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Old eyes can learn new tricks; findings offer hope for adults with 'lazy eye'

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New evidence that the brain regions responsible for vision are capable of adapting in adults offers new hope for those with an untreated condition commonly known as lazy eye. Also called amblyopia, the condition is the most prevalent cause of visual impairment in a single eye, affecting about six million people in the United States alone.

" If not detected early enough—before seven to twelve years of age—the condition has been considered untreatable because the brain wasn't thought to be plastic enough," said Benjamin Thompson of McGill University in Canada. "The main message here is to show that there really is plasticity in the adult visual system. There is real momentum now to find a treatment for adult amblyopia."

Current treatments for children with amblyopia emphasize patching or otherwise penalizing their "good" eye before the age of twelve. By forcing the use of the amblyopic eye, children can often recover some function. However, after that critical window in childhood, no treatment has been widely available.

Thompson said the condition often goes unnoticed in children because they don't realize there is a problem. Of the six million sufferers in the U.S., he said, most are adults. But there is good news: some studies have begun to show evidence of plasticity in the adult visual cortex of human and animal brains.

Thompson, along with Robert Hess and their colleagues, now shows that

such plasticity can be released temporarily with just 15 minutes of repetitive transcranial magnetic stimulation (rTMS). The noninvasive treatment involves placing a handheld coil against the scalp that delivers a rapid train of magnetic pulses.

The researchers found that 15 minutes of rTMS therapy improved contrast sensitivity in patients' amblyopic eyes for a period of at least 30 minutes. That improvement was measured by showing them two patches of grating, one with lots of fine detail and the other with thicker, easier-to-see lines. After rTMS, people needed less contrast to see those finer details than they had prior to treatment.

While it's not entirely clear how rTMS works, it seems to change the balance of excitation and inhibition in the cortex, Thompson said, noting that the method is already in use for stroke rehabilitation and is being tested for use in those with depression.

He said that repeated doses of rTMS may allow for longer-lasting effects. The treatment might also prime the brain for training regimes in which adults are asked to perform series of visual tasks. Recent studies have suggested that such perceptual training can improve vision in amblyopic eyes.

Source: Cell Press