positioning, patient history, case presentation skills, and institutional computer systems. All patients examined by trainees are scanned again by an experienced sonographer prior to presenting to the radiologist. At this time, images are being critiqued with immediate constructive feedback on technique and methodology of documenting breast findings in sequential order. During hands-on training, trainees have the opportunity to learn the ultrasound system for image optimization, patient positioning, and techniques in documenting the findings.
breast. Appropriate gain setting and transducer usage for each patient’s habitus are critical in capturing findings. Trainees must gain competency in “knobology” and machine settings to optimize image quality and distinguish pseudo-mass and artifact from actual findings.

Prior to scanning, trainees must learn the clinical indications for breast ultrasound and understand the importance of obtaining a complete patient history. Also, reviewing other available breast imaging such as mammograms or MRI significantly aids the sonographer in localizing the targeted lesion for correlation.

Recognizing normal breast anatomy is critical. Sonographers must learn to differentiate benign from pathological findings. Trainees are first introduced to basic concepts such as differentiating cysts from benign appearing solid lesions. During the initial few months sonographers are expected to recognize and characterize simple breast lesions, distinguish solid masses from cystic lesions, perform appropriate measurements, and recognize the regional nodal basins. After scanning each patient, trainees prepare a case presentation that includes a concise history, indication for the procedure, and their impression of the findings.

The final hurdle for all sonographers is to sharpen their learned skill set and apply it to complex scans. In this last stage, trainees are expected to learn how to differentiate types of breast cancer, recognize nodal basins of involvement, distinguish multi-focal from multi-centric breast disease, understand Color and Power Doppler, and apply advanced technologies like elastography in the appropriate settings.

Beyond diagnostic examination, breast ultrasound trainees should be knowledgeable about preparing interventional procedures such as core needle biopsy, fine needle aspiration, pre-operative needle localization, clip placement, radiation seed placement, and intra-operative guidance. They should also understand the importance of breast sonography for clinical management, treatment, and follow-up of breast cancer patients. For example, sonographers should have a firm grasp of how ultrasound impacts clinical staging, surgical planning, the timing of chemotherapy, the extent of radiation therapy, and response to treatment.

In conclusion, breast ultrasound requires skilled sonographers to capture and illustrate breast findings for radiologists. In order to be successful, breast sonographers must possess a receptive mindset and the willingness to turn constructive feedback into learning opportunities. Furthermore, breast sonographers must maintain a thorough scanning process and display compassion toward patients who are often emotionally distressed. Together, sonographers and radiologists can collaborate to provide the best outcome for patients.
India overwhelms the senses with its incredible population, diverse cultural groups and languages, vivid colors and outstanding food. Many of our fellows, residents, and staff come from India. There are more than 47,000 Indian doctors currently practicing in the United States. Yet, we often have a very limited sense of where they come from, or what the country is like.

I had the good fortune to visit India this year. I taught at the 2nd Indo-British Advanced Master-Class in Oncoplastic Breast Surgery and Breast Cancer Symposium in Pune, a city 3 hours north of Mumbai, organized by Dr. C.B. Koppiker. One of the best parts of the conference was the multidisciplinary discussion: a four hour competition between private healthcare network hospitals to determine who demonstrated the best breast imaging, diagnosis, and treatment. The first place team was from Max Hospital in Delhi, led by a committed breast surgeon, Dr. Geeta Kadayaprath. The quality of medical care was on par with our best breast centers in Canada and the United States.

The challenge of medical care in India is staggering. With a population exceeding 1.25 billion people, the medical system is underfunded. India spends 5.1% of its GDP on health care (the United States spends 15.6%). India spends 4.2% on private health care while public-sector health programs receive 0.9% (1). In India, there are more than 2.5 million cases of cancer annually, of which 70% are diagnosed in late stages. More than 60% of breast cancer patients present at a locally advanced stage (2). No population-based mammography screening program exists in India. While the incidence of breast cancer in India is lower than in the United States, the mortality rate is significantly higher. In 2015, 155,000 women will be diagnosed with breast cancer in India, and roughly half of them (76,000) will die from it. Contrast this with the United States, where 232,000 new invasive cancers and 40,000 (17%) deaths are expected in 2015 (3).

Some of the disparity in outcomes can be attributed to a shortage of trained physicians in India. The physician-to-patient ratio in India is 7 per 10,000, compared with 25 per 10,000 in the United States (3). Although the number of medical school admissions in India more than doubled to 24,000 in 2005, India is the largest exporter of physicians in the world. Almost 60,000 India-educated physicians currently practice in the United States, United Kingdom, Canada, and Australia (1). The loss of trained physicians is challenging. One surgeon I met in Pune could not find a qualified radiologist to work in her breast center, requiring her to perform all stereotactic and ultrasound guided breast biopsies, review all breast pathology, and perform all breast surgery.

Other challenges are corruption, lack of credentialing, and an “uncontrolled and uncoordinated health care system” (1). Quality of...
Breast Imaging and Education in India, continued from previous page

medical schools vary a great deal, with some outstanding and others very poor. Accusations of cheating and fraud have been leveled against one out of six private medical schools (4), and less than half the graduating physicians find subspecialty training positions (1).

Despite the challenges facing the medical system in India, there are signs of improving care (5). More Indian doctors are returning to India. Many Non-Resident Indians, a term used to characterize Indians who have moved abroad regardless of their precise emigration status, have been recruited to new proprietary hospitals and high-tech medical centers catering to “medical tourism,” in part because their international credentials are important in the institutions’ marketing strategy (1). My former colleague, Dr. Shilpa Lad, returned to Mumbai two years ago and is building a high quality breast imaging private practice there.

Indians traditionally value education and hard work. At an afternoon teaching session I gave in Mumbai at Hinduja Hospital, more than 50 radiologists attended. There was a keen interest in improving standards and quality of breast imaging and a strong sense that earlier diagnosis is critical to improving patient outcomes (4). Indian physicians typically work 12 hours per day and six days per week. One breast surgeon told me that he operated on 300 women each year. There is a pervasive ambition to “catch up” with the western medical world, along with the belief that this is possible. After my trip to India, I had the distinct impression that it was.

There are many benefits to learning about breast imaging in India. It behooves us to train residents and fellows from India so they can return to deliver high quality breast imaging. An awareness of the high rates of locally advanced breast cancer when no screening programs exist reinforces the work we do in the Western world and the positive impact it has on breast cancer.
Breast Imaging and Education in India, continued from previous page

mortality. An increased awareness of the medical system in India allows us to better communicate with our colleagues, trainees, and patients and may foster collaboration between hospitals and medical centers for improved research and training. Ultimately, this will benefit women with breast cancer throughout the world.

REFERENCES

In August of the year 2000, I rented out my house in Seattle, put all of my belongings in storage, packed up my two young daughters (aged 10 and 12 at the time), and moved to Kumasi, Ghana for a year. I had never been to Africa before. In fact, I had never left North America before.

I had spent the last 12 months recruiting donations of ultrasound machines, textbooks, and related supplies that I could use to start an ultrasound training program in a developing country. In response to my appeal, I managed to fill up my garage with donated equipment and supplies. In June I hosted a work party at my home. We packed, labelled, inventoried and loaded everything onto a 40-foot cargo container, which was then shipped to Ghana courtesy of a local church. I didn't see the container or its contents again until weeks after we arrived in Kumasi.

To the relief of my extended family, my daughters and I had a great year. We rented a little concrete block house with occasional electricity and running water for $100 a month. After burning tires to smoke out the cobras from the bedraggled and abandoned front yard, we planted roses and...
tropical flowers and looked forward to eating kiwis from my lone kiwi tree. A Ghanaian seamstress made traditional brown and gold school uniforms for my daughters, and they joined Ghanaian and expat students at the local “international” school.

Each morning after dropping off the girls at school, I headed down the rutted red dirt road to the small private hospital on the outskirts of Kumasi where I set up my training program. In the morning I lectured and monitored the students practicing on each other. In the afternoons, we scanned patients in the hospital together. There were long lines of patients everywhere but it was often impossible to scan due to the constant power outages from an overloaded and insufficient electrical grid and lack of fuel for the hospital generator. When we could scan, the pathologies we encountered were so advanced and bizarre that it was often impossible to tell what organs were involved.

At the time, breast cancer screening was not offered in Ghana. And most patients could not afford to see the doctor for a breast “lump.” These were typically ignored. Most young women presented to the doctor for vague breast pain, and older women presented with very advanced and very obvious disease.

Ghana is now my second home. In 2007, after getting to know the Dean of the medical school in Kumasi, I spent the summer working with the administration at the Kwame Nkrumah University of Science and Technology (KNUST) (http://www.knust.edu.gh/) and government officials to create the first four-year Bachelor’s degree program in sonography in Africa. We admitted our first students to the program in the Fall of 2009 and have since graduated three classes with a current enrollment of over 100 students from Ghana and Nigeria. I typically return three times a year to lecture at the university and lead short-term workshops in Accra and Kumasi with the teaching hospitals and a group based out of the Mayo Clinic called Africa Partners Medical (http://www.africapartnersmedical.org/).
Breast Ultrasound in Sub-Saharan Africa: One Sonographer’s Experiences in Ghana, continued from previous page

During the 15 years since my initial stay in Ghana, progress has been made towards advancing the status of medical diagnosis. The curriculum established by the West African College of Surgeons for the training and certification of physicians, and in particular radiologists, has become more developed and purposeful (1). Mammography, CT, and MRI are available in the country. The newly established Allied Health Professions Council, along with the Ministry of Health and Ministry of Education, have initiated policies for training and certification of radiographers and sonographers, as well as regulations for the accreditation of educational training facilities by enactment of the Allied Health Professions Regulatory Bodies Act, 2013 (Act 857) (2). In addition, campaigns by the government as well as a variety of NGOs to educate the public about breast cancer and other treatable and preventable diseases (including the project “National Action to Fight Women’s Cancers”) have been initiated (3).

Unfortunately, the incidence of breast cancer in sub-Saharan nations is increasing (4-9). Even though extensive Guidelines for International Breast Health and Cancer Control were published in 2007 by the Breast Health Global Initiative (10), early breast cancer diagnosis and treatment in Ghana remains elusive. It is possible to get a screening mammogram in Ghana now, but most women do not. With a total population of 25 million, the few facilities that offer mammogram screening in Accra (serving the entire southern half of Ghana) or Kumasi (serving the entire northern half) are expected to serve millions of women. Diagnostic mammograms are more likely to be offered to patients presenting with clinical findings. However, ultrasound is big business in Ghana and can be found everywhere making sonography the exam of choice.

Ultrasound-guided core biopsies are also now performed, but diagnosis of any kind in Ghana still is a considerable challenge. When I lived in Ghana in 2000, there were no pathologists in the country. We had one radiologist at our teaching hospital who performed breast biopsies, but the...
Breast Ultrasound in Sub-Saharan Africa: One Sonographer’s Experiences in Ghana, continued from previous page

specimens were sent to Europe or South Africa for examination if the patient was able to pay. There are now a handful of radiologists and pathologists in Ghana, but they are few and far between.

Patients continue to present late in the course of their disease. Limited access to physicians and equipment, electrical outages and water shortages persist, undermining the most ambitious of plans. The internet and worldwide web, while opening the door for advanced learning opportunities, are frequently inaccessible, limiting the abilities of both technical and professional staff to obtain continuing education. High temperatures, humidity, and dust levels combined with a lack of preventive maintenance lead to frequent breakdowns of equipment. Long periods of non-use then follow due to a lack of financial ability to pay for repairs or qualified biotechnical support. Despite the progress that has been made and the high incidence, diagnosis and treatment of breast cancer in Ghana remain significant problems, and will be in the foreseeable future.

Ann Polin is a sonographer at Virginia Mason Medical Center in Seattle, WA and a faculty lecturer in the Bachelor Degree Programme in Sonography at the Kwame Nkrumah University of Science and Technology in Kumasi, Ghana. She is due to return in the Fall of 2015. She has a short wish list that includes equipment, funding, grant writing and on-site participation. If you are interested in getting involved she may be contacted at: WestAfricaAnn@comcast.net.

REFERENCES
Breast Imagers’ Expert Opinions Research via SBI: Tribute to All Breast Radiologists

By Jiyon Lee, MD

The fast pace of our daily work schedules can appropriately bring our patients into sharp focus. But it can also blind us to the diversity of breast imaging in our country. Radiology and breast imaging, despite the clear guidelines of the MQSA and the BI-RADS® Atlas, are as heterogeneous as the people of the United States. For example, there are communities spread across vast distances:

“… we are general radiologists, the red headed step children of radiologists. One challenge … is distance. Calling someone back for a diagnostic examination who may live 150 miles away sort of ups the ante a bit. It seems that distance and rural imaging gets lost a bit in more academic pathways.”

Some patients lack the opportunity to receive care because providing it is not financially feasible:

“I practice in a poor rural state. One third of the counties in my state do not have standing mammography facilities. Many women present for their first mammogram with a palpable abnormality.”

While other facilities have everything under the sun, possibly to the point of excess:

“A 50 year old friend … has been going to a Women’s Center…. She listened to an expert in a panel discussion…. The expert radiologist … said that a screening mammogram is not helpful if you have a dense breast. She had a screening breast US … the pt. was recalled for a diag. US. A mammogram was finally done and read as neg. The rad. wanted a chest MRI; done and Neg. Still concerned and wants a breast MRI.”

These candid illustrations of everyday breast imaging come from radiologists around the United States responding to a survey designed to gather information about screening mammography attitudes and practices. The data, indicating that we breast imagers practice what we preach, were collected through collaboration with the SBI and recently published in the AJR (1). The multifaceted study design embodied an opportunity to glimpse how differently our colleagues strive for the same things: credibility, MQSA-based accountability, and consistency in screening recommendations to others and for themselves.

“After considerable discussion at higher levels in our health system and cancer center, we were ‘asked’ to modify the recommendations in our screening reports. Essentially, we changed from annual to 1-2 years. These changes were not initiated by the Breast Imagers, as they did not reflect our true recommendations.”

The authors are indebted to the SBI for making this study possible. Only SBI members may submit research survey requests (info@sbi-online.org) for approval from the SBI Board to confirm educational intent. The web link for this survey, with brief study description, end date (SBI policy is typically one month), and author contact information, was publicized via SBI weekly newsletter emails for one month. Only SBI members received the survey invitation, and voluntarily responded directly to the study author or survey link. Monitoring of the online survey instrument, all data collection, and any correspondence were then fully managed by study authors. For our study, we sought additional
recruitment via separate email outreach, focusing on SBI members (via access to member directory) in more rural or lower representation states. Ultimately, we invited and gained representation of all 50 states and across all practice profiles.

All data were reported in aggregate. But both within the free-text portions of the survey and in separate email correspondences, many comments from thoughtful radiologists provided insight beyond the checkboxes and numbers—the space for which is rarely available in a peer-reviewed journal. Our nation and its people are heterogeneous in every way imaginable, and the sometimes poignant comments bring light to the challenges in breast imaging that aren’t appreciable in dry values of callback rates, cancer incidence, and survival. Indeed, these comments also give life and voices to our dedicated colleagues who are grappling with those challenges.

“In my practice, the USPSTF guidelines were embedded in our EHR without our input or knowledge. We partnered with our referring clinician colleagues to successfully have these removed but this was particularly concerning for us due to the high percentage of African American women in our practice who have a higher incidence of breast cancer at younger ages.”

“The general surgeons, who are actually pretty decent guys, can never the less be difficult. They want to see a number of the patients and then decide themselves whether or not to biopsy. Part financial, part old school wanting to develop a relationship before telling someone they have cancer, and part a misunderstanding of the sheer number of patients that come through the practice and the sheer number of primary care providers who order screening studies.”

The more highly visible leaders in our field are not defending mammography alone. These quotes from participants contribute to the collected wisdom of the dedicated radiologists across the country who are “in the trenches,” whose experience bolsters personal convictions, leading to personal behavior consistent with their screening recommendations to others. But external pressures abound, preventing consistency.

“USPSTF recommendations have done women a huge disservice. More women will needlessly die because of these. The argument of excessive anxiety from mammographic work up and over biopsy are overblown.”

Healthcare is non-uniform across our vast country, with geography and lack of specialized services being two more of the reasons why.

“Because of the size of the state, and the reticence of some of the population living in rural areas to receive medical care, as well as the inaccessibility of care in many places, we see a very large number of advanced breast cancers. In addition, because of the large size of the state, and how remote many towns and villages are, our mammography mobile unit is an important supplement to screening. Calling back patients from mobile screening definitely has its challenges, as many patients must fly in from villages or small towns. Some small communities … have screening and diagnostic mammography (many still
Breast Imagers’ Expert Opinions Research via SBI: Tribute to all Breast Radiologists, continued from previous page

film-screen), but the reads are often tenuous, at best, and interventions cannot be performed in these locations.”

But within all living realities, radiologists still try their best, and try to provide and explain what is optimal. We’re not trying to hog the good stuff for ourselves and our family and friends. So here’s gratitude, to all dedicated radiologists for our compassionate care of all the women—and men—we serve.

REFERENCES
1. Lee J, Gordon PB, Whitman GJ. “Do unto others as you would have them do unto you”: Breast imagers’ perspectives regarding screening mammography for others and for themselves—do they practice what they preach? AJR Am J Roentgenol. 2015; 204(6): 1336-1344. PMID 26001246

Additional quotations from survey participants are provided here to fully illustrate the diversity of practices and dedication of the breast imaging community.

“…The main challenge I see is the drop in mammography volumes in the past few years. I believe this is in part due to some of the local physicians advising their patients that screening mammography is only recommended every 2 years unless they are high risk. Our community also has a significant low income population, which has been hit hard by the economy, and this likely impacts volumes.”

“There are a lot of challenges… One … is the powers that be think that oncology should be the hub of breast work. That is very backwards in my opinion. Only a small fraction of breast patients need an oncologist. I think centers work well with Radiology being at the hub.”

“Rural … hospital based. General radiology practice performing all modalities including mammography with biopsies. 2 colleagues perform the same duties. I like the idea of patient’s taking more responsibility for their healthcare decisions. A patient should at least have the option to understand all they can about their individual health and the way our government spends their money….”

“The … population has their own tribal healthcare system…. Although they perform basic screening and diagnostic exams as well as ultrasound guided interventions for their patient population, they do not perform breast MRI, MRI biopsy, or stereotactic biopsies and localizations, so we have been providing supplemental care for these patients for these procedures.”

“Finally, almost every breast imager… (the one exception that I’m aware of is a semi-retired radiologist in our practice who does only breast imaging) is primarily a general radiologist who performs approximately 25% breast imaging. I am fellowship trained in breast imaging, but I read everything from mamms to neuro, and I do everything from breast biopsies to CT guided drain placements and laser ablation of varicose veins. So, it is a challenging but very interesting
I am a retired member of SBI, and I rarely participate in surveys, but I would be happy to help with all the nonsense that is going on.

I have noticed that the percentage of primary care providers who order/recommend annual screening mammography has fallen at least 10 to 20% since the task force recommendations. This is despite the fact that our common employer … continues to recommend annual screening starting at age 40. Our breast cancer pathway committee (oncologists, surgeons, pathologists, and radiologists) continues to follow the original guidelines that are shared with most in our field … thanks for the email that prompted me to respond to this survey. Hope this helps.

...we need to improve uptake of mammography and decrease barriers to access in rural...

Our Section Chief recommended we consider this. Note that this does not capture one thing: my OWN belief (yearly screening) varies from our integrated Breast Problems clinic recommendations (where screening is 1–2 years, as per discussion between patient and physician).

When asked about screening recommendations I do tell patients the ACS recommendation of yearly mammography after age 40 for as long as the patient is in good health. I do however tell patients that their physician may recommend a different screening interval.

A few remaining surgeons in some of our rural communities still perform excisional biopsies on palpable breast masses; although this is gradually happening less and less often.

Dying from untreated breast cancer is as horrible as chemotherapy. If I get breast cancer I want options for minimizing morbidity.

Radiologists’ responses regarding their screening mammography recommendations to patients:

“Our institution established guidelines which we are required use in written communication with patients: Routine screening mammography every 1–2 years for women aged 50–74. A baseline screening mammogram should be obtained in average risk 40–49 year old women, preferably at age 40. Recommend additional screening mammography for women age 40–49 every 1–2 years based on a discussion of the risks and benefits of mammography in this age group. Recommend screening every 1–2 years for women age 75–85 based on a discussion of the risks and benefits of screening mammography in this age group. I personally emphasize the yearly beginning at age 40 in live conversations with patients.”
Radiologists' comments regarding USPSTF 2009 guidelines:

“I believe that the yield for screening increases by age and it is somewhat arbitrary to pick an age to start such as 40 or 50. Society needs to make a cost decision but there is no right or wrong age to start. Also, it’s readily apparent that every 2 year screening will definitely delay diagnosis by a year in many patients so that has to affect response to treatment.”

“Give patients data on both recommendations.”

“Made my recommendation for annual exams at age 40 and beyond more firm to others as a counter to what USPSTF wanted to recommend.”

“It made me push harder for annual screening and to vigorously oppose these USPSTF recommendations to other MDs and to patients.”

“It didn’t affect my practice because the recommendations weren’t logical or concordant with my experiences treating patients. Many women I have seen have found their own breast cancers by self exam and many patients with cancer were under the age of 50.”

“… I’ve seen too many subtle false negatives which are quite obvious the following year. I would hate to wait 2 years for that cancer to be discovered. The start age of 50 is just ridiculous. I’ve seen too many cancers in the 40 to 50 age group.”

“Feel they are untrustworthy. They are using guideline to prevent services. Worry about the years that I become one of those who need a service or procedure. Will it be available?”

“The recommendations are extremely faulty and biased. There are real issues of over diagnosis and treatment that can be addressed much better by breast imaging community. However, USPSTF should be completely reevaluated with regard to premise that it is best to have panel of non experts evaluate complex study data and make recommendations. This is where the problem lies and not just for breast imaging.”

“It is more of a discussion with patients when they ask. I tell them that ACR and american cancer society recommendations are different than the task force.”

“I explain that there are varying recommendations and why I support 40 and over, every year but I explain the alternative approach as well.”

“I go along with the SBI viewpoint on screening. If we could better stratify patients, there may be some value in adopting a tiered screening program, but we don’t have to tools to make that prospective decision now. The life impact of a premenopausal cancer, biological and societal, is
Breast Imagers’ Expert Opinions Research via SBI: Tribute to all Breast Radiologists, continued from previous page

much greater than the post-menopausal cancers (in my opinion). Anecdotally, I see enough cancer in young women without accelerated risk to believe in the value of the screening paradigm.”

“I am all too aware of the individuals in their 40s who develop Breast cancer as interval disease from one year to another. I see too much cancer in women under 50 to support the recommendations ... which I understand are population based.”

“Those recommendations were based on cost analysis, not on saving lives. I choose to save lives. In addition, if I had chosen to follow the USPSTF recommendations, I probably would not have been diagnosed until late in my cancer. Finally, as a radiologist, I chose to follow the ACR recommendations.”

“It dramatically increased the amount of explaining I have to do when people ask me about this. Also, I participated in a consensus panel for our hospital/health plan system triggered by the 2009 recommendations, resulting in a change of the official system recommendation from yearly to a complicated wishy-washy ‘consult your doctor/ every year or two’ recommendation. We had to fight to keep yearly screening for the 40s.”

“Had to negotiate with Hospital and referring docs to keep yearly screening for 40-year-olds. They wanted to cut it out altogether.”

Upcoming Events & Activities

<table>
<thead>
<tr>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 29 - December 4 – Chicago, IL</td>
<td>Radiological Society of North America (RSNA), McCormick Place</td>
</tr>
<tr>
<td>January 16-17, 2016 – Orlando, FL</td>
<td>Case-Based Review &amp; Advanced Breast Imaging Course: Digital Breast Tomosynthesis</td>
</tr>
<tr>
<td>April 7-10, 2016 – Austin, TX</td>
<td>SBI/ACR Breast Imaging Symposium</td>
</tr>
</tbody>
</table>

For a listing of other society events please check out the SBI Calendar of Events at [www.sbi-online.org](http://www.sbi-online.org)