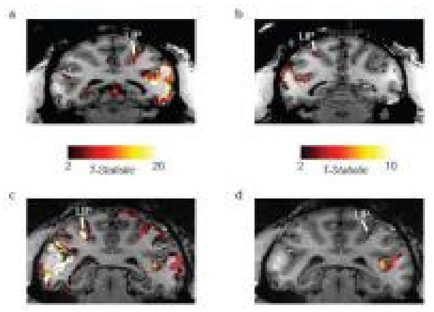
Scientists find explanation for blindsight

25 June 2010, by Lin Edwards



Visually driven responses in parietal area LIP. (See the original paper for details.) Image: Nature, doi:10.1038/nature09179

(PhysOrg.com) -- The rare phenomenon of blindsight has been known for a long time, but until now has never been understood. People with blindsight are effectively blind through damage to the primary visual cortex and yet may be able to identify colors and to avoid obstacles in their way even though they are not consciously aware of them.

New research on monkeys has found that loss of part of the primary visual cortex leaves the brain unaware of visual information in affected areas, but other regions of the brain appear to be involved in processing visual information, and these areas may contribute to the phenomenon of blindsight.

The researchers, Michael C. Schmid and colleagues from the U.S. National Institute of Mental Health (NIMH) in Bethesda in Maryland, worked with two macaque monkeys with small lesions in their primary visual cortexes, which made them unaware of visual cues in a subset of their visual fields. The researchers first defined the precise areas of the visual field to which they no longer responded and then confirmed with functional magnetic resonance imaging (MRI) that stimuli in those areas could induce activity in the rest of the visual cortex.

The researchers then injected a part of the brain called the lateral geniculate nucleus (LGN) with a chemical, THIP, which activates the receptor for an inhibitory signaling molecule, and thus temporarily shuts down the LGN. The LGN is part of the thalamus in the middle of the brain and has been shown by previous studies to have projections to several secondary visual areas, which implies it may play an important role in the visual system.

The researchers tested the responses of the monkeys to high-contrast stimuli presented to the part of the visual field affected by the lesion both before and after the injection. The results showed that before the injection the monkeys exhibited blindsight responses of eye focusing movements, correct location of the stimuli, and activation of areas of the brain shown by the fMRI. After the injection there were no responses.

The findings suggest LGN may be the main relay between the retina and the main visual cortex, and projections from LGN to other parts of the brain provide a critical contribution to blindsight.

The paper is published in the journal *Nature*.

More information: Blindsight depends on the lateral geniculate nucleus, Michael C. Schmid et al., *Nature* advance online publication 23 June 2010. doi:10.1038/nature09179