



QCIF Technology Diffusion Project Progress Report 5, August 2007

1. Project Identification

1.1 Administering Organisation

The University of Queensland

1.2 Project Title

Improved Breast Cancer Detection Enabled by Rapid Visualisation of Suspicious Lesions in DCE-MRI of the Breast
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1.3 First-named participant

<i>Name</i>	Dr Andrew Mehnert
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1.4 Other participants

<i>Name</i>	<i>Institution</i>
Dr Stephen Wilson	The University of Queensland
Prof Stuart Crozier	The University of Queensland
Dr Kerry McMahon	Queensland X-Ray
Mr Dominic Kennedy	Queensland X-Ray

2 Project Description and Objectives

2.1 100 Word Project Summary

<p>The large quantity of data acquired during a breast MRI examination is difficult for clinicians to review and the cost of missed or incorrect detection of cancerous lesions is high. This project will develop software for visualising dynamic contrast-enhanced MRI data of the breast as a colour-coded volume that can be used in the routine clinical setting to identify regions of suspicious enhancement with greater accuracy and speed than can be achieved by current practice. Parallel and grid-based supercomputing will be investigated for the purpose of generating a visualisation in an amount of time that is acceptable in the clinical setting (minutes).</p>

2.2 Summary of original objectives

<p>The primary objective is to develop software for visualising 4D DCE-MRI data of the breast as a single colour-coded volume (each voxel is colour-coded to reflect its enhancement kinetics) that can be used in the routine clinical setting to identify regions of suspicious enhancement with greater accuracy and speed than can be achieved by current practice. The secondary objective is to implement the computationally demanding model-fitting backend of the visualisation software, using parallel and grid-based supercomputing, such</p>

that visualisation can be achieved in an amount of time that is acceptable in the routine clinical setting.

3 Project over Duration of Funding

3.1 Have there been changes to the project (yes/no)? If yes, give details.

No

3.2 What were your research plans and objectives for the period covered by this Report?

This report covers progress for the second quarter of 2007. The major research plans and objectives for this period (as outlined in the last progress report) relate to clinical evaluation of the visualisation software by a radiologist from Queensland X-Ray. In particular we planned to: (i) complete model-fitting and colour-coding the “ground-truthed” Queensland X-Ray data described in our first report; and (ii) to use the tracing software described in our last report together with a subset of the colour-coded data (data for which we have both MRI and pathology findings) to undertake a clinical evaluation of the visualisation (as described in our original proposal).

3.3 Did the research project proceed as planned? What have you achieved over this period?

The project has proceeded as planned but not at the rate anticipated.

Model-fitting / colour-coding

- We performed model-fitting and colour-coding on 14 DCE-MRI datasets from routine clinical practice.

Clinical evaluation

- We experimentally evaluated the visualisation/tracing software using the 14 datasets above. Experimental results show that using the visualisation/tracing tool a medically trained operator can achieve the same sensitivity for the detection of malignant lesions as a radiologist using conventional manual interpretation, but with better specificity.

MICCAI (10th International Conference on Medical Image Computing and Computer Assisted Intervention)

- Our clinical evaluation results were written up as a paper which has been accepted for presentation at the *MICCAI workshop on Interaction in Medical Image Analysis and Visualization*.

3.4 Have you experienced any difficulties that have affected the progress (yes/no)? If yes, give details.

Yes.

- Progress was slowed because of Dr Mehnert’s teaching commitments and time spent writing an ARC Discovery grant application based, in part, on the results of this project.

3.5 What are your research plans and objectives for the coming quarter?

- To complete model-fitting and colour-coding of the remaining “ground-truthed” Queensland X-Ray data described in our first report.
- To undertake a clinical evaluation of the visualisation/tracing software using a radiologist in addition to a medically trained operator.

4 Academic Outputs

4.1 Publications and other academic outputs

(Enter the number of publications in each category, for the period covered by this Report. Where appropriate, enter full publication details; include ‘published’ and ‘in press’ publications, but exclude ‘forthcoming’ and ‘submitted’ work.)

Item	Category	Number	Publication Details

5 Certifications

5.1 Certification by first-named investigator

I certify that:

- This is an accurate progress report for the period covered; and
- All named investigators are in agreement that this report is an accurate representation of the current progress of the project.

1st-named Investigator signature _____

Date _____