Brain stimulation can help partially paralyzed stroke patients regain use of their muscles

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Stroke patients who were left partially paralysed found that their condition improved after they received a simple and non-invasive method of brain stimulation, according to research in the September issue of the *European Journal of Neurology*.

Researchers from the Ain Shams University in Cairo, Egypt, studied 60 patients with ischaemic stroke - where the blood supply is reduced to the brain - who had been left with mild to moderate muscle weakness down one side of their body.

Twenty of the randomly assigned treatment group received repetitive transcranial magnetic stimulation (rTMS) applied at 5-Hz over the brain hemisphere affected by the stroke and the other 20 received 1-Hz stimulation of the unaffected hemisphere. The remaining 20 formed the control group, receiving inactive placebo doses of the treatment. All patients received the same physical therapy.

"When we compared the results between the three groups, we found that both of the treatment groups showed significant motor function recovery" says co-author Anwar El Etribi, Professor of Neurology and Psychiatry at the University. "No improvements were seen in the control group who had received the placebo treatment and the same physical therapy protocol."

The majority of the patients (95 per cent) had suffered their stroke in the last three years, having been enrolled in the study at least one month after their stroke. However, there was no difference between the level of clinical improvement and the interval since the patients' strokes.

"We believe that people develop partial paralysis down one side after they have a stroke because the hemispheres of the brain become unbalanced" explains Professor Etribi. "The hemisphere that has not been affected can become over-active, while the damaged hemisphere can become inhibited.

"Our treatment worked on the theory that increasing the activity of the hemisphere affected by the stroke and reducing the activity of the unaffected hemisphere can reduce muscle weakness and improve overall motor function."

The 60 patients who took part in the study had similar baseline characteristics, apart from a lower incident of ischaemic heart disease in the 5-Hz rTMS group, which was unlikely to have had an effect on recovery.

Patients averaged just under 54 years of age and just over two-thirds were male.

The patients were randomly assigned to one of the three groups and magnetic stimulation was administered in three different ways:

- Patients in group one received a daily 5-Hz session for 10 days over the part of the brain affected by the stroke. This equated to 750 pulses per session and 7,500 pulses over the course of the treatment.

- Patients in group two received a daily 1-Hz session for 10 days over the part of the brain not affected by the stroke. This equated to 150 pulses per session and 1,500 pulses over the course of the treatment.

- The "treatment" in the placebo group was applied in the same way as group two, but the stimulator was angled at 90 degrees to render it ineffective.

Patients were clinically assessed at baseline and at two, four, eight and 12 weeks using a range of tools to determine motor function and cognitive status.

Further details of the scores and the treatment sessions are outlined in detail in the full paper.

"Our study shows that using rTMS can help patients who have suffered an ischaemic stroke and are experiencing partial paralysis on one side of their body to regain motor function" says Professor Etribi. "We also found that the time interval from stroke to treatment did not have an effect on how well the patient recovered.

"It appears that inhibitory and stimulatory rTMS may well prove useful tools in long-term programmes to rehabilitate stroke patients."

More information: Repetitive transcranial magnetic stimulation at 1Hz and 5Hz produces sustained improvement in motor function and disability after ischaemic stroke. Emara et al. European Journal of Neurology. 17, pp1203-1209. (September 2010). DOI: 10.1111/j.1468-1331.2010.03000.x

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