



Revealing more diagnostic information with xSPECT Bone

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From its beginning nuclear medicine has constantly evolved, offering ever-better results and outcomes for patients. “But every so often along that journey there are quantum leaps,” says Iain Duncan, MD, co-founder of Garran Medical Imaging in Canberra, Australia. “xSPECT Bone is one of those leaps. No question.”

By Clement Webster | Photography by Geoff Comfort



Dr. Duncan, Nick Ingold, and Dr. Perera (opposite page) gather around Garran Medical Imaging's Symbia Intevo™ SPECT/CT to discuss a recently imaged patient.

Demands for more patient-centric care are reshaping the role of imaging. Technologies that differentiate good images from great ones—those that boost the level of clinically relevant information and offer clarity into a patient's condition—are finding their place.

For nuclear medicine, xSPECT Bone™ aims to accomplish such a differentiation by taking an entirely new approach in the generation of SPECT/CT images. Duncan explains that the technology, “seems to sidestep a limitation of SPECT/CT—the lower spatial resolution of the SPECT component of the fused imaging. With xSPECT Bone, at a fundamental level, the gamma information is re-engineered

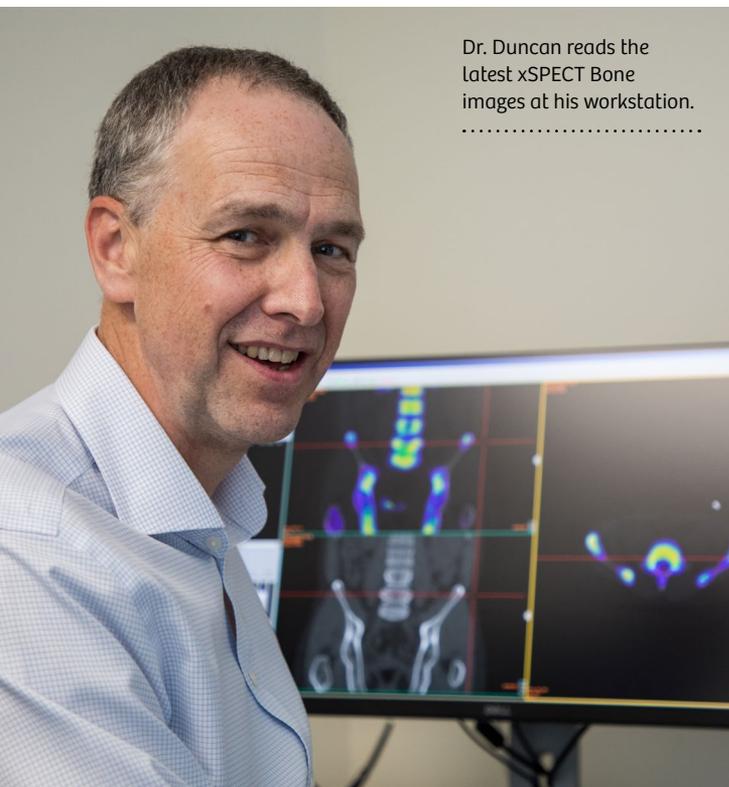
to use the detailed spatial information about the tissues from the CT scan. It's just a better image from the start, and the end result is a high-resolution bone scan with data that everyone can appreciate.”

When introduced in 2013, xSPECT Bone immediately caught Duncan's attention. Convinced this technology would have a major clinical impact, and provide great value to referring physicians, he and his team decided to install xSPECT Bone in their brand-new practice in Canberra, the Australian Federal capital. That was July 2015. Since then, Duncan has become one of the most active xSPECT Bone users in the world and a tremendous advocate of the technology in Australia.

A patient-centric approach

“With xSPECT Bone imaging, our reports consistently have a high level of information upon which we can act,” shares Duncan. “This helps us better communicate with our referrers so they, in turn, can better manage their patients.”

The ability to use this additional information is crucial. Duncan stresses that, “understanding individual patients is vital. One of the biggest pieces of advice I would give anyone starting with xSPECT is that you must be much more aware of the patient's background in relation to the scans. xSPECT Bone scans provide you with a lot more information.



Dr. Duncan reads the latest xSPECT Bone images at his workstation.

“The most frequent changes in diagnosis we have seen are related to sacroiliitis—which we diagnosed with xSPECT Bone imaging, but not on prior bone scans—focal inflammation in thoracic spine small joints, focal osteochondral injuries/ degeneration, and subtle bone stress lesions in athletes’ ribs and feet.”

Iain Duncan, MD, Garran Medical Imaging

Applying it in context to a patient’s history and symptoms is key, and it allows you to be very patient specific in your findings. All of our patients now fill in a detailed questionnaire about their symptoms and their pain, and they draw where their pain is on maps of the body,” he says. “The more information you can get about and from the patient the better the result.”

Recognizing how xSPECT Bone could potentially advance their practice’s efforts to provide patient-centric care, Duncan and team realized that, as with any change, they had to take proactive steps to understand the differences and benefits of their new technology. They also understood they needed to work closely with their referring physicians to help them leverage the additional information and insight xSPECT Bone offers over traditional SPECT/CT.

The clinical value of xSPECT Bone

With xSPECT Bone, Duncan admits he had to adapt his usual approach to analysis and diagnosis. “It’s a different way of looking at scans, so your brain has to adjust. Naturally, this takes a bit of time.”

To fully understand the clinical utility of xSPECT/CT Bone compared with standard SPECT/CT reconstruction, Duncan and team decided to prospectively evaluate their first 200 cases. “In August 2015, we set up a study where we performed sequential reporting of SPECT/CT followed by xSPECT/CT. Differences between the initial SPECT/CT and the final report (after xSPECT/CT Bone reconstruction) were documented and analyzed.

“Our findings, published in the *European Journal of Hybrid Imaging*, showed that xSPECT Bone imaging makes a big difference; it provided us more diagnostic information in 71% of scans,” Duncan emphasizes. At the end of the study, they concluded xSPECT/CT Bone reconstruction offers notable imaging improvements over standard SPECT/CT reconstruction algorithms. “When using xSPECT Bone, we changed our diagnosis in 20% of the cases. Since the imaging improvements are often clinically significant, they have the potential to improve diagnostic accuracy,” Duncan states.

The Garran Medical Imaging (GMI) team now performs all of their bone scans with xSPECT Bone, but according to Duncan, the technology has the most impact when imaging smaller lesions. “The most frequent changes in diagnosis we encounter are related to sacroiliitis—

which we diagnosed with xSPECT Bone imaging but not on prior bone scans—focal inflammation in thoracic spine small joints, focal osteochondral injuries/degeneration, and subtle bone stress lesions in athletes' ribs and feet," Duncan reveals. xSPECT Bone's impact is noticeable, "in defining uptake as articular rather than periarticular and in defining subtle bone stress lesions in ribs and lower legs," he adds. And, with the Australian Institute of Sport (AIS) and its elite athletes close by, Duncan and team find that xSPECT Bone allows them to more appropriately serve their orthopedic and sports-medicine communities.

Implementing xSPECT Bone

To guarantee GMI was able to leverage xSPECT Bone's capabilities, GMI's practice manager and chief technician, Nick Ingold, had to ensure the successful integration of the technology. "I had to confirm the workflows we use were set up correctly with the xSPECT Bone acquisition and reconstruction parameters. These are somewhat different from standard SPECT parameters and need to be correct for xSPECT Bone reconstruction to properly run. Because the image quality is so much better and quite different from traditional SPECT/CT, I also aligned with my nuclear physician to determine the best method of image display and his requirements for images being sent to PACS," he states. Ingold found that when he fused xSPECT Bone datasets with CT, the true benefit of the additional detail and resolution was even more evident.

Overall, the integration of xSPECT Bone was quick and made no significant change to daily workflow, Ingold stresses. "The system processing/reconstruction of the xSPECT Bone image takes slightly more time than traditional SPECT reconstruction, but this additional time does not pose any detriment or change to my daily workflow.

A referring physician's perspective

According to Chandi Perera, MD, director of the rheumatology unit at Canberra Hospital, the hospital and rheumatology department like to keep abreast of significant developments in medicine. Perera elaborates that the advent of xSPECT Bone was one of those developments. "xSPECT Bone is a powerful, advanced anatomical and functional diagnostic tool," Perera states. "The fidelity of the images is much higher than we have had before and, in terms of diagnosis, xSPECT Bone results in a much more sensitive image, which gives us the detail we require for decision making."

When asked what this means for patients, Perera shares that, "good images are helpful, but often don't reveal the level of information needed, which can potentially delay diagnosis. With xSPECT Bone, the images are great. Connecting the detailed imaging results with patient history and symptoms lends itself to more patient-specific assessments. In the end, it's the patients who benefit."

The transition to interpreting xSPECT Bone imaging at Canberra Hospital was smooth, he states. "Iain came to the hospital and talked about xSPECT Bone, so we were aware of what it could do. Another advantage is that Garran Medical Imaging is very close by, so we can easily discuss the images. He is able to layer the information and make very useful observations.

"When striving to deliver more patient-centered care, the clear reports help to provide insight into a patient's situation. They are also valuable when conferring with patients about their condition and the best course of care. xSPECT Bone is a communication tool as well as a diagnostic one," Perera concludes.

"After using xSPECT Bone, we also discovered that high image quality is not a question, even with a short acquisition time and/or lower patient dose. Decreasing the time per view of the SPECT acquisition or decreasing the dose administered to the patient does not degrade our image quality when we reconstruct with xSPECT Bone. This is great for saving time in a busy department and reducing radiation doses for our patients."

Spreading the word

The addition of xSPECT Bone imaging was a leap forward. "To spread the word about our new technology and its value, we held information sessions for our referrers and hosted two general practitioner education events that included orthopedic and sports-medicine clinical input," Duncan reveals. "I also gave specific lectures to rheumatology

5 considerations when implementing xSPECT Bone

The Garran Medical Imaging team's top five suggestions on how to implement xSPECT Bone:



1. Educate yourself on image differences between xSPECT Bone and traditional SPECT/CT (consider doing side-by-side viewing for the first few exams).



2. Create the needed workflows as soon as the software is installed.



3. Make sure communication with referring doctors is open and detailed.



4. Spend time educating referrers about the technology and the differences between xSPECT Bone and traditional SPECT/CT scans. Make sure they understand precisely how big those differences are and the benefits they offer.



5. Confer with referring physicians about the background of their patients. Have patients provide detailed information about their pain and medical history.

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Nick Ingold, B.MRS(NM), Garran Medical Imaging

and oncology groups at Canberra Hospital and to the physicians at AIS. Additionally, we put information about xSPECT Bone on our website, and I include direct links to this information in my reports.”

Duncan states that, “it’s all about communication. We can’t just offer great new services and expect them to be known. We have to show the community what we can do and how it is going to benefit them and their patients.”

Today, education remains a part of the practice’s aims and operation. “With xSPECT Bone, the images speak

for themselves. They are CT-like, a modality with which our referrers are quite familiar, but we still want to help them understand how useful the extra information can be.

“We find our referring physicians are quite satisfied with the precise reports and appreciate the open lines of communication,” shares Duncan. “A lot of them are reaching out to us now because they have come to understand that xSPECT Bone is something different,” Ingold adds.

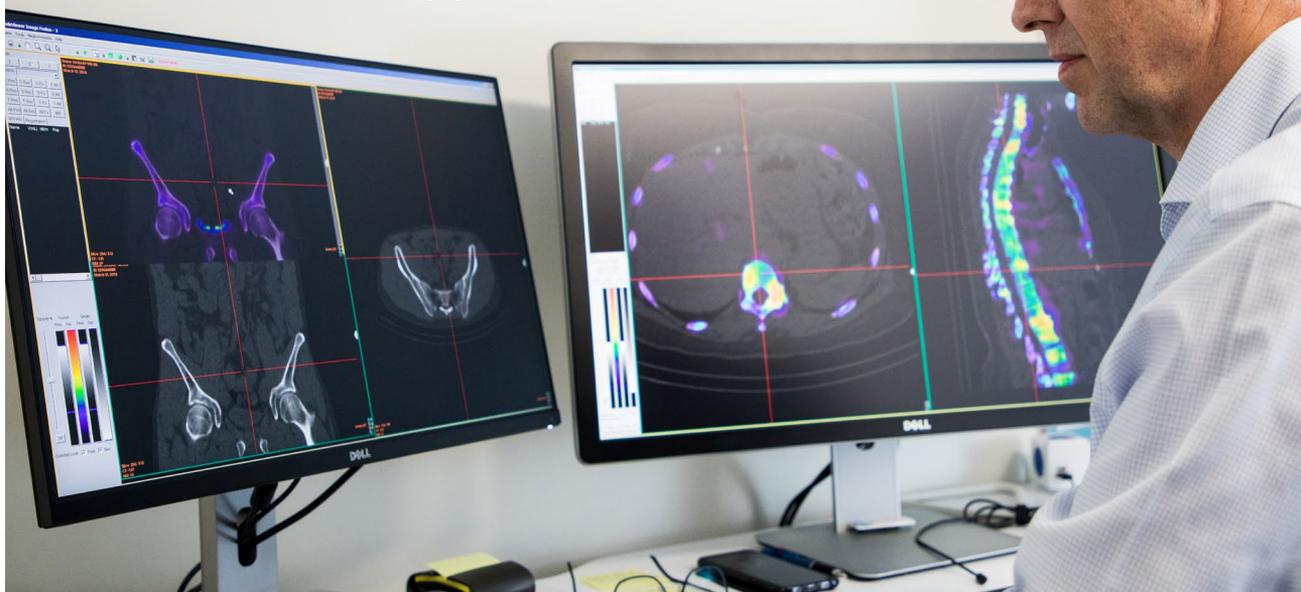
When recounting GMI’s experience with xSPECT Bone, Duncan further expresses that the clinical effect

of this technology is a positive and significant one. “The detail in xSPECT Bone, particularly for musculoskeletal problems, has allowed us to make bone-scan interpretation specific to each patient in a way never before possible. Our diagnostic confidence has increased dramatically. By providing a more complete picture of a patient’s situation, we can help facilitate better communication and more effective decision making.”

According to Ingold, “the additional information and resolution we visualize with xSPECT Bone is amazing. Subtle or no pathology on planar images is clearly

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Dr. Duncan examines the additional detail xSPECT Bone provides.

visualized with xSPECT Bone. These changes are real and may not have been recognized without xSPECT Bone. Referring doctors and patients can now look at nuclear medicine images and better understand what they see thanks to the high-resolution and anatomic detail that xSPECT Bone provides, as opposed to traditional SPECT/CT. The days of ‘unclear medicine’ are over now that xSPECT Bone is here.” ●

Explore Duncan & Ingold’s xSPECT Bone publication

<https://ejhi.springeropen.com/articles/10.1186/s41824-017-0024-9>

Learn more about xSPECT Bone

siemens.com/xspectbone

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