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Australian Diagnostic Imaging Association **Feature**

Breast Imaging – The Way Forward

At some point during our lifetime we will know someone affected by breast cancer. It is the most common cancer in women (excluding non-melanoma skin cancer) and accounts for 15.5% of all female cancer deaths in Australia.[1] It is estimated that 1-in-8 Australian women will be diagnosed in their lifetime[2] and the incidences of breast cancer are increasing – by 2020 it is estimated that there will be over 17,000 new cases of breast cancer in Australia alone.[3]

While breast cancer is well known, there are still a number of facts that are overlooked. For example, diagnosing breast cancer is far from easy. While risk factors such as a strong family history or known genetic mutation are known, only 5-10% of breast cancers are due to these factors.[4] Equally as difficult are issues such as breast density, which not only makes it more difficult to find breast cancer, it may also increase the risk of having cancer by up to six times.

Faced with these challenges, the diagnostic imaging sector is constantly striving to tackle breast cancer by developing techniques that enable it to be detected earlier and with greater accuracy. This article looks at the current methods used to find breast cancer and the advances that will transform the diagnosis and treatment of breast cancer in the years to come.

Breast Imaging Today

Dr Manish Jain, a radiologist and specialist in breast imaging, outlines four modalities that are used to detect and monitor response to treatment for breast cancer - mammography, ultrasound, Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) – and highlights the value of patient access to each of these modalities for both screening and diagnosis.

'The problem with breast cancer is that it is a collective term for a large variety of diseases. There are different types of breast cancer and not all are visible with any one modality. It's like looking at the world through different coloured lenses – you might only be able to see the road with one lens.'

Mammography, for example, is the first port of call when screening for breast cancer. Mammography, more commonly referred to as a mammogram, uses low energy x-rays to scan the breast and involves compressing the breast between two flat plates to obtain high quality images.

'However, the effectiveness of mammography is reduced if the breast tissue is too dense'.

More recently a process called tomosynthesis, commonly referred to as 3D mammography, has emerged.

'Over time I would expect that 3D mammography will replace conventional mammography completely. It has been shown to detect more cancers earlier and reduces both false positives and negatives. Unfortunately, at this stage, it is not covered by Medicare' says Dr Jain.

Ultrasound, another modality used to diagnose breast cancer, is often used to supplement a mammogram and is generally used to diagnose any abnormalities detected during a scan. Ultrasound can help to show additional features of an abnormal area and is also used to guide breast biopsies using the real time images ultrasound produces.

Similarly, MRI is also a supplementary tool for mammography and ultrasound for the staging of breast cancer or screening of high-risk patients. It has a number of benefits, particularly with breasts that are too dense for conventional mammography. There is no compression of the breast in MRI and it is more sensitive than mammography and ultrasound in depicting breast cancer. MRI scans are also beneficial as they do not use ionising radiation.

Unfortunately MRI for breast cancer attracts very limited Medicare funding. 'As far as Medicare is concerned, MRI is only available for screening, and only then in limited, high-risk individuals. For the staging of breast cancer MRI is not currently eligible for a Medicare rebate' says Dr Jain.

PET is another modality that is effective for the staging of breast cancer. A form of nuclear medicine, PET uses a radioactive tracer to locate cancerous cells. It has been shown to be more accurate than a conventional imaging[5] for initial breast cancer staging[6]. Unfortunately there is no Medicare rebate available for this procedure.

Dr Christian Wriedt
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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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While each of these modalities has an important role to play in the diagnosis and monitoring of breast cancer, new technologies are constantly being developed to increase the accuracy of breast imaging.

The Future of Breast Imaging

Dr Jain highlights two advances that are worthy of note in breast imaging – Contrast Enhanced Spectral Mammography (CESM)[7] and Breast Specific Gamma Imaging (BSGI).

CESM is a relatively new procedure that takes conventional mammography one step further. It creates more detailed images that assist in identifying breast cancer. The procedure involves injecting a patient with a special dye prior to undergoing a conventional mammogram and takes about 15 minutes to perform.

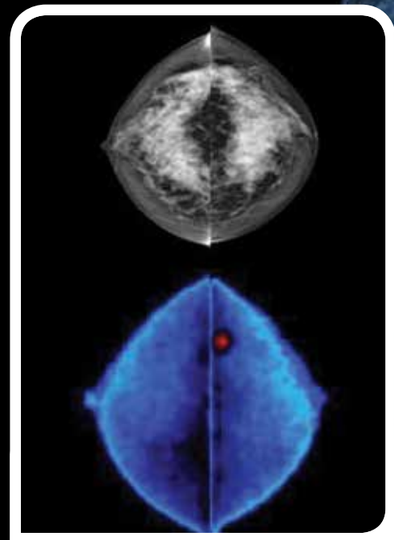
'Currently it is a new procedure with a limited application' says Dr Jain, 'but shows a great deal of promise in the detection of breast cancer'.

CESM has demonstrated a greater sensitivity than conventional mammography and may be useful in the identification of breast cancers in patients with dense breasts and for some patients it may be a viable - and less expensive - alternative to diagnostic MRI for breast cancer patients.

Breast Specific Gamma Imaging, or BSGI, is a form of nuclear medicine that is designed specifically for breast cancer. The process involves the insertion of a radioactive tracer that travels to the breast. Abnormal tissue takes up more dye than normal tissue and this is identified by a special gamma camera that captures images of the breast. The test takes approximately 45 – 60 minutes to perform.

BSGI has shown a great deal of promise in assisting clinicians with staging breast cancer and can help to identify if multiple breast tumours are present. It is also a valuable tool in identifying lesions within the breast that need a biopsy. Nuclear medicine breast imaging may be appropriate for patients with dense breasts or large abnormalities that are difficult to examine with mammography or ultrasound.

It is important to note that BSGI is not appropriate for the screening of breast cancer and has a limited ability to detect small abnormalities.



The impact of BSGI

TOP: a mammogram that is difficult to interpret due to dense breast tissue.

BOTTOM: Utilising BSGI, a lobular carcinoma was detected in a region that returned a benign biopsy in a patient with dense breasts

Where to from here?

At the end of the day it is essential that all patients have access to the correct imaging when dealing with breast cancer. However, the current funding arrangements make this difficult. Dr Jain highlights the importance of appropriately funding for the basic necessities for breast imaging, such as ultrasound and MRI.

'The lack of Medicare funding for diagnostic MRI and ultrasound limits patient access to these imaging modalities. This reduces the chances of detecting breast cancer early and early detection is essential because finding breast cancer early is both better for the patient and reduces the cost to the health system.'

At one time or another breast cancer will affect us or someone we love. It is essential that Medicare funding is available, not simply when screening for breast cancer, but also for patients who require imaging following their diagnosis. Breast imaging needs to be available to every patient – not just those who can afford to pay significant upfront costs.

Resources:

1. Australian Cancer Incidence and Mortality (ACIM) Books - Breast cancer for Australia (ICD10 C50). http://www.aihw.gov.au/acim-books/ [Accessed July 2015]
2. National Breast Cancer Foundation, www.nbcf.org.au/Research/About-Breast-Cancer.aspx [Accessed July 2015].
3. Australian Institute of Health and Welfare 2012. Cancer incidence projections: Australia, 2011 to 2020. Cancer Series no. 66. Cat. No. CAN 62. Canberra: AIHW [Accessed July 2015].
4. Sue-Anne McLachlan, 'Managing healthy women at risk of breast cancer', Australian Prescriber, Vol. 25 No. 6 2002).
5. The conventional multimodal algorithm utilizes X-ray mammography, breast ultrasonography, chest plain radiography, bone scintigraphy and ultrasonography of the breast, liver and axillary fossa.
6. Riegger et al (2012), ' Whole-body FDG PET/CT is more accurate than conventional imaging for staging primary breast cancer patients' European Journal of Nuclear Medicine Vol 39, 852–863
7. Fallenberg et al. 'Contrast-enhanced spectral mammography versus MRI: Initial results in the detection of breast cancer and assessment of tumour size', European Radiology, January 2014; 24(1), 256-64.