

# Method for Correcting Spatial Distortion in Magnetic Resonance Images

ICR Licensing Opportunity  
November 2012

- Robust and fully automated software tool for correcting MR images for effects of B0 inhomogeneity
- No noticeable loss of image quality in regions of low signal
- Suitable for use with large field-of-view, extra-cranial images
- Potential benefit for MR-based radiotherapy treatment planning
- Unique phantom for quality assurance

## Background

Advances in external beam radiotherapy necessitate accurate delineation of tumour volume and adjacent structures at risk. Magnetic resonance imaging (MRI) offers superior soft-tissue contrast compared with conventional x-ray CT but suffers from inherent geometric distortions. These distortions have to be corrected if MRI is to be applied successfully to radiotherapy treatment planning.

## Development

A comprehensive study of the key determinants of geometric distortion in MR images is being carried out in an ongoing programme of research at the ICR.

This work has led to the development of a novel mutual information-based method for correction of static-field inhomogeneities, which is supplemented by further known methods for correction of gradient-based distortions to deliver MR images of high geometric accuracy suitable for use in radiotherapy treatment planning.

The method does not require quantification or knowledge of the inhomogeneity and therefore can be applied to patient-induced field inhomogeneities and can be implemented on any clinical scanner. The method also performs better than other currently published methods for chemical shift artefacts. We have also developed a unique phantom which is particularly good for areas like the shoulders.

The phantom can aid MRI quality assurance and together with the software provides a complete testing package.

## Inventors

The original software was written by Professor Martin Leach, Dr Stefan Reinsberg and Dr Simon Doran at the ICR, ongoing work is being performed by Dr Simon Doran and Dr Maria Schmidt. They are based within the Cancer Research UK Clinical Magnetic Resonance Research Group at ICR and The Royal Marsden NHS Foundation Trust in Sutton, Surrey, UK.

## Key Publications

Reinsberg SA et al,  
"A complete distortion correction for MR images: II Rectification of static-field inhomogeneities by similarity-based profile mapping,"  
Phys. Med. Biol. (2005) 50, 2651-2661.

Doran SJ. et al,  
"A complete distortion correction for MR images: I Gradient warp correction,"  
Phys. Med. Biol. (2005) 50, 1343-1361.

## Intellectual Property

The software in this project is protected by copyright owned by the ICR and the phantom by unregistered design rights. In addition, the ICR has a considerable body of expertise and know-how surrounding MR imaging and also in radiotherapy treatment planning, which will enable applications of this technology to be progressed rapidly and effectively.

## Contact

Contact: Paul Carnochan, Senior Business Development Manager  
e-mail: paul.carnochan@icr.ac.uk  
Telephone: +44 (0) 20 7153 5213

# Method for Correcting Spatial Distortion in Magnetic Resonance Images

## Commercial Opportunity

The ICR is currently seeking a licensing partner to take the product to market. The partner would receive exclusive commercialisation rights to the technology. The team are also willing to explore collaborating to further develop the technology.



In partnership with

*The* **ROYAL MARSDEN**  
NHS Foundation Trust

## Contact

Contact: Paul Carnochan, Senior Business Development Manager

e-mail: [paul.carnochan@icr.ac.uk](mailto:paul.carnochan@icr.ac.uk)

Telephone: +44 (0) 20 7153 5213

The Institute of Cancer Research: Royal Cancer Hospital,  
123 Old Brompton Road, London, SW7 3RP, UK  
[www.icr.ac.uk/enterprise](http://www.icr.ac.uk/enterprise)