John Scheel, MD, PhD, along with local physicians and government representatives, signs the new national commitment to use the BI-RADS Atlas for reporting at the Uganda Society for Advancement of Radiology and Imaging conference on November 5, 2016.
I write this in December, a few weeks after our presidential election. You will receive it around the inauguration on the eve of the new president’s first 100 days. It is impossible to predict, from my December chair, what will happen. Uncertainty alone can minimally perturb or markedly shake the foundations of our psyches and those of our patients. How do we prepare them and ourselves? Dr Nicole Saphier contributes an article to this edition of the newsletter that sheds some light on how we and our patients may be affected by a new administration. Our national political sea change reminds me that the only constant is change.

New developments, through our drive to improve patient care, maintain the excitement and dynamism of breast imaging. This newsletter features summaries of the most exciting research and development in our field from the recent Radiological Society of North America meeting. The future is bright! However, many individuals and groups currently challenge our recommendations and attempt to restrict access. We can be glad for these opportunities to clarify our message and confirm the data that support our patient advocacy. Perhaps I harbor an inner Pollyanna. The alternative is to let opposition discourage us and chip away at our mission.

Fortunately, the strength of the SBI reassures me. There are many leaders shaping our future society, just as there are many leaders shaping our nation. We are not beholden to a single individual. Our diverse and abundant leaders display a steadfast, daily, evidence-based resolve to preserve access and superb care for all patients. This edition of the newsletter includes introductions to the critical staff members behind the scenes of the SBI. They are a silent and reliable force without whom many of our achievements would not be possible.

We do not have to be elected leaders to have an impact. Tremendous individual efforts abound. Some are presented in this edition of the newsletter. Consider Dr John Scheel and his success with promoting BI-RADS in Uganda. There are opportunities to learn from some of our great predecessors, like Dr David Dershaw, who shares what he has learned during his illustrious career. We also honor the all-too-brief career of Dr Pavel Crystal, who leaves behind a legacy of inspired trainees. These examples energize me, especially in this climate of uncertainty.

Now, as always, in the face of uncertainty, every individual can make a difference in this society and this nation. We can contribute on a grand scale with the American College of Radiology Imaging Network or the National Mammography Database, as described by Dr Cindy Lee in this issue. And we can provide stability and reassurance by educating and empowering a patient or provider with a single conversation about breast imaging. There is great value in these and many other paths. We simply need to choose a direction and maintain our resolve. I wish you all luck in 2017 with whatever endeavor you pursue.
# Table of Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>By</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>President's Column: Being Thankful and Giving</td>
<td>Elizabeth A. Morris, MD, FACR, FSBI</td>
</tr>
<tr>
<td>4</td>
<td>Meet the Staff of the SBI!</td>
<td>Yasmeen J. Fields, CAE</td>
</tr>
<tr>
<td>6</td>
<td>SBI/ACR Breast Imaging Symposium 2017 Preview</td>
<td>Wendy B. DeMartini, MD, FSBI</td>
</tr>
<tr>
<td>8</td>
<td>Uganda Endorses BI-RADS</td>
<td>John R. Scheel, MD, PhD; Zeridah Muyinda, MBChB, MMed Radiology</td>
</tr>
<tr>
<td>9</td>
<td>Big Data in Breast Imaging: What Can We Learn From the National Mammography Database?</td>
<td>Cindy S. Lee, MD</td>
</tr>
<tr>
<td>13</td>
<td>SBI Committee Updates</td>
<td>Shadi A. Shakeri, MD; Yasmeen J. Fields, CAE</td>
</tr>
<tr>
<td>15</td>
<td>Updates from the Meetings of the National Mammography Quality Assurance Advisory Committee and National Accreditation Program for Breast Centers</td>
<td>Robert D. Rosenberg, MD, FACR, FSBI; Gary Whitman, MD, FACR, FSBI</td>
</tr>
<tr>
<td>17</td>
<td>Breast Imaging in the Changing Political Landscape</td>
<td>Nicole B. Saphier, MD</td>
</tr>
<tr>
<td>19</td>
<td>The SBI Goes To India</td>
<td>Jennifer Harvey, MD, FACR, FSBI; Michael Linver, MD, FACR, FSBI</td>
</tr>
<tr>
<td>20</td>
<td>In Memoriam: Pavel Crystal, MD, FSBI</td>
<td>Supriya Kulkarni, DMRD, DNB, ABR</td>
</tr>
<tr>
<td>21</td>
<td>What I've Learned: David Dershaw, MD, FACR, FSBI</td>
<td>Annie Ko, MD, SBI Resident and Fellow Section Representative</td>
</tr>
<tr>
<td>24</td>
<td>Common Problems with the Mediolateral Oblique: How to Help Your Technologist</td>
<td>Louise C. Miller, RTRM, FSBI</td>
</tr>
<tr>
<td>27</td>
<td>Interesting Case: Role of Magnetic Resonance Imaging in Tomographic Architectural Distortions Without an Ultrasound Correlate</td>
<td>Rubal Penna, DO; Grady Hartzog, MD; Steven Adler, MD</td>
</tr>
<tr>
<td>34</td>
<td>Highlights from RSNA 2016: Breast Imaging Physics</td>
<td>Robert Nishikawa, PhD, FAAPM, FSBI, FAIMBE</td>
</tr>
<tr>
<td>36</td>
<td>Highlights from RSNA 2016: Breast Ultrasound</td>
<td>Vilert A. Loving, MD, MMM</td>
</tr>
<tr>
<td>38</td>
<td>Highlights from RSNA 2016: Breast MRI</td>
<td>Ashmitha Srinivasan, MD, MBA; Jessica Leung, MD, FACR, FSBI</td>
</tr>
<tr>
<td>40</td>
<td>Highlights from RSNA 2016: Digital Breast Tomosynthesis</td>
<td>Liane Philpotts, MD, FACR, FSBI; Madhavi Raghu, MD</td>
</tr>
<tr>
<td>43</td>
<td>Highlights from RSNA 2016: Molecular Imaging of the Breast</td>
<td>Gaiane M. Rauch, MD, PhD; Jessica Leung, MD, FACR, FSBI</td>
</tr>
<tr>
<td>45</td>
<td>Highlights from RSNA 2016: Breast Cancer Screening</td>
<td>Rajni Natesan, MD, MBA; Jessica Leung, MD, FACR, FSBI</td>
</tr>
<tr>
<td>47</td>
<td>Highlights from RSNA 2016: Breast Interventions</td>
<td>Deanna L. Lane, MD; Jessica Leung, MD, FACR, FSBI</td>
</tr>
<tr>
<td>49</td>
<td>Lessons from a Clinic Fire—Part 2</td>
<td>Danna Grear, MD</td>
</tr>
<tr>
<td>51</td>
<td>New Fellows Inducted Into the SBI at the 2016 Radiological Society of North America Meeting</td>
<td>Supriya Kulkarni, DMRD, DNB, ABR</td>
</tr>
<tr>
<td>52</td>
<td>Upcoming Events</td>
<td>Liane Philpotts, MD, FACR, FSBI</td>
</tr>
</tbody>
</table>

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President’s Column:
Being Thankful and Giving

By Elizabeth A. Morris, MD, FACR, FSBI

We make a living by what we get, but we make a life by what we give. Life is not measured by the number of breaths we take but by the moments that take our breath away.

As I sit down in November to write this column after Thanksgiving but before the whirlwind of the holidays I am reminded why this time of year is precious. We see friends and families, wrap presents, and give thanks for good things—health, relationships, and prosperity. It’s no wonder that Thanksgiving is the favorite holiday of many people. It turns out that being thankful is good for one’s health. Gratitude brings new friends, improves your heart as well as your immune system, and even makes you more optimistic! Being thankful should be mandatory for everyone—like brushing your teeth daily or getting your yearly mammogram.

Moving into December, we witness the wonder of the season. The excitement of our children and grandchildren makes us dig deep and remember that sense of awe and wonder surrounding the holidays. This time of year can make one a believer in miracles. Anything seems possible. Someone once said, “There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.” I choose to believe that members of the SBI live their lives through the daily miracles that we are honored to be a part of—a conversation with a patient, holding a hand through a biopsy, a kind word, or a smile. I believe that we are a self-selected group of people who choose to believe in miracles and want to make a difference in the world, one patient at a time. I also believe that we value connectedness. We are a part of something bigger that I think can be translated into the mission of the SBI: “Our passion is to save lives through early detection.” This is the ethos we all share and it binds us together.

There is a joke these days that in Silicon Valley all new start-ups have “make the world a better place” as a tagline to their mission statements. It is a testament to how employees and even companies want a valuable and meaningful work experience. As members of the SBI we are grateful that this occurs almost daily in our work. There is no need to add this slogan. We are very lucky to have this level of meaning in our work. To pursue what we personally find meaningful is the greatest gift—practically a miracle.

As I wind down my tenure as president, I feel gratitude and hope when I look at the members of the SBI. We really have only just begun. We have set in motion many exciting programs that will make us grow considerably over the next few years. The future of the society depends on all of us. It is time for many of us to consider giving thanks and to invest in our future through the SBI Research and...
Education Fund to ensure the future vitality of the society. I would like to inspire all of us to consider donating. As Mother Teresa once said, “Love begins at home, and it is not how much we do, but how much love we put in the action that we do.” We love our specialty and want others to love it as well. The fund was initially developed to foster resident and fellow participation by providing travel stipends to several scientific oral abstract presenters to attend the annual SBI/ACR Symposium. However, if you make a gift I believe that we can do more. If response is good we can have a self-sustaining fund that allows us to invest in our breast imaging educators and researchers through seed grants. A goal would be to inspire the next generation of breast imagers through groundbreaking research and education. I strongly believe that we are the society to do this.

Our specialty has grown enormously. Long gone are the days of being labeled as mammographers. In order to protect and guide our specialty into the future, careful support of our future generation to explore and contribute to the understanding of breast cancer and the complex interplay between screening, diagnosis, and treatment is needed. I predict that soon many of us will be changing our specialty designation as we expand our services to include intervention and risk assessment. I have a huge sense of wonder when I imagine the future of our specialty. By supporting the SBI Research and Education Fund we will be promoting innovation and providing a miracle for necessary and worthy research. Our future colleagues, and most importantly our patients, will be forever grateful.

I have been enormously proud to represent the SBI. As this is my second to last column, I would love to thank each and every one of you for allowing me this wonderful opportunity. It has humbled me to see the talent and passion all of you have. Let’s make 2017 the year of the SBI and consider donating to our future. No amount is too small, just as no act of thankfulness and gratitude is too small. It takes each of us to make a difference for all of us. Happy New Year!

REFERENCE

Elizabeth A. Morris, MD, FACR, FSBI
President, Society of Breast Imaging
Meet the Staff of the SBI!

By Yasmeen J. Fields, CAE

The SBI has 2996 members! That includes 661 members in training and 125 international members. Our board and committees spend a great deal of time and effort to make the SBI the primary source of information and leadership in our field. In turn, they depend on our tremendous staff. Without their contributions to our smooth operations, we couldn’t be what we are today. Please take a minute to get to know our staff and if you reach them on the phone or see them at a meeting, say thanks!

Yasmeen Fields

Yasmeen J. Fields, CAE, is the executive director of the SBI. Her main role is to serve the Board of Directors by carrying out important initiatives that support the growth and well-being of the society. Along with the daily operations of running a small nonprofit membership organization, Yasmeen directly oversees several committees, including the Patient Care & Delivery Task Force, Breast Imaging Quality & Value Task Force, and the International Education Outreach, Scientific Advisory, SBI Fund, Bylaws, Awards, Nominating, and Fellows committees. In her free time she is a graduate student at Marymount University, a soccer and parent-teacher organization mom to Juliana (8) and Tommy (5), and mom to a spoiled shih tzu, Rosie.
Meet the Staff of SBI, continued from previous page

Andrea Craddock

Andrea manages all the SBI education programs and continuing medical education (CME) compliance. She comes to the SBI from the ACR Education Department, where she supported numerous live education courses. Andrea supports the Education, Symposium, SAM and CME, SBI Exam, and Online Education committees. Andrea looks forward to growing the SBI annual meeting and enhancing the attendees’ experience with new learning formats and technologies, as well as continuing to expand the e-learning portfolio of the Society.

Kesha Willis

Kesha came to the SBI as the marketing and communications manager. In that role she managed all of the SBI communications platforms. She also provided support to the Membership, Communications, Newsletter, Social Media, and Member-In-Training committees and subcommittees.

Recently she transitioned into her new role as the public relations and communications director, where she provides oversight and strategic guidance for SBI communications operations and initiatives, public engagement, and media relations. Kesha will continue to support the Membership, Communications, and MIT committees and subcommittees.

Holly Gainer

Holly came to the SBI as the project coordinator, where she oversaw the redesign and management of the SBI website and assisted Yasmeen, Kesha, and Andrea with their projects. She transitioned into the digital media and marketing specialist role, where she manages the SBI social media accounts and the SBI website and writes and designs the weekly emails to members. Holly also manages the Breast Imaging Fellowship Match and provides support to the Breast Imaging Fellowship Committee and the Newsletter Committee. Holly graduated from Washington and Lee University in 2011 and currently lives in Washington, DC, with her husband and rescue pup.
We hope to see you soon at our upcoming 2017 SBI/ACR Breast Imaging Symposium, taking place April 6-9 in sunny Los Angeles, California! Our 2016 course was a great success, with nearly 1000 attendees. The 2017 Symposium program has been updated and enhanced with new topics and speakers to further improve the educational experience.

Over the 4-day Symposium, leading experts in breast imaging and breast cancer diagnosis and treatment will provide the latest information on a wide variety of highly important topics. As in prior courses, the 2017 Symposium will provide general-session plenary lectures each morning and focused refresher course workshops and scientific sessions in the afternoons.

On day 1, the general session will focus on Tools and Techniques in Breast Imaging. Day 2 will emphasize Diagnosis and Treatment, day 3 will highlight Practice in the United States and Worldwide, and we will finish on day 4 with Enhanced Skills and Knowledge. Our international speaker from the European Society of Breast Imaging will be Dr Julia Camps Herrero from Hospital de la Ribera, Alzira, Spain, to discuss the state of breast magnetic resonance imaging practice in Europe.

In addition to skilled breast imaging speakers, the 2017 Symposium will include expert lecturers in breast cancer medical oncology, surgery, and pathology. These multidisciplinary talks include the keynote lecture, “Current Concepts in Systemic Therapy for Breast Cancer,” by Dr George Sledge Jr, from Stanford University School of Medicine; “Oncoplastic and Advanced Breast Cancer Surgery Techniques,” by Dr Benjamin Anderson, from the University of Washington School of Medicine; and "Breast Cancer Pathology: Markers and Gene Profiles," by Dr Thomas Lawton, from the University of North Carolina Medical School.

Other highlights of the 2017 Symposium will include our scientific program of original research and education presentations. Oral abstracts will be given in the plenary and the dedicated scientific sessions, and e-posters will be available for review at convenient lobby kiosks. The 2017 Symposium will again offer sessions specifically designed for members in training as well as technologists.

As a new addition, since we know you can’t attend all the concurrent refresher course workshops, we are offering access to recordings of all of these talks. Attendees who choose this option when registering will receive automatic access in the conference app when the recordings are made available approximately 6 to 8 weeks after the symposium.
Also new for 2017 is an optional (additional registration fee) preconference hands-on workshop on digital breast tomosynthesis (DBT). The course will be taught by expert faculty and will provide 8 hours of initial training in DBT, including the unique features of the Hologic, GE, and Siemens DBT systems, as required by the Food and Drug Administration. We look forward to seeing you in Los Angeles!

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SBI/ACR Breast Imaging Symposium
2017

APRIL 6-9, 2017 • Los Angeles, CA
Uganda Endorses BI-RADS

By John R. Scheel, MD, PhD; Zeridah Muyinda, MBChB, MMed Radiology

On November 4-5, 2016, Ugandan radiologists and radiographers confirmed a national commitment to the BI-RADS Atlas for all reporting of breast imaging. The announcement coincided with the annual Uganda Society for Advancement of Radiology and Imaging (USOFARI) conference. Signatories on the landmark agreement included Dr Harriet Kisembo, president of USOFARI; Dr Zeridah Muyinda, president of the Association of Uganda Radiologists; Dr Joyce Kaducu Moriku, health minister; and Dr John R. Scheel, from the University of Washington and the keynote speaker of the conference (Figure 1).

Uganda is a low-income country in sub-Saharan Africa where most women with breast cancer present with late-stage incurable disease. Dr Scheel and Dr Kristen DeStigter, from Imaging the World, have worked to improve breast cancer detection and diagnostic services. Their long-term goal is to shift the presentation of breast cancer to lower stages, thus improving survival. Dr Scheel will continue working with the Ugandan radiologists to evaluate the success and impact of implementing BI-RADS.

Figure 1. Signatories of the commitment to use BI-RADS as the guiding reference for breast imaging reporting in Uganda. From left to right: Ms Harriet Lwere, member of the local organizing committee; Dr Betty Akello, member of the local organizing committee; Michael G Kawooya, MBChB, MMed (Rad), PhD, Director of Ernest Cook Ultrasound Research and Education Institute, Mengo Hospital; Dr Joyce Kaducu Moriku, Hon. Minister of State for Primary Health Care, Woman Member of Parliament, Moyo District; Dr Harriet Kisembo, President of USOFARI; Dr John R. Scheel, University of Washington; Dr Birabwa Male Doreen, Deputy Executive Director of Mulago Hospital; Dr Elsie Kiguli-Malwadde, Director, African Centre for Global Health and Social Transformation, Coordinating Center, Medical Education Partnership Initiative; Dr Rosemary Byanyima (obscured in the image), Senior Consultant Radiologist Director of the Directorate of Diagnostics, Mulago Hospital; Mr Collins Owami, representative of Imaging The World Africa.
Big Data in Breast Imaging: What Can We Learn From the National Mammography Database?

By Cindy S. Lee, MD

Why do we need the National Mammography Database?

Breast imaging has long been considered the model subspecialty for big data analytics because of our early adoption of the Breast Imaging Reporting and Data System (BI-RADS), which provides a common, structured language for data analysis. Containing over 11 million mammograms from 219 facilities in 39 of the United States, the National Mammography Database (NMD) certainly fits the criteria for big data. The NMD is designed to empower breast imaging practices of all types to improve practice quality and ensure better patient care by providing periodic individualized performance feedback. An example of an NMD report can be found at https://www.acr.org/~/media/ACR/Documents/PDF/QualitySafety/NRDR/NMD/NMDSampleFacilityReport.pdf (Figure 1).

Figure 1. Sample NMD facility report comparing the performance of an individual facility to national benchmarks and its peers of similar census region, practice type, practice setting, and annual examination volume.
Big Data in Breast Imaging: What Can We Learn From the National Mammography Database?, continued from previous page

What data does the NMD collect?

Each enrolled facility uploads data to the NMD online. In fact, some of these are the same data we collect for the audit required by the Mammography Quality Standards Act. The NMD collects 4 types of self-reported data: (1) data on facility characteristics, including practice type, practice setting, annual examination volume, and census regions (Figure 2); (2) patient demographic information, like age, ethnicity, and history of breast cancer; (3) data about image interpretation, including examination date, indication, breast density, BI-RADS assessment category, and management recommendation; and (4) outcome data on biopsy date, result, tumor stage/size, and nodal status. In return, each member facility receives a unique feedback report with standardized BI-RADS audit measures: recall rate, cancer detection rate, and various positive predictive values. All data elements in the NMD can be found online at https://www.acr.org/~/media/ACR/Documents/PDF/QualitySafety/NRDR/NMD/DataElementsNMD.pdf.

Figure 2. Overall NMD facility characteristics as of June 2016, sorted by facility type, facility location, census region, and annual mammography volume.
**What did we learn?**

The initial paper on the NMD confirmed the feasibility of data collection and the ability to provide up-to-date, ongoing audit measurements for screening mammography performance.¹ This study also showed no significant difference in performance measures by practice type, setting, census region, or annual examination volume. This means that breast imaging facilities of all types can improve. When looking at temporal trends in performance from 2008 through 2012, Lee et al found a slight but statistically significant decrease in recall rate.¹ One possible explanation may be related to how the periodic feedback from the NMD affects practice performance.

**What is the latest news?**

Presented at the 2016 Radiological Society of North America meeting and covered by CNN, the latest NMD research study focused on the upper age limit for screening mammography.²³ In the last decade, different interpretations of the evidence on outcomes have resulted in ongoing debates regarding the balance of benefits and risk of screening and multiple different screening attendance guidelines. These discussions include the appropriate time to stop screening, as women older than 74 years were not included in randomized trials. The data on this population are limited to small observational studies. To address this knowledge gap, the NMD research team looked at the relationship between patient age and screening mammography performance metrics. After analyzing millions of screening mammograms, the team found a significant downward trend for recall rate and upward trends for cancer detection rate and positive predictive values associated with increasing age. In other words, these large-scale outcomes argue against a fixed age cutoff to stop screening. Instead, this study adds support for guidelines that encourage screening decisions based on individual patient values, comorbidities, and health status. Capturing the attention of the public and radiology and oncology communities, this latest study showed how the entire breast imaging community could benefit from the NMD.³¹

**How do I get involved in NMD research?**

If you would like to get involved, you need to submit a data request form, and more details can be found online at https://www.acr.org/FAQs/NRDR-FAQ#access and contacting nrdr@acr.org. A complete proposal should include project title, background, research question, methodology, and plans for publication or presentation. Funding support is required if your facility is not part of the NMD. Chaired by Margarita Zuley, MD, FACR, FSBI, the NMD committee reviews all research project proposals to ensure project feasibility and strict protection of confidential health information. For a balanced representation of different perspectives, the NMD committee is composed of US breast imagers from both academic and community practices.
**Big Data in Breast Imaging: What Can We Learn From the National Mammography Database?, continued from previous page**

**Future directions**

As we transition from the fourth edition of BI-RADS to the fifth, the NMD is also upgrading its software to accommodate these new changes. The new NMD 3.0 allows for separate data entry for 2-dimensional mammography and digital breast tomosynthesis and also accepts data on breast ultrasound and magnetic resonance imaging, allowing us to generate audit measures for all modalities. However, only 3 breast reporting software vendors are currently approved for NMD 3.0 (MRS, MagView, and Epic). Please encourage your vendors to complete these essential upgrades as soon as possible so you can maximize the benefits!

**REFERENCES**


The year 2016 was very busy for the SBI committees. A breast imaging fellowship match was successfully launched and new task forces were formed. Many of the committees met at the Radiological Society of North America Annual Meeting in Chicago in November to crystallize their agendas. This rendezvous also provided a great opportunity for committee members to visit with old friends and meet new ones in person. The new ideas and creativity sparked in these gatherings will undoubtedly keep the dedicated SBI staff busy well into the new year. To keep you updated with the progress of our society’s committees, here are the latest developments:

The Scientific Advisory Committee, chaired by Jennifer A. Harvey, MD, FACR, FSBI, has written the following 3 white papers, which may be accessed at http://www.sbi-online.org/RESOURCES/WhitePapers.aspx:

- Breast Cancer Staging. Physiology Trumps Anatomy, October 2016
- Breast Density and Supplemental Screening, September 2016
- Digital Breast Tomosynthesis for Screening and Diagnostic Imaging, September 2016

These are overviews of current hot topics written by society members who are experts in these areas. All papers have undergone review by the SBI Scientific Advisory Committee and been approved by the SBI Board of Directors. Please note that unless otherwise stated, the content of the white papers reflects the perspective of the authors and not necessarily the position of the SBI. Other white papers are in development and in various stages of review. We hope that you will find these to be helpful resources.

The Education Committee, chaired by Wendy B. DeMartini, MD, FSBI, has plans for the development of educational products to be delivered in 2017. Currently, the SBI offers FREE webinars for all members, and up to 9 are planned to be unveiled in 2017. Previously recorded webinars can be accessed at https://www.sbi-online.org/EDUCATION/ELearning/9916Webinar.aspx.

The Communications Committee, chaired by Margarita L. Zuley, MD, FACR, FSBI, has met and discussed goals for 2017, including active member engagement on various communication platforms such as the SBI website, forum, and social media outlets. Activity on the SBI website and social media (Facebook, Twitter, and now Instagram!) is on the rise as more people follow the SBI. Be sure to like SBI on Facebook and follow us using the handles @BreastImaging on Twitter and @EarlyDetectionSavesLives on Instagram. Use any of these social media to connect with SBI!
The International Education Outreach Committee, chaired by Murray Rebner, MD, FACR, FSBI, is currently working on future collaborations with Nepal, Egypt, and Indonesia. The most recent outreach visit to India was an incredible success and there was a strong interest expressed in training here in the United States. If your institution offers an international observership, please send an email to info@sbi-online.org.

The Patient Care and Delivery Task Force, chaired by Stamatia Destounis, MD, FACR, FSBI, is developing a comprehensive survey to establish the variety of practices focused on the area of patient-centered care and communication. The survey will soon be distributed to members. Please be on the lookout and assist us with this important work by taking a moment to complete the survey.

The Quality and Value Task Force, chaired by Wendy DeMartini, MD, FSBI, has met for the first time and has defined goals and deliverables at this initial meeting.

The Board of Directors has discussed and updated the 2017 operating budget, plans for new projects, year-end financials, and the overall strategic plan for the SBI.

The first Breast Imaging Fellowship Match will begin in March 2017 for the 2018 appointment year. The Match is sponsored by the SBI and managed by the National Resident Matching Program. The Breast Imaging Fellowship Match Committee, chaired by Gary Whitman, MD, FACR, FSBI, has continued to work diligently to keep program directors and coordinators informed. To direct applicants and find more information regarding the Match, go to https://www.sbi-online.org/RESOURCES/MatchInformationforApplicants.aspx.

Please note and remind your trainees that they must contact each individual institution for their application. There is no standard application. Additionally, they must contact the program they are interested in to find out when they are interviewing. A few reminders regarding the Match schedule:

- March 22 – Registration Opens
- April 26 – Ranking Opens
- May 17 – Quota Change Deadline
- May 31 – Ranking Closes
- June 14 – Match Day

With new members, new committees, and new projects, 2017 promises to be an even busier and more productive year for the SBI committees as we forge ahead in the pursuit of excellence in all aspects of breast imaging.
In September, the US Food and Drug Administration (FDA) convened a National Mammography Quality Assurance Advisory Committee meeting to discuss changes to the Mammography Quality Standards Act (MQSA) program and to ask for input from a panel of radiologists, physicists, consumers, and industry representatives. The radiologists and physicists on the panel included Eric Berns, PhD; Lora Burke, DO; William Geiser, MS; Carol Lee-French, MD, FACR, FSBI; Mary Newell, MD, FACR, FSBI; Robert D. Rosenberg, MD, FACR, FSBI; and Jessica Torrente, MD. At the meeting, it was announced that the new digital mammography quality assurance (QA) manual, produced by the ACR and Enhancing Quality Using the Inspection Program (EQUIP), was accepted. The new digital QA manual creates one process applicable for all digital mammography units and standard digital mammographic images. The QA manual does not apply to digital breast tomosynthesis (DBT). The manual creates a new QA process that is consistent for all machines. However, adopting this new process requires the purchase of a new digital mammography phantom.

Helen Barr, MD, of the FDA, discussed lessons learned from the first 25 years of MQSA, including EQUIP. The FDA views the MQSA program as successful in improving dose and technical quality, but quality secondary to positioning was not a focus for MQSA. However, since most MQSA failures are due to positioning, a greater emphasis has been placed on appropriate positioning. A new process aims to improve image quality and positioning by formalizing communication between the technologists and radiologists, especially the lead mammographer and the lead radiologist. The process will be implemented in stages. It will be informational in the first year, then required in subsequent years. In addition, the annual FDA inspection will be streamlined. There will be no level 3 (minor) violations. A frequent violation, lack of credentials, and/or inadequate continuing medical education documentation will not be a violation if the requested material is supplied within 5 days. If the documentation is not supplied within 5 days, a level 2 violation will be assessed.

The FDA received input from the panel that the inspection process was often traumatic for the lead technologist. Now, at the start of an inspection, the lead technologists will be given the number for the FDA hotline (1-800-838-7715) to report any problems with inspection or the inspector.
The lack of compatibility of DBT images on various picture archiving and communications systems was also discussed at the meeting.

The last issue the committee tackled was the status of breast density legislation and the impact of breast density laws on clinical practice. The FDA staff indicated that there were plans to create a breast density notification requirement. However, there were no specifics provided for the wording or timing.

The board of the National Accreditation Program for Breast Centers (NAPBC) met in Washington, DC, on October 17, 2016. Carl D’Orsi, MD, FACR, FSBI; Dana Smetherman, MD, MPH, FACR; and Robert D. Rosenberg, MD, FACR, FSBI, attended the meeting. The NAPBC is a multidisciplinary organization that has accredited over 600 facilities. Updates to the accreditation process and data gathering were discussed.

Breast cancer screening guidelines were discussed. The prior NAPBC guidelines required that the accredited facilities had a screening mammography recommendation. After discussion, the NAPBC board indicated that either the American Cancer Society or the ACR guidelines were acceptable, reiterating that annual screening mammography should be available to start at age 40 years.

At the NAPBC board meeting, the committee discussed the possibility of adding mammography outcomes to routine facility quality measures. The potential metrics for possible inclusion were the recall rate, the positive predictive value (PPV), PPV$_2$, and PPV$_3$. No definitive decision was finalized.

Other important issues discussed at the NAPBC meeting included expanding the NAPBC accreditation process to international sites, a request for new surveyors, and research proposals using the collected data. The committee considered studying Oncotype DX to determine if the test is ordered appropriately and if the results are used appropriately to direct treatment.
Breast Imaging in the Changing Political Landscape

By Nicole B. Saphier, MD

As the inauguration of President-elect Trump approaches, with the Republicans maintaining the House and Senate, Representative Tom Price as secretary of the Department of Health and Human Services, and Seema Verma as head of the Centers for Medicare and Medicaid Services (CMS), there will undoubtedly be some momentous changes in health care ahead. The threat or promise (however you choose to see it) to repeal and replace the Affordable Care Act (ACA), also known as Obamacare, has many people wondering what is next for radiology and patient care.

A new administration means an opportunity to address the existing issues that consistently arise regarding our current health care system. The health care debate has been too focused on high premiums and technical problems rather than on the needs of patients. President-elect Trump has already shown he is serious about addressing the ACA by appointing Tom Price as his health secretary, a former orthopedic surgeon turned politician who is blatantly opposed to the current version of the ACA. The truth is that we are talking about repair and replace rather than full repeal. Regardless of the verbiage used, Obamacare will change once this administration takes office; to what extent remains unknown.

The Republican majority within the House and Senate may result in fewer federal-level mandates regarding insurance coverage and ultimately the states may need to take more responsibility. If the ACA is completely dissolved there may once again be a large number of uninsured patients. Since the implementation of the ACA, breast cancer screening has mildly increased but the data are scarce given the short time period. Therefore, if the ACA is repealed completely and these patients are no longer covered, we may see fewer non-Medicare screening patients and more cases of advanced disease on presentation.

President-elect Trump and other Republican leaders have reaffirmed their commitment to making sure patients with preexisting conditions are not without available and affordable coverage. Promoting competition amongst the insurance carriers without the restrictions of the ACA should drive the premiums and deductibles back down. This may lead to an increase in cancer screening and image utilization.

The responsibility will then be placed on state services, federal grants, and tax-exempt health savings accounts in an effort to cover those who cannot afford screening and follow-up imaging. Additionally, with the unfolding of the Medicare Access and CHIP Reauthorization Act (MACRA) and the Merit-based Incentive Payment System (MIPS) upon us, we need to be prepared for the transition to a value-based payment system. Even with Seema Verma as the new head of CMS, the rollout of MACRA and MIPS is in process and, although likely to be delayed, is unlikely to be halted.
Breast Imaging in the Changing Political Landscape, continued from previous page

It is imperative for us as an imaging service to ensure we are practicing cost-effective medicine while keeping the economic status of the patient in mind, as we did when we recited the Hippocratic Oath: “I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person’s family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick.”¹

It is time for radiologists to step outside of our microcosm and be aware of what goes on around us. From federal mandates to individual screening regimens, we all have the patient’s best interests at heart. We need to be aware of what goes on to ensure patients have the access they need. Please read the Society of Breast Imaging website legislative blog for a more in-depth policy update. ♦

REFERENCE
The SBI Goes To India

By Jennifer Harvey, MD, FACR, FSBI; Michael Linver, MD, FACR, FSBI

Drs Jennifer Harvey, Michael Linver, and Jean Seely participated in the Breast Imaging Society of India Conference (BISICON) in Chandigarh, India, November 11-13, 2016. As representatives of the SBI, they provided 16 lectures and 3 workshops. Although this was only the fourth BISICON meeting, over 300 people attended, including 25 from Bangladesh. Smt Anupriya Patel, the Indian Minister of Health, opened the meeting, stating that breast cancer has now surpassed cervical as the most common cause of cancer death for Indian women and that the efforts of the society to improve breast care are greatly appreciated. Drs Veenu Singla, Smriti Hari, and Niranjan Khandelwal, conference organizers, were fantastic hosts. This international expedition, led by Dr Harvey, marks the second by the SBI, the first being a collaborative conference in South Africa in 2016. In 2017, the SBI will be collaborating with breast imaging societies in Egypt and Nepal as the International Educational Outreach Committee continues to help elevate breast imaging quality around the globe.

Drs Michael Linver, Jennifer Harvey, and Jean Seely with attendees of the fourth Breast Imaging Society of India Conference on November 11-13, 2016, in Chandigarh, India.
In Memoriam: Pavel Crystal, MD, FSBI

By Supriya Kulkarni, DMRD, DNB, ABR

Pavel Crystal, MD, FSBI, passed away suddenly and unexpectedly on November 9, 2016, from a cardiac event.

Dr Crystal joined the Breast Imaging Division within the Joint Department of Medical Imaging (JDMI), University Health Network, Mount Sinai Hospital and Women's College Hospital (Toronto, Ontario, Canada) as a staff breast imaging radiologist in 2005. He served as the head of the Breast Imaging Division at the JDMI since January 2013. Dr Crystal was an associate professor in the Department of Medical Imaging at the University of Toronto and a fellow of the Society of Breast Imaging.

Prior to joining the department in Toronto, Dr Crystal completed training in diagnostic imaging in Israel and served as a battalion doctor in the military before working as a staff radiologist and director of breast imaging at Soroka University Medical Center in Israel.

Dr Crystal was a talented leader, clinician, researcher, teacher, and a good friend to many of us. He was loved and respected by his colleagues in breast imaging and the multidisciplinary breast groups across the hospital sites where he worked. Dr Crystal served on many provincial, national, and international initiatives and committees. Dr Crystal’s deep passion for patient care and his talented, kindhearted personality were reflected in his visionary leadership role as head of the Breast Imaging Division.

The Crystal Breast Imaging Research Award has been established recognizing Pavel’s clinical, administrative, and research achievements in support of breast imaging sciences. Donations can be made 3 ways:

1. Online:

2. By phone Monday - Friday, 9am - 5pm at (416) 946-6560, select option 1.

3. By mail:
   The Princess Margaret Cancer Foundation
   610 University Avenue
   Toronto, ON M5G 2M9
   Please make checks payable to The Princess Margaret Cancer Foundation with the Crystal Breast Imaging Research Award in the memo line.

Dr Crystal is survived by his wife and 2 young daughters, aged 11 and 4 years. His funeral was held in Israel. He will be deeply missed by all who worked and interacted with him.
What I’ve Learned:
David Dershaw, MD, FACR, FSBI

By Annie Ko, MD, SBI Resident and Fellow Section Representative

Dr David Dershaw is a world-renowned breast imager whose many achievements include founding the breast imaging service at Memorial Sloan Kettering Cancer Center in New York, where he served as director for 20 years. He was president of the SBI in 2003 and 2004, received the SBI gold medal in 2013, and has worked extensively with the ACR Breast Imaging Task Force and the Radiological Society of North America Public Information Advisors Network. Dr Dershaw has recently retired, and the following interview gives us a peek into his reflections and lessons learned over his career.

In your opinion, what is the single biggest advance in breast imaging that you have seen?

We have dramatically modified our role by taking the scalpel out of the hand of the surgeon and putting the needle in the hand of the breast imager. Compared to what breast imaging was like when I first started, we are now profoundly more important in the decision-making process and [act as] diagnostician, physician who does the biopsy, and determines how much surgery is necessary. Additionally, we frequently are the ones telling the patient she does or does not have cancer, has a high-risk lesion or needs to be followed in a certain kind of way, and refers the patient to the appropriate specialist.

What do you consider to be your single most important contribution to the field?

I think the biggest contribution I’ve made is putting together a group of breast imagers that have contributed significantly to the literature, provided outstanding clinical care, and have made it possible for the breast imaging community to make database decisions on how we should manage our patients, what equipment we should be using, and made compelling arguments for the role of breast imaging in the medical care of women. By being researchers, we’ve been able to assist breast imagers in caring for their patients. That means tens or hundreds of thousands of women have been assisted, I hope, by the work that we’ve done.
Do you have a guiding principle in life?

Collegiality, shared values, defined work roles, and respect for the people that you work with has been a guiding principle in terms of forming a large organization for breast imaging. It's important to make sure your colleagues share a common value system and a common goal to support and build on each other. It's trite to say the workplace is kind of like a family, but in fact the workplace is like a family. We carved out sections so that different people could take ownership of certain subsections of breast imaging so there was no competition on research. I think it's also important to realize your colleagues are physicians and need to be treated with a level of respect appropriate with having an MD after your name.

In terms of taking care of individual patients, we have to pay attention to the level of anxiety and trust the patients have given to us in all of our clinical interactions. Getting the answer right is important, but getting the relationship right with the patient is also extremely important.

Screening mammography will continue to be a political issue as public health advisors and politicians try to rein in our health care expenditure. What do you recommend to practicing radiologists in navigating the changing health care landscape?

Breast imagers need to study up on the facts and be able to distill information into a few key points that can be communicated very quickly. The SBI website is a wonderful source of information about mammography screening and its benefits. Breast imagers [should] understand what the controversies are about and what the data actually means. A lot of the issue about screening is about money. You can't argue whether or not mammography works in decreasing breast cancer mortality because it does. You can argue whether or not those dollars that are spent on mammography screening should be used on something else. In a population where breast cancer affects 1 in 8 women and costs of treating it are profound, then the usefulness of screening is [substantial].

What do you see as the greatest threat today to delivering quality mammography services?

Modification in screening guidelines and reimbursement that deprive women of screening mammography. If women can't afford to get a mammogram, they're not going to. We have to make sure third-party reimbursement remains available for mammography services.

What is your best piece of advice for the young radiologist like myself just starting out?

I think the most important thing in terms of making a career decision is to truly know what it is that you want and what will make you happy. Once you know that, find a situation where you're with people who share the same value system. Try to make the best out of what you have. If you can't make a decision in a practice in which you are happy and satisfied, go somewhere else where you can.

Or for the senior radiologist considering retirement?

I started planning my retirement 7 years ago and I slowly cut back on clinical, administrative, and academic responsibilities and made sure I would be happy in the next phase of my life. It's a big
What I’ve Learned: David Dershaw, MD, FACR, FSBI, continued from previous page

change but part of my happiness in retirement is knowing I had a career that is so very rewarding. I would like to thank all those people that I had the opportunity to work with for giving me such a wonderful, satisfying career.

Can you name a person who has had a tremendous impact on you as a leader?

Two people: my father, who was a family practitioner and devoted physician. He was extraordinarily smart and a very ethical man. He certainly had a great influence on me.

In terms of teachers, Barry Goldberg, the head of my fellowship program in ultrasound at Jefferson in Philadelphia, taught me, among other things, that when you’re doing research, there’s only one gold standard—you take out tissue and look at it under the microscope. You only publish stuff that is path proven and it makes a great deal of difference. In running a large research program, I made sure everything we published was verified by the pathologists. Either we took it out and it was benign or followed it long enough to establish its benignity.

You had mentioned in a prior interview about your unexpected beginnings as a breast imager after your fellowship in ultrasound and computed tomography. If you could go back at the start of your career, would you choose a different path?

Certainly not. It’s been incredibly satisfying and rewarding and I’ve had a really fascinating career. But, one of the lessons my career is decisions were made for me—one of which was that I was going to do mammography—and I took those decisions and tried to do the best that I could. It’s the old story of making lemonade if you’re given lemons. Being in breast imaging in the ’80s and ’90s was advantageous because it was so conspicuously covered in the media and breast cancer is such a common disease.

You have been a vocal champion for breast imaging throughout the years. Today, as technology becomes an increasingly powerful tool for communication and outreach, how can mammographers capitalize on that and most effectively get out our message?

I think there is a general awareness in the public about mammography. A physician recommendation has an important impact on the patient’s care and the lay population. I think the important communication that needs to be made is not necessarily to women themselves but to primary care practitioners: to the family doctor, internist, or OB [obstetrician] to send their patient for mammography.

I gathered that you have recently retired—how are you enjoying your days now?

We’re going to Mexico City for a long weekend. We’re shopping for a country house. I’m happy not doing much of anything, becoming a “bum” taking care of house, cooking, taking care of dogs, sleeping late, eating out. It’s been absolutely wonderful. I’m quite happy not doing anything. It’s not a scenario that would work with everyone but it works for me.
Common Problems with the Mediolateral Oblique: How to Help Your Technologist

Part 2 – Not Enough Pectoralis and the Sagging Breast

By Louise C. Miller, RTRM, FSBI

This is the second of a 3-part series on common positioning problems and how they can be addressed by your technologist.

How much pectoralis is enough?

The pectoralis muscle serves as an anatomical landmark important to both the technologist and radiologist for ensuring proper positioning and thereby maximizing the amount of breast tissue included in the mammogram. Each of the following factors play an important role in maximizing the amount of breast tissue and pectoralis included in the image.

Length of muscle:

Visualization of the pectoralis muscle down to the level of the posterior nipple line (PNL) should be demonstrated on the mediolateral oblique (MLO) projection.

Width of muscle:

There should be a wide margin of the pectoralis muscle in the axilla relative to the muscle width at or below the PNL on the MLO projection.

Shape/opacity of the muscle:

The muscle should appear to be convex or straight and radiolucent on the MLO projection. A concave shape of the muscle may indicate that the muscle is not relaxed, which will hinder efforts to pull breast tissue away from the chest wall and thus will not appear radiolucent.

The appearance of the pectoralis is dependent on the following factors:

1. Equipment setup
2. Patient position
3. Patient body habitus

The technologist should note any barriers to proper positioning on the history sheet. Comparison with prior images is critical as this will confirm the ability to accomplish positioning goals or any consistent limitations.

Maximizing visualization of the pectoralis muscle: problems and solutions

Problem 1: Muscle is not visualized down to the level of the PNL, resulting in possible exclusion of medial breast tissue (Figure 1).

Causes/solutions:

Equipment setup: The angle is too steep. Lower the angle by 5°.
**Common Problems with the Mediolateral Oblique: How to Help Your Technologist, continued from previous page**

**Patient position:** The patient must be facing forward, with both shoulders, hips, and feet oriented towards the machine.

**Problem 2:** The margin of muscle at the axilla is narrow, resulting in potential exclusion of posterior lateral/medial breast tissue (Figure 2).

**Causes/solutions:**

**Equipment setup:** The corner of the image receptor (IR) is placed too far forward in the axilla. Place the IR just anterior to the latissimus dorsi.

**Patient position:** The patient pulls her shoulder and thorax back when compression is applied. Maintain your hand on the patient’s shoulder to push it forward and down. The compression paddle should lie slightly anterior to the suprasternal notch.

**Problem 3:** The muscle is concave and/or radiopaque.

**Causes/solutions:**

**Equipment setup:** The IR is too high, so the shoulder and arm are not relaxed. Lower the height of the IR so the top is parallel to the level of the sternoclavicular joint or halfway between the top of the shoulder and the axillary crease.

**Patient position:** The arm, shoulder, elbow, and/or hand are tense. Make sure the shoulder, elbow, arm, and hand are relaxed. The elbow should be bent and behind the IR, with hand resting on the machine.

The pectoralis does not extend below the nipple line (left). Visualization is improved after lowering the angle (right).

Figure 2: The pectoralis is narrow in the axilla (left). It is thicker after adjustment of the image receptor (right).
**Common Problems with the Mediolateral Oblique: How to Help Your Technologist, continued from previous page**

### The sagging breast

Our goal for all mammographic imaging is to maximize visualization of breast tissue. On the MLO it is incumbent on the technologist to position the breast in its true anatomical position, with the PNL as close to perpendicular to the chest wall as possible. A technique employed by the technologist and often referred to as the “up and out” position helps us accomplish this goal. This maneuver, in combination with adequate compression, will help to separate the fibroglandular tissue and thus minimize superimposition. Proper compression also helps to decrease motion blur and reduces radiation exposure. This presents an especially challenging obstacle for the technologist when positioning patients with extremely large and heavy breasts, who often have large, fatty axillae. Even with maximum tolerable compression, the upright position of the patient and resulting effects of gravity make it virtually impossible to maintain the breast in the up and out position despite the technologist’s best efforts. If this is the case, an anterior compression view should be acquired.

**Problem 4:** The breast is not maintained in the up and out position, resulting in potential superimposition of structures in the anterior breast, increased probability of motion, and increased and unnecessary radiation exposure.

**Causes/solutions:**

**Equipment setup:** Compression should be applied only until the breast tissue is taut, and it should not be painful.

**Patient position:** The technologist must hold the breast in the up and out position until the compression is complete. Visualize the PNL as close to perpendicular to the chest wall as possible. The technologist should anchor the breast with the base of the thumb, pushing up and out in the inframammary fold and lower inner quadrant area until compression is completed. The breast may need to be hyperextended during compression or it will fall back down.

### Summary

Regardless of the experience and expertise of the technologist, the perfect image cannot be produced 100% of the time. According to a study published by Basset et al in 1993,¹ the pectoralis was within 1 cm or below the PNL on the MLO projection only 81% of the time because of variations in body habitus and patient conditions. Improvement was seen in 68% after standardized positioning training. Technology has changed and so have positioning techniques. Unfortunately, given the availability of online education and lack of updated positioning training requirements by the Mammography Quality Standards Act or our licensing organizations, most technologists do not receive updated hands-on positioning training until it is critical or mandated by the ACR as part of the accreditation process. Hopefully this series of articles will be helpful as we all work together to create a high standard of excellence in breast imaging.

### Reference

A 48-year-old woman with a past medical history significant only for migraines presents for an annual screening mammogram (Figure 1). A focal area of architectural distortion was noted in the left breast only on the craniocaudal (CC) view at middle depth in the retroareolar region, without a visible mass. This examination was assessed as a BI-RADS 0, and spot-compression views and ultrasound were recommended for the left breast.

Figure 1. The screening mammogram shows new architectural distortion on the craniocaudal (CC) view of the left breast in the retroareolar plane at middle depth (circle). There is no correlate in the mediolateral oblique (MLO) view.
Interesting Case: Role of Magnetic Resonance Imaging in Tomographic Architectural Distortions Without an Ultrasound Correlate, continued from previous page

She returned for the diagnostic examination, and 2-dimensional (2D) full mediolateral (ML) and spot-compression CC and ML views were obtained (Figure 2). The area of distortion did not persist on the CC spot view, and the ML and ML spot views were normal.

Figure 2. Left full ML and spot-compression CC and ML views were normal. The architectural distortion did not persist on the CC view and could not be localized on an ML view.
Interesting Case: Role of Magnetic Resonance Imaging in Tomographic Architectural Distortions Without an Ultrasound Correlate, continued from previous page

The radiologist remained suspicious and requested full left MLO and CC digital breast tomosynthesis (DBT) images. This examination reproduced the architectural distortion in the CC plane but not the MLO (Figure 3). The slice locations suggested the distortion was slightly cranial to the nipple.

An ultrasound was recommended and performed, but a sonographic correlate for the distortion was not found (Figure 4). The final assessment incorporating all available imaging was BI-RADS 0, and magnetic resonance imaging (MRI) was recommended for further evaluation.

Figure 3. Architectural distortion (measured) was seen only on CC DBT images of the left breast.

Figure 4. Ultrasound of left breast demonstrates no sonographic correlate at the 12- to 1-o’clock position slightly superior to the nipple.
Interesting Case: Role of Magnetic Resonance Imaging in Tomographic Architectural Distortions Without an Ultrasound Correlate, continued from previous page

The MRI was normal and did not show any correlate to the suspicious mammographic finding (Figure 5). A final assessment of BI-RADS 4 was given for the left breast with a recommendation for “attempt at stereotactic biopsy from the superior aspect of the breast in the craniocaudal position.” A stereotactic biopsy was attempted 2 days later. However, the finding was “not reliably reproducible on 2D imaging so a 2D biopsy was not performed.”

Figure 5. Bilateral breast magnetic resonance imaging is negative for a finding corresponding to the left breast architectural distortion seen on mammographic CC view.
Interesting Case: Role of Magnetic Resonance Imaging in Tomographic Architectural Distortions Without an Ultrasound Correlate, continued from previous page

At this point, options of either DBT-guided wire localization followed by excisional biopsy or DBT-guided core biopsy were discussed with the patient, who decided to proceed with the core biopsy. Since our institution does not offer DBT-guided core biopsy, assistance was provided with transfer of care to an outside institution with the available resources. The following week, she underwent a successful DBT-guided biopsy (Figure 6). The results were benign.

Figure 6. Images demonstrate a successful DBT-guided core biopsy with marker clip at the expected location of the distortion on the postprocedure CC and ML views.
Interesting Case: Role of Magnetic Resonance Imaging in Tomographic Architectural Distortions Without an Ultrasound Correlate, continued from previous page

Discussion

This case illustrates challenges of abnormalities found only on DBT. Since the advent of DBT, a larger number of suspicious noncalcified lesions are being discovered. As a result, there are more cases of lesions found on diagnostic mammograms without an ultrasound correlate.¹

An algorithm for such instances has recently been proposed in which MRI could be used to increase our diagnostic confidence.¹ Some have also suggested recommending MRI if stereotactic biopsy is not feasible and there is no ultrasound correlate, as in our case above.² In theory, MRI could be used for problem-solving, or it could be considered as helpful guidance for biopsy when no target is visible on ultrasound. The argument in favor of the problem-solving role of MRI assumes that a normal MRI could justify short-term follow-up in lieu of tissue biopsy. However, it appears that there are no large reassuring studies with 2- to 3-year follow-up of patients with mammographic distortion and a normal MRI.

On the other hand, if we are to recommend MRI to identify a potential biopsy target we still undertake the risk of a 10% chance of finding a suspicious lesion elsewhere, which may lead to additional unnecessary interventions.³ Additionally, 73% of architectural distortions are seen by DBT only (not on 2D mammography), and 27% of these lesions turn out to be malignant.³ So why assume the additional cost of an MRI when a histological diagnosis is warranted regardless? And why consider a 6-month follow-up if 27% are malignant? Given the current lack of studies with appropriate follow-up, we propose that a breast MRI should not substitute for a tissue biopsy in the case of a suspicious abnormality seen only on DBT.

Fortuitously, our patient’s DBT-guided biopsy results were benign. Tissue pathology revealed adenosis, columnar cell change, and stromal fibrosis. Focal fibroadenomatous change and focal pseudoangiomatous stromal hyperplasia–like changes were also present, and the results were deemed concordant with the imaging findings. A 6-month follow-up mammogram with DBT technique was subsequently recommended for stability assessment of the biopsy site. The histologic changes, though benign, were detected mammographically and yet were occult on ultrasound and MRI. The lack of an MRI correlate is reassuring since the sensitivity for malignancy on MRI is 95% to 100%. However, false negatives do occur. The ACR, through the Practice Parameters, has provided guidance for how to use MRI in the clinical setting.⁴ The parameters currently state, “MRI should not replace ultrasound or diagnostic mammography to evaluate clinical focal signs or symptoms in the breast or to evaluate lesions identified on screening mammography” and “MRI should not be used in lieu of biopsy of a mammographically, clinically, and/or sonographically suspicious finding.”

Similar to the early historical implementation of breast MRI, access to DBT and DBT-guided biopsy is currently sporadic. The Practice Parameters have recommended that “[f]acilities performing breast MRI should have the capacity to perform mammographic correlation, directed breast ultrasound, and


**Interesting Case: Role of Magnetic Resonance Imaging in Tomographic Architectural Distortions Without an Ultrasound Correlate, continued from previous page**

MRI-guided intervention, *or create a referral arrangement with a cooperating facility that could provide these services* [italics added]. At this time we have decided to proceed with referral of patients to neighboring facilities with the capability to perform DBT-guided biopsy of suspicious findings seen only on DBT rather than proceed with problem-solving MRI. This is similar to the recommendations that have been made by the ACR in the past with regards to facilities that perform breast MRI but do not have MR-guided biopsy services.

**REFERENCES**


At the Radiological Society of North America (RSNA) meeting this year, the buzz was about deep learning. Several keynote talks, hot-topic sessions, and refresher courses discussed the impact of deep learning on radiology. There were a number of talks on deep learning in breast imaging, but more on that later. Let’s start with the physics sessions on breast computed tomography (CT).

CT Imaging GmbH, a company started by Willi Kalender, PhD, that makes a photon-counting breast CT system, presented a series of 3 papers. One of the papers was on dosimetry for breast CT. They found that the mean glandular dose was 4.8 mGy for a breast of average size and density, which is acceptable compared with a bilateral mammogram. Using Monte Carlo simulation, they determined that the dose to all other organs is negligible. Their other 2 papers compared 2-dimensional (2D) digital mammography, digital breast tomosynthesis (DBT), and photon-counting breast CT using phantoms and surgical specimens. With the breast phantoms, they were able to accurately determine that breast CT could image a sphere of 2-mm diameter that neither 2D digital nor DBT was able to image. Further, for simulated calcifications, breast CT was again the clear winner, detecting 0.16-mm specks compared with 0.25 mm for DBT and 0.53 mm for 2D digital. They attribute the higher performance of breast CT to its higher image contrast and to the absence of normal tissue superimposition. When imaging actual breast tissue (14 lumpectomies and 16 total mastectomies, with 27 total lesions), the 94% sensitivity of breast CT was superior to 2D digital (75%) and DBT (69%). The specificity was 71% for breast CT, 71% for 2D digital, and only 29% for DBT. The mean viewing time was 77 seconds for 2D digital, 122 seconds for DBT, and 131 seconds for breast CT.

One clinical paper compared breast CT to ultrasound and 2D digital mammography in 102 patients in a diagnostic setting. The area under the receiver operating characteristic curve was 0.86 for breast CT compared with 0.86 for ultrasound and 0.83 for 2D digital mammography. They also found that the moderate (78%) sensitivity of noncontrast breast CT could be increased to a phenomenal 99% with the use of contrast. Breast CT has been around for 10 years, and it appears investigators are still looking for a good clinical role for it in a crowded space that has many developing specialized imaging modalities, such as positron emission tomography (PET)/magnetic resonance imaging (MRI).

There were a small number of presentations on breast PET/MRI. The Harvard group presented an excellent overview poster on breast PET/MRI that outlined its advantages and disadvantages compared with PET/CT. PET/MRI delivers a lower radiation dose to the patient, is able to

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Highlights from RSNA 2016: Breast Imaging Physics

By Robert Nishikawa, PhD, FAAPM, FSBI, FAIMBE

Robert M. Nishikawa, PhD, FAAPM, FSBI, FAIMBE
Highlights from RSNA 2016: Breast Imaging Physics, continued from previous page

simultaneously characterize the primary tumor and disease staging, offers better detection of metastatic lesions in the bone, brain, and liver (but poorer in the lungs), and is multiparametric. However, there are many technical considerations to overcome. Attenuation correction for the PET image and design of the MRI coil occupy the top 2 places on the list. A group from the Hong Kong Sanatorium & Hospital looked at using a breast coil to image the region around the breast instead of the whole body. Sirong Chen presented data from 20 breast cancers in 13 patients imaged with PET/CT, whole-body (WB) PET/MRI, and regional prone PET/MRI with a breast coil. They found that PET/MRI with a breast coil was comparable to PET/CT in quantitative assessment of primary breast cancer but was not suitable for evaluating the axillary nodes. Results were opposite for WB PET/MRI. Further, compared with PET/CT, maximum standardized uptake value was equivalent for PET/MRI with a breast coil but 20% lower for WB PET/MRI. Last, a group led by Johannes Grueneisen, from Essen University Hospital, Germany, found that in restaging 32 breast cancer patients, compared with MRI alone, PET/MRI increased sensitivity and specificity from 81% and 85%, respectively, to 93% for both. From my perspective, PET/MRI will probably have greater utility in future applications, such as assessing response to therapy or assessing personalized treatment options for a patient.

Deep learning is a machine learning technique with applications in artificial intelligence that can exploit large volumes of data to find lesions, assess disease states, and make predictions about effectiveness of therapies. There were several talks on computer-aided diagnosis that used deep learning. Dr Maryellen Giger’s group, from the University of Chicago, had 3 papers showing that deep learning has the potential to improve on existing methods for classifying masses as benign or malignant on ultrasound, classifying clustered microcalcifications on mammograms, and predicting breast risk from mammograms. Eun-Kyung Kim, from Yonsei University, Korea, presented a paper indicating that deep learning shows promise in detecting breast cancer in mammograms.

My personal view was that the papers presented for breast imaging were high quality, interesting, and showed some advantages over more traditional machine learning techniques. However, there were no talks that seemed to “push the envelope.” Deep learning has the potential to change the practice of radiology, including breast imaging, and will give us an opportunity to advance our role in patient care beyond what is traditionally done by radiologists. There are many groups working in this area. I look forward to new innovations at future RSNA meetings.
Along with mammography, ultrasound remains the primary imaging modality that radiologists employ to distinguish benign from malignant breast pathology. Researchers presented a variety of excellent abstracts related to ultrasound at the 2016 Radiological Society of North America annual meeting, a small sample of which is discussed in this article.

With the expanding breast density notification laws in the United States, automated volume breast ultrasound (AVBS) has been introduced as a supplemental screening modality to mammography. However, is there a role for AVBS in the diagnostic realm? Richard Barr, MD, PhD (Northeast Ohio Medical University), compared the diagnostic accuracy and interobserver variability of handheld ultrasound (HH) versus a single-volume AVBS centered over the area of clinical concern. Ninety consecutive diagnostic ultrasound patients underwent both HH and AVBS in a randomized order. Nine lesions were malignant and 81 were benign. The kappa value (measure of agreement between tests) was 0.831 between AVBS and HH, indicating near-perfect agreement. The area under the curve (AUC) for lesion characterization using both radiologists was 0.91 for AVBS. There was no significant difference in kappa agreement when AVBS was performed by a mammography technologist or a sonographer. The researchers concluded that single-volume AVBS is equivalent to HH in diagnostic ultrasound workups.

One of the concerns regarding AVBS is the requisite interpretation time and its impact on breast imaging workflows. Computer aided detection (CAD) systems may provide a potential solution. Two independent studies were presented by Ritse Mann, MD, PhD (Radboud University Medical Center, the Netherlands), and Lingyun Bao, MD (The First People's Hospital of Hangzhou, China), comparing the interpretation times of AVBS with and without the assistance of a CAD program. Mann's team performed a reader study with 8 radiologists and 120 cases (30 malignant, 30 benign, 60 normal). AUC for conventional AVBS was 0.82 and was unchanged at 0.83 with CAD. Mean reading time decreased from 158 seconds to 133 seconds with the use of CAD (16% decrease, \( P < .001 \)). Bao's team also performed a reader study with 9 radiologists and 1000 cases (206 malignant, 486 benign, 308 normal). AUC for conventional AVBS was 0.75, which improved to 0.78 with CAD \( (P < .05) \). CAD decreased the interpretation time by 10%, which was statistically significant. These 2 studies concluded that CAD may assist breast imagers when incorporating AVBS into their workflow. Bao's study also suggests performance improvement with CAD.

In patients with newly diagnosed breast cancer, the determination of axillary node status is critical for treatment planning. Currently, sentinel lymph node biopsy (SLNB) serves as the primary staging technique in clinically node-negative invasive disease. While less morbid than axillary...
dissections, SLNB does have risks—bleeding, infection, allergic reactions, and lymphedema. Intradermal microbubbles and contrast-enhanced ultrasound (CEUS) may provide an even less morbid solution. Karina Cox, MBBS, FRCS, MD (Maidstone Breast Clinic, United Kingdom), presented a study from the UK Microbubble Working Group. For their procedure, sulfur hexafluoride microbubbles were injected in the periareolar region, radiologists identified the sentinel node via CEUS, and the nodes underwent either core-needle biopsy or fine-needle aspiration (FNA). Retrospective and prospective data collected across 4 participating institutions demonstrated that the sentinel lymph node (SLN) was successfully identified and sampled in 77% to 89% of cases. The sensitivity for detecting SLN metastases was 46% to 62%, suggesting a fair number of false-negative results. However, the specificities were 96% to 100% and the negative predictive value was 77% to 91%. In a comparable CEUS for a SLNB feasibility study in the United States, Basak Dogan, MD (MD Anderson Cancer Center), used perflutren protein-type A microspheres, which are available for medical use in the United States, unlike sulfur hexafluoride. CEUS successfully identified the SLN in 20 of 21 patients. All 20 of the identified nodes correlated with an intraoperatively identified SLN. Pathologic evaluation of the surgical SLN showed metastases in 2 of 20 patients, including 1 identified preoperatively by CEUS-guided FNA. Overall, while this technique is not ready for immediate clinical implementation, these studies lay the groundwork for future research.

By definition, ultrasound screening includes scanning of the entire bilateral breasts. However, should radiologists routinely include the axillae during these examinations? Su Hyun Lee, MD (Seoul National University Hospital, Korea), presented a study of 20,327 screening ultrasound examinations in women with normal findings on screening mammograms. All ultrasound scans included the bilateral axillae. Of the 20,327 screening ultrasound examinations, 1715 (8.4%) were considered positive in the breast, and 27 cancers were diagnosed (cancer detection rate [CDR], 1.3 per 1000; positive predictive value [PPV], 27 of 1715 [1.6%]; PPVs, 23 of 295 [7.8%]). Of the 20,327 scans, 46 were positive in the axilla, none of which yielded nodal malignancy. As a result, the CDR remained unchanged by axillary ultrasound, but the PPV slightly decreased (PPVs, 1.5%; PPVs, 7.5%). The authors concluded that we may not need to include the axillae with routine breast ultrasound screening.
The 2016 Annual Meeting of the Radiological Society of North America (RSNA) was another stellar year, with 186 scientific sessions, 436 educational courses, 2976 posters and exhibits, 6 plenary sessions, and 72 corporate symposia. The subspecialty of breast imaging included 226 presentations from the above-mentioned categories.

The majority of the presentations on breast magnetic resonance imaging (MRI) were grouped into “Breast Series: MRI Emerging Technology in Breast Imaging” on Tuesday, November 29, moderated by Fiona J. Gilbert, MD, from Cambridge, United Kingdom, and Habib Rahbar, MD, FSBI, from Seattle, Washington. The breast series encompassed 17 presentations over a period of 3.5 hours. The series began with a presentation on “Screening MRI” by Constance D. Lehman, MD, PhD, FACR, FSBI (Harvard). The takeaway point of Lehman’s presentation was the eye-opening statement that despite established guidelines on the use of screening MRI for high-risk patients, the majority of high-risk patients do not undergo screening breast MRI. Lehman emphasized the importance of educating our referring clinicians and patients on the proper utilization of screening MRI.¹

Another presentation in this series was “High Risk Breast Cancer Screening with an Ultrafast High Spatiotemporal Resolution MRI Sequence; Less Costly and as Reliable as a Full Diagnostic MRI Protocol,” presented by Ritse M. Mann, MD, PhD, from Nijmegen, the Netherlands. The purpose of this study was to investigate whether breast cancer screening with ultrafast dynamic contrast-enhanced (DCE) MRI is as accurate as screening with a full diagnostic protocol. They concluded that ultrafast DCE–only MRI can be performed within 102 seconds, substantially decreasing the time needed to perform accurate breast MRI and thus decreasing the costs associated with a full diagnostic protocol.²

Yanqiong Chen, MD, from Shanghai, China, presented “Dual-Parametric MR Imaging with Read-Out Segmented Diffusion-Weighted and High Temporal Resolution Dynamic Contrast-Enhanced Imaging Improves the Differentiation of Breast Lesions.” The purpose of the study was to investigate the clinical value of a dual-parameter classification method in differentiating benign from malignant breast lesions using readout-segmented diffusion-weighted imaging (RS DWI) and quantitative DCE MRI. One hundred seven patients with 125 breast lesions were scanned with DCE MRI (a prototype TWIST-Dixon VIBE sequence was used to achieve a temporal resolution of 5.3 seconds) and RS DWI (RESOLVE, b = 50,800 s/mm²) in a 3T MRI scanner. The study concluded that the implementation of dual-parametric MRI in combination with DCE MRI and DWI optimizes the diagnostic accuracy of breast tumors at 3T.³

Both Mann and Chen received the RSNA’s Travel Stipend Award for their abstracts.
Laura Heacock, MD, MS, from New York, presented the “Feasibility Analysis of Early Temporal Kinetic Features in an Abbreviated MRI Protocol as a Surrogate Marker for Tumor Type, Grade, and Prognosis.” The purpose of the study was to evaluate the role of early temporal kinetics in differentiating invasive ductal carcinoma and ductal carcinoma in situ by tumor grade, tumor type, and prognostic markers. The study was based on the theory that high initial enhancement ratio (percent signal increase over baseline at the first postcontrast acquisition) can differentiate high-grade malignancy, HER2+/TN breast cancers, axillary invasion, and high ki-67 tumors as they are often considered to be predictors of tumor recurrence after therapy. The study concluded that initial enhancement ratio correlates with likelihood of a biologically significant breast cancer and can be incorporated into screening abbreviated breast MRI. Heacock received the RSNA’s Trainee Research Prize for this study.

A novel study was presented by Deepa Sheth, MD, from Chicago, Illinois, titled “Electronic Property Tomography (EPT): A New Breast MRI Application for Differentiating between Malignant and Benign Breast Lesions.” EPT was described as a method that maps conductivity and permittivity using phase-based conductivity images reconstructed from clinical MRI sequences. The study revealed a statistically significant difference in mean conductivity between benign and malignant breast lesions. The clinical significance of this emerging concept is that we might have a way to increase diagnostic accuracy of breast MRI without the use of intravenous contrast.

Glen Lo, MBBS, from Perth, Australia, presented “Breast MRI: Is Background Parenchymal Enhancement (BPE) Predicted by Serum Sex Hormone Levels?” This Australian study observed no association between individual or combination serum sex hormone levels and BPE. This conclusion has the potential to alter our day-to-day clinical practice of scheduling breast MRI examinations based on menstrual cycle.

REFERENCES
A large number of abstracts examining the evolving role of digital breast tomosynthesis (DBT) in breast imaging were presented at the annual meeting of the Radiological Society of North America in 2016. The research assessed the value of DBT in a wide variety of ways, underscoring the expanding use and benefit of this technology in screening, diagnostic, and interventional breast imaging.

In the Sunday morning session on multimodality screening, Elizabeth Dibble, MD, from Brown University, presented on interobserver variability in the detection of architectural distortion on 2-dimensional (2D) full-field digital mammography (FFDM) and DBT. She reported a retrospective reader study of architectural distortion cases with matched controls, read by experienced breast imagers and by trainees, and showed that interobserver variability was lower, confidence was higher for both experienced and inexperienced readers, and sensitivity was improved with DBT. In the same session, Liane Philpotts, MD, FACP, FSBI, from Yale University, summarized 5-year experience with DBT in screening and provided outcome metrics with subgroup analysis by patient age, showing no significant differences compared with FFDM in women aged 40 to 44 years or in those aged 45 to 49 years. When baseline examinations were excluded, younger women had better screening outcomes than older women.

The Monday morning “Breast Series: Hot Topics in Breast Imaging” session showcased a few abstracts on DBT. Despina Kontos, PhD, from the University of Pennsylvania, showed that parenchymal texture analysis from the low-dose DBT central source projection images may provide similar associations with breast cancer risk compared with standard-dose FFDM images. Jin You Kim, MD, from Pusan National University, South Korea, discussed the clinicopathological and immunohistochemical characteristics of invasive cancers visible only on DBT and showed them to be significantly smaller, denser, and more often luminal A (ER/PR positive, Her2 negative) subtype. Valentina Lotti, MD, from Reggio Emilia, Italy, presented preliminary results from the population-based randomized controlled trial comparing DBT to FFDM, showing that DBT reduced recall rates and improved cancer detection rates. And Christine Chen, MD (student stipend travel award recipient), from Yale University, presented 5-year data showing that initial-incidence DBT screening metrics (recall rate, cancer detection rate, and positive predictive value [PPV]) are not only sustained but actually show a trend for improvement over time.
The Tuesday morning session was devoted to DBT in the diagnostic setting. A few studies, including 2 papers from Seoul National University Hospital, South Korea, evaluated the detection and visibility of malignancies with DBT. The first, presented by Jung Min Chang, MD, found that the addition of DBT improved the detection of noncalcified T1 breast cancers, although the diagnostic yield of DBT in extremely dense breasts was still limited. The second paper, presented by Su Hyun Lee, MD, PhD, found that although there was no overall difference in the mean detectability of cancer, DBT did show a higher detection for some subtypes. Third, a paper from the University of Iowa, presented by Serine Baydoun, MD, reported significantly improved cancer detection rates with DBT compared with 2D FFDM in the screening (4.2 versus 2.5 per 1000) and diagnostic (15.9 versus 9.3 per 1000) populations. The findings included higher detection of invasive lobular carcinomas as well as less aggressive cancer subtypes with DBT.

Two papers evaluated the role of magnetic resonance imaging (MRI) in patients who received DBT. Federica Pediconi, MD, of the University of Rome, Italy, compared the performance of MRI with DBT in the preoperative evaluation of malignancies in women with dense breasts. She concluded that MRI had improved sensitivity (100% versus 81%), PPV (93% versus 89%), and accuracy (97% versus 77%) compared with DBT. DBT, however, had good accuracy and sensitivity, indicating that DBT could be a valid tool for preoperative staging in women who did not or could not receive MRI. Ashley Roark, MD (student stipend travel award recipient), from Massachusetts General Hospital, evaluated the added cancer yield of supplemental MRI in women with increased risk who were screened 1 year prior with either DBT or 2D FFDM. She concluded that the supplemental value of MRI was similar in both groups. A majority of cancers detected with MRI in this study were invasive, node negative, and subcentimeter in size. Finally, Madhavi Raghu, MD, from Yale University, reported a malignancy rate of 1% in a cohort of BI-RADS 3 findings evaluated with DBT. The majority represented early-stage and low-grade cancers diagnosed at the first 6-month interval.

Many studies presented during the RSNA meeting examined the utility of synthesized mammograms (SM), finding no difference in area under the curve for FFDM plus DBT versus SM plus DBT. Nachiko Uchiyama, MD, from the National Cancer Center, Japan, also found that interpretation performance with different slab thicknesses (2 mm versus 6 mm) was not significantly different. And Luca Carbonaro, MD, from San Donato Milanese, Italy, reported on new SM software that increased the overall dose for DBT only 21% to 32% over FFDM. Tokiko Endo, MD, of Higashi Nagoya National Hospital, Japan, presented a new image processing technique for DBT (Aspire) that improved feature analysis while decreasing dose. Emily Ambinder, MD (student stipend travel award recipient), from Johns Hopkins University, showed no difference in cancer detection rate, PPV1, or PPV3 with SM but a significant reduction in recall rate, particularly for calcifications. Finally, Catherine Giess, MD, from Brigham and Women's Hospital, Boston, showed the difference in lesion conspicuity of FFDM versus SM, with calcifications and architectural distortion being more conspicuous but masses and asymmetries often less conspicuous.
Two studies showed DBT-guided biopsy to be highly accurate and much quicker than conventional 2D stereotactic technique. Vincenzo Sabatino, MD, from Trento, Italy, reported an average procedure time of 9 minutes. Nikki Ariaratnam, MD, from South Jersey Radiology, Voorhees, New Jersey, showed the majority of DBT-directed biopsy procedures for sonographically occult lesions yielded high-risk or malignant pathologies.

On Wednesday, several sessions included DBT-related studies, particularly the afternoon session devoted to screening. Two studies from Massachusetts General Hospital assessed the prevalence effect of DBT screening. Kathryn Lowry, MD, and Pragya Dang, MD, showed that recall rate reductions are sustained over time (a 2-year period), but initial increased cancer detection rate was found to subsequently decrease. Arielle Bauer, MD (student stipend travel award recipient), from the University of Colorado, presented data showing that DBT decreased high-risk lesion detection while increasing cancer detection.

Finally, Madhavi Raghu, MD, from Yale University, presented data on the effect of DBT on workflow over 5 years, showing a continued decrease in the volume of diagnostic mammograms, fewer images being required for diagnostic examinations, and an increase in the percentage of women receiving immediate results.

All these papers highlight the interesting and exciting work supporting the varied benefits that DBT brings to breast imaging.
Molecular imaging allows noninvasive assessment of breast cancer biology on the subcellular, metabolic, and biochemical levels, leading to development of tailored approaches for breast cancer diagnosis and treatment. The 2016 Radiological Society of North America (RSNA) annual meeting included presentations on a range of molecular breast imaging modalities, including hybrid imaging with positron emission tomography (PET)/computed tomography (CT) and PET/magnetic resonance imaging (MRI), as well as dedicated breast fluorodeoxyglucose (FDG)-18 PET imaging (dbPET) and technetium 99m sestamibi breast-specific gamma imaging (BSGI).

The combined RSNA and European Society of Radiology Hybrid Imaging Symposium featured an excellent lecture by Osman Ratib, MD, PhD, from University Hospital of Geneva, Switzerland, about current applications of PET/CT and PET/MRI for breast cancer imaging. Proven applications of PET/CT for breast cancer include staging and restaging of primary and recurrent breast cancer. Spatial resolution of PET/CT (5-6 mm) is insufficient for detection of early axillary lymph node involvement, but it may be valuable for the early assessment and prediction of response to neoadjuvant therapy. Current research areas include new tracers targeting receptors and cell membranes, along with hypoxia imaging and new imaging modalities such as PET/MRI. Combining the molecular capabilities of PET imaging with the anatomic and functional features of MRI should increase specificity, decrease unnecessary biopsy rate, and improve evaluation of posterior and chest wall lesions and lymph node involvement. PET/MRI may improve local staging for early- and advanced-stage breast cancer through evaluation of nodal status and may increase accuracy of neoadjuvant therapy monitoring.

Catherine Wong, MD, from Hong Kong Sanatorium & Hospital, presented results of a prospective study evaluating PET quantification accuracy in primary breast cancer and axillary lymph node (ALN) metastasis using whole-body (WB) PET/MRI and regional prone PET/MRI acquired with a breast coil, as compared with WB PET/CT. Thirteen patients with 20 breast cancers and 11 ALN metastases were enrolled in the study. The investigators found that WB PET/MRI underestimated disease and maximum standardized uptake value ($SUV_{\text{max}}$) compared with PET/CT, while prone breast PET/MRI was comparable to PET/CT in lesion detection and $SUV_{\text{max}}$. For ALN metastasis, WB PET/MRI was similar to PET/CT for identifying nodes with comparable $SUV_{\text{max}}$. However, prone breast PET/MRI detected less ALN disease with significantly different $SUV_{\text{max}}$. They concluded that regional prone
PET/MRI with a breast coil was comparable to PET/CT in quantitative assessment of primary breast cancers but was not suitable for evaluation of the axillary nodes, whereas results were the opposite for WB PET/MRI. Combined prone breast and WB PET/MRI was the recommended procedure, particularly for monitoring treatment response in the breast or nodes.

Michel Herranz Carnero, PhD, from Santiago de Compostela, Spain, presented a large study in 500 patients with known or suspected breast cancer, comparing the performance of dbPET and MRI for evaluation of 537 breast lesions. In lesion-by-lesion analysis, the sensitivity and specificity of MRI alone were 91% and 54%, respectively, while lesion-based sensitivity of positron emission mammography was 93% and breast-based specificity was 100%. The positive predictive value (PPV) and negative predictive value (NPV) for MRI alone were 69% and 85%, respectively, and for dbPET were 100% and 89%, respectively. A high degree of correlation with postsurgical pathology after neoadjuvant therapy was found in dbPET. They concluded that FDG-dbPET is an excellent tool for diagnosis and monitoring of neoadjuvant therapy, showing earlier, more precise, and more accurate determinations than conventional techniques. Kanae Miyake, MD, PhD, from Kyoto, Japan, presented results of a joint project with Stanford University evaluating differences between high-resolution dbPET and conventional WB PET in tumor uptake morphology and image quality, with comparison to dynamic contrast-enhanced breast MRI. This was a retrospective study of 35 patients with invasive breast cancer. They found that dbPET was able to visualize more detailed morphology of tumor uptake with image quality almost equivalent to WB PET, which potentially allows for deeper understanding of tumoral functional structures and a detailed multimodality approach compared with MRI.

Researchers from George Washington University, led by Rachel Brem, MD, FACR, FSBI, evaluated outcomes of BSGI-guided biopsy for diagnosis of breast cancer. They retrospectively reviewed 116 BSGI-guided biopsies, 103 of which were successful, in 113 women. Of the canceled biopsies, 12 were canceled because the lesion was less conspicuous or no longer visible, and 1 was canceled because of a vasovagal reaction. The 13 canceled biopsies were followed for 1 year, and no cancers were found. BSGI-guided biopsy had a sensitivity of 100%, specificity of 82.6%, PPV of 53.1%, NPV of 16.5%, and NPV of 100%. The authors concluded that BSGI-guided biopsy is a reasonable and accurate technique, and results compare favorably to those reported for MR-guided biopsy. This is a very timely study since the Food and Drug Administration recently approved a biopsy device for molecular breast imaging, which is a dual-detector–based imaging variant of BSGI that will likely lead to increased utilization of this promising functional imaging modality.

In summary, molecular imaging brings a new dimension to breast cancer diagnosis, staging, and treatment. Exciting research results await us, with the potential of impacting our existing imaging approaches.
The 2016 Radiological Society of North America annual meeting featured a broad range of excellent presentations on breast cancer screening. Screening research largely comprised 3 areas: digital breast tomosynthesis (DBT), screening guidelines and policy, and multimodality innovation.

The superior performance of DBT over 2-dimensional (2D) digital mammography in breast cancer screening was reaffirmed in multiple scientific presentations. A study by Kathryn Lowry, MD, et al (Harvard, Massachusetts General Hospital) found that the added value of DBT over time lies in the sustained improvement in recall rate (RR) versus sustained increase in cancer detection rate (CDR). A total of 69,049 screening full-field digital mammography (FFDM) examinations were compared with 12,153 DBT screens without prior tomosynthesis comparison studies and 43,267 DBT screens with 1 or 2 prior tomosynthesis comparison studies. The underlying prevalence screen effect was uncovered whereby CDR was found to increase with initial DBT examinations relative to FFDM but return to similar rates as FFDM at subsequent examinations.

In a study of 560 women in a prospective trial, Janice S. Sung, MD, et al (Memorial Sloan Kettering Cancer Center) found a reduced clinical value of whole-breast ultrasound screening (WBUS) in women undergoing DBT. Both DBT and WBUS increased the cancer detection rate compared to FFDM. However, no additional cancers were detected on WBUS compared to DBT. The added advantage of tomosynthesis was a 15% reduction in the RR.

Multiple presentations focused on the health policy environment surrounding breast cancer screening. Linda E. Chen, MD, et al (University of Washington, Seattle) found that specialty society recommendations influence referral patterns for screening mammography, encouraging radiologists to engage with these societies to advocate the benefits of screening mammography. Following examination of office-based preventive service visits for women aged 40 or more years from the National Ambulatory Medical Care Survey for years 2007-2012, Chen noted a decrease in mammography referral rates in the wake of the 2009 US Preventive Services Task Force revised recommendations, with larger declines seen among family and internal medicine physicians compared to obstetricians/gynecologists.

Several scientific presentations and posters explored synthesized 2D mammography (SM) with DBT as an alternative to FFDM with DBT in efforts to mitigate the increased radiation dose associated...
Highlights from RSNA 2016: Breast Cancer Screening, continued from previous page

with adding tomosynthesis. Most practices combine DBT with FFDM, resulting in a 2-fold higher radiation dose. In a retrospective review of 5342 screening examinations in the DBT plus FFDM group and 14,980 screening examinations in the DBT plus SM group, Emily Ambinder, MD, MSc, et al (Johns Hopkins) found that the use of SM rather than FFDM in conjunction with DBT had no significant effect on RR (7.2% vs 7%), PPV (7.61 vs 7.08, \( P = .87 \)), or CDR (5.27 vs 4.87, \( P = .81 \)) while sparing unnecessary radiation dose. In a prospective study by Catherine S. Giess et al (Brigham and Women’s Hospital), 7 breast imagers evaluated a total of 1206 screening mammograms (FFDM, DBT, and SM) to compare the conspicuity of imaging findings of masses, calcifications, asymmetries, focal asymmetries, and architectural distortion. While most findings were seen on both SM and FFDM, calcifications and architectural distortion were better seen on SM, and masses and asymmetries were better seen on FFDM. It was concluded that radiology practices should potentially increase emphasis on DBT data for detecting masses and asymmetries. A study by Deanna L. Lane, MD, et al (MD Anderson) corroborated these findings in a retrospective study of 147 patients comparing FFDM and SM images, where significantly more noncalcified masses were detected on FFDM compared to SM (71 vs 55 masses, \( P = .0015 \)). Overall, SM downgraded BI-RADS assessment compared to FFDM in 16% of radiologists’ readings and upgraded BI-RADS assessment in 8%.

Two key scientific presentations focused on the value of contrast-enhanced digital mammography (CEDM) as a screening tool for the early detection of breast cancer. In a prospective trial of 126 asymptomatic women, Janice S. Sung, MD, et al compared CEDM with WBUS. The CDR of CEDM (40 per 1000) was noted to be higher than both 2D mammography and WBUS. While CEDM was noted to have the potential to be a more sensitive alternative to WBUS, Sung noted that magnetic resonance imaging (MRI) was recommended for further evaluation of CEDM-only findings in 9 (8%) patients in this study. In a retrospective cohort study of 438 women, Vera Sorin, BMedSc, et al, from Israel, compared the diagnostic performance of contrast mammography with (1) digital mammography and (2) digital mammography combined with ultrasound. A total of 23 carcinomas were detected, with contrast mammography significantly increasing diagnostic performance over comparison modalities.

Innovation in ultrafast MRI technology for the screening of high-risk patients was highlighted with a presentation by Jan Van Zelst, MD, et al, from the Netherlands. An ultrafast dynamic contrast-enhanced TWIST sequence (UDCE) obtained in 102 seconds was compared with a full diagnostic protocol that typically takes 15 to 20 minutes for image acquisition. Following a reader study, it was concluded that UDCE is as accurate as full diagnostic protocol for breast cancer screening in this study and would substantially decrease time and costs associated with breast MRI.
The 2016 meeting of the Radiological Society of North America (RSNA) included a Wednesday scientific session on breast intervention and pathology correlation.

Kenneth R. Tomkovich, MD, from Freehold, New Jersey, presented interim results of an innovative trial assessing the use of cryoablation for primary treatment of low-risk breast cancer. The Ice3 trial is a multicenter study limited to women age 65 years or older with low-risk breast cancer: unifocal, 1.5 cm or smaller, ER+/PR+ or ER+/PR−, HER 2−, and Nottingham grade 1 or 2. The cryoablation procedure is performed under ultrasound guidance with local anesthesia. An ice ball forms at the tumor site during freeze-thaw cycles. Although patients may additionally undergo hormone therapy, chemotherapy, or radiation therapy, the cryoablation procedure serves as primary treatment for these carefully selected patients, and surgical resection is not performed. To date, 53 patients treated with cryoablation have reached the 6-month follow-up mark, and 24 patients have reached the 12-month follow-up mark. With 100% procedural success rate, there have been no serious adverse effects. One recurrence has been reported. Dr Tomkovich concluded that with further study, cryoablation could become an alternative to surgical lumpectomy for carefully selected patients with low-risk invasive breast cancer.

Several presentations addressed high-risk breast lesions. Carolina Martinez Gammara, MD, from Madrid, Spain, explained her approach to papillomas and presented long-term outcomes. For benign-appearing or biopsy-proven benign papillomas, Dr Gammara’s group performs ultrasound-guided vacuum-assisted removal. Their study included 126 papillomas (119 benign and 7 atypical) treated by ultrasound-guided vacuum-assisted removal. After removal, serial follow-up ultrasound was performed at 1 to 2 months, 6 to 8 months, 12 to 14 months, and annually thereafter. On ultrasound follow-up, 14 residual and 9 recurrent lesions were identified. Ultrasound-guided vacuum-assisted removal was repeated as re-excision for 20 residual/recurrent lesions; pathology after re-excision was benign for each. None of the papillomas treated with this approach were upgraded at follow-up (mean, 41 months), and nipple discharge stopped after percutaneous removal in 68 of 69 symptomatic patients. Dr Gammara concluded that an operation could be avoided and ultrasound-guided percutaneous vacuum-assisted removal is an effective treatment for most papillomas.

Erin Alencherry, MD, of Case Western Reserve, investigated factors associated with surgical upgrade rates of atypia diagnosed via vacuum-assisted core-needle biopsy. She analyzed 254 cases...
of flat epithelial atypia (FEA), atypical lobular hyperplasia, and atypical ductal hyperplasia. After exclusion of patients deemed high risk (simultaneous breast cancer diagnosis in either breast or association of FEA with a second high-risk lesion), the upgrade rate of FEA was 3%. Dr Alencherry found that patients with a personal history of breast cancer and the following imaging findings were associated with upgrade: segmental distribution of calcifications, presence of a mass, and removal of only 0% to 24% of calcifications at the time of biopsy. The authors suggested that in the absence of these criteria, isolated FEA may be followed instead of excised; however, atypical lobular hyperplasia and atypical ductal hyperplasia should be excised because of higher upgrade rates.

Marissa L. Albert, MD, MSc, from New York University Langone Medical Center, investigated patient compliance with annual screening mammography after diagnosis of a high-risk lesion at stereotactic biopsy. The study included 208 patients, two-thirds of whom underwent surgical excision. In patients with a high-risk lesion, 57% complied with annual mammography, similar to 56% of control patients with normal screening mammography. Patients with a high-risk lesion were more likely to comply if they underwent excision versus those who did not have excision (70% vs 32% compliance). For patients who did not undergo surgical excision, compliance with annual mammography was significantly lower if they did not consult a breast surgeon; 77% of compliant patients consulted a breast surgeon, while only 34% of noncompliant patients consulted a breast surgeon. The authors suggested that adequate patient education and specialist care are important for patient compliance with imaging recommendations.

Victoria Mango, MD, from Memorial Sloan Kettering Cancer Center, discussed her group’s experience using the SAVI SCOUT device for preoperative localization. Traditional wire localization performed the day of operation limits scheduling flexibility, while radioactive seed localization requires regulatory radiation procedures. The SAVI SCOUT is a nonradioactive reflector that can be placed mammographically or sonographically up to 7 days prior to surgery. The procedure is similar to placing a biopsy marker or radioactive seed, and localization or bracketing can be performed. In the operating room, the surgeon uses a handpiece that emits electromagnetic wave signal and infrared light to detect the reflector. Dr Mango reported outcomes in 68 patients. The target and reflectors were successfully excised in 100% of patients, with no significant complications. A small percentage of reflectors migrated (>1.2 cm in 4% of cases), but this did not affect successful excision. Three patients required re-excision for positive margins. Current limitations of the SAVI SCOUT include cost. Additionally, a reflector placed deeper than 4.5 cm from the skin may be difficult to detect. The average depth of reflectors in Dr Mango’s study was 2.6 cm (range, 0.3-6.3 cm) on postplacement mammogram and 1.3 cm (range, 0.5-2.8 cm) on ultrasound.
Lessons from a Clinic Fire—Part 2

By Danna Grear, MD

This is the second part of a 2-part story of the fire that consumed The Breast Center of Northwest Arkansas in Fayetteville on December 18, 2015. The first part appears in Issue 4 of the 2016 SBI Newsletter.

In November 2016, after being displaced by a fire that devastated our breast imaging clinic, we moved back into our newly remodeled facility. The insurance settlement, temporary relocation, rebuild, and return to our home took almost a full year. The cause of the fire was ultimately determined to be electrical; however, no specific origin was ever identified. Our physicians and staff are thankful to be back in our expanded and updated space after months in a temporary location, feeling like we were occupying an extended-stay hotel.

Although undoubtedly the most stressful event in our 13 years of practice at The Breast Center of Northwest Arkansas, the experience has taught us a multitude of lessons and has enriched our practice in many ways.

First, large commercial claims are complicated. Those related to medical equipment are uncommon and therefore even more challenging. Although our insurance company reassured us from the beginning that their goal was to make us whole again, there were times that we felt they...
Lessons from a Clinic Fire—Part 2, continued from previous page

were trying to break us apart. Fortunately, we had coverage for every component of our practice, including our building and contents as well as business interruption and relocation. This allowed us to continue to pay our employees and physicians throughout the periods when our productivity was limited. With a firm resolve and an arbitrator to help us negotiate the intricacies of our claim, we expect the settlement, amounting to approximately $3.0 million, will soon be finalized.

Second, to our delight but not our surprise, the dedication of our employees has astounded us. Members of our clinical staff have driven to locations far from their homes and worked additional and extended hours to serve our patients. Our scheduling staff have patiently repeated the words, “Did you know that we had a fire?” and “No, it’s the building right behind McAlister’s” to literally thousands of patients. Our information technology staff have moved hundreds of phones and computers, primarily after hours and during the weekends to minimize the disruption to our patient services. Additionally, the support staff from our vendor partners (Hologic, Supersonic, Aurora, and SonoCine) have worked tirelessly to coordinate our multiple moves.

Third, our loyal patients have followed us to new locations—sometimes after showing up at our fire-damaged building only to read a sign informing them that we have relocated. We have learned that patients don’t always listen to phone messages or read all the words in printed communications. Our referring physicians felt our pain and encouraged and supported us through the process. They continued to encourage their patients to use our services even when inconvenient.
Lessons from a Clinic Fire—Part 2, continued from previous page

Fourth, my partners are a phenomenal group of physicians who are dedicated to serving our patients. Overnight, we went from interpreting mammograms to packing boxes, writing press releases, and meeting with realtors, architects, and vendors. They have chosen to view this misfortune as an opportunity for a new beginning. Our practice has grown through this experience. Now, instead of complaining about an especially hectic day, we rise to the occasion.

Last, when life gives you lemons, you can make lemonade. Our new clinic is updated and ready to serve our growing practice. We have expanded our space, taking over a portion of the building that we previously leased to another physician group. We have remodeled to separate our screening services from our diagnostic services. Although our digital mammography machines survived the fire, their cold-sensitive arrays did not. Instead of using the insurance settlement to replace the arrays on machines greater than 10 years old, we bit the bullet and purchased 4 new machines with tomosynthesis. The fire pushed us to do what we had been considering for quite some time. And finally, we replaced that old, stained, outdated carpet…..

New Fellows Inducted Into the SBI at the 2016 Radiological Society of North America Meeting

The SBI inducted 5 new fellows during the Radiological Society of North America meeting on November 28, 2016. Left to right: Samantha Heller, MD, FSBI; Laurie Margolies, MD, FACR, FSBI; Stephanie Patterson, MD, FACR, FSBI; Daniel Kopans, MD, FACR, FSBI, chair of the Fellows Committee; SBI President Elizabeth Morris, MD, FACR, FSBI; Mary Newell, MD, FACR, FSBI; and Abid Irshad, MD, FSBI.
## Upcoming Events & Activities

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 5, 2017</td>
<td>Los Angeles, CA</td>
<td>Pre-SBI/ACR Breast Imaging Symposium 2017 Workshop: Digital Breast Tomosynthesis</td>
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<tr>
<td>April 6-9, 2017</td>
<td>Los Angeles, CA</td>
<td>SBI/ACR Breast Imaging Symposium 2017</td>
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<tr>
<td>April 18, 2017</td>
<td>Montreal, Quebec</td>
<td>Canadian Association of Radiologists (CAR) Advanced Cardiac Life Support for Radiologists (ACLS-r)</td>
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<tr>
<td>April 20, 2017</td>
<td>Montreal, Quebec</td>
<td>Canadian Association of Radiologists (CAR) 80th Annual Scientific Meeting</td>
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<td>April 22-27, 2017</td>
<td>Honolulu, HI</td>
<td>International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting</td>
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<td>April 30 - May 5, 2017</td>
<td>New Orleans, LA</td>
<td>The American Roentgen Ray Society (ARRS) Annual Meeting</td>
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<tr>
<td>May 21-25, 2017</td>
<td>Washington, DC</td>
<td>American College of Radiology (ACR) Annual Meeting</td>
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<tr>
<td>September 22-23, 2017</td>
<td>Berlin, Germany</td>
<td>European Society of Breast Imaging (EUSOBI) Annual Meeting</td>
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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)