

Supported by grants from the “Comitato Telethon Fondazione Onlus” – Italy – (GGP06209), the Italian “Ministero della Salute” (PS04.20 and RF04.125O), and the Lundbeck Foundation – Denmark – (COFIN04.125O).

Oral session 10

Rehabilitation

O87

Activation in dominant and non-dominant brain regions in relation to language performance in chronic aphasic stroke patients

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Objectives: Recovery from aphasia after stroke is optimal when the ipsilesional dominant hemisphere can regain its role in language processing. In the earlier phases after stroke, functional neuroimaging studies have shown extensive activation in the non-dominant hemisphere not correlated to recovery. This may lead to novel therapeutic strategies, such as use of transcranial magnetic stimulation (TMS). The non-dominant side may still contribute to language performance in the chronic phase. The aim of our study was to identify the contribution of left and right brain areas to language function in chronic stroke patients and controls.

Methods: We examined 11 chronic aphasic stroke patients and 12 controls using 3 fMRI language paradigms: verb generation (VERB), picture word matching (PWM), and semantic decision (SD). SPM2 was used for data-analysis. The number of activated voxels (NAV) and lateralization index (relative contribution of the left hemisphere (LI)) were calculated in different regions-of-interest (ROIs).

The Aachen Aphasia Test was used as a measure of aphasia severity, and was correlated with NAV and LI in ROIs.

Results: LI for all ROIs combined was lower in the patient group for the following language tasks: PWM (LI = 0.39 (controls) vs. 0.09 (patients); $p = 0.002$), and VERB (0.37 vs. 0.20; $p = 0.07$).

LI in cerebellum was higher in patients for the language tasks SD (-0.27 vs. 0.14 ; $p = 0.001$), and VERB (-0.35 vs. -0.01 ; $p = 0.003$).

A positive correlation between performance and LI for all ROIs combined was found for PMW ($p = 0.01$), and SD ($p = 0.071$). In PMW mainly posterior ROIs were responsible ($p = 0.008$).

NAV in the left supramarginal gyrus (SMG) tended to be positively correlated with performance for VERB ($p = 0.080$).

Conclusions: In agreement with previous findings, we found relatively more active left cerebellar and right cerebral hemispheres in patients. Within the patient group language performance was positively correlated with LI in language areas. Particularly posterior areas contributed to this correlation. NAV in the left SMG correlated positively with language performance for VERB.

Our data suggest that activation in the ipsilesional left hemisphere, especially posterior regions, is most important in language recovery. We found no clear evidence for a contribution of the right, non-dominant hemisphere to language performance in chronic ischemic stroke patients.

Supported by the Dutch Heart Foundation, grant 2003B196.

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Measuring intentional mental imagery – and hence consciousness – in non-communicative brain injured patients using fMRI

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Introduction: The assessment of voluntary behaviour in non-communicative brain injured patients is often challenging due to the existence of profound motor impairment. In the absence of a full understanding of the neural correlates of consciousness, even a normal activation in response to passive sensory stimulation cannot be considered as proof of the presence of awareness in these patients. In contrast, predicted activation in response to the instruction to perform a mental imagery task would provide evidence of voluntary task-dependent brain activity, and hence of consciousness, in non-communicative patients. However, no data yet exists to indicate which

imagery instructions would yield reliable single subject activation. The aim of the present study was to establish such a paradigm in healthy volunteers.

Methods: Two exploratory experiments evaluated the reproducibility of individual brain activation elicited by 4 distinct mental imagery tasks. The two most robust mental imagery tasks were found to be spatial navigation and motor imagery. In a third experiment, where these two tasks were directly compared, differentiation of each task from one another and from rest periods was assessed blindly using a priori criteria and was correct for every volunteer.

Results: The spatial navigation and motor imagery tasks described here permit the identification of volitional brain activation at the single subject level, without a motor response.

Conclusion: Volunteer as well as our reported patient data (Owen et al., Science 2006) strongly suggest that this paradigm may provide a method for assessing the presence of volitional brain activity, and thus of consciousness, in non-communicative brain-injured patients.

The Belgian National Fund for Scientific Research (FNRS), an MRC programme grant, Commission of the European Communities (contract # 043457), Marie Curie Training Networks (contract # MRTN-CT-2006-0359) and the Mind Science Foundation funded this work.

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Comparison of the admission policies to stroke rehabilitation units and of the aftercare situation in four European centres. Data from the CERISE study

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Objectives: The CERISE (Collaborative Evaluation of Rehabilitation in Stroke Across Europe) study aimed in part examining differences in the amount and content of therapy, in organisational characteristics and staff input, in regional networking for admission and aftercare in four European stroke rehabilitation units (SRUs). On the last ENS meeting we reported on the impact of the therapeutic activities on outcome. Now, we present data on the networking with acute clinics and the aftercare services.

Methods: In each of the four centres, questionnaires and semi-structured interviews were performed by a single researcher with the medical consultants exploring the importance of factors related to the patients, factors related to the network between facilities and the referring acute hospital in the decision-making process concerning admission. Home visits at 6 months post-stroke were conducted to monitor the services patients receive at home. Together with the outcome data of the SRUs we can provide a synopsis on the network for acute treatment, rehabilitation and aftercare in stroke in each region of the SRUs.

Results: In the GB-SRU, severely disabled patients were admitted significantly earlier after stroke compared to the other units. Pre-morbid conditions were frequently more taken into account in BE-, CH- and DE-SRU. Networks between the acute facilities and the respective SRUs also influenced their decision-making on admission.

Between 66% (CH) and 75% (DE) of the patients lived at home 6 months post-stroke. They differed significantly in their motor and functional status. The most contacted professional caregivers were general practitioners (89% (CH)–43% (GB)), followed by the physiotherapists (82% (B)–47% (CH)) and the nurses (42% (B)–4% (D)). The aftercare situation showed hereby also significant differences, which could not be fully explained by the patients' status.

Conclusion: Regional networking with acute clinics and shared decision making on patients' conditions can facilitate the admission to SRUs. Improving the aftercare situation can be obtained by the cooperation between the SRUs and mainly general practitioners, physiotherapists and nursing services in the region. Networking for acute treatment, rehabilitation and long term (after)care in stroke should include all these partners.

The study was performed within the framework of the research “Collaborative Evaluation of Rehabilitation in Stroke across Europe (CERISE)”, Quality of life, key action 6, 2001–2005, contract number QLK6-CT-2001–00170 funded by the