Department of Rehabilitation Medicine

Masahiro Abo, Professor
Kazushige Kobayashi, Professor
Itaru Takehara, Associate Professor
Kun Suk Chung, Assistant Professor
Masanori Funakoshi, Assistant Professor
Nobuyuki Sasaki, Assistant Professor

Shu Watanabe, Professor
Wataru Kakuda, Associate Professor
Keiji Hashimoto, Associate Professor
Hidekazu Sugawara, Assistant Professor
Tadashi Suzuki, Assistant Professor
Toru Takekawa, Assistant Professor

General Summary

The main research topics of our department are as follows: (1) repetitive transcranial magnetic stimulation (rTMS) for stroke, (2) dysphagia, (3) analysis based on a database, and (4) image analysis for brain injury.

Research Activities

Use of rTMS for treating stroke

1. Effects of low-frequency rTMS combined with intensive speech therapy on cerebral blood flow in poststroke aphasia
The results suggest the possibility that functional magnetic resonance imaging–guided low-frequency rTMS combined with intensive speech therapy may affect cerebral blood flow and contribute to the improvement of language function of patients with poststroke aphasia.

2. Role of brain-derived neurotrophic factor in beneficial effects of rTMS for upper-limb hemiparesis after stroke
The combination therapy of rehabilitation plus low-frequency rTMS seems to improve motor function in the affected limb, by activating the processing of brain-derived neurotrophic factor (BDNF). Both BDNF and its precursor, proBDNF, are potentially suitable biomarkers for poststroke motor recovery.

3. Therapeutic administration of atomoxetine combined with rTMS and occupational therapy for upper limb hemiparesis after stroke: a study of 3 patients
Our protocol of triple therapy of atomoxetine, low-frequency rTMS, and occupational therapy is safe and feasible for patients with upper-limb hemiparesis after stroke.

Dysphagia

1. Assessment of feeding and swallowing in children: Validity and reliability of the Ability for Basic Feeding and Swallowing Scale for Children
Significant correlations of the total Ability for Basic Feeding and Swallowing Scale for Children score, Fujishima’s Grade of Feeding and Swallowing Ability, and the Functional Independence Measure for Children suggest the need for comprehensive assessments rather than assessments of individual feeding and swallowing functions.

2. Effect of tube feeding method on establishment of oral intake in patients with dysphagia after stroke: Comparison of intermittent tube feeding and nasogastric tube feeding
The results of this study suggest that managing tube feeding by performing it intermittently achieves better outcomes for dysphagia rehabilitation than does nasogastric tube feeding.

3. A test of swallowing a citric acid solution is useful for screening for aspiration at the bedside and for detecting swallowing dysfunction at an early stage.

   The results suggest that a test of swallowing a citric acid solution is more sensitive for detecting dysphagia with laryngopharyngeal sensory dysfunction than is a modified water-swallowing test.

4. rTMS with intensive swallowing rehabilitation for poststroke dysphagia: An open-label case series.

   The 6-day in-hospital protocol of rTMS and intensive swallowing rehabilitation seems safe and feasible for patients with poststroke dysphagia and improves swallowing function.

5. Effect of dysphagia rehabilitation on oral intake in elderly patients with aspiration pneumonia.

   The data suggest that dysphagia rehabilitation has a positive effect on total oral intake in elderly patients with aspiration pneumonia and shows greater benefit if the pneumonia is mild rather than more severe.

**Analysis based on database**

1. Very early versus delayed rehabilitation of patients with acute ischemic stroke with intravenous recombinant tissue plasminogen activator: A nationwide retrospective cohort study.

   Patients with acute ischemic stroke undergoing very early rehabilitation after thrombolysis were more likely to achieve functional independence without an increase in adverse outcomes.

2. Effects of ankle-foot orthoses on functional recovery after stroke: A propensity score analysis based on a Japan rehabilitation database.

   These data suggest that the use of ankle-foot orthoses is a feasible option for improving the functional recovery of patients after stroke.

3. Clinical management provided by board-certificated physiatrists in early rehabilitation is a significant determinant of functional improvement in patients with an acute stroke: a retrospective analysis of a Japan rehabilitation database.

   These data demonstrated that clinical management provided by board-certificated physiatrists in early rehabilitation can lead to good functional recovery of patients with an acute stroke.

**Image analysis for brain injury**


   The data showed that the volume of white matter decreased markedly in several regions of interest and correlated significantly with performance IQ and the processing speed index. The results indicate that this application can be used to evaluate diffuse axonal injury.
2. White matter structure and clinical characteristics of patients after stroke: A diffusion tensor magnetic resonance imaging study

Differences in generalized fractional anisotropy between hemispheres with lesions and hemispheres without lesions varied depending on the affected brain region, the patients’ age at the onset of paralysis, and whether paralysis occurred in the dominant or nondominant hand.

Others

1. Trailblazing introduction of a hospitalization-associated disability prevention system using electronic medical recording systems at our hospital: Systemic attempt for forgotten complications in hospitalized patients

Our proposed hospitalization-associated disability prevention system using an electronic medical recording system appears to facilitate early rehabilitation and to prevent hospitalization-associated disability.

2. A reference value of higher brain function for resumption of driving in patients with brain injury

Results of a paper-based test serve as a guideline as to whether a patient is capable of resuming driving but do not represent an absolute standard. Therefore, the safety of resuming driving should be investigated on a case-by-case basis.

Publications


Kobayashi K, Kobayashi M, Abo M. A citric acid solution swallowing test is useful as a screening test for aspiration at bedside and for the early detection of swallowing dysfunction. *J Cln Trials.* 2015; 5: 245.


Kinoshita S, Kakuda W, Momosaki R, Yamada N, Sugawara H, Watanabe S, Abo M. Clinical management provided by board-certified physiatrists in early rehabilitation is a significant determini-
