

# FOCUS ON RESEARCH

## MR IMAGES: MAGNETIC RESONANCE ASSESSMENT OF INTRAVENOUS MAGNESIUM EFFICACY IN ACUTE ISCHAEMIC STROKE TRIAL

### Researchers

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### Aim

To test whether administering magnesium sulphate intravenously early after acute stroke reduces the extent of cortical (grey matter) stroke damage, as measured by magnetic resonance brain scans (MRI). To assess the value of MRI for use in stroke trials.

### Project Outline/Methodology

Acute stroke - where part of the brain suddenly loses its blood supply and is permanently damaged - is the leading cause of medical disability and third leading cause of death in UK. Treating patients with magnesium soon after stroke onset could improve outcome: we were testing this in an international trial called IMAGES. However, such trials usually need to be very large to detect improvements in recovery. An alternative means of selecting and assessing patients is magnetic resonance imaging (MRI). An MRI scan at hospital admission could measure brain tissue that had already died and a scan 3 months later would measure the final damage. By comparing these scans in two groups of patients - those treated with magnesium and those given usual care - we hoped to demonstrate a) that magnesium had reduced the extent of brain damage in the treated group; and b) that MRI would be a useful alternative method for acute stroke trials that would give useful results from a smaller number of patients. We conducted extra scans in a few patients taking part in the IMAGES trial, and called our sub-study MR-IMAGES. We hoped to study 100 to 150 patients in MR-IMAGES (35-50 through UK co-ordination).

### Key Results

Amongst the 104 patients enrolled, we found that magnesium did not reduce the development of brain damage after cortical stroke as measured by MRI. We confirmed links between the amount of damage on the MRI scan and the final recovery of the patient, and so we believe that MRI is a valuable tool in stroke trials.

When IMAGES reported no overall benefit from magnesium treatment in 2003, recruitment to the MR-IMAGES sub-study was halted. We had recruited 104 patients: 39 through the UK coordinating centre

based in Glasgow and 24 from Scottish sites. This was an excellent contribution to an international trial. However only 7% of patients at busy clinical sites with MRI appear to have access to MRI scans acutely; and only 6% of UK IMAGES centres were able to contribute at all.

### Conclusions

Indeed, IMAGES suggests that any beneficial effect would be concentrated among patients who were specifically excluded from the MR IMAGES sub-study: those with small deeply placed ("lacunar") strokes.

### What does this study add to the field?

IMAGES has discounted magnesium as a magic bullet for all stroke, but has identified possible benefit in a sub-group of patients; MRI may be useful to select these patients. We have identified limited access to imaging as a hurdle to overcome before MR imaging can be routinely used in UK for stroke research.

### Implications for Practice or Policy

The IMAGES trial has identified a possible treatment that could help to limit disability for patients with lacunar stroke. One third of stroke patients have lacunar stroke and are particularly likely to be long term stroke survivors: since magnesium is inexpensive, simple to administer and appears safe, this would make its use highly cost-effective. Further work to confirm the benefits must be a high priority. Access to scanning needs to be improved before MRI can be properly utilised in stroke trials in the UK. Our data will be essential for planning future trials of magnesium therapy and stroke research using MRI.

### Where to next?

A trial of magnesium in the sub-group of patients with acute lacunar stroke is planned. Meantime, we need to improve access to MRI scanning for acute stroke in UK at research active centres. Prof Lees has MRC support to test vitamins for stroke prevention and Dr Saver has NIH support to test magnesium further in early stroke.

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