'Lazy eye' treatment shows promise in adults

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New evidence from a laboratory study and a pilot clinical trial confirms the promise of a simple treatment for amblyopia, or “lazy eye,” according to researchers from the U.S. and China.

The treatment was effective on 20-year-old subjects. Amblyopia was considered mostly irreversible after age eight.

Many amblyopes, especially in developing countries, are diagnosed too late for conventional treatment with an eye patch. The disorder affects about nine million people in the U.S. alone.

Results from the laboratory study will be published online the week of Mar. 3 in PNAS Early Edition.

Patients seeking treatment will need to wait for eye doctors to adopt the non-surgical procedure in their clinics, said Zhong-Lin Lu, the University of Southern California neuroscientist who led the research group.

“I would be very happy to have some clinicians use the procedure to treat patients. It will take some time for them to be convinced,” Lu said.

“We also have a lot of research to do to make the procedure better.”

In a pilot clinical trial at a Beijing hospital in 2007, 28 out of 30 patients showed dramatic gains after a 10-day course of treatment, Lu said.

“After training, they start to use both eyes. Some people got to 20/20. By clinical standards, they’re completely normal. They’re not amblyopes anymore.”

The gains averaged two to three lines on a standard eye chart. Previous studies by Lu’s group found that the improvement is long-lasting, with 90 percent of vision gain retained after at least a year.

“This is a brilliant study that addresses a very important issue,” said Dennis Levi, dean of optometry at the University of California, Berkeley. Levi was not involved in the study.

“The results have important implications for the treatment of amblyopia and possibly other clinical conditions.”

The PNAS study shows that the benefit of the training protocol – which involves a very simple visual task – goes far beyond the task itself. Amblyopes trained on just one task improved their overall vision, Lu said.

The improvement was much greater for amblyopes than for normal subjects, Lu added.

“For amblyopes, the neural wiring is messed up. Any improvement you can give to the system may have much larger impacts on the system than for normals,” he said.

The Lu group’s findings also have major theoretical implications. The assumption of incurability for amblyopia rested on the notion of “critical period”: that the visual system loses its plasticity and ability to change after a certain age.

The theory of critical period arose in part from experiments on the visual

system of animals by David Hubel and Torsten Wiesel of Harvard Medical School, who shared the 1981 Nobel Prize in Medicine with Roger Sperry of Caltech.

“This is a challenge to the idea of critical period,” Lu said. “The system is much more plastic than the idea of critical period implies. The fact that we can drastically change people’s vision at age 20 says something.”

A critical period still exists for certain functions, Lu added, but it might be more limited than previously thought.

“Amblyopia is a great model to re-examine the notion of critical period,” Lu said.

The first study by Lu’s group on the plasticity of amblyopic brains was published in the journal Vision Research in 2006 and attracted wide media attention.

Since then, Lu has received hundreds of emails from adult amblyopes who had assumed they were beyond help.

Berkeley’s Levi cautioned that the clinical usefulness of perceptual learning, as Lu calls his treatment, remains a “sixty-four thousand dollar question.”

“It's clear that perceptual learning in a lab setting is effective,” Levi said. “However, ultimately it needs to be adopted by clinicians and that will probably require multi-center clinical trials.”

Source: University of Southern California