

New Imaging

Further Advancing Patient Care

The science of Diagnostic Imaging (DI) was born on 22 December, 1895. On that day, German physics professor Wilhelm Röntgen, the man who had discovered x-rays only a month earlier, took an image of his wife's hand which clearly showed the separate bones in her fingers. Since that seminal Sunday in Würzburg, DI has been helping us to understand, recognise, diagnose and treat an ever expanding range of medical conditions, writes *Dr Chris Wriedt*.

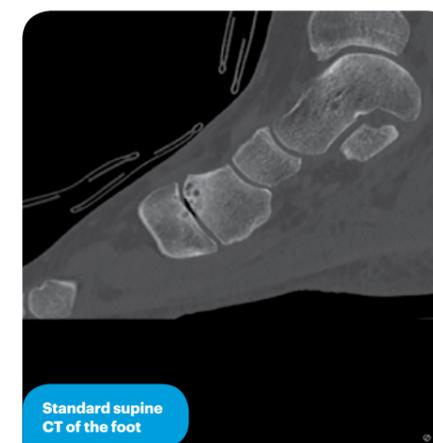


Wilhelm Röntgen

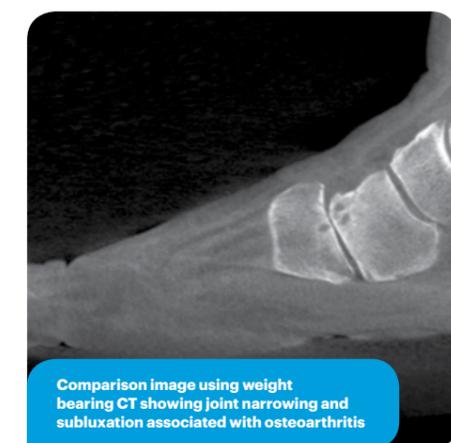


Röntgen's first "medical" X-ray
Image source: Wikipedia

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New advances in technologies and techniques have the ability to deliver significant benefits to clinicians and their patients. The following article outlines some of these advances that, while still relatively new to Australia, are starting to show tangible rewards. The challenge remains to make these advances more accessible to all. Access to most advances in medical imaging is too expensive for patients without Medicare funding.



Standard supine CT of the foot



Comparison image using weight bearing CT showing joint narrowing and subluxation associated with osteoarthritis

SPOTTING THE SUBTLE

Even with the best equipment and specialist training it can be difficult to diagnose subtle and occult bone injuries. This hasn't been helped by the fact that, until very recently, CT and MRI scanning had always been done with the patient lying down so that their extremities were not scanned in their natural weight bearing position.

That situation is now considerably improved, with the introduction of new "low dose" Weight Bearing CT technology. This technology allows images to be obtained in the functional position, which significantly helps diagnosis for clinicians and treatment for patients. Dr Andrew Rotstein at Victoria House Medical and I both see clear benefits of Weight Bearing CT for patients.

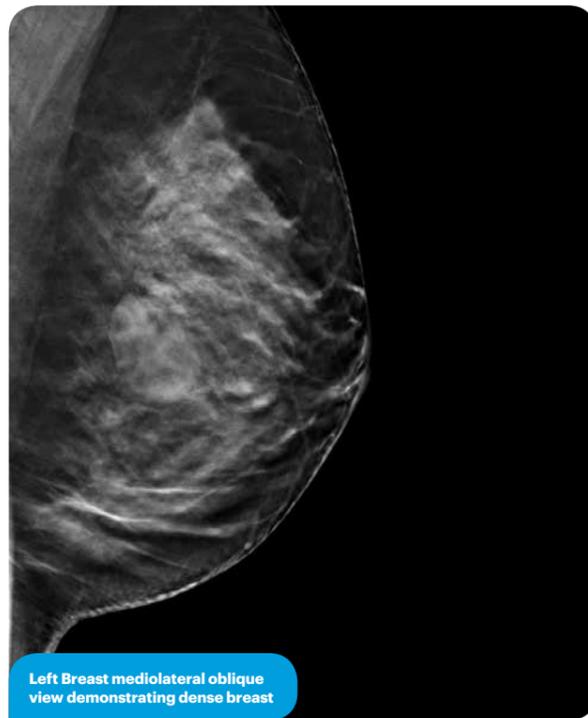
"Patient clinical indications include ankle syndesmosis injury (high ankle sprain), Lisfranc injury and joint malalignment associated with

degenerative diseases," Dr Rotstein said.

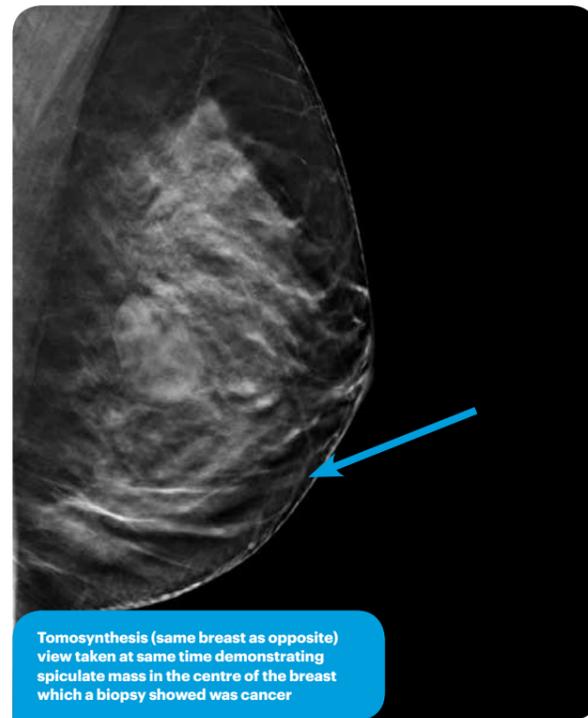
"Ankle syndesmosis, for example, has a prolonged recovery time so a timely and accurate assessment is critical to expedite treatment and recovery for the patient. Being able to assess the condition in its natural, weight-bearing state considerably aids in this process and that helps deliver a better outcome for the patient."

Not only do Weight Bearing CTs assist significantly with speeding up treatment and recovery times for patients, but they also generate approximately 10 per cent of the radiation of a more routine CT.

"Because the new scans are more likely to find the problem the first time, the need for repeat imaging with its associated radiation exposure, cost and aggravation is also greatly reduced," Dr Rotstein said. →



Left Breast mediolateral oblique view demonstrating dense breast



Tomosynthesis (same breast as opposite) view taken at same time demonstrating epiculate mass in the centre of the breast which a biopsy showed was cancer

BETTER FOR BREAST CANCER

No-one can argue that breast screening (mammography) has not contributed hugely to improved early detection of breast cancer in Australia. But, debate remains among researchers on whether the benefits are being countered by over-diagnosis, overtreatment and radiation exposure.

Both false positive and false negative results are distressing to women and their families. And, despite the best efforts of radiologists worldwide, there remains room for improvement.

The U.S.-based National Cancer Institute estimates mammography has a false negative (missed cancer) rate of up to 30 per cent, though many of these may be small cancers of doubtful biological relevance. The Institute believes false positives run at up to 10 per cent and, along with the intense psychological distress this causes, the additional testing needed to rule out cancer can be costly, time consuming and cause physical discomfort.

With that background, any improvement in mammogram accuracy – like that provided by tomosynthesis – should be welcomed by all. Tomosynthesis is a special kind of mammogram which

produces a three-dimensional image of the breast by using a swinging x-ray tube which takes pictures in an arc of usually 30 degrees. The x-ray dose is similar to that of a regular mammogram.

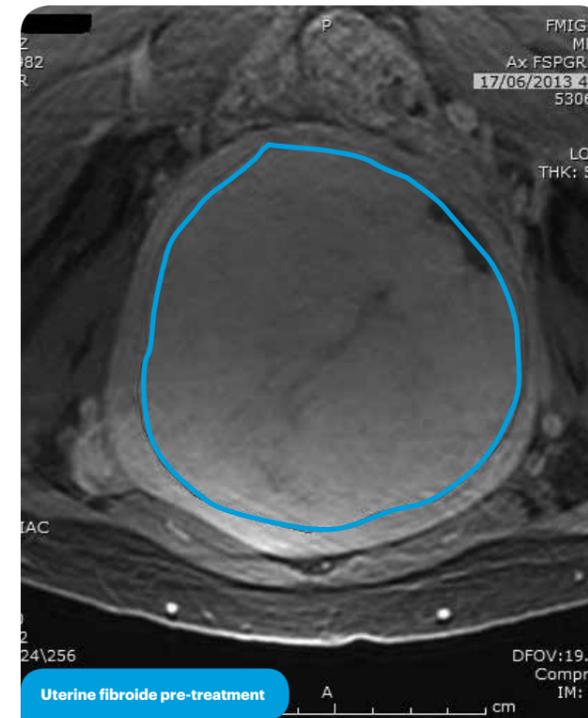
Tomosynthesis assists radiologists in two significant ways. Lesions are more perceptible in the multiple adjacent slices increasing sensitivity, and once these lesions are detected it is often possible to better characterise their features, thereby increasing effectiveness and reducing unnecessary recall.

In clinical trials, tomosynthesis used as an adjunct to digital mammography has been shown increase sensitivity for invasive cancer detection by 20-40 per cent in different series and at the same time reduce recall rates for non-cancer.

“The procedure can be done in just four seconds, which is much more patient friendly as women no longer need to hold their breath for long periods of time,” said Dr Manish Jain from Monash Radiology. “With tomosynthesis, the total number of images required in the work up of breast cancer is reduced, and once the imaging procedure is completed there is usually no need to take additional images.”

“The procedure can be done in just four seconds, which is much more patient friendly as women no longer need to hold their breath for long periods of time.”

Dr Manish Jain
Monash Radiology



Uterine fibroide pre-treatment



Uterine Fibroid post MRgFUS ablation

FIGHTING FIBROIDS

In Australia, uterine fibroids are one of the most common disorders of the uterus and are the most prevalent benign tumour in women of reproductive age. For most women treatment is not required but, for others, fibroids are difficult to live with.

For those women, existing medical and surgical options have now been broadened with the development of MRI-guided ultrasound ablation.

While this treatment has been available to patients in the United States for almost a decade, it still uncommon here – for cost rather than clinical reasons.

Dr Andrew Dobrotwir, a Director of Future Medical Imaging Group in Melbourne says the procedure has the potential to revolutionise the treatment of fibroids.

“Usually we would treat fibroids with surgery which has risks and there is no guarantee it will improve fertility,” Dr Dobrotwir said. “The MRI-guided ultrasound ablation allows patients the option of a non-surgical, outpatient procedure which can relieve fibroid symptoms and allow them to resume normal activity in a few days. “Another major attraction is that MRI-guided ultrasound ablation preserves the uterus and cervix, allowing for the possibility of future pregnancies.”

One such example of this is Melbourne woman Amy Cordel. She was diagnosed with a uterine fibroid the size of a tennis ball, and was in a tricky spot so doctors could not remove it.

“They couldn’t operate on it because of where it was; it was too risky, and would probably result in lots of bleeding and a high chance of ending up in a hysterectomy,” she told the Herald Sun in 2011.

Amy became one of the first to receive the ultrasound ablation treatment in 2009. After a six-hour procedure, she went home on the same day and was jogging three days after that. Four months later, a scan revealed her fibroid had shrunk by half and, two months later, she was pregnant. Amy gave birth to baby Neroli in early 2011.

While radiology is often an invisible medical specialisation to patients, it is providing medical specialists with greater visibility than ever to support diagnosis and treatment of wide ranging health conditions affecting patients in Australia.

The science of Diagnostic Imaging is central to health care and research. Patients are receiving quicker and more accurate diagnosis, they are getting more targeted treatment options, they are spending less time in hospital - and they’re returning faster to their families and jobs.

Wilhelm Röntgen would be proud.



» **Dr Chris Wriedt**
Vice-President of the Australian Diagnostic Imaging Association

» **ADIA** represents medical imaging practices throughout Australia, both in the community and in hospitals, and promotes ongoing development of quality practice standards so doctors and their patients can have certainty of quality, access and delivery of medical imaging services.

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