Report of fNIRS Test and Randomized Control Trial

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【Summary】
We report our study of Brain activity using the functional near-infrared spectroscopy (fNIRS) by performing motivative and passive exercise (PEX) on the lower extremities, including RCT for gropes motivative exercise (MEX) accession or not. We compare the legs MEX which is a simultaneous legs training, leaded by unaffected side with the PEX, in order to clarify the feature which the MEX activate the brain.

【Method】
Subjects were 11, out patients of the facility. The activated part of the brain during the time when the PEX of a paralysis side leg joint performed and when the both legs were exercised together with the MEX equipment were investigated. In RCT with 26 subjects, there were no effective result on Rom, MMT, Barthel index, HDS of Dementia scale, and Rehab official scale.

The FOIRE-3000 by Shimazu Corporation was used for fNIRS extermination. The test was conducted during December 8 to 10, 2009 with the passive exercise to a paralysis side leg or knee and the motivative exercise for their both leg or knee by using the devises simultaneously at the test. We made a task cycle for each patient, which is 20 seconds rest from a start - 30 seconds task - 20 seconds rest and performed three cycles. The evaluation was determined by the load average of the three cycles exercise. This analysis was performed using the Functional Optical Imager for Research (FOIRE) software equipped with FOIRE-3000 and performed multiple examination of the oxy hemoglobin (OxyHb) change at the time of rest and task. The yellow frames in Fig 1 - 4 show the significant difference at the points of measurement and the white frame show no significant difference.

【Result】
As for comparing passive movement performed by a physiotherapist and bending exercises of motivative exercise, the extension motivative exercise shows brain broadly active (P<0.05). We show the result on Fig.1 and Fig. 2 for the passive exercise effects and Fig.3 and Fig.4 for the motivative exercise. RCT for gropes MEX accession or not showed any change (P=0.1).

【Consideration】
The influence of the brain activity on the program used from the time of opening with this institution was investigated. It shows that the motivative exercise using KORO influences brain activity in the larger range than the passive exercise which PT performs, and it is seemingly made the brain activate. As continuable rehabilitation program even after acute phase and recovery phase, one of the fact that our program is effective is shown in this investigation. Result of RCT shows there aren't bad inference for its introduction. We can consider the replacement of PEX to MEX.