fMRIにより慢性脳卒中リハビリテーションの脳への効果が画像化される

脳卒中後6ヵ月以上経過しても意義あるリハビリテーションが可能であることが機能的MRIにより示された

Functional MRI shows significant rehabilitation is possible more than 6 months after stroke

研究者らは、手動ロボット装置と機能的MRI（fMRI）を用いて慢性脳卒中患者はこれまで考えられていたよりもリハビリ有効期間が長いことを明らかにした、とRadiological Society of North America（RSNA）学会で発表された。このスタディは、fMRIを用いて脳の地図を描き脳卒中リハビリテーションを追跡した初めてのものである。脳卒中発症後6ヵ月以上経過して開始した8週間のハンドグリップ運動の結果、前頭皮質の活性が上昇した。スタディのために患者らは特別なMR対応ロボット装置を1日1時間週3回、4週間握った。前頭皮質のfMRIをベースライン、トレーニング中、トレーニング終了直後、およびトレーニング終了から1ヵ月後に行った。トレーニング前には患者らの前頭皮質活性は8週間のトレーニング後と比較し有意に低かった（p<0.05）。上昇した皮質活性は1ヵ月後のフォローアップ時にも持続しており、リハビリテーションの持続性が示唆された。筆者らは、この結果から、これまで考えられていたよりも脳卒中後長期経過した後の脳でも順応性があり、そのため6ヵ月経過してもリハビリテーションが可能であることが示唆された、と述べている。

Full Text

Researchers used a hand-operated robotic device and functional MRI (fMRI) to demonstrate that chronic stroke patients can be effectively rehabilitated longer than previously thought according to a study presented at the annual meeting of the Radiological Society of North America (RSNA). This is the first study using fMRI to map the brain in order to track stroke rehabilitation.

"We have shown that the brain has the ability to regain function through rehabilitative exercises following a stroke," said A. Aria Tzika, Ph.D., director of the NMR Surgical Laboratory at Massachusetts General Hospital (MGH) and Shriners Burn Institute and assistant professor in the Department of Surgery at Harvard Medical School in Boston. "We have learned that the brain is malleable, even six months or more after a stroke, which is a longer period of time than previously thought."

Previously, it was believed that there was only a short window of three to six months following a stroke when rehabilitation could make an improvement.

"Our research is important because 65 percent of people who have a stroke affecting hand use are still unable to incorporate the affected hand into their daily activities after six months," Dr. Tzika said. To determine if stroke rehabilitation after six months was possible, the researchers studied five right-hand dominant patients who had strokes at least six months prior that affected the left side of the brain and, consequently, use of the right hand.

For the study, the patients squeezed a special MR-compatible robotic device for an hour a day, three days per week for four weeks. fMRI exams were performed before, during, upon completion of training and after a non-training period to assess permanence of rehabilitation. fMRI measures the tiny changes in blood oxygenation level that occur when a part of the brain is active.

The results showed that rehabilitation using hand training significantly increased activation in the cortex. Furthermore, the increased cortical activation persisted in the stroke patients who had exercised during the training period but then stopped for several months.

"These findings should give hope to people who have had strokes, their families and the rehabilitative specialists who treat them," Dr. Tzika said.

Dr. Tzika is an affiliated member of the Athinoula A. Martinos Center for Biomedical Imaging in the Department of Radiology at MGH, where the research is ongoing.

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RSNA2008特集

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