Editor’s Note

I heard it. I heard it again! It wasn’t even Halloween yet, and I heard holiday music. I guess it’s that season again. For many radiologists, that means Thanksgiving and the Radiological Society of North America (RSNA) meeting.

RSNA is a big, complex, exciting meeting. You can’t cover it all, and you need to plan where you are going and when.

In this issue, Jessica Leung offers a preview of the 2014 RSNA annual meeting (see page 18). RSNA allows us to look at our field and mark time. We can assess where breast imaging is and where it is going.

At my first RSNA meeting, I saw an exhibit by Steve Parker on a new biopsy instrument. The device looked relatively easy-to-use, and the concept seemed practical (1). Little did I know that now, 25 years later, percutaneous biopsies would be the standard approach, and there would be few indications for an excisional breast biopsy. Nevertheless, percutaneous breast biopsy is currently underutilized—despite our ability to perform accurate biopsies in a less expensive, quicker manner compared to surgical biopsies (2). Thus, as we develop new tools and technologies, we must also perform the necessary studies to demonstrate efficacy and cost-effectiveness. Liz Morris discusses this issue vis a vis breast magnetic resonance imaging in this issue (see page 8).

In terms of effectiveness, Abray Stillson at the Society of Breast Imaging (SBI) is off the charts. Abray has been the main liaison for the SBI newsletter while a publications manager was being recruited. Now Abray returns to her day job as SBI’s educational coordinator and Mohammad Iqab has come on board to serve as the main organizer for this issue. Mohammad did a great job learning the ropes and coordinating this issue. Thank you Abray and welcome Mohammad!

Breast imaging recently lost two major leaders, Ellen Shaw de Paredes and Werner Kaiser (see pages 20, 21, and 26). Both dedicated their too short lives to breast imaging. Both were amazing people and fantastic radiologists. May their memories be a blessing.

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President’s Column: Physician Heal Thyself

The title of my column originates in scripture - Luke 4:23.23. The underlying message is that one should not be quick to cast aspersions on others when one’s own house is not in order. If one examines the phrase from a different, more literal perspective it can be applied to our profession.

Our mission is to detect breast cancer at its earliest, most treatable stage of development. Obviously, in order for us to do our job properly we must be in good health. This implies both being of sound mind and sound body. We are all aware of the increased prevalence of depression, drug addiction and alcoholism among physicians compared to other professions. However, I do not think that many of us pay attention to the physical strains which our subspecialty imparts on us.

A study, which looked at injuries among breast imagers, was recently published online in the Journal of the American College of Radiology (1). The principal investigator, Atalie Thompson, MPH, from Stanford Medical Center, analyzed various factors associated with repetitive strain damage in breast imagers. (I and my daughter Rachel, a physical therapist, helped in the research - how often do father and daughter co-author a paper?) 😊

An anonymous survey regarding repetitive strain injury (RSI) and work habits was sent to 2,618 physicians. Seven hundred twenty-seven responses were received and analyzed. The levels of pain, before and after the implementation of digital imaging, were compared. The associations between RSI symptoms and work habits were assessed.

Four hundred thirty-eight (60%) of the respondents reported RSI symptoms and 242 (33%) reported prior diagnosis and treatment of RSI. RSI symptoms were statistically higher in those breast imagers who spent more time working at their job on a daily basis and especially in an awkward position. Only 17% of the responding breast imagers used an ergonomic mouse and only 13% used an ergonomic chair. Respondents noted a significant increase in pain after the implementation of PACS, and a decrease in pain after ergonomic training or initiating the use of ergonomically-friendly equipment such as a special mouse, an adjustable chair, or an adjustable table. Those with RSI or a prior diagnosis of repetitive strain syndrome were more likely to desire future ergonomic training.

In an earlier smaller survey, Boiselle et al noted the same phenomenon among all radiologists (2). Seventy-three responses were received (a 68% response rate) from 33 faculty members and 40 trainees (residents and fellows). A majority of respondents (68%) reported working more than 8 hours per day at a personal computer or a PACS monitor (55% of faculty members, 80% of trainees). Repetitive stress symptoms were reported by 58% of respondents (52% of faculty members, 63% of trainees), and prior diagnoses of repetitive stress syndrome were reported by 38% (39% of faculty members, 38% of trainees). Improvements in repetitive stress symptoms were reported by 70% of respondents who received ergonomic chairs (n = 54), 80% who received ergonomic workstations (n = 55), and 80% who underwent ergonomic training (n = 20).

Clearly, our jobs are not conducive to physical fitness. In the past, we used to lean forward with a magnifying glass and read film-screen mammograms. Now we sit and stare for hours at multiple monitors to interpret digital images from...
mammography, ultrasound and magnetic resonance imaging studies. Many of us do not pay attention to our posture or whether the equipment we use is beneficial for our bodies. Dr. Debra Ikeda, one of the co-authors of our paper and current chief of breast imaging at Stanford, gives an excellent lecture on RSI and ways to improve the ergonomic conditions in which we practice.

On a personal level, I have already had spine surgery for disc disease, and I have undergone physical therapy for back and pelvic problems multiple times. My surgeon and physical medicine doctor have told me that my job is a major contributor. Based on their recommendations, I currently get out of my chair every 45 minutes and walk around our department for 5 minutes. I have also started to read mammograms in a standing position and I feel much better at the end of the day. My physical medicine physician told me that he has treated approximately half of the radiologists in one private practice group in Ann Arbor, Michigan.

RSI is not unique to breast imagers. For example, interventional radiologists who wear lead aprons over a prolonged period of time suffer from neck and shoulder injuries. However, with the advent of breast MRI, digital breast tomosynthesis, and automated breast ultrasound we are looking at more images than ever before. We need to be proactive in our approach to our health. This will improve our physical condition and it will also help our colleagues by decreasing the number of sick days we require. Hopefully, it will also extend our careers should we desire to work longer.

Good clinical skills take years to develop. Fortunately, the shift to a better ergonomic approach in our jobs does not require that much time. For those of us to which the phrase is applicable, let us heal ourselves!

Murray Rebner, MD, FACR, FSBI
President, Society of Breast Imaging

REFERENCES

Tomosynthesis FAQs
Generated from the 2014 SBI Digital Breast Tomosynthesis Course

By Liane E. Philpotts, MD, FSBI

How have you handled the “time issue” in your department? To avoid mental fatigue, what do you find is an optimal workload for tomosynthesis cases? Would you do on-line reading of screening DBT?

The workflow for tomosynthesis is quite different from full field digital mammography (FFDM). This may not be immediately evident to those just adopting the technique or using it in only some patients. However, when used uniformly for all screening and diagnostic patients, it has a profound effect on workflow, generally for the better! Screening interpretation time for tomosynthesis has been demonstrated in multiple studies to be roughly twice that of two dimensional (2D) FFDM. Although screening tomosynthesis does take longer to read, most exams can be read in 1-2 minutes - faster than the technologists can image the patients. While many worry about the increased time required to read screening tomosynthesis images, this time expenditure can be balanced by expedited diagnostic work-ups.

Diagnostic mammography with tomosynthesis is vastly improved over that using 2D alone. For many patients who have been recalled from tomosynthesis at screening, there is little need to acquire additional views. For other diagnostic patients (e.g., BI-RADS 3 patients) who may be due for their 6-month follow-up or their annual exam, the ‘routine’ craniocaudal and mediolateral oblique views often suffice. Decreasing additional views requires less technologist time leading to a simplified and expedited diagnostic exam. At my facility, the radiologists assigned to diagnostics have found time to read screening exams between diagnostic cases. Screening and diagnostic exams interspersed with ultrasounds create a diverse case-load and avoids the potential mental fatigue from reading only screening tomosynthesis exams.

So, the bottom line: tomosynthesis can actually help your overall workflow.

What do you think is the value of 2D/three dimensional (3D) spot views in the work-up of tomosynthesis findings on a screening study? Why repeat tomosynthesis images on a diagnostic exam if they were already completed on a screening exam?

The question of whether or not to repeat images, and especially spot views, in diagnostic tomosynthesis is very relevant. When starting to use tomosynthesis, it is natural to practice the way we are comfortable with and work up cases in the familiar way – e.g., spot, 90° mediolateral, and rolled craniocaudal views. While magnification views are still required to evaluate calcifications, most of the other views may be avoided as tomosynthesis provides the ability to evaluate the shape, size, margins and location of most lesions in the breast. Many patients with masses and some with focal asymmetries or architectural distortions may bypass diagnostic mammography, avoid additional radiation, and undergo breast ultrasound (US).

For questionable or vague asymmetries or architectural distortions, many will still prefer to obtain additional images to fully evaluate the lesion and establish their level of concern prior to performing US. If spot views are needed, a combination of 2D and 3D imaging is preferable – 2D to confirm that the correct area was spotted and 3D for the more complete diagnostic assessment of the size and the features of a persistent abnormality. There is definitely a
Tomosynthesis FAQs, continued from previous page

learning curve when using tomosynthesis in the work-up of findings. The use of spot views in tomosynthesis is still being studied to refine which cases benefit most from additional views.

*How often do you find lesions visible only on tomosynthesis and without an ultrasound correlate? What do you do with architectural distortions seen on only one tomosynthesis view?*

The challenge of lesions seen only on tomosynthesis causes great concern among those new to the technology. In reality, most lesions seen on tomosynthesis, if truly real, will be identified with US. This requires accurate localization through review of the tomosynthesis images and careful US scanning, often looking for subtle findings such as changes in architecture.

The first step is to carefully scroll through the tomosynthesis images to determine if there is a true finding or not. Architectural distortions are more commonly found in tomosynthesis compared with 2D images, but there may be a tendency to ‘over-call’ such findings. Most real lesions will have a correlate in two views, although it is still possible that the finding may be seen in only one view, especially the craniocaudal view. If real, localization to a quadrant should be possible. Even if the lesion is seen in only one view, the hemisphere (e.g., medial or lateral) and the depth can be determined and scrolling will allow the quadrant (e.g., superior or inferior) to be pinpointed and focused US scanning can be performed.

If there truly is no US correlate, we return to the tomosynthesis exam and ask: is the finding real or is it superimposed tissue or trabeculations? If there is persistent suspicion on tomosynthesis, a decision must be made between tissue sampling or additional imaging with MRI. If there is a suspicious MRI correlate, biopsy can be performed. If the MRI is negative the level of suspicion for malignancy may decrease, but there is still a mammographic abnormality. If desired, wire-localization can be performed under tomosynthesis-guidance and surgical excision can occur. Tomosynthesis-guided stereotactic biopsy may also be performed with an attachment to a tomosynthesis unit. This permits biopsy of findings visible only on tomosynthesis and negates the need for MRI in many cases. Radial scars may be responsible for these types of findings, and some may or may not enhance on MRI. There is not enough evidence at present to know whether excision of radial scars found only on tomosynthesis is necessary. It is likely there will be more literature on this topic in the near future as many wrestle with this challenging aspect of tomosynthesis.
ACR BI-RADS® Atlas 5th Edition

By Wil Creech and Priscilla Butler, MS, FACR, FSBI

Under the leadership of Drs. Carl D’Orsi, Edward Sickles, Ellen Mendelson, and Elizabeth Morris, the writing groups and the subcommittees for the three Breast Imaging Reporting and Data System (BI-RADS®) lexicons and the audit chapter did a superb job of creating and coordinating the content for the new atlas and providing plentiful examples to illustrate the elements in each lexicon. The group produced the most comprehensive and consistent version of this work to date. The 5th Edition of the BI-RADS® Atlas debuted early in 2014 in hardcopy.

It has been popular and well received since its appearance, but in the more sophisticated technological climate that prevails today, the American College of Radiology (ACR) leadership and the BI-RADS® committee members realized that a digital version of the atlas would be a beneficial addition to the publication. As soon as the hardcopy was released, the ACR began preparing the manuscript for conversion to an electronic format.

While the e-book was being developed, the BI-RADS® webpage (http://www.acr.org/Quality-Safety/Resources/BIRADS) was renovated and updated with free support materials for the new atlas. The resources include excerpts from the new edition along with a variety of reference materials. One of these, a suggestion from the ACR Breast Imaging Commission chair, Dr. Barbara Monsees, is a convenient pocket reference guide (with an accompanying wall chart) which lists all of the findings for the three breast imaging modalities along with the table of BI-RADS® assessment categories. This guide turned out so well that the ACR had them printed and bundled and now offers them for sale at cost in bundles of twenty to imaging facilities for general distribution, or to physicians who would like an inexpensive, effective handout.

The BI-RADS® webpage includes several useful resources:

- ACR BI-RADS® Atlas 5th Edition Changes (a concise tabulation of major changes in the new atlas compared to the previous edition)
- BI-RADS® Software Vendor List
- BI-RADS® Atlas 5th Edition e-Book Download Instructions

Although the content for the atlas was complete when the hardcopy appeared in early 2014, the transition from paper and ink to monitor or touchscreen required significant work to incorporate the features that would make the e-book both attractive and functional. The ACR hired a software firm with expertise in the field to translate the written BI-RADS® into digital copy. Development and testing continued through the spring and summer, and the new e-book finally...
made its appearance in early September. Our developers were able to create an e-book that can be used on computers (desktop or laptop), tablets, or even smart phones. The electronic format enables easy navigation, searches, and bookmarking; internal and external references are linked; and for tablet users, images, font sizes, and color schemes can be manipulated. The digital edition is also lighter and thinner than the bound volume, making it easier to carry and store.

The price for the e-book is lower than the hardcopy version, and the ACR has reduced the price further for those who purchase both versions as a bundle. (This reduction in price is available for those who previously purchased the hardcopy and would now like to supplement it with the digital book.) Each e-book purchase comes with five downloads so that a customer can install BI-RADS® on several devices. For larger organizations and teaching facilities, the ACR offers an institutional license which permits the e-book file to be loaded onto a server, making it accessible to connected workstations. The price points are based on the number of breast imaging radiologists and trainees.

The ACR and the BI-RADS® Committee are still considering developing a BI-RADS® app; however, nothing has yet been scheduled for this project.
The Future of Preoperative Breast MRI

By Elizabeth A. Morris, MD, FACP, FSBI

Breast magnetic resonance imaging (MRI) in the preoperative setting finds itself at the crossroads of changes in imaging and breast cancer treatment. Whether we like it or not, in order to be relevant in the future, radiologists will need to demonstrate that imaging adds value to patient care. This is no more evident than in the MRI setting. Currently, some practices recommend preoperative breast MRI for all patients and other practices use it selectively. The guidelines are vague. What is right?

We know that MRI in the preoperative setting picks up additional cancers in 16% of patients. Proponents of preoperative MRI believe that the detection of these additional lesions is good for the patient. But is it? Are recurrence rates decreased? Is overall mortality affected? Does it make surgery easier? As we move from fee for service to value-based care, debate continues about the use of preoperative breast MRI. Breast MRI is seen as an expensive option in a bloated health care system that has spiraled out of control. The backlash against MRI is real and growing and potentially disastrous as patients may be denied access.

For those of us who have dedicated our lives to early detection, the mere suggestion that identifying all cancer does not matter sounds blasphemous. We celebrate the detection of early breast cancer, as we know that it saves lives. Prospective randomized controlled mammography trials have demonstrated decreased mortality in the screening setting. Detecting smaller cancers is better. We cannot imagine that the small additional cancers detected in the diagnostic setting by MRI may not matter to the patient and that we may not be adding value to the patient. The surprising fact is that finding additional disease on breast MRI in a patient with known cancer may not change outcomes or translate into better care. While this is counterintuitive to some, if we as a specialty want to remain relevant to the field of medicine, we need to demonstrate improvement in patient outcomes as the bottom line. We will become irrelevant if we do not see the big picture. Our job does not end with detection. We need to be patient-centered and data-driven, measuring outcomes that matter to patients. We cannot support our technology without data that show benefits to patients from the imaging test. According to the current mantra: we have to own the entire value chain from beginning to end.

Unfortunately, the majority of the existing retrospective data looking at preoperative MRI have shown no overall benefit to the patient. All of us have seen the studies stating that MRI leads to increased mastectomy rates and wider local excisions that may not be necessary. Granted, at some institutions there are studies that demonstrate no increase in mastectomy rates, lower re-excision rates and fewer total operations, but these studies are drowned out by the majority findings. It also does not help that the two prospective randomized controlled multicenter trials evaluating breast MRI in the preoperative setting (COMICE and MONET), no matter how flawed, have shown no benefit (1, 2).

We desperately need a well-designed prospective trial, led by radiologists, to evaluate preoperative breast MRI. After many years of planning, a trial has been recently launched: Alliance A011104/American College of Radiology Imaging Network (ACRIN) 6694, Effect of preoperative breast MRI on surgical outcomes, costs, and quality of life in women with breast cancer. While we have been waiting for this trial,
The Future of Preoperative Breast MRI, continued from previous page

the confidence in preoperative MRI has eroded. Let this be a lesson to us as a specialty that we need to take ownership of our technology and conduct these trials early on.

Compounding the dearth of relevant trials, while breast MRI use has increased, our understanding of breast cancer has undergone a major revolution. We no longer see breast cancer as one disease – in fact it is at least four basic different types of cancer (luminal A, luminal B, triple negative and Her-2-neu positive) depending on genomic profiling. Luminal A (estrogen receptor positive) breast cancer carries an excellent ten year breast cancer specific survival rate of approximately 90% and is found in the majority of postmenopausal patients. With the widespread use of hormonal therapy such as tamoxifen, luminal A cancers (which likely constituted the majority of cases in the flawed COMICE and MONET trials) have excellent outcomes despite the dormancy and late metastatic recurrences beyond ten years that are characteristic of these tumors (1, 2). This is why the Alliance A011104/ACRIN 6694 trial is focused on triple negative and Her-2-neu positive cancers that have higher local recurrence rates and worse outcomes.

Since 2000, when gene expression profiling showed the variability of breast cancer, an understanding has developed: biology trumps size and anatomy. These days, the tumor stage may not be the primary determinant of outcome. Although we know that detecting early stage cancers saves lives and allows for less invasive surgery and oncologic treatment, we have also seen T1a cancers metastasize before detection. Research into metastatic potential is important and may hold important clues regarding why women still die from breast cancer, regardless of early detection. The idea that not all cancers are created equal is something that we as radiologists need to recognize and embrace. We need to be leaders in designing studies to evaluate our technology and recognize that we may not provide benefit all patients. We cannot stick our heads in...

Upcoming Events & Activities

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The Future of Preoperative Breast MRI, continued from previous page

the sand and insist that everyone be scheduled for a preoperative MRI. We will appear self-serving and lose credibility, an approach that will surely backfire.

So what are we to do on a day-to-day basis? We need to audit our own data and participate in clinical trials. We need to keep up with the seismic changes that are happening in how breast cancer is treated. In all specialties dealing with the breast cancer patient, there are movements to do less, particularly in subgroups of patients. In surgery, the American College of Surgeons Oncology Group (ACOSOG) Z11 trial showed us that we can leave disease behind in the axilla in a subgroup of patients with T1 and T2 clinically node negative breast cancers, with positive sentinel lymph nodes, treated with breast conserving surgery and whole breast irradiation. Furthermore, close margins may not necessitate further surgery. In radiation oncology, subgroups of patients (e.g., > 65 years old and hormone-receptor positive) have been identified at sufficiently low risk of recurrence that skipping radiation therapy is a reasonable option if hormonal therapy is given. In medical oncology, genetic tests that can stratify patients for recurrence have defined populations of women who can forgo chemotherapy safely. We need to get on the “do less” train as well and do the clinical trials so that we are not recommending unnecessary tests. We need to be outcomes-based and recognize that the “one size fits all” approach is likely historical. Our patients need to be at the center of our decision-making process and management recommendations. They rely on us to make the right recommendations.

REFERENCES

Controversies Regarding Breast Margin Assessment

By Michael Z. Gilcrease, MD, PhD

Although margin status is routinely assessed in breast surgical resection specimens and is one of the factors used to guide decisions regarding the adequacy of surgical resection and the need for re-excision, there has been much disagreement about what constitutes an adequate surgical margin for breast cancer. Surveys have revealed widely different opinions among surgeons and radiation oncologists about the amount of uninvolved tissue that should be excised at the periphery of a breast cancer (1). Theoretically, only the malignant tumor cells need to be excised, but in practice, there is no perfect way to determine whether the entire tumor has been removed, as histologic evaluation is based on limited sampling. Some amount of residual tumor may remain in a patient deemed to have close
but negative margins. The goal of surgery is not necessarily to remove all microscopic traces of tumor. The goal, particularly for patients undergoing breast conservation and post-operative radiation therapy, is to remove enough tumor so that any amount of microscopic tumor remaining after radiation therapy would be insufficient to produce a clinical recurrence.

The Society of Surgical Oncology (SSO) and the American Society for Radiation Oncology (ASTRO), after conducting a meta-analysis of studies from the literature on the association between tumor margins in early-stage invasive breast cancer and local recurrence, recently issued a consensus guideline stating that the absence of tumor at the actual edge of the resected tissue (“no ink on tumor”) should be the standard definition of an adequate margin for invasive breast cancer (2). The guideline was based on the inability to demonstrate from the studies in the literature a statistically significant increase in ipsilateral breast tumor recurrence (IBTR) for patients with wider margins. Without hard evidence that re-excisions reduce the rate of IBTR for patients with close but negative margins, the SSO/ASTRO guidelines concluded that re-excisions are not routinely warranted for such patients, as they increase the risk of surgical complications, may cause greater discomfort and stress to patients, potentially compromise the patient’s cosmetic outcome, and result in increased utilization of health care resources and increased medical costs.

Many pathologists have expressed concern about using “no ink on tumor” as the definition of an adequate surgical margin. Pathologists know that invasive breast cancers can appear discontinuous histologically, and they occasionally observe residual tumor in tissue re-excised because of close but negative margins. Proponents of the new guideline argue that the presence of residual tumor in such re-excised tissue is irrelevant, as an increase in IBTR has not been clearly demonstrated for patients with close but negative margins. Proponents of the new guideline maintain that systemic therapy and tumor biology have a greater impact on local recurrence (3). A recent endorsement of the new guideline by the American Society of Clinical Oncology (ASCO), however, was not without some important qualifications (4). The ASCO review panel emphasized the importance of post-lumpectomy mammography for patients whose tumors are associated with microcalcifications. The ASCO panel recommended that post-lumpectomy mammography occur prior to breast irradiation to ensure that the targeted microcalcifications and/or satellite lesions have been removed. The panel also called for monitoring of outcomes at the institutional level as institutions transition to adopting the new SSO/ASTRO guideline, and they recommended flexibility in the application of the guideline because of the weak evidence supporting it. That evidence was derived mainly from retrospective studies, which often suffer from selection bias.

A recent editorial highlighted the weakness of the evidence supporting the new guideline (5). The editorial pointed out that breast cancer patients are not treated randomly. For patients in many of the previous studies, the decision not to re-excite close margins was likely based on features that suggested a low risk of local recurrence. For example, the close margin in many cases might have been the deep margin at the pectoralis fascia. Some of the patients might have had only focal, minimal tumor near the margin. Conversely, those with close margins in some cases might have received a higher dose of radiation therapy.

Additional controversial issues regarding breast margins include whether the margin status should...
be assessed at the time of surgery, and if so, how extensively the margins should be evaluated. Sliced surgical specimens can be radiographed, and the combination of radiographic assessment and gross pathologic assessment, supplemented with the use of immediate frozen section evaluation, can increase the likelihood that adequate margins will be obtained during the first operative procedure. There is general agreement that a positive margin (tumor touching the inked edge of tissue) needs to be re-excised. For these patients, there is a clear benefit to knowing that the tumor is at the inked margin at the time of the initial surgery, as a conservative re-excision can be performed at that time to avoid the cost and morbidity of a subsequent operation. Such an immediate assessment, however, involves more time and effort from the radiologist, the pathologist and the surgeon and increases the amount of time the patient spends in the operating room. Some have advocated against intraoperative assessment of breast margins, arguing that it is not cost effective (6). Others have emphasized that for patients with large irregular tumors or those with extensive microcalcifications extending beyond the mass lesion, intraoperative margin assessment can significantly increase the likelihood that the patient will have an optimal surgical procedure the first time.

In light of these controversies, a tailored approach in adopting the new SSO/ASTRO guideline and in the use of intraoperative margin assessment seems prudent. As has been suggested recently, young patients with multiple very close margins, or those with close margins and an extensive intraductal component, might benefit from a re-excision, particularly if they have large breasts and the re-excision would not adversely impact the cosmetic outcome significantly (5). Especially now, in light of the new consensus guideline and the increased likelihood that patients with close but negative margins will not return to the operating room, it might be even more worthwhile to conduct some form of intraoperative evaluation of breast margins. When the final pathology report is issued, some surgeons and patients may decide not to have a close margin re-excised, but the surgeon might have excised a little more tissue at the time of surgery had he or she known that the margin was very close.

REFERENCES

Sentinel Lymph Node Biopsy Update

By Brigid Killelea, MD, MPH, FACS

The most important prognostic indicator associated with breast cancer recurrence and death is the presence of metastases in the axillary lymph nodes. For many years, mastectomy with axillary lymph node dissection was the preferred procedure for breast cancer patients - even for those who were clinically node-negative at presentation. Since the 1990s sentinel lymph node biopsy has emerged as a reliable way to safely stage the axilla and spare many patients the potential morbidities associated with more extensive operations. In the past few years, data from the American College of Surgeons Oncology Group (ACOSOG) Z0011 trial has demonstrated no significant difference in either local recurrence or survival among select patients with one or two positive axillary nodes treated with sentinel lymph node biopsy alone (1).

The sentinel lymph node is defined as the first node or nodes that drain the breast; the sentinel node is also the one most likely to contain metastases. Several methods of sentinel node identification have been described, with the most accurate being the combination of vital blue dye (either methylene blue or isosulfan blue) and a radioactive isotope (usually technetium 99m sulfur colloid). These agents are typically injected into the breast at or close to the tumor, into the dermis, or into the subareolar region prior to definitive surgery. At the time of surgery, a handheld probe is used to identify “hot” nodes that have taken up the radioactive isotope. Similarly, when blue dye is used, the sentinel node is found by visual identification of a blue-stained lymphatic channel leading to a blue node or nodes.

Since the acceptance of sentinel lymph node biopsy, patients found to have metastases to the axilla have generally undergone completion axillary dissection. Axillary dissection is also indicated for patients with a clinically positive axilla preoperatively, as well as a positive lymph node on needle biopsy. According to the American Society of Clinical Oncology (ASCO) guidelines, completion axillary dissection should be performed for patients found to have micrometastatic disease (0.2 – 2.0 mm) in the sentinel node. Axillary dissection refers to clearance of the tissue and the nodes in levels I and II, or nodes in levels I, II or III from below the axillary vein superiority, to the chest wall medially, and to the latissimus dorsi muscle laterally.

Recently, the results of the ACOSOG Z0011 trial were published (1). This study randomized 891 patients with clinical T1 and T2 tumors and a
negative axilla who had a positive sentinel lymph node to undergo either completion axillary dissection (n=445) or observation alone (n=446). All patients underwent partial mastectomy. The majority of patients (>95% in both groups) received adjuvant chemotherapy and/or hormonal therapy.

In both groups, all patients received adjuvant whole breast radiation therapy. After a mean of 6.3 years of follow-up, the authors observed no significant differences in the rate of local recurrence (p=0.11) or the rate of regional recurrence (p=0.45) in either group. The authors concluded that observation and appropriate adjuvant therapy without completion axillary dissection is appropriate treatment for women with tumors less than 5 cm who have a one or two positive sentinel lymph nodes. Although the trial did not reach its target accrual of 1900 patients, since its publication, adoption of observation alone has been widely accepted by the majority of United States surgeons caring for patients with breast cancer (1).

Another controversial issue surrounding the practice of axillary lymph node dissection versus sentinel lymph node biopsy has been in the management of patients with a clinically positive node who undergo neoadjuvant chemotherapy. Oftentimes, neoadjuvant chemotherapy can result in a complete pathologic response, rendering a previously positive axilla free of disease. To help answer this question, the ACOSOG Z1071 trial evaluated 756 patients with clinical T0-T4, N1-N2, M0 disease who underwent neoadjuvant chemotherapy (2).

All patients in the ACOSOG Z1071 trial had a documented positive axillary lymph node prior to treatment. Of these patients, 643 had a sentinel node identified and underwent an axillary dissection. Overall, the sentinel lymph node identification rate was 92.5%, and nodal status was correctly identified by sentinel lymph node biopsy in 84% (258 of pathologically node negative and 327 of pathologically node positive). The prespecified false negative rate limit was 10%, and results from the ACOSOG Z1071 trial revealed a false negative rate of 12.8%. The authors did find that the false negative rates were lower in patients in whom three or more nodes were removed, a dual tracer technique (blue dye and technetium 99m sulfur colloid) was used, and a clip was placed in the positive node and its removal was subsequently confirmed by specimen radiography. Provided that clips are placed at the time of diagnosis and the clipped node is subsequently removed, a dual tracer technique is used, and three or more nodes are removed, it does appear that post-neoadjuvant sentinel lymph node biopsy can be performed in such patients (2).

REFERENCES
Breast Imaging Mini-Fellowships

By Madhavi Raghu, MD and Liva Andrejeva, MD

With the advent of the new American Board of Radiology (ABR) core exam format, fourth year diagnostic radiology residents have the opportunity to refine their knowledge in areas that are most interesting to them via mini-fellowships. Mini-fellowships allow residents to spend two to three months concentrating in a radiology subspecialty of their choosing. Since its inception at our institution, Yale School of Medicine, breast imaging has been one of the top choices for fourth year residents. Most of the mini-fellows have also indicated that breast imaging may be a component of their practice in the future.

The mini-fellows are integral components of the breast imaging team, functioning as breast imaging fellows. During their three months in breast imaging, the mini-fellows learn and work alongside the breast imaging fellows. They rotate on a weekly basis through four designated areas: diagnostic mammography and sonography, screening mammography, breast interventional procedures and breast MRI. Responsibilities and expectations are similar to those of the breast fellows. In addition, the fellows and the mini-fellows attend and participate in several conferences per week, including tumor board and interesting case conferences.

Integration of the mini-fellowship into the breast imaging section has had distinct advantages. All of the senior residents have enjoyed their experience and found the opportunity to function as fellows to be stimulating and rewarding. Many have also indicated that the focused training has better prepared them for fellowship. The residents have noted that exposure to cutting edge technologies like digital breast tomosynthesis and screening breast ultrasound in dynamic clinical practices has been invaluable, and they hope to integrate this knowledge into their own future practices.

Although the mini-fellowship in breast imaging has been well received at our institution, a few challenges remain. Transitioning a fourth year resident with limited experience in breast imaging to a mini-fellowship can require intense supervision, as the learning curve is steep and the daily workflow is demanding. Also, in our practice, most screening and diagnostic mammograms are performed with tomosynthesis. Therefore, developing competency and acquiring confidence with this technology in a short period of time can be difficult. Nevertheless, the mini-fellows remain enthusiastic for having the opportunity to work with new technologies available in our section.

In conclusion, the mini-fellowship in breast imaging has been well received by both trainees and attending physicians at our institution. Although the impact of the mini-fellowship on the future careers of the individuals remains to be seen, those who have had this opportunity at Yale have been thrilled to witness the future of breast imaging.
The 4 Es for Optimizing Radiologist-Technologist Synergy

By Jade Q. de Guzman, MD

Everyone knows that the people you work with and how you work with them can have a more significant impact on overall job satisfaction than what you do or what you know. As a breast imager, my hard work - my interpretations and my ability to detect and diagnose early breast cancer - is purely an extension of someone else’s hard work – another person’s ability to obtain diagnostic images effectively and efficiently. So if you ask how important it is for me as a radiologist to gel with my technologist – I will say that it is absolutely critical. Here are the ways I go about optimizing synergy with my technologists:

Educate – I will never forget my first day as an attending. “I’ve been doing this longer than you’ve been alive, honey.” I should have felt threatened, but honestly, I was relieved. At least one of us knew exactly what we were doing. The beauty is that the woman who made that statement has become one of my best mammography technologists because we have developed free-flowing crosstalk. I ask for more mammographic views, and she asks “Why? If you’re going to do an ultrasound anyway?” I explain to her that I need the spot compression views for margin analysis to establish my level of suspicion before I enter the ultrasound room.

When I ask for a lateromedial instead of a mediolateral view for those calcifications in the right upper inner quadrant, she understands why I need those calcifications as close to the detector as possible to get the best image. When she fails to get that far medial posterior implant displaced craniocaudal spot compression view on that 67-year-old patient with encapsulated calcified implants, she explains to me why it is so difficult. As a radiologist, we have not just signed up to continuously educate ourselves and other radiologists, but we also need to teach our technologists and let them teach us.

Engage – How awesome is it that we as breast imagers are able to easily follow up on everything we call back and recommend a biopsy because of the Breast Imaging Reporting and Data System (BI-RADS®)? Why not extend that valuable information to our technologists who work so hard to obtain those images? There is perhaps nothing more gratifying than knowing that your work has contributed to saving someone’s life. I often follow up with my technologists regarding results from a diagnostic work-up, a biopsy or a needle localization that they were involved in. “The margins were clear on that bracket localization. Good job!” “We would have never seen that small cancer if you didn’t get far back onto that pectoralis.” “I can’t take credit for finding that axillary metastasis.” Give credit where it is due – and you will reach whole new heights with your technologist.

Encourage – I often say “Thank you” after every biopsy and procedure I do with my technologists. I often tell the truth to them as well. “If anyone can get this spot, it’s you.” Everyone wants to feel appreciated and recognized for what they do well. That appreciation and validation builds confidence and motivates our technologists to strive for excellence in every image they take because they know that it means something, that it matters and that it makes all the difference. The importance of
encouraging our technologists to ask questions whenever they are unsure of why the patient is presenting for a diagnostic evaluation or what views to get cannot be stressed enough.

**Empower** — Developing standard imaging protocols for callbacks and clinical symptoms in a variety of settings (i.e., age, pregnancy, lactating, post-mastectomy with reconstruction, etc.) will give your technologists the free reign to obtain initial images for you. This is also a huge time-saver. After you have developed a relationship with your technologists, they will learn what additional images you need. Why not give them the freedom to take them at that point?

I often say to my technologists, “I can’t do what you do and I can only see what you show me.” Indeed. A big “THANK YOU” to all the wonderful technologists I have ever worked with.

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**The 4 Es, continued from previous page**
RSNA 2014 Preview

By Jessica W. T. Leung, MD, FACP, FSBI

Celebrating its 100th year, the 2014 meeting of the Radiological Society of North America (RSNA) will be special, with the theme of “A Century of Transforming Medicine.” Tribute will be paid to the history of radiology: the science, the technology, and the innovators. As always, the meeting, held November 30-December 5, 2014, will commence the Sunday after Thanksgiving at McCormick Place in Chicago. N. Reed Dunnick, MD will open the meeting with the President’s Address.

On Sunday morning, there will be a special lecture entitled “Exceptional Opportunities in Biomedical Research” to be delivered by Francis Collins, MD, PhD, Director of the National Institutes of Health, notable physician-geneticist, and leader of the international Human Genome Project. Dr. Collins will focus on recent advances in biology and how such advances contribute to human health. Specific areas that he will discuss include: the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative; the Accelerating Medicines Partnership (AMP); and affordable technologies to optimally provide imaging to low resource areas. The Annual Oration in Diagnostic Radiology on December 2 will be delivered by David C. Levin, MD. In this era of healthcare reform, this lecture will be timely, topical, and intriguing: “Transitioning from volume-based to value-based practice: a meaningful goal for all radiologists or a meaningless platitude?”

Paralleling the ever-increasing nature of global connectivity, there will be not one but two countries featured in the international “Country Presents” series at the 2014 RSNA: Canada and Republic of Korea. The top researchers from each country will focus on cardiovascular imaging, each presenting at 90-minute scientific sessions: Korea on December 1st and Canada on December 2nd.

We are proud to report that a Society of Breast Imaging (SBI) Fellow, Etta D. Pisano, MD, will be honored as one of the three Gold Medalists at the RSNA meeting. Dr. Pisano is receiving this honor for her numerous and monumentous lifetime educational and scientific contributions, including her leadership in the Digital Mammographic Imaging Screening Trial (DMIST), which was the largest clinical trial ever led by a radiologist. Dr. Pisano, along with Drs. Gary J. Becker and Allen S. Lichter, will receive Gold Medals on December 2nd.

As in past years, the breast imaging learning opportunities will be multifaceted and designed for diverse levels of experience and expertise. On Sunday afternoon, the “State of Union” breast imaging lecture will be delivered by Dr. Daniel B. Kopans on Current Controversies, Dr. Carol H. Lee on Supplemental Screening Beyond Mammography, and Dr. Geraldine McGinty on Current Economic Challenges. A “Pros and Cons” controversy session will take place on Wednesday morning on the subject of “Breast Density Notification Legislation.”

In total, 13,485 science and education abstracts were submitted for consideration for presentation at the 2014 RSNA annual meeting. Of these, 2,703 were selected for scientific presentations and 2,151 as educational exhibits. The topics covered by the abstracts span the gamut of breast imaging; there is sure to be some learning for everyone. The offerings are too numerous to list; they will include tomosynthesis (technology, clinical applications, outcomes), ultrasound (both screening and diagnostic studies), various aspects of MRI (including diagnostic, staging, and treatment monitoring), emerging technologies (including contrast-
enhanced mammography), quantitative imaging, and breast density and risk assessment. Educational exhibits will enhance the educational experience, with many case-based and image-based exhibits and exhibits emphasizing imaging-pathologic correlation.

Hands-on workshops will be conducted on Sunday and Thursday afternoons on “MRI Imaging-guided Breast Biopsy” and Monday morning on “Ultrasound-guided Interventional Breast Procedures.” An interactive session on the “New BI-RADS” will take place on Wednesday morning. A special American Society of Radiologic Technologists (ASRT) lecture entitled “The Miracle of Breast MRI” will take place on Wednesday morning, when the concept of a limited protocol for MRI screening, also known as “abbreviated breast MRI”, will be introduced.

For those of you who cannot travel to Chicago, there will be a virtual meeting available, providing nearly 60 live-streamed and on-demand sessions, scientific exhibits and cases of the day. And for the foodies, there will be a “Sip and Savor Social” on the evening of December 3. With a $40 ticket to this event, you will be able to enjoy drinks, entertainment, and culinary treats by Chicago’s top restaurants. This will be a wonderful opportunity to network and socialize, reflect over the past century in radiology, and celebrate the new frontiers being explored.

REGISTER TODAY!

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Orlando, Florida
In Memorium:
Dr. Ellen Shaw de Paredes

By Phan T. Huynh, FACR, FSBI

A lbert Schweitzer said: “In everyone’s life, at some time, our inner fire goes out. It is then burst into flame by an encounter with another human being. We should all be thankful for those people who rekindle the inner spirit.”

Ellen Shaw de Paredes had an innate ability to connect with her patients. She was able to recall with ease countless patients’ names and their unique personal stories. Dr. Ellen, as she was often known to her patients, was more than their doctor; she was their friend, their aunt, their sister, their daughter. She was the pillar of support at their darkest hours, and she celebrated their finest victories.

Teaching was Ellen’s passion. Her thirst for knowledge was contagious. It was in vain to resist the influence of her power to start a research project or to work on an educational exhibit. True to her generous spirit, exchanging knowledge was her gift to scores of medical students, residents and fellows. More than a teacher and lifelong mentor, she opened her heart and along with her beloved husband, Victor, her home to all of us fortunate for having the opportunity to be trained by her. We became her extended family.

Two weeks prior to her untimely death, I received this text from Ellen: “We ran our intervention course yesterday and today and I was so happy to be able to give 3 lectures.” Dr. Ellen Shaw de Paredes lived to the fullest and fought the most valiant fight. It is for us, the breast imaging community, to carry on her legacy.
In Memorium:
Dr. Werner Alois Kaiser

By Stamatia V. Destounis MD, FACP, FSBI

Dr. Werner Alois Kaiser was a skilled radiologist and a wonderful teacher. As a researcher, he was responsible for many of the significant advancements in the field of magnetic resonance imaging (MRI) in the last thirty years. Dr. Kaiser passed away on December 27, 2013, in Bonn, Germany. His death marks the end of an era in breast MRI research and advancements of novel MRI applications. Dr. Kaiser was a true pioneer in our field.

Werner Kaiser was born in Buhl, Germany on May 10, 1949. He studied chemistry at Karlsruhe and at Freiburg, Germany, where he graduated in 1975. He received his medical degree in 1980. His residency training included pediatrics for three years, and at the completion of his residency, he became interested in MRI, which during that time was still rudimentary. Dr. Kaiser recognized the enormous potential of MRI and decided to return for additional training to become a radiologist. His residency started in Munich in 1983 and was completed at Nuremberg.

Dr. Kaiser negotiated with Siemens to explore MRI and started examining admitted patients at hospitals in the nearby region. Dr. Kaiser developed and investigated many new MRI applications, including cardiac and musculoskeletal techniques. However, breast MRI became his specific interest. Initially publishing on breast MRI in 1985, his early works included the first dedicated double breast coil and the introduction of dynamic contrast-enhanced (DCE) breast MRI. His contributions greatly influenced DCE imaging, an application that has helped to define and diagnose disease throughout the body. As a result, he was awarded the European Magnetic Resonance Award in 1991.

From 1990 to 1993 he worked as a Senior Radiologist and Assistant Professor at the University Hospital of Bonn, and published a major book titled MR Mammography (MRM). In addition, Dr. Kaiser published a detailed and extensive textbook on MRI and MR spectroscopy of the breast in 1992. In 1993, he became an Associate Professor at the University of Würzburg, and the following year became Professor and Chairman of the Radiology Department in Jena, a position he held until the end of his life.

Despite his extensive administrative responsibilities, Dr. Kaiser introduced the first MRI scanners in Jena, and tirelessly concentrated on breast MRI, gaining extensive diagnostic and technical knowledge on the subject. He and his coworkers were some of the first scientists to explore interventional image-guided treatments of early breast cancer, such as cryotherapy and magnetic thermoablation. For his work, he received the Wachsmann Award of the German Röentgen Society in 2003. Werner believed in meticulous quality control with regular case review sessions that were famous! The sessions were extensive and highly detailed and could last several days to weeks. He always shared his knowledge willingly, and he was a brilliant, tireless teacher, which made him very popular among students, fellows, and other radiologists.
Dr. Kaiser authored over 400 peer-reviewed papers, and he held 22 patents. His success as a teacher and as an example to radiologists is supported by the large number of his former fellows and residents who are now department heads and hold key positions in many radiology practices and departments around the world. He traveled extensively to present lectures, courses and workshops. He received several major awards from the scientific community, and he was a visiting professor at Harvard Medical School.

On a personal note, my first meeting with Dr. Kaiser was in Berlin, Germany at a panel discussion on mammography computer assisted diagnosis (CAD). Dr Kaiser warmed and engaged the crowd by taking the opposite view from the one I was presenting, and an interesting, lively discussion ensued that lasted, to the attendees’ delight, for a considerable time. I will never forget it and I consider it a personal highlight of my professional career. Since that time, which was more than 12 years ago, I have had the opportunity to interact with Dr. Kaiser frequently, and he was one of the most genuine, warm and passionate people I ever met in medicine and radiology. I was honored to be in his presence.

For his outstanding scientific achievements, Professor Kaiser will be honored posthumously by the Order of Merit of the Federal Republic of Germany. Dr. Kaiser is survived by his wife, children and grandchildren.
Dealing With Difficult People: Part 2

By W. Phil Evans, MD, FACP, FSBI – (Based on the works of Bill Crawford, PhD)

Many of you have heard of the Serenity Prayer, “grant me the serenity to accept the things I cannot change, the courage to change the things I can, and the wisdom to know the difference.” It can be thought of as a precursor to acceptance and change and as a ‘pause button’ before a difficult conversation begins. Remember what you cannot change (the difficult person), what you can change (your way of responding), and the wisdom to know the difference.

There are several reasons why we may perceive others to be difficult. First, they have a need to tell us something. Listen to what they have to say. Don’t just let them vent. Listen for what is important to them. They will give you the “key” to their cooperation. You will have valuable information to draw upon later. Demonstrate that you have heard and understood what they said.

Second, they are afraid that you don’t understand the seriousness of the problem. Empathize with them so that they can stop defending the seriousness of their problem and their right to be upset. It is not necessary to agree with them, but you can state that you can understand their difficulty and frustration.

Third, they don’t believe that you value their input or ideas. Ask them for their ideas and/or help. You could be surprised that they may have good and helpful ideas. Listening, empathizing and asking are all “receptive” skills.

Fourth, they are afraid that if you win, they lose. The key here is to problem-solve by taking an “active” role and blending their ideas with yours. It is important to realize that, as physicians, our natural tendency is to jump into the problem-solving mode first before listening, empathizing, and asking, as that has been our training. The receptive skills need to come before we attempt to problem solve or the cycle of conflict will not be broken. In your conversation be careful of the one word that negates everything in front of it: BUT. Change the word to AND. AND draws from their solution and your solution. For example, “I hear what you have to say, AND I have some thoughts as well”—not “I hear what you have to say, BUT I have some thoughts as well.” With AND, they will be more open to what you have to say.

Finally, they are afraid that we will blame or criticize them. Speak in a way that doesn’t put them on the defensive. Dr. Crawford emphasizes that we remember the “you stupid idiot” rule. Never speak in a way that sounds as if you could put “you stupid idiot” at the end of your sentence, such as “No, we can’t do it that way (you stupid idiot)!”. They will react as though we actually said it and be even more on the offensive.

We have now discussed how to deal with difficult people once conflict has begun, but how do we behave in order to prevent conflict? It begins with being clear about our current purpose and our vision of our future goals. Our past is our comfort zone, but the past prepares us to use old habits, beliefs or ways of responding that are incongruent with our current purpose. The question should be “Is my behavior congruent with my purpose and what I want to bring to this interaction?”, or “Am I reacting based on old habits and beliefs that really don’t serve me well?” Michael Levine said, “Sometimes we stay in Hell a long time because we’ve learned the names of the streets.”

It is important to choose an ‘energy’ that is congruent with your purpose. Difficult people may seem to be frightening or threatening. However, if you view them as threatened rather than threatening or frightened rather than
Dealing With Difficult People: Part 2, continued from previous page

frightening, then it may be easier to choose your reaction to them. Stress is likely to be the biggest indicator of our belief in the value and validity of our worries and fears. To the degree that we hold onto our fears about other people and how they will act as valuable and valid, we will experience stress. Therefore, stress may be a helpful indicator that we are holding onto beliefs that do not serve us. Choose your energy very purposefully—energies such as awareness, compassion, or even love—something other than fear. Finally, if you want to be influential and powerful in your interactions with others, you must take 100% responsibility for your ability to respond.

Dealing with difficult people is more about a change in us than a change in them. By understanding the basis for their behavior and using Dr. Crawford’s principles as discussed, we hopefully can have much better interactions with those whom we believe to be difficult.

REFERENCES

2014 Intersociety Summer Conference Report

By Janice S. Sung, MD, FSBI

The American College of Radiology (ACR) Intersociety Summer Conference (ISC) aims to promote collegiality in the field of radiology and open communication between the various radiology subspecialty societies. The Society of Breast Imaging (SBI) has participated in the ISC for many years. The 2014 ISC was held July 25-27 in Santa Fe, New Mexico and focused on “Reengineering the Radiology Enterprise.” Over 40 societies, including the SBI, were represented.

This conference emphasized the need for change that must occur for radiology to remain relevant in the evolving health care environment. There is near universal agreement that the United States’ health care system must undergo fundamental reform. National health care spending continues to increase each year, and despite spending the most per capita of all developed nations, health care outcomes in the United States are poorer than in many other nations that spend far less. The traditional fee for service model, which has long been the basis of the United States’ health care system, is not sustainable, and encourages the use of more tests without considering outcomes. The 2010 Affordable Care Act is an attempt to increase the quality and affordability of health insurance, lower the uninsured rate, and reduce the cost of healthcare for individuals and the government.

The impacts of health care reform are already apparent. Fewer advanced imaging studies are being performed, the payer mix has shifted to fewer private and more government-funded insurers, reimbursements have decreased, and
mergers have created radiology megagroups. Hospital administrators have also become more focused on reducing expenditures and more willing to use national groups to reduce costs. We must be aware of these changes and be prepared to respond.

How do we change? The recurring theme was that radiology must evolve to become a field that is patient-centered, data-driven and outcome-based. Our field must shift from one that is volume-based to one that is value-based. Cultural changes are difficult to implement, but these changes will be essential. Process improvement methods such as lean and six sigma that reduce both error and waste can be successfully implemented to improve quality and efficiency. Programs such as Kotter’s 8 step framework are available to lead change, which includes establishing a sense of urgency, creating a guiding coalition, developing a change vision, communicating the vision for buy in, empowering broad-based action, generating short term wins, never letting up, and incorporating changes into culture. The University of Colorado Health System (UCHS) emergency center and a private radiology practice in Colorado were used as case examples to demonstrate how these principles were employed effectively to bring dramatic change to dysfunctional systems. For example, at the UCHS emergency center, the door to provider time decreased from one hour to 12 minutes, and the number of patients seen per hour increased by 33%.

What types of changes are available? Imaging 3.0 is an initiative of the ACR based on the principle that radiology needs to take ownership of all aspects of imaging. This includes focusing on a value-based approach instead of the number of cases read and outcomes instead of just interpretations. Specific value opportunities include REACH, a program developed at Johns Hopkins where a clinician can have a virtual on demand consultation with any available radiologist in a reading room, allowing the radiologist to be an active, visible member of the treatment team. Clinical decision support is another opportunity, where tools are used to ensure that the correct test is ordered, reducing unindicated imaging studies, thereby also reducing radiation exposure and costs and improving patient outcomes. Image interpretation and recommendations vary widely among radiologists, and having standardized reports and recommendations is another step to reduce unnecessary studies, dose, and costs.

In summary, the United States’ health care system is going through major reforms, which undoubtedly will continue to substantially impact radiology. The 2014 ISC conference reminded us that as a field, we must anticipate these changes and be prepared to respond. The next steps will be for us to implement those reforms that will improve the quality and value of imaging for our patients to ensure an enduring position for our specialty. A consensus paper summarizing the conference will be published in the Journal of the American College of Radiology.
There are people who can be described with one praising word and Ellen Shaw de Paredes was one of them. The word to describe her would be magnanimous. Those who are privileged with having this trait are people who have greatness in spirit and are high minded. This unique gift is often subtle, and this was even more so with Ellen because of her very unassuming personality.

Her spirit of greatness was obvious when during her short life numerous awards and honors were bestowed upon her. She accepted these with her habitual grace and gratitude, and she was very happy, but this satisfaction could not match the joy and pride that were immense when letters from former fellows and residents would surprise her with their accomplishments. She would then become very emotional and share generously with me the words of recognition and appreciation for the support and advice that she had provided to her trainees.

When I think about Ellen’s mind, I measure its high quality for the generosity with which she judged other people; never with malice or ill feelings but always with kindness or forgiveness. The combination of her great spirit and clear mind probably contributed enormously to making her a very happy person. She was exceptionally joyful and fun to be around. She loved to make fun of herself and this, perhaps, was because of her connection with nature, where things are not artificial but spontaneous, as usually funny things are.

Ellen’s work ethic was second to none. Her sixteen to eighteen hour work days were not altered by weekends or even during her therapy. She would love to go to farmers’ markets and return home with her trove of colors, shapes and shades of nature’s gifts, and, thereafter, she would fix a beautiful French dish. Ellen loved to spend time with these farmers, many of whom were without insurance or never had a mammogram. She would solve these minor deficits with free care and answer the numerous medical questions that were waiting for her. Even when she was getting her chemotherapy, she was using her laptop to work on her next talk, always mindful that her participation in those events were an honor and her duty.

Ellen loved life and living things from hummingbirds to frogs to butterflies. She was always concerned about their needs and survival, sensing their struggle and the brevity of their existence, and, in many ways, comparing them with the lives of the underserved, whom she regarded as her moral obligation to help and support.

I could continue writing about Ellen, but I will stop here with the hope that someone with her same magnanimity will soon be following in Ellen’s path to give us the joy and genuine concern that has been taken from us.

Dr. Ellen Shaw de Paredes: Magnanimity

By Victor Paredes, MD
Radiation-Induced Breast Cancer Risks

By Jerrold T. Bushberg, PhD, FAAPM

Everyone is exposed to ionizing radiation from natural and medical sources. National and international scientific committees have been reviewing the literature and refining radiation-induced cancer risk for over 70 years. There is little doubt that the female breast is known to be highly susceptible to radiation-induced cancer when exposure occurs before menopause. For women exposed to ionizing radiation during mammography, the potential for an increase in the risk of breast cancer is of particular concern. The high prevalence and morbidity of breast cancer, and the often differing professional opinions about the risks and benefits of screening mammography exacerbate these concerns.

Epidemiological studies of groups of women exposed to ionizing radiation have conclusively found that sufficiently large radiation doses can cause breast cancer. These groups include: 1) the female survivors of the atomic bombings in Japan; 2) women given radiation therapy to treat Hodgkin disease and malignant and benign breast disease; 3) girls treated as infants or children for several non-malignant conditions such as enlarged thymus glands; and 4) young adolescents and women who received large numbers of diagnostic x-ray examinations to monitor tuberculosis treatments or to monitor the curvature of the spine during treatment for severe scoliosis. In fact, more is probably known about the patterns of breast cancer following radiation exposure than of any other cancer, including leukemia.

While epidemiological studies provide the primary basis for estimation of radiation-related risk in human populations, at dose levels typical of mammography (approximately 4 mGy), estimates of radiation-related risk are very uncertain. Even if risks were present at these low doses, the inherent difficulties involved in controlling for confounding factors and the statistical limitations associated with variations in a substantial baseline risk make epidemiological detection of such risks unlikely. Despite these challenges, risk estimates at low doses and dose rates continue based on extrapolation of observations at moderate to high doses (typically greater than 100 mGy). While the decades old debate of the linear-no-threshold (LNT) hypotheses (i.e., dose is linearly related to cancer risk with no threshold) continues, the scientific community is in agreement with the fact that, if there is risk at low doses, it is very small compared to the natural incidence of the disease.

There is epidemiological evidence of excess breast cancer cases associated with multiple fluoroscopic examinations for which the average breast dose was approximately 10 mGy per exam and the average cumulative dose over several years was approximately 800 mGy (1). However, this study and similar studies are not taken as definitive epidemiological evidence of proportionality between dose and risk down to a few tens of mGy because of the possibility that higher-dose fractions may have contributed disproportionately to the risk estimates (2).

The latest National Academy of Sciences report on the biological effects of ionizing radiation (BEIR VII Phase 2 in 2006) utilized a pooled analysis of data on atomic bomb survivors and medically exposed persons to evaluate the radiogenic breast cancer risk (3). The investigators interpreted the data to be best fit by a linear dose-response model without a threshold. The data from acute and fractionated (but high dose rate) exposure studies indicated that fractionation of the dose did not significantly reduce the risk of radiogenic breast cancer. There is some evidence that protracted (i.e., low dose rate) exposure to radiation in children reduces the risk of radiation-induced breast cancer compared with acute or highly fractionated exposures (4).
Several investigations have suggested that the presence of estrogen, acting as a promoter, is an important factor in the incidence and latency associated with spontaneous and radiation-induced breast cancer. The latent period ranges from ~10 to >40 years, with younger women having longer latencies. In contrast to radiogenic leukemia, which demonstrates a definite period of increased risk following exposure, there is no identifiable window of expression with breast cancer. Therefore, the risk continues throughout the life of the exposed individual.

The BEIR VII committee estimated that the lifetime attributable risk of developing breast cancer in a population of women with an age distribution similar to that of the United States-general population is $31.0/10^5/0.1 \text{ Gy}$. The risk is very age-dependent, being ~13 times higher for exposure at age 5 years ($9.1/10^5/0.1 \text{ Gy}$) than at age 50 years ($70/10^5/0.1 \text{ Gy}$). Using the age-specific values in the BEIR VII report, the lifetime attributable risks of developing breast cancer for females receiving a breast dose of 4 mGy (typical of mammography) at age 40, 50, 60, 70 or 80 are approximately one in 17,700, 35,730, 80,650, 208,300 and 325,000, respectively. Thus, for a women who receives an annual mammogram from ages 40-59 years and then biennially until age 80 years (total dose, 120 mGy) the estimated risk of radiation-induced breast cancer (assuming LNT and no other causes of death) would be approximately one in 1,400 (90% CI 1 in 2,700 to 1 in 900). This is significantly lower than the 2.8% lifetime risk of breast cancer mortality for the general population.

Thus, while the radiation-induced cancer risk for an individual patient is relatively minor, considering the high utilization of mammography and computed tomography (CT) in the United States and elsewhere, justification of the imaging procedure supported by current evidenced-based referral guidelines (5) and optimization of the exam to keep the dose As Low as Diagnostically Acceptable (ALADA) are important public health considerations. ALADA has been proposed as a variation of the familiar radiation protection acronym ALARA (As Low as Reasonably Achievable) to emphasize the importance of optimizing (rather than simply minimizing) radiation exposure in medical imaging (6).

While there is still some concern about radiation-induced breast cancer risks associated with mammographic screening and other diagnostic x-ray exams, it is reassuring that the risk of radiation-induced breast cancer decreases substantially with age at exposure. Regardless of the dose-response model one selects for risk estimation, there is no strong epidemiologic evidence for significant risks from exposures of post-menopausal women. In addition, typical doses received during breast imaging are substantially below the levels for which significantly increased risks have been detected. Thus, compared to other previously mentioned risk factors, radiation from diagnostic medical procedures is not considered to be a major cause of breast cancer.

REFERENCES
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