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National Horizon Scanning Unit

Horizon scanning prioritising summary

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**MRI screening for breast cancer: Screening
for breast cancer with MRI in genetically
high-risk women.**

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Enquiries about the content of this summary should be directed to:

HealthPACT Secretariat
Department of Health and Ageing
MDP 106
GPO Box 9848
Canberra ACT 2606
AUSTRALIA

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This *Horizon scanning prioritising summary* was prepared by Linda Mundy and Tracy Merlin from the National Horizon Scanning Unit, Adelaide Health Technology Assessment, Department of Public Health, Mail Drop 511, University of Adelaide, South Australia, 5005.

PRIORITISING SUMMARY

REGISTER ID: 0000062

NAME OF TECHNOLOGY: MRI SCREENING FOR BREAST CANCER

PURPOSE AND TARGET GROUP: SCREENING FOR BREAST CANCER WITH MRI
IN GENETICALLY HIGH-RISK WOMEN

STAGE OF DEVELOPMENT (IN AUSTRALIA):

- | | |
|---|---|
| <input type="checkbox"/> Experimental | <input type="checkbox"/> Established |
| <input checked="" type="checkbox"/> Investigational | <input type="checkbox"/> Established <i>but</i> changed indication or modification of technique |
| <input type="checkbox"/> Nearly established | <input type="checkbox"/> Should be taken out of use |

AUSTRALIAN THERAPEUTIC GOODS ADMINISTRATION APPROVAL

- | | |
|------------------------------|--|
| <input type="checkbox"/> Yes | ARTG number |
| <input type="checkbox"/> No | <input checked="" type="checkbox"/> Not applicable |

INTERNATIONAL UTILISATION:

COUNTRY	LEVEL OF USE		
	Trials Underway or Completed	Limited Use	Widely Diffused
United Kingdom	✓		
Canada	✓		
Netherlands	✓		
Italy	✓		
USA	✓		

IMPACT SUMMARY:

The AIHW reported 11,400 new cases of breast cancer in Australia with a crude mortality rate of 26.1 per 100,000 in the year 2000. Breast cancer is the most common registered cancer and the leading cause of mortality for women in Australia. Of these women, approximately 5-10% are considered to be high-risk due to the confirmed presence of the BRCA1 or BRCA2 gene mutation in either themselves or in relatives, or there is a history of breast cancer in multiple first-degree relatives.

The National Breast Cancer Centre in Australia (NBCC) estimates that <1% of the total female population of Australia would be considered at high-risk of developing breast cancer. The mutation frequency for both BRCA1 and 2 is estimated to be 1/1000 (source: NBCC). Figure 1 shows the number of familial high-risk women tested for BRCA1 and 2 in South Australia. Women who carry the BRCA1 or 2 mutation have a 40-80% or 30-70%, respectively, lifetime risk of developing breast cancer (source: South Australian Familial Cancer Service). In addition, more than half of these patients will develop breast cancer before the age of 50 and a significant number before the age of 35 (Kuhl 2002).

Conventional mammographic screening of asymptomatic women in Australia is targeted at women in the 50-69 age bracket (AIHW 2004). Detection and differential diagnosis of younger women is difficult to achieve with mammography (Kuhl 2002). This is due to pre-menopausal women having denser breast tissue than older women, which reduces the sensitivity of mammograms by up to 40%. Tumours in younger women may also be faster growing, and therefore missed by conventional mammography screening programs. Genetic screening for BRCA1 and 2 is available in Australia but currently does not have a Medicare Benefits Scheme item number and is only available for women who have been referred by a familial cancer service, after extensive counselling.

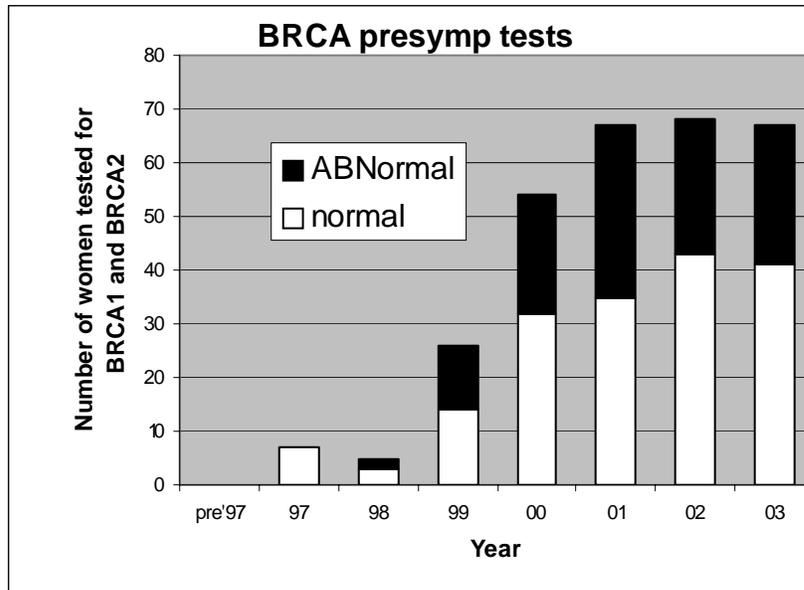


Figure 1 Familial, asymptomatic high-risk women tested for BRCA1 and 2 in South Australia (SAFCS)

Magnetic resonance imaging (MRI) is used to image internal structures, particularly soft tissues. MRI has been proposed as a screening tool for use in women at high risk of breast cancer for whom mammography is not suitable, usually because of age. The aim of MRI screening is to provide early detection of breast cancer and to increase the number of therapeutic options available to high-risk women. Currently many women identified as high-risk opt for prophylactic mastectomy rather than non-surgical options such as frequent mammographic screening. MRI is not feasible for population breast cancer screening because of cost and capacity. MRI scanners are currently available in major public and private hospitals in Australia therefore this technology would be widely available.

In a retrospective cross-classification study by Stoutjesdijk et al (2001), 179 high-risk women ($87\% \leq 50$ years of age) received biannual palpation in addition to annual MRI, mammography or both. Thirteen breast cancers were detected, seven of which were not detected by mammography or palpation. The diagnostic accuracy (area under the curve) for mammography was 0.74 [95%CI 0.68-0.79], compared to 0.99 [95%CI 0.98-1.0] for MRI. A subgroup of 75 women received an MRI scan and a mammogram within a 4-month period. The diagnostic accuracy (area under the curve) for mammography in this group was 0.7 [95%CI 0.6-0.8], compared to 0.98 [95%CI 0.95-1.0] for MRI. In the study by Warner et al (2001), 196 high-risk women (aged 26-59 years) underwent mammography, ultrasound, MRI and physical examination. Six invasive and one non-invasive breast cancers were detected by MRI. Of these, three cancers were detected by

ultrasound, two by mammography and two by physical examination. Similar results were reported by Podo et al (2002) where eight cases of breast cancer were detected by MRI from a group of 105 high-risk women (aged 25-77). Mammography and ultrasound detected only one cancer case. MRI detected one false positive case. No false positives were detected by mammography or ultrasound .

The UK National Health Service estimates the cost of targeted MRI screening as £350 per patient, per annum, and a cost per cancer detected of approximately £13,700. This compares with the current cost of population mammographic screening of between £5-8,000 per cancer detected (Brown et al 2000c). Another study by Tilanus-Linthorst et al (2000) estimated the cost per cancer detected using MRI as €13,930 compared to €9,000 for conventional mammography.

CONCLUSION:

There are currently limited options available to this vulnerable group of high-risk women. Based on the available evidence and the considerable international interest, it appears that MRI screening may be of benefit for women considered to be at high-risk of breast cancer.

HEALTHPACT ACTION:

It is therefore recommended that a Horizon Scanning report be conducted.

SOURCES OF FURTHER INFORMATION:

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Hartman, A. R., Daniel, B. L. et al (2004). 'Breast magnetic resonance image screening and ductal lavage in women at high genetic risk for breast carcinoma', *Cancer*, 100 (3), 479-489.

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SAFCS (South Australian Familial Cancer Service) (2003). 'Surgery to prevent breast and ovarian cancer'.

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Warner, E., Plewes, D. B. et al (2001). 'Comparison of breast magnetic resonance imaging, mammography, and ultrasound for surveillance of women at high risk for hereditary breast cancer', *J Clin Oncol*, 19 (15), 3524-3531.

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SEARCH CRITERIA TO BE USED:

Breast Neoplasms/*diagnosis/*genetics/*pathology/radiography/*prevention & control

*Genetic Predisposition to Disease

Risk Factors

Genes, BRCA1

Genes, BRCA2

Magnetic Resonance Imaging/*methods

Mammography/*methods

Mass Screening/*methods

Sensitivity and Specificity