

Volume 7 - Issue 2, 2007 - Country Focus:Sweden

MR Research in Sweden - Late-enhancement Cardiac MRI Detects Past Infarctions

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Uppsala University Hospital is a research hospital. Advanced clinical research is performed in close cooperation with Uppsala University's Medical Faculty, which gives immediate access to the latest findings in basic research. The hospital also has an extensive collaboration with the pharmaceutical industry. Every year, more than 100 clinical trials of new drugs are started here. The cooperation with Uppsala University also provides an enlarged financial basis for building up advanced technical resources for research, diagnosis and treatment. Uppsala University Hospital is Sweden's oldest university hospital. The hospital is one of the country's most complete regional hospitals, with around 40 departments and over 8,200 employees.

In the Department of Radiology at Uppsala University Hospital in Sweden, we have 320 employees, of which sixty are medically trained radiologists. We have an extensive range of the most up-to-date imaging equipment, including three 1.5T cameras, a new 3T camera, two PET/CT cameras, ultrasound equipment and interventional labs for peripheral and neurological interventions

Following discussions between the head of the university and our department, it was decided locally, to purchase a new Philips 3T machine, which we are beginning to incorporate into regular use. The advantage of 3T is that you end up with more signal from tissues and therefore higher spatial resolution. The only downfall of this type of equipment is that any kind of movement (e.g. caused by breathing) can affect the quality of image. However, for examination of stable tissue, for example for spectroscopy looking for metabolites, it is highly superior. Training, which was very necessary as 3T is a much more demanding technology to use, was provided by Philips themselves by sending our technologists and related staff to other sites where 3T was already in use. This way we were able to see at ground level, how the equipment really functions.

Late-Enhancement Cardiac MRI Detects Past Infarction

The principal research areas undertaken by our department are in PET, and also the applications of cardiovascular MR, particularly whole-body MRA, for which I am responsible. Five years ago, having developed this technique, our department performed a study on a selected population of 300 70-year olds, where we injected contrast material to visualise the vasculature of the whole body. By adding late-enhancement cardiac MRI we were also able to investigate scars in the myocardium for evidence of past infarction. The basic principal is that ten minutes after injection, the contrast material collects into the infarcted area.

Worryingly, the study revealed that there are many people in this type of population, especially women, who have no other clinical symptoms, but who have gone through infarction nevertheless. We are not yet sure of the whole spectrum of implications of this finding. It is not just simply a matter of providing drugs to these types of risk groups, such as to lower blood fats. With this in mind, we are now re-investigating the same population of people, now 75 year olds, to examine their present state of health.

Getting the Whole Picture

We also included approximately 300 other parameters, such as dietary history, genetic pre-dispositions, etc. that impact on cardiovascular disease, to relate to the findings we already have. In this phase of the project we will expand our parameter areas, by examining changes in the brain with MRI, changes caused by stroke, etc. We also have a team examining fat distribution with MRI (i.e., visceral or subcutaneous), which is important in the development of cardiovascular disease. They will then computerise their findings. All this should enable us to create a more epidemiological report on the factors that increase the risk of this group in developing cardiovascular disease and to help other institutions provide more informed healthcare.

Medical Safety

In order to commence a research project in Sweden, it is essential to involve an Ethical Committee in the research application process. National guidelines here in Sweden state that if you have agreement from the volunteer study group, then you don't need to submit your application to the Ethical Committee. However, if you are performing invasive or medically challenging procedures or requesting personal information from your study group, then you are obliged to submit report to the Ethical Committee, regardless of the patients' agreement.

Financing Our Research

Obviously, such a large study project causes an equally large financial burden! A rough estimate of the costs of the study so far is around SEK 10m. Although we originally started out with a population group of 1,000, this had to be cut down to a select 300 in order to ensure the future stability of project financing. We are lucky to have received financial input not just from the University hospital itself here in Uppsala, but also the Swedish Medical Research Council, the Swedish Heart and Lung Foundation, and also, AstraZeneca who are very involved in cardiovascular research, particularly into statins.

In terms of financial organisation, the department functions by having two separate heads – one for patient care and the other, myself, who takes care of research and education in radiology. Although both departments are, in principal, integrated, with separate heads and separate budgets set by the university hospital administrators, it allows me to concentrate primarily on the research activities taking place at the hospital. It also removes the types of financial conflicts that commonly occur when there is one head in a radiology department who is responsible for all three branches: patient care, research and education.

Published on : Sun, 1 Apr 2007