A Mature Brain Does Not Adapt

Max Planck researchers in Tübingen have now discovered that the primary upper brain area VI, where the visual stimuli converge, does not respond to retinal lesions. In other words, it cannot compensate for the damage.

Functional magnetic resonance imaging has made it possible to measure changes in blood flow, which are associated with neuronal activity. In area VI, the outside world is depicted in such a way that every point in the external field of vision corresponds to one point in cortex VI. Using this technique, activity maps can be created that depict the organization of the visual field in VI in 3-D resolution and these maps are very similar in monkeys and humans.

What the neurobiologists found was that these “topographical maps” in the brain of adult macaques showed no plasticity. After shutting down part of the retina, they looked for changes in the visual cortex VI. “We saw that even seven and a half months after the retinal lesion, area VI still had not recovered its original responsiveness,” says Logothetis.

“Our data suggest that in adult macaques possess only limited potential for reorganization.”

In addition, the experiments of the Tübingen neurobiologists show that functional magnetic resonance imaging allows for the observation of the organization of cortical structures over a longer time period and that this technique is also optimally suited for precise observations of the brain organization in neurological patients. Further investigations are now turning to determining whether and to what extent regeneration processes can be stimulated in adult visual cortices.

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