Diagnostic Imaging

Breast Magnetic Resonance Imaging and High Risk Hereditary Breast Cancer

The Eastern Health Breast Site Group's definition of **"high risk"** would be those patients who have any of the following:

1. a known mutation in BRCA1, BRCA2, CDH1 (Hereditary Diffuse Gastric Cancer), or other genes predisposing to a markedly elevated breast cancer risk;

2. an untested first- or second-degree relative of a carrier of such a genetic mutation;

3. a family history consistent with a hereditary breast cancer syndrome, mutation unknown. Individuals eligible for MRI in such families would be *first-* (parent, child, sibling) and *second-degree* (grandparent, aunt, uncle, niece, nephew, or half-sibling) relatives of individuals with breast and ovarian cancer, where there are:
   a. Four or more relatives with breast* or ovarian** cancer at any age *on the same side* of the family, who are all first- or second-degree relatives of one another OR in a pattern suggestive of a hereditary cancer predisposition;

   b. Three first- or second-degree relatives with breast* or ovarian** cancer, *on the same side* of the family, with <u>ONE OR MORE</u> of the following:
      - One person affected < 50 years of age,
      - Breast and ovarian cancer in the same individual, bilateral or multifocal breast cancer in one individual,
      - Male breast cancer.

* includes ductal carcinoma in-situ (DCIS), but not lobular carcinoma in-situ (LCIS).

** refers to invasive non-mucinous epithelial ovarian cancer, includes cancer of the fallopian tubes or primary peritoneal cancer; excludes borderline ovarian tumors

To begin to identify these individuals, the physician would need to complete a thorough clinical history, family history, as well as a consult to medical genetics.

The Provincial Medical Genetics Program previously recommended screening for all patients at risk of developing hereditary breast cancer (presently been updated) in the form of:

1. a monthly self-breast exam,
2. clinical breast exam once or twice a year,
3. and an annual mammography, starting 5-10 years before the earliest breast cancer diagnosed in the family, but not before age 25.

The Eastern Health Breast Disease Site Group feels that enough evidence is now available to support the use of breast MRI screening for these high risk patients.

RECOMMENDATION

All patients found to be at high risk of developing hereditary breast cancer should undergo an annual screening breast MRI if requested by a referring physician. Optimally, the high risk patient should have alternate mammography with breast MRI every six months. See guideline for breast MRI for high risk patients, Eastern Health.

MRI is a noninvasive imaging technique that does not involve exposure to radiation. The primary goal of providing breast MRI to high risk women would be to reduce subsequent breast cancer mortality through early detection. Adversely, due to its highly variable specificity, MRI carries the potential risk of false-positive and false-negative findings. False-positives result in anxiety, further testing and possible biopsy for the patient, while false-negatives will miss a true cancer at a potentially curable stage.

This ‘high risk’ criteria should **not** be construed has the only circumstances under which genetic testing referrals should be sent, but rather only those circumstances which necessitate a breast MRI referral.

Clinical Practice Guideline for Breast Screening with MRI for Patients at High Risk for Hereditary Breast Cancer

Eastern Health Breast Disease Site Group

Questions:

What is the recommended screening protocol for breast MRI in **"high risk"** patients?

Target Population :

These recommendations apply to all patients who are deemed to be at high risk, as per the definition of Eastern Health, for the development of hereditary breast cancer.

Recommendations and Supporting Evidence :

Magnetic Resonance Imaging (MRI) has been shown to be superior in sensitivity to mammography, but significantly lower in specificity, resulting in a higher false-positive rate. Therefore, the recommendation would be for its use in screening only those patients at high risk for hereditary breast cancer (5,6,7,8,9).

If a patient does fit the criteria for high risk, annual screening breast MRI will be requested by the referring physician, and reported by a radiologist with specific training in breast MRI. For optimal screening, the high risk patient should alternate mammography with breast MRI every six months.

Breast MRI should be scheduled during the second week of the menstrual cycle (days 5 to 13) in premenopausal women. Occasionally, areas of normal hormonally sensitive breast tissue may enhance intensely on MRI which may cause a false positive reading. Therefore, examination is best performed in mid-menstrual cycle (10).

Guideline Development Process

The target users are of this guideline would be family physicians, other specialists, and other health care professionals.

The Eastern Health Breast Cancer Disease Site Group is a collaboration of professionals of all areas of health care, involved in the screening, diagnosis, and management of breast disease, in the province of Newfoundland and Labrador. These professionals include members of the provincial breast screening program, genetics program, radiologists, pathologists, surgical oncologist, medical oncologists, radiation oncologists, pharmacists, nurses, social workers, palliative care physicians and members of administration.

Due to rather limited resources, team leaders were designated for each discipline from the existing members of the Eastern Health Breast Cancer Disease Site Group. Literature searches were carried out by the Guidelines Coordinator and reviewed by the team leader, with which recommendations were then formulated, with input from all involved parties.

Literature searches were conducted in Pubmed, CINAHL, and the Cochrane Library and using keywords “breast MRI” AND “hereditary breast cancer”. All selected literature articles were in English and dated after the year 2000, unless the selection was a landmark study and would then be included.

Once the draft guideline has been developed, it is reviewed at the monthly meeting of the group. Feedback is welcomed, any revisions are carried out and consensus, where possible, is reached. The guideline is then circulated to select target users for feedback, and revisions made accordingly. The guideline is then presented to the administrative body for approval. Upon approval, it will be distributed to appropriate health care providers in the province.

This guideline will be reviewed and/or updated every 3-5 years, unless new research requires an earlier review.

These guidelines are a statement of consensus of NL Breast Disease Site Group regarding their views of currently accepted approaches to diagnosis and treatment. Any clinician seeking to apply or consult the guidelines is expected to use independent medical judgement in the context of individual clinical circumstances to determine any patient's care or treatment.

Literature Support for Breast Screening with MRI for Patients at High Risk for Hereditary Breast Cancer

1. Magnetic Resonance Imaging Screening of Women at High Risk for Breast Cancer: A Clinical Practice Guideline. Cancer Care Ontario.April 2007. www.cancercare.on.ca

2. MRI (Magnetic Resonance Imaging): Clinical indications for breast MRI. BC Cancer Agency. November 2004. www.bccancer.bc.ca

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5. Warner E, Plewes DB, et al. Surveillance of BRCA1 and BRCA2 mutation carriers with magnetic resonance imaging, ultrasound, mammography, and clinical breast examination. JAMA. 2004;292(11):1317-1325.

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7. Lehman CD, Blume JD, et al. Screening women at high risk for breast cancer with mammography and magnetic resonance imaging. Cancer. 2005;103(9):1898-1905.

8. Lord SJ, Lei W, et al. A systematic review of the effectiveness of magnetic resonance imaging (MRI) as an addition to mammography and ultrasound in screening young women at high risk of breast cancer. Eur J Cancer.2007; 43(13):1905-1917.

9. Kriege M, Brekelmans CTM, et al. Efficacy of MRI and mammography for breast-cancer screening in women with a familial or genetic predisposition. N Engl J Med. 2004; 351(5):427-437.

10. Delille JP, Slanetz PJ, et al. Physiologic changes in breast magnetic resonance imaging during the menstrual cycle: Perfusion imaging, signal enhancement, and influence of the T1 relaxation time of breast tissue. The Breast Journal.2005;11(4):236-241.