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Neural mechanism of the spatial orienting in the posterior parietal cortex in live mouse: Two-photon brain imaging study

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Keywords: Two-photon microscope; Lesion; Posterior parietal cortex; Spatial orienting; Morris water maze

Objective.—The aim of this study was to demonstrate the crucial role of right posterior parietal cortex in spatial orienting using two-photon microscope detecting cortical neuronal activity and Morris water maze testing visuospatial function.

Methods.—Eighteen C57BL/6 J mice were randomly divided into two groups as damaged group that received electrolytic lesion of right posterior parietal cortex and normal control group that received no operation. Morris water maze was performed to test visuospatial orienting function. And then, depose the mouse under two-photon to observe and record.

Results.—Under the two-photon calcium imaging, damaged mice in the posterior parietal cortex showed significant deficits on the recorded neurons compared with normal control group. Moreover, the lesion in the posterior parietal cortex resulted in significant decreases in the number of both the neuron cell and the neurogliocyte. During the Morris water maze test, damaged mice showed significant deficits in the spatial orienting compared with normal control group.

Conclusions.—Two-photon microscope can detect online neuronal activity, with high temporal and spatial resolution. Posterior parietal cortex plays a crucial role in spatial cognition.

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Changes of cerebral glucose metabolism in patients with minimally conscious state after hypoxic-ischemic brain injury

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Keywords: Cerebral glucose metabolism; Minimally conscious state; Hypoxic-ischemic brain injury

Background.—Hypoxic-ischemic brain injury (HIBI) is one of the most devastating adult neurological diseases causing the disorder of consciousness (DOC). In clinics, most patients suffered from the vegetative state (VS) or minimally conscious state (MCS).

Objective.—To assess the altered brain metabolism in DOC after HIBI, which can predict the neurological recovery.

Methods.—Thirty patients with VS, 20 patients with MCS after HIBI were recruited. In VS and MCS patients, mean age was 43.5 and 44.1 years, mean JFK-CRS score was 5.4 and 11.7 respectively. We measured the brain glucose metabolism in both groups and compared the brain metabolism using SPM2.

Results.—The brain metabolism in right superior occipital gyrus, both superior parietal gyri, both precentral gyri, both postcentral gyri was significantly increased in the MCS compared to the VS patients. However, there was no brain area that was decreased of brain metabolism in MCS compared to VS patients.

Discussion.—Our findings suggested that spared brain metabolism in the primary motor-sensory and visual cortices is relevant for meaningful response to environmental stimulation in MCS patients. A better understanding of the altered brain metabolism will contribute to optimizing therapeutic intervention for the recovery of DOC after HIBI.

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Driving and cognitive disorders

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Keywords: Cognitive disorders; Driving simulator; Comète-France; Neuropsychological; Driving licence

Objective.—Acquired and stabilized brain injuries are responsible for difficult to diagnose cognitive impairment and may compromise the resumption of driving.

Methods.—Their detection requires a careful medical evaluation completed by a robust neuropsychological assessment. As part of a multi disciplinary care of stroke patients in specialized rehabilitation, facility dedicated team, built around “Comète France” implements a specific support to enable them to resume driving in an appropriate way.

A protocol is established: medical assessment, physiotherapy and occupational therapy assessment, psychological and neuropsychological assessment, testing and rehabilitation and re-entrainment on driving simulator with the type “VTS Vienna Test System and Cogniplus”, finally test station auto driving school software adapted road. Accompanying administrative steps to regularize the Licence and if possible to obtain spatial vehicle subsidies.

Results.—Many brain injury patients were able to restart driving and thus regain their independence.

Discussion.—These findings underline the difficulty of establishing sufficient security level for each patient.

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Repetitive transcranial magnetic stimulation in the left hemisphere on a patient aphasic

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Keywords: tTMS; Aphasia; Stroke

Background.—The rTMS, in addition to aphasia rehabilitation, is usually suggested at a 1 Hz rate (inhibitor stimulation) on the right side, to enable ipsilesional recovery. This location of stimulation could be discussed for some patients having developed language skills in contralesional.

Methods.—Mr S., 45 years old, victim of a cerebrovascular accident of the left hemisphere in 2009, suffered from mixed aphasia predominating on the expressive side. The language assessment based on oral expression is divided in 4 equal parts, as to define the best stimulation zone: one each is submitted on 4 different days, before and after a rTMS session. The stimulation locations are the following: left and right pars triangularis and left and right pars opercularis.

Results.—Improvement being more important after stimulation of the left pars opercularis, 10 rTMS sessions of 20 minutes were done on that zone, following by 30 minutes of speech therapy.

In total, improvement in denomination: 2/20 versus 7/20 in the final test.

Discussion.—These findings support the interest of clinical or functional imaging analysis to determine the best stimulation location for rTMS for each patient.

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Visual agnosia related to hypoxic ischemic encephalopathy: A case report

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