

## Headache's secrets revealed



Scientists have linked brain structure to brain function

A certain type of headache may be caused by structural abnormalities in the brain, researchers have discovered.

The finding could revolutionise approaches to all primary headaches, which had not been thought to be caused by factors in the physical structure of the brain.

But using a new scanning technique, doctors have established that cluster headaches are likely to be caused by excessive growth of grey cells in one part of the brain.

It is the section that governs the body clock, which could be responsible for the regularity of the headaches' appearances.

### Male condition

Cluster headaches are characterised by a sudden excruciating pain on one side of the head around the eyes, temple or cheek, and can last for 15 minutes to 3 hours.

Affecting 0.1% of the population - mainly men - they recur over a period of weeks or months before disappearing, hence their name.

Professor Peter Goadsby, of the headache research unit at London's Institute of Neurology, published his team's discovery in the journal Nature Medicine.

He told BBC News Online that the finding revolutionised scientists' perception of headaches.

"It's like the first time somebody said the earth was round - you have to step back and reconsider," he said.

This was because whereas with secondary headaches - where there was a known structural cause such as a brain tumour or bleeding - primary headaches had been thought to be caused by chemical factors alone.



Professor Goadsby: A revolution in understanding headaches

"The dogma is that primary headache, like cluster headaches and migraine, are due to abnormal brain function with completely normal brain structure.

"Our study shows this is simply not the case," he said.

### **Revolutionary discovery**

In the past, high-resolution brain scans have shown no abnormalities in the brain structure of cluster headache sufferers.

But using the latest imaging techniques, Professor Goadsby and colleagues found an increase of grey matter in an area of the brain known as the hypothalamus on the side where the headache occurs.

Whereas standard high resolution scans take a picture of the brain that doctors can examine, the new technique takes pictures of many brains.

A computer then analyses the pictures down to the finest detail, making extremely subtle differences apparent.

Because the differences were seen both when the patients were studied while they had a headache and also in a headache-free state, changes are likely to be permanent.

Professor Goadsby said: "We also found that the area of the brain where these structural abnormalities were seen, the hypothalamus, is the same area of the brain where functional studies show that activity is abnormal during the headache state.

"This complete correlation of functional and structural abnormality is striking."

The hypothalamus is the part of the brain associated with circadian rhythms - the 24 hour rhythm of the human body.

"Our results demonstrate for the first time the precise location in the brain involved in cluster headaches and help to explain why this condition shows such striking seasonal variation and clock-like regularity," said Professor Goadsby.

"The findings have profound implications for understanding how the brain is affected in primary headaches."



The new scanning technique revealed abnormalities in the hypothalamus