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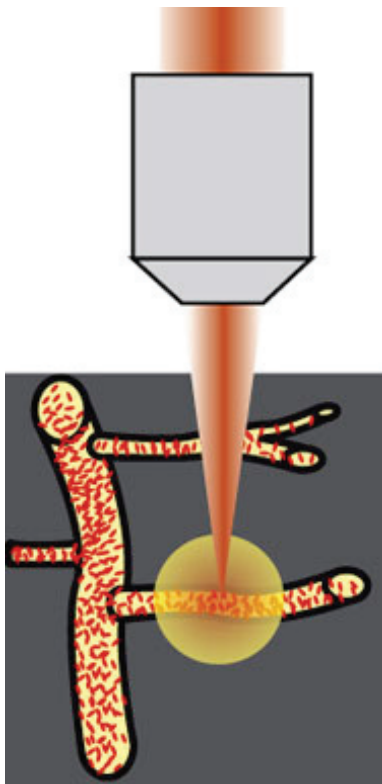
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New Bane for the Rat Brain

By Karen Heyman
ScienceNOW Daily News
 27 January 2006

Researchers have found a way to use femtosecond lasers to cause strokes deep in the brains of rats. The technique should help researchers create more realistic rodent models of stroke and aid the search for human therapies.

There are two basic types of stroke: an ischemic stroke, in which a blood vessel is blocked, and a hemorrhagic stroke, in which a blood vessel ruptures and bleeds out. In both cases, the tissue fed by the vessel dies because it doesn't receive enough oxygen. Existing whole animal stroke models cannot separate these different aspects properly for study. In addition, researchers are seeking to create "microstrokes," in which only one small, individual blood vessel is damaged. An accumulation of microstrokes can cause cognitive deficits that are often confused with the initial symptoms of Alzheimer's disease.

To help develop a better rat model for strokes, physicist David Kleinfeld, neurologist Patrick Lyden, and colleagues at the University of California, San Diego, turned to femtosecond lasers. Traditionally used for cutting material such as glass, the lasers create short, high-energy pulses of light.

Direct hit.

Femtosecond lasers can target individual blood vessels in the brain.

Credit: Nishimure *et al.*, *Nature Methods* 3 (2006)

Using the lasers on living brain tissue for the first time, the team found that, when concentrated to a precise point, the femtosecond laser light vaporized tissue in rats, creating either blockages or ruptures in individual blood vessels, depending on the intensity. Aiding precision, the light is cooler than that of traditional lasers, so researchers do not have to sort stroke damage

from thermal damage.

The new technique can also go deep. Existing methods only disrupt large vessels near the surface of the brain, says Kleinfeld. When the researchers combined the laser with three-dimensional brain mapping, they could target vessels far below the visible surface, they report in the current issue of *Nature Methods*.

"The coupling of these technologies is going to allow [us] to address questions that were previously unanswerable because there was no experimental model," says hematologist Robert Flaumenhaft of Beth Israel Deaconess Medical Center in Boston, Massachusetts. Radiologist Eng Lo of Massachusetts General Hospital in Charlestown says researchers now have a tool to investigate many different types of stroke. "The paper presents an important advance," he says.

Related sites

- [Kleinfeld Laboratory home page](#)
- [Lyden Laboratory home page](#)
- [National Stroke Association](#)
- [NINDS Stroke Information Page](#)