

Fat suppression for Dynamic Contrast Enhanced MRI of Breast Cancer

- Robust to spatial non-uniformity of magnetic field
- Improves contrast between enhancing tissues with different types of uptake kinetics
- Allows computation of mammographic density with the prospect of identifying subjects suitable for breast screening
- Results in faster and more reliable localisation of lesions and the tumour contour is clearly defined

Background

Effective fat suppression in images is of major importance for dynamic contrast enhanced MRI of the Breast. Current approaches rely on subtraction and active fat suppression. Subtraction increases white noise of the resulted difference image. Active fat suppression is highly susceptible to magnetic field spatial non-uniformity, and may result in longer acquisition time and increased power deposition. As a result the tumour's outline may not be well defined, and important details may not be clearly visible.

Development

Scientists at ICR have developed a method of fat suppression via post processing based on multivariate statistical analysis of individual voxel uptake vectors. (ie. Set of values representing a temporal evolution of the signal from a voxel.)

The work so far has shown that the method is robust to tissue heterogeneity and non-uniformity of the magnetic field, it defines clearly the lesion's outline and improves contrast between enhancing tissues. This can be used to discriminate between lesion and normal parenchyma or blood vessels, and to identify the lesion's structure. Additional application of the method is measurement of mammographic density: the relative part of breast volume occupied by non-fatty tissue. The method is subject to clinical evaluation.

Inventors

Dr Michael Khazen is the principal scientist leading the work at ICR with Professor Martin Leach. Professor Leach is a director of imaging research and cancer diagnosis at the Cancer Research UK Clinical Magnetic Resonance Research Group, ICR and Royal Marsden NHS Foundation Trust.

Key Publications

Khazen M, Leach MO,
"Excitations independent fat suppression for DCE-MRI of breast cancer, using a multivariate statistical approach,"
Proc.Intl. Mag. Reson. Med. (2004) 11, 830.

The UK Breast Screening Study Advisory Group,
"MRI Imaging Screening in Women at Genetic Risk of Breast Cancer: Imaging and Analysis Protocol for the UK Multi-centre Study,"
Mag. Res. Imaging (2000) 18, 765-776

Intellectual Property

ICR has filed a patent application relating to the method for image processing, which is currently at the PCT stage. In addition ICR has a considerable body of expertise and know-how surrounding MRI which will enable applications of this technology to be progressed rapidly and effectively.

Commercial Opportunity

ICR is currently seeking a partner for licensing and collaboration to undertake further development of commercial products based on this technology through to market. The partner would receive exclusive commercialisation rights to the technology.

The Institute of Cancer Research

The ICR works in a unique partnership with The Royal Marsden Hospital forming the largest comprehensive cancer centre in Europe. ICR spends on average 75 million pounds a year on research and employs over 1200 scientists and support staff.

It has a world-wide reputation for excellence based on a continued tradition of achievement.

The ICR is also responsible for many of the scientific advances which have made a difference to people's lives in recent decades.

The Royal Marsden 
NHS Foundation Trust



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