

From the Exhibitors' Hall: SNMMI Annual Meeting 2012

Attendees at SNM (now SNMMI) Annual Meetings have doubtless noticed that the summary sessions are increasing in number and popularity. The reasons are clear: (1) topics covered in the Annual Meeting have proliferated (now including multiple aspects of molecular imaging); (2) no one person can attend all of the scientific presentations of interest and still find time to visit posters, exhibitors, and special events as well as attend important meetings; and (3) attendees coming to the Annual Meeting are grateful to receive an overview of the important directions and innovations covered in the summary sessions by experts in their respective fields. After a careful review at the 2012 Annual Meeting in Miami, FL, in June, I believe that the same situation applies to the exhibitors' booths, which represent companies and other organizations that annually bring their newest products and services for display in the Exhibitors' Hall (Fig. 1). Even in the circumscribed space, too much was going on for a single individual to see everything.

In the same way that the new summary sessions bring an important overview of current changes and directions in the scientific endeavors of SNMMI, a "summary session" on the Exhibitors' Hall can offer a view of new manufacturing directions, changes to previous methods of providing services, and even a look forward to where businesses are expanding or enhancing their product lines. This overview will attempt such a survey of what the commercial booths and displays at the 2012 Annual Meeting seemed to be telling us about the current and future directions of nuclear medicine and molecular imaging.

I have always made a point to visit and examine the Exhibitors' Hall but, until this year, never took extensive notes. A primary responsibility of a summary session is to report on the state of the art, so that will be my primary focus. When appropriate, however, I will be relying on my



FIGURE 1. The Exhibitors' Hall at the 2012 SNM (now SNMMI) Annual Meeting.

memory for drawing contrasts with previous years of exhibitors' presentations and products.

Imaging Cameras

The Exhibitors' Hall is always highlighted by the main anchor industries of our field. These anchors are obvious by their size (i.e., the biggest booths), and this year, as is usually the case, GE, Philips, and Siemens were well represented. These "Big Three" companies include a vast variety of medical care products and subsidiaries, but one reason for their prominence on our exhibitors' floor is because they bring the newest generation of cameras for display and scrutiny. We come to see the new PET, PET/CT, SPECT, SPECT/CT, and PET/MR cameras for use in our imaging departments. Although radiopharmaceuticals are the "gasoline" that fuels our industry, we come to see the motors and slick designs that "drive" everyday clinical activities. The newest cameras and associated software (reconstruction, display, and analysis) developments on display in these largest booths have high visibility at every meeting.

The hottest topic this year was PET/MR imaging, which is swiftly making its way into clinical use. Siemens had a PET/MR scanner on display; Philips showed a miniature model of their combined (but physically separate) PET and MR unit; and GE showed a video of their combined scanner (in a room that often had a waiting line for entrance). The buzz was so strong over these newest scanners that it was impossible to miss them. Although relatively few (20–30) PET/MR cameras are operating clinically worldwide, this number will rise sharply over the coming year. Some development is still needed to make PET/MR scanners ready for prime time—most notably, how to apply PET attenuation correction from the MR scan. Several scientific sessions that highlighted methods for MR-based attenuation correction were attended with standing room-only audiences. The various methods currently used to apply this correction can introduce large variability in quantitative PET standardized uptake values.

It is interesting to report on some of the less-trumpeted but equally innovative camera developments that might go unnoticed amid the flurry of activity around PET/MR. One specialized cardiac SPECT camera, for example, stands out as different and quite innovative. The Alcyone 19-pinhole camera by GE is truly a new type of clinical camera. Pinhole camera designs have been used for several years now for small animal imaging, but the Alcyone is the first major manufacturer's clinical camera being evaluated



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for patient cardiac imaging that uses pinhole (instead of standard parallel/fan-beam collimators) as a “next generation” cardiac camera. A stationary camera for dynamic, gated SPECT imaging has important advantages, and the imaging community is looking forward to seeing how well this new design does in the clinical setting. Each pinhole (detector) obtains a projection view from a different direction (Fig. 2), so the reconstruction of all 19 views requires reconstruction methods more advanced than the multiple, independent 2D transverse-slice methods employed for conventional SPECT. These fully 3D reconstruction methods are more difficult to accomplish, but the camera benefits from a vastly enhanced sensitivity and, therefore, very short imaging times. The actual 19-pinhole collimator is a fascinating piece of engineering design.

In previous years, multiple companies showed their new camera designs at SNM annual meetings. Some of these companies, like Summit, Trionix, Park Medical, Sopha (SMV), IS2, Elscint, Picker, and ADAC, focused primarily on camera development and service. There was a time when even Raytheon (known for military defense contracting) built nuclear medicine cameras. This year I could find only 2 non-“Big Three” companies building new cameras for clinical use. Mediso Medical Imaging, a company based in Hungary, has an offering of standard-design SPECT and PET cameras coupled with CT. They offer designs for small animal imaging also. Neurologica, based in Massachusetts, has built a new generation scanner, an updated tomographic version of the early rectilinear scanners employing focused collimators. By scanning the focal spots of 24 detectors throughout the imaging volume, a high-resolution image of radiotracer uptake can be reconstructed. The complete scanning is accomplished by rotating the gantry around the patient while also opening and closing the “clamshell” gantry holding the detectors (Fig. 3). The engineering of this camera is quite impressive, and the images are indeed higher resolution than typically obtained using conventional parallel or fan-beam collimators.



FIGURE 2. GE's design for the 19-pinhole stationary SPECT cardiac camera. Left: schematic drawing of geometry involved whereby each pinhole views the heart from a different angle so as to obtain projections sufficient for 3D reconstruction of radiotracer distribution. Right: actual 19-pinhole array. (Courtesy GE Healthcare).

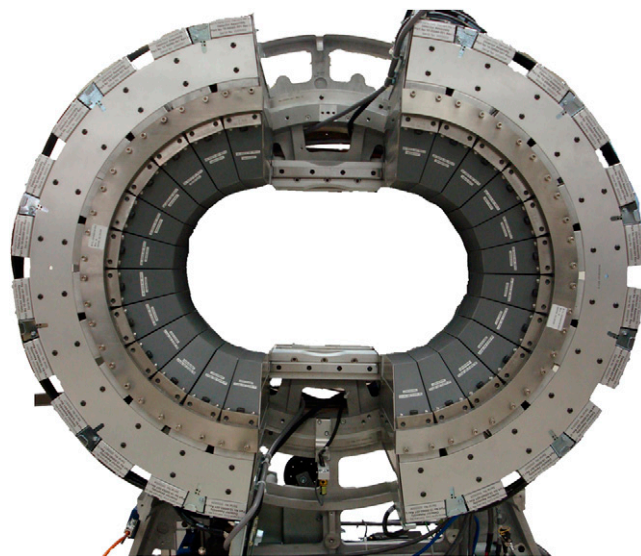


FIGURE 3. Neurologica's inSPira rotating and scanning SPECT brain camera. Internal workings with a total of 24 detector/focused-collimator units mounted on 2 semicircular (“clamshell”) gantry assemblies. (Courtesy Neurologica).

Imaging Support Industry

If cameras to a certain extent “drive” our interests and even define the parameters for the types and methods of imaging, an extensive support industry provides an array of products and services that make patient imaging possible. At the 2012 SNMMI meeting, these companies appeared to fit into 6 general categories (in order of increasing size): (1) small animal imaging instruments and preclinical laboratory equipment; (2) logistics services, data gathering and analysis, and clinical trial management (and even freight shipping); (3) independent workstations, software services displays, and PACS systems; (4) associations, certification, publication, and educational groups; (5) suppliers of biomarkers, precursors, chemical compounds, and (radio)pharmaceuticals; and (6) refurbished equipment/cameras and associated meters, hot cells, shielding, etc.

Another person might subdivide these offerings differently, but, in my view, each of the divisions outlined here targets different research groups, professionals, and funding sources. For example, chemists and radiopharmaceutical researchers are drawn to the biomarker and precursor booths; software programmers and image processors are drawn to the workstations and display/PACs booths; those with clinical imaging suites look to camera refurbishers; and preclinical research groups have interests in small animal scanners. It is important to note when a company or concern is mentioned here by name, it is not because that company is best in its category but, instead, because it is representative of a group of businesses that I have tried to characterize.

The smallest number of booths using this categorization scheme was that of small animal imaging and preclinical equipment. Only 5 booths were solely dedicated to support-

ing these types of studies (the operative word here is “solely”), with Bioscan from the United States and MILAB from Europe being the best known to me. I find the small numbers somewhat surprising, given that so many scientific presentations focused on small animal imaging. However, after some thought, it makes sense that these preclinical research groups have a very strong focus on publishing, so that many publications may be based on the products of only a few suppliers. It is also true that the Big Three companies each have a range of small animal imaging offerings, although this is not their primary focus.

The next category of business services can be described as logistics, data gathering, and clinical trial management. Thirteen booths represented this group of businesses, which have no instruments, gadgets, or even computers to directly sell to the target consumer. These companies describe themselves as offering “breadth and depth of expertise that spans the entire Molecular Imaging spectrum” to “provide comprehensive R&D programs” (Battelle Inc.). Others (NorCal, CarciNet) offer emotional support and attempt to network patients with similar illnesses. Many of these service companies are experienced consultants who can help to set up imaging centers, laboratories, and care facilities for patients. I personally did not know the details of these services until I started stepping into their booths and asking about what they offer. As a group they constitute a wealth of information and established expertise.

The next largest category of product offerings at the Annual Meeting included independent software workstations, image displays, and PACS networks. I counted 14 booths with central products focusing on software (which they often sell installed onto their specifically configured hardware platforms). These smaller businesses compete with the Big Three, who bundle clinical software, networking capabilities, and analysis programs together with their cameras. I believe it is fair to say that these smaller companies have the newest software earlier and may have flashier displays and eye-catching graphics. Also, when it comes to interfacing and combining multiple manufacturers’ scanners into a single department’s operation, these companies work very hard to make everything work harmoniously and often can mediate between 2 competing companies’ service people when interfacing or connectivity problems arise. Many of us recognize and use software from MedImage, MIM, Mirada, PMOD, Segami, Thinking Systems, and others. These were just the few that I could visit this year.

When visiting these software companies (including the Big Three), I made an interesting discovery. Because we are all still excited about having 2 new radiotracers approved by the U.S. Food and Drug Administration (FDA) within the past year (something that has not happened for decades), I inquired at these booths about DaTscan and Amyvid clinical analysis software. I found that clinical software packages for the evaluation of Parkinson and Alzheimer diseases are only in their infancy. After some thought, I realized that despite FDA approval, reimburse-

ments have not been fully established and the actual reports and evaluations that these clinical software packages would deliver have not been clearly defined. Moreover, offering clinical analysis software (replete with 510k approval) is not an easy process and involves validation studies with sufficient number of clinical (not clinical trial) subjects. Based on past development of quantitative cardiac analysis packages, it will be a year or so before competitive, finalized, quantitative brain analysis software is likely to be offered by these companies for use in hospitals and imaging clinics.

A total of 20 booths can be described as representing societies, associations, certification boards, and publication companies. Institutions like SNMMI and many others serve as “academic” organizations that schedule other complementary meetings, supply professional certifications, and encourage general professional networking. I also include publishers in this category. One thing stands out about these societies and associations: they are increasingly international. The Australian and New Zealand Society of Nuclear Medicine and the European Association of Nuclear Medicine have had booths in our Exhibitors’ Hall for many years. We are now hosting the Chinese Society of Nuclear Medicine as well as the World Federation of Nuclear Medicine and Biology. At the Sunday plenary session, the participation of international groups and attendees was recognized. This year 8 organizations and companies came to exhibit from Germany, 5 each from Canada and France, 3 each from the United Kingdom and Belgium, 2 each from Australia, China, Austria, The Netherlands, and Spain, and one each from Taiwan, Sweden, Hungary, Turkey, Switzerland, Japan, Russia, and Italy. We are a world forum.

The second largest category of booth presentations (42) offered biomarkers, precursors, chemistry compounds, and radiopharmaceuticals. These are the constantly resupplied “fuels” that drive our profession. This year, 5 of them mentioned “therapy” in their product offerings, reminding us that developments like therapeutic antibodies (ImaginAb Inc.) and ^{90}Y continue to play an important (if not the most important) role in our profession, in that these therapies seek to treat (not merely diagnose) cancers and other diseases. The majority of suppliers for these products focus on diagnosis, and the supply of PET biomarkers and PET precursors (compared to SPECT-based products) continues to grow.

The largest group of company booths (62 that I counted) represented cameras and instruments, hot cells, calibration flood sources, shielding, and general accessories. A number of these supply refurbished cameras, which for smaller imaging centers make good financial sense, especially in this still struggling economy. Most of these companies have a full “catalog” including anything one might need in a nuclear medicine department. Companies like Capintec, Pinestar Technologies, and Biodex stand out in my mind because for many years I have had (and still have) hardcopy catalogs from these companies on my shelf for ordering equipment and supplies. Such companies have

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lasting and productive collaborations with colleagues from across other disciplines. He was able to engage other specialists in working with his team at Duke to discover ways nuclear medicine could illuminate longstanding questions and bring novel insights to both diagnosis and therapy. Ed trained numerous physicians at Duke, many of whom are now recognized leaders in nuclear medicine and radiology. In training residents, he invariably emphasized the impact of imaging studies on patient care, and his teaching style incorporated a mixture of scientific evidence, anecdotal experience, and occasional humor. For this, he received multiple teaching awards during his tenure at Duke. He was also involved in the training of many physicists, graduate students, and postdocs and was a faculty member in the graduate medical physics program at Duke.

For those of us who had the privilege of working with him on a daily basis, Ed was a friend, a mentor, a colleague, and a leader: but most of all he was a genial spirit and an inspiration. No matter how busy things were, Ed always had time to listen. He treated everyone

he knew with respect and, in turn, was highly respected by all. Ed's many interests—his athletic ability (he was a member of the University of Evansville's national championship basketball team), his ongoing passion for sports (notably Duke basketball), his devotion to his children, his zest for travel (he successfully summited Mt. Kilimanjaro with his daughter, son, and son-in-law)—all characterized his enthusiasm for action. This enthusiasm carried over to the care of his patients and in his academic pursuit to revolutionize imaging and revitalize nuclear medicine practice.

Ed is survived by his wife, Irma; 2 daughters; 1 son; 2 stepchildren; 5 grandchildren; and 5 step-grandchildren. A memorial service was held on June 28 at the Duke University Chapel. A tribute to Ed's life and career is planned for later in the year.

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served us like "Sears catalog" suppliers of everything from leaded gloves to ventilation systems to calibration phantoms. Now that we are in the Amazon/eBay era of purchasing, DOTmed.com brings a strong Web-focused approach to purchasing/selling equipment, particularly for imaging.

This largest category of suppliers is extremely difficult to characterize. The specialized subgroups within this group are varied and too numerous to list. Some companies focus on supplying tungsten alloys (TLWM from China or M&I Materials) or hand-held probes (Crystal Photonics) or phantoms (Data Spectrum and The Phantom Library) or collimators (Nuclear Fields). The list of such specialized equipment goes on and on. Given more time and space, a summary session review of these varied suppliers of accessories and technologies alone would provide a worthwhile look at the current state of nuclear medicine research and practice.

Conclusion

The SNMMI Exhibitors' Hall is an astounding microcosm of experts, engineers, logistics networks, and business

entrepreneurs. It is here that the meeting attendee finds the successful ideas and instruments that are used primarily at "bedside." The fascinating and innovative new ideas presented at the "bench" in the scientific sessions have a long road to travel before they make it to the Exhibitors' Hall, where they are offered for use in hospitals and clinical centers. With more and more booths displaying instruments and services from a growing international world stage, the Exhibitors' Hall provides a one-of-a-kind current view on the state of the art in preclinical and clinical research and medical care in our field. A single snapshot helps to understand the current status of our industry and can be referenced to the history of previous developments, but it is the ongoing movie of dynamic changes in our field that is even more interesting and gives us clues about what the next year may bring.

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