extremity, and this has been demonstrated by constraint-induced movement therapy. Physiological studies show enhancement of function in the damaged hemisphere after such interventions. Other techniques likely use the same principle such as neuromuscular electrical stimulation, robot-enhanced training and virtual reality training. Sensory stimulation enhances plasticity and can be delivered in a number of ways, from passive movement to cutaneous stimulation with transcutaneous electrical nerve stimulation and even acupuncture. Another principle is that reduction of inhibition enhances plasticity; this has been shown to be relevant with the deafferentation model. Our group has now demonstrated that this can be efficacious in stroke patients. We studied patients with weak hands and more preserved proximal arm function, with a goal of taking over some of the proximal representation in the brain for use by the hand. We coupled anesthesia of the proximal arm with exercise of the hand and showed that this increases hand function more than exercise alone.

F5 MOTOR REHABILITATION | C

ÜBEN – ABER WIE? STRATEGIES IN MOTOR REHABILITATION

H. Hummelsheim (Leipzig-Bennewitz, D)

In recent years, our understanding of motor learning, neuroplasticity and functional recovery after brain lesion has grown significantly. New findings in basic neuroscience provided stimuli for research in motor rehabilitation. Repetitive movement execution and motor activity in a real world environment have been identified in several prospective studies as favorable for motor recovery in stroke patients. EMG initiated electrical muscle stimulation and simultaneous voluntary and electrical muscle activation improves motor function of centrally paretic muscle groups. Furthermore, specific features within training procedures have been identified that render the interventions more efficacious. In particular, the influence of a training close to the patients' individual limit of motor performance, the role of shaping elements and of repeated motor practice will be discussed.

F6 STROKE | C

PROBABILITY OF REGAINING DEXTERITY IN THE FLACCID UPPER LIMB: IMPACT OF SEVERITY OF PARESIS AND TIME POST ONSET IN ACUTE STROKE

G. Kwakkel (Amsterdam, NL)

Background and Purpose: To improve the accuracy of early post onset prediction of motor recovery in the flaccid hemiplegic arm, the effects of change in motor function over time on the accuracy of prediction were evaluated, and a prediction model for the probability of regaining dexterity at 6 months was developed.
Methods: In 102 stroke patients, dexterity and paresis were measured with the Action Research Arm Test, Motricity Index, and Fugl-Meyer motor evaluation. For model development, 23 candidate determinants were selected. Logistic regression analysis was used for prognostic factors and model development.
Results-At 6 months, some dexterity in the paretic arm was found in 38%, and complete functional recovery was seen in 11.6% of the patients. Total anterior circulation infarcts, right hemisphere strokes, homonymous hemianopia, visual gaze deficit, visual inattention, and paresis were statistically significant related to a poor arm function. Motricity Index leg scores of at least 25 points in the first week and Fugl-Meyer arm scores of 11 points in the second week increasing to 19 points in the fourth week raised the probability of developing some dexterity (Action Research Arm Test =10 points) from 74% (positive predictive value [PPV], 0.74; 95% confidence interval [CI], 0.63 to 0.86) to 94% (PPV, 0.83; 95% CI, 0.76 to 0.91) at 6 months. No change in probabilities of prediction dexterity was found after 4 weeks.
Conclusions: Based on the Fugl-Meyer scores of the flaccid arm, optimal prediction of arm function outcome at 6 months can be made within 4 weeks after onset. Lack of voluntary motor control of the leg in the first week with no emergence of arm synergies at 4 weeks is associated with poor outcome at 6 months.

F7 C

CHANGE OF ACTIVATION PATTERNS IN THE HUMAN SENSORIMOTOR CORTEX BEFORE AND AFTER SUBSENSORY WHOLE-HAND AFFERENT ELECTRICAL STIMULATION

S.M. Golaszewski, K.M. Stephan, C.M. Siedentopf, F. Koppelstätter, F.M. Mottaghy, S.R. Felber, F. Gerstenbrand, R. Seitz, V. Hömberg (Meerbusch, Düsseldorf, Ulm, D; Innsbruck, Vienna, A)

Introduction: Stimulation of proprioceptive pathways using whole-hand electrical stimulation with a mesh-glove has been shown to improve motor performances of stroke patients with chronic neurological deficits. The aim of the study was to elaborate, whether changes in the motorcortex activation patterns can be demonstrated after electrical stimulation of the hand in normal volunteers.
Material and methods: All experiments were performed on a 1.5 Tesla MR-scanner in 10 healthy subjects. The motor-paradigm was self-paced finger-to-thumb-tapping of the left hand. Firstly, a baseline fMRI-examination and secondly subthreshold electrical stimulation with 0.9 mA was applied for 20 minutes outside the magnet to the left hand using a mesh-glove. Thirdly, an identical fMRI run to the baseline and the second run 12 hours post stimulation was performed. Post processing was done with SPM99.
Results: Group-analysis of fMRI-data showed: 1. Baseline fMRI-examinations revealed brain activation of the primary and secondary sensorimotor cortex as previously described. 2. After electrical stimulation of the left hand there was an increase of activated pixels in these areas. 3. In addition, there was activation of regions not visible on the baseline studies. These involved the ipsilateral inferior parietal lobule, the pre- and postcentral gyrus and the superior parietal lobule. 4. These changes disappeared twelve hours post stimulation.
Conclusions: fMRI reflects an increased BOLD-response due to an increase of local-field-potentials within the sensorimotor cortex due to electrical stimulation. Thus, local-field-potentials can be successfully influenced by subsensory stimulation of afferent pathways. This holds promise for the application of fMRI in the planning of neurorehabilitation strategies.

F8 C

FITNESS TO DRIVE WITH NEUROLOGICAL DISABILITIES

J. Kesselring (Valens, CH)

To restore the ability to drive is one aim of the rehabilitation of patients with neurological disabilities. In some instances, an evaluation is required in order to judge a patient's fitness to drive in today's traffic. Forty-three patients of the neurorehabilitation unit of the Valens Clinic were assessed by a standard traffic psychological test protocol and a control drive. In 88% there was agreement between the judgments based on each procedure. In 12% the judgements diverged. Four patients had failed either the psychological tests or the control drive but not both. A telephone interview two years after discharge showed that 3 of 4 patients drove anyway. One patient drove uneventfully but 2 patients who had failed the psychological tests had committed several minor traffic offences, one of them in addition a car crash while pass-

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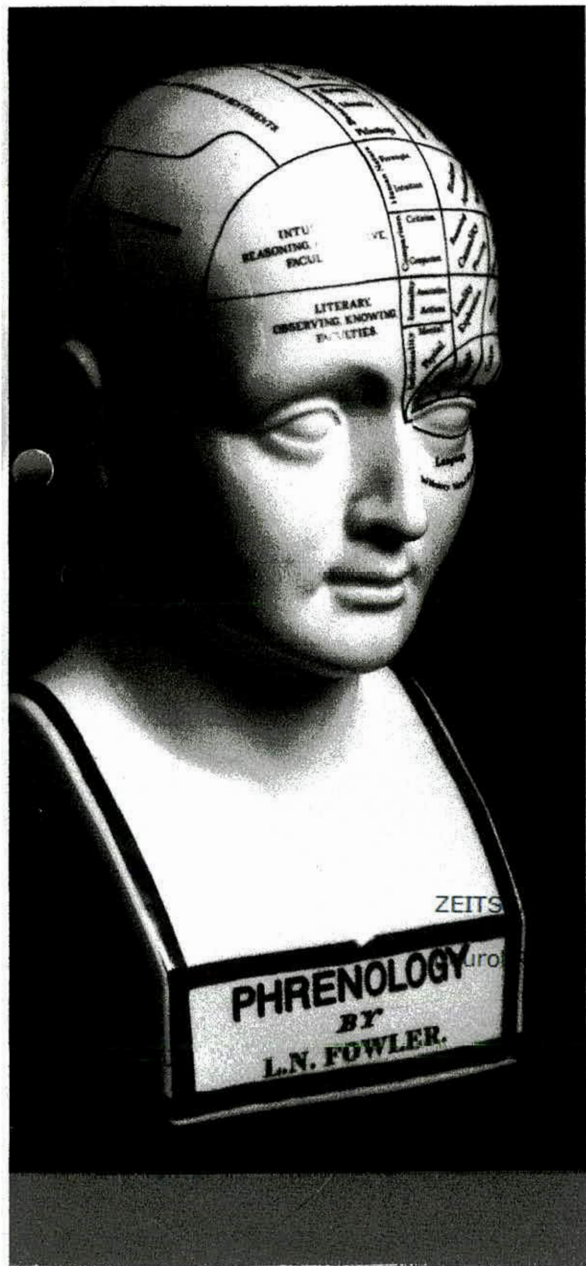

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