Juggling Makes Your Brain Bigger

Last updated: 1 February 2004 at 12am PST

It's no longer just a party trick. Juggling might also enhance your brainpower.

A new study published in the journal Nature finds that **learning to juggle may cause certain areas of your brain to grow.**

The finding challenges conventional wisdom the structure of the brain cannot change except through aging and disease. Previous studies have shown learning can result in changes in brain activity. But this latest study demonstrates an anatomical change as a result of learning - that is, the brain size actually expands.

German researchers divided 24 non-jugglers into two groups and assigned one group to practice juggling for three months. The scientists performed brain scans on the volunteers using magnetic resonance imaging, or **MRI**, before and after they learned to juggle.

The type of MRI scans the researchers used allowed them to focus on structural changes rather than changes in brain activity. Using a sophisticated analysis technique called voxel-based morphology, the researchers were then able to investigate changes in brain gray matter, the area of the brain that consists mostly of the cell bodies of neurons rather than the connective fibers.

The study found that volunteers who did not train to juggle showed no difference in their brain scans over the three-month period. However, those who now acquired the skill demonstrated an increase in gray matter in two areas of the brain involved in visual and motor activity, the mid-temporal area and the posterior intraparietal sulcus.

Scientists defined increases as a bigger volume and higher density of gray matter in those areas.

While the increase in brain size appears to be due to an expansion in gray matter area, the nature of this increase is not clear. Since the study focused on gray matter, the researchers were primarily looking at changes in cells rather than their connections.

Use it or Lose it

'It has generally been accepted that new neuron formation in adults is limited to particular areas of the brain. However, this dogma is changing,' according to Dr. George Wittenberg at the Department of Neurology at Wake Forest University Medical Center in Winston-Salem, N.C.

Dr. Arne May, assistant professor of neurology at the University of Regensburg in Germany and the head researcher of the study, believes, 'The growth of cells could be due to locally new cells, **stem cells** invading from somewhere else or local connections between cell - but we simply do not know.'

Interestingly, increase in brain size does not last. After three months of no practice, the group that learned to juggle lost their gained brain power and the enhanced brain regions decreased in size.

'The brain is like a muscle, we need to exercise it,' says May. While the effects appear to only be transient, the study provides an example of how activity may have growth benefits on the brain.

It is not clear whether increases in brain size would be more permanent if the training time were extended. May and colleagues are interested in examining the timeframe of these alterations and whether the changes are affected by age.