

# FOCUS ON RESEARCH

## IS MOST LACUNAR STROKE DUE TO DISORDERED CEREBRAL ARTERIOLAR PERMEABILITY?

### Researchers

Professor. J. Wardlaw, Dr Fergus Doubal, Dr. P Armitage, Prof B Dhillon, Prof G Lowe, Dr C. Sudlow, Prof P Mitchell, Professor. M Dennis.

### Aim

About a quarter of all strokes are small and affect the connecting fibres deep in the brain. Although these lacunar strokes are disabling, they rarely cause death, so they have been somewhat neglected in stroke research. They are thought to be due to blockage of small blood vessels deep in the brain. However, recent studies suggest that they may be caused by a generalised abnormality of the lining of the small blood vessels (endothelium) leading to thickening of the vessel walls and eventually to damage to the membrane between the blood and the brain (blood-brain barrier) and focal and diffuse brain damage. We aimed to find out if patients with lacunar stroke had more leaky blood-brain barrier, and other evidence of generalised small vessel abnormalities, than patients with other types of stroke.

### Project Outline/Methodology

We studied patients with lacunar stroke and control patients with a different type of stroke due to blockage of a blood vessel supplying the brain surface (cortical). We measured their blood-brain barrier leakiness using magnetic resonance brain scanning with a dye that should stay in the blood, photographed the blood vessels at the back of the eye, and tested blood samples for stickiness and inflammation.

### Key Results

Lacunar stroke patients had more leaky blood-brain barrier in the deep connecting fibre areas of the brain. The thickness of the small blood vessels in the eye was different in lacunar stroke in a pattern consistent with diffuse abnormality of the vessel lining. There were no differences in blood markers of inflammation or blood stickiness except for one substance that is a marker of vessel wall stickiness. We found no evidence that lacunar stroke was caused by vessel blockages.

### Conclusions

This study provides more evidence that lacunar stroke has a different cause to other types of stroke, and therefore needs different treatment to prevent these strokes and for after the stroke has happened.

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

The traditional approach, that lacunar stroke is due to small vessels in the brain getting blocked and that it is the same as cortical (large artery) stroke needs rethinking. The blood-brain barrier has been overlooked in stroke research, but has a large surface area and is an important gateway to protecting the brain and maintaining normal function.

### Implications for Practice or Policy

Management of stroke should take account of the type of stroke and seek and treat risk factors accordingly. Until we know more about the precise mechanism of lacunar stroke, we should continue to use the same methods to prevent and treat it. The stroke clinical research network should actively support as much research as possible into better understanding of lacunar stroke.

### Where to next?

We plan a larger study with long term follow-up to see whether patients with the most leaky blood vessels are most likely to have more lacunar strokes. More sensitive substances for detecting blood-brain barrier damage are needed as the present compounds are very insensitive.

### Further details from:

Prof J Wardlaw,  
Division of Clinical Neurosciences,  
University of Edinburgh,  
Western General Hospital,  
Crewe Road, Edinburgh, EH4 2XU.  
Tel +44 131 537 3110  
Fax +44 131 332 5150

