Molecular breast imaging: a qualitative study

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Introduction

Breast screening using mammography has relatively low sensitivity to cancer in dense breast tissue. A small number of retrospective studies have shown Molecular Breast Imaging (MBI), to have a higher sensitivity in this group (Fig 1). Perceptions of MBI among UK stakeholders (including radiologists, technologists, and Public Health England) are unknown and are key to understanding the value of, and route to, adoption.

Method

10 semi-structured interviews with stakeholders about the NHS Breast Cancer screening pathway, new MBI pathway(s) and routes for MBI adoption were thematically analysed using Nvivo software.
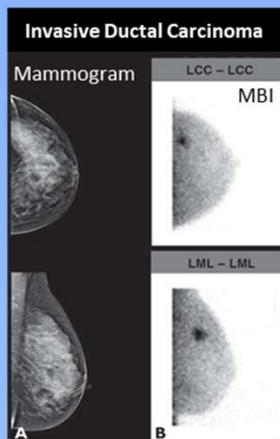

Figure 1: Rechtman et al. (2014) *Breast-specific gamma imaging for the detection of breast cancer in dense versus nondense breasts.* AJR Am J Roentgenol. 2014 Feb;202(2):293-8.

Consultant Clinical Oncologist (S001) & Consultant Clinical Geneticist (S010)

'[People are] very keen to have scans. A CT scan is not an insignificant dose of radiation. Mammography is a very small dose. This is a very small dose. But people are actually relatively cool about it in a way which surprises me.' S001

'barriers to adopting it are … the time it takes to do the investigations.' S001

'the group that I worry about more is the strong family history but no identified faulty gene. It doesn't mean there's not one there, it's just we can't find it. At the minute, they are only screened via mammography from the age of 40.' S010

Consultant Breast Radiologists (S005, S006, S009, S011) & Senior Breast Radiographer (S003)

'The need for breast services exceeds capacity at the moment … An hour per screen is just not practical' 'The additional [radiation] dose isn't necessarily a barrier' S005

'So, we had to have staff who are willing to learn to inject. That was one problem. Then you had to train them.' S003

'women worry about the radiation dose of mammography and I think would be more worried about the radiation dose of molecular breast imaging even though, in medical terms, it's negligible.' S006

'You haven't shown me any data that helps me make that decision [addition of biopsy], so what you need to do is tell me how many lesions are picked up on MBI only…It may well be that if you're using this as a screening test, that that might not be a problem, but without the data, we can't say that.' S011

'the disadvantages are small tumour detection, dose, cost, time and small cancer detection and all the faffing involved with administering anything to do with nuclear medicine.' S009

Policy (S007, S001) & Nuclear Medicine Specialists (S002, S004)

'the practical difficulties of charging around the countryside with your radioactive material probably exceed the benefits. [but] It's not impossible.' S001

'about the time. It doesn't sound terribly practical at the moment.' S007

'it's probably important to determine how you do that and whether you're going to use any ratios or you're going to use any quantitative measures to determine what is positive or negative, as opposed to just eyeballing it, which helps in something which is novel and tentative.' S004

'whilst you are keen to turn it into a breast screening technique, it's really only going to be in dense breasts, problem solving … The advantage is that you've got a potential solution to the high-density breast problem.' S002

Results

Six themes were identified:

1. **Scan time** (40min) and radiation dose (administered activity 740MBq) are inversely proportional. Reducing both is important, but time appears to be the bigger barrier to implementation.
2. An MBI **biopsy function** could be valuable.
3. **Mobile MBI services** seem unfeasible. Although nuclear medicine scans could be implemented in mobile units, maintaining safety would be expensive.
4. **Location**, staffing, and radiotracer management require careful planning. Preparation of tracers requires specialist radiopharmacy facilities. The skills and expertise of both breast screening (for breast positioning) and nuclear medicine (for image acquisition) staff are important.
5. **Diagnostic interpretation** of MBI images (automated by contrast-to-noise ratio, and/or visually by radiologists), and **minimum lesion detectability** (for identification of the smallest tumours) must be established and validated.
6. MBI is highly unlikely to replace mammography, but **may be valuable** for:
   - screening woman with dense breasts/implants/at higher risk of breast cancer (as an MRI alternative),
   - monitoring disease response during neo-adjuvant chemotherapy,
   - post-cancer surveillance in dense breasts.

Conclusion

Initial evidence suggests a potential place for MBI in a UK system for specific population subsets. Further work is underway to refine pathways and design studies evaluating the effectiveness of the technology.