### 2-5-1: Pattern-Reversal Visual Evoked Fields (VEF) in children with occipital lobe lesions

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The pattern-reversal visual evoked potential (VEP) measured electrically from scalp electrodes is known to be delayed and decreased in patients with occipital lesions. We questioned whether the measurement and source analysis of the neuromagnetic visual evoked field (VEF) might offer additional information regarding the location of functional cortex relative to the lesion. We retrospectively examined 12 children (6-16yrs) with occipital lesions on MRI who underwent MEG and ophthalmology as part of their pre-surgical assessment. Binocular half-field VEF were obtained in our 151-channel whole-head MEG (CTG Omega). Data were averaged and dipole source analyses performed for each half-field stimulation. For the non-lesional hemisphere, in all cases, a VEF was observable and localized to calcarine cortex. For the lesional hemisphere, 3/12 cases did not show a VEF while 9/12 demonstrated a localizable VEF. Differences in latency and magnetic field strength were not significant between the two hemispheres; however, a shift in the dipole location was observed in the lesional hemisphere. We conclude that the VEF is obtainable in children and demonstrates the expected location in the non-lesional hemisphere. In the lesional hemisphere, in contrast to the electrophysiological data, we did not find latency and amplitude changes. We suggest that the differences between the electrical and MEG data are due to the ability of the MEG to capture the maximal evoked response because of its whole-head coverage; whereas scalp electrode placement may not be ideally situated, due to mass effects of the lesion. Furthermore, MEG was useful for identifying functional cortex in the event that mass effects resulted in a cortical displacement. This demonstrates the utility of the neuromagnetic VEF in children with occipital lobe lesions.

### 2-5-2: Visual information processing under the effect of methylphenidate in healthy volunteers: a combined EEG/MEG study

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Introduction: The effect of methylphenidate (MPH) on neural bases of sensory information processing remains unclear. In our recent study we demonstrated that MPH affects auditory information processing by reducing P200 response. We aimed to investigate whether a single dose of MPH affects visual information processing in healthy adults. Methods: Half-field achromatic checkerboard reversal stimuli were presented. Neuronal activity was recorded with simultaneous whole-head MEG and EEG in 12 healthy subjects after oral administration of 40 mg MPH or placebo in a randomised, double-blind, cross-over design. We analyzed both electric and magnetic N75 and P100 components, as well electric N145 and P200 components. Results: MPH increased arousal levels in Visual Analogue Scales. MPH had no effect on the dipole strength or location of visual N75 and P100 components. Although N75 was enhanced after the MPH administration, according to our preliminary results, this effect failed to reach statistical significance. MPH did not change electric P100, N145 and P200 responses.Conclusions: The lack of the effect of MPH on visual information processing but pronounced effect on auditory information processing suggests differential effect of MPH on neural correlates of sensory processing. We suggest that visual information processing is less sensitive to dopaminergic/noradrenergic modulation produced by MPH than the auditory processing.

### 2-5-3: Processing face and food stimuli - latency advantage for faces as a biomarker for socialization

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Functional studies have found that the human fusiform “face” area (FFA) responds preferentially to faces over other objects. To evaluate the selective role of the FFA in processing social (face) versus non-social (food) stimuli, 275-channel MEG data were collected while six healthy subjects viewed each type of stimulus. In each subject, multiple dipole source analyses (regional sources) localized primary visual activity as well as the 170 ms fusiform response in each hemisphere. The latency of primary visual cortex activity did not differ between face and food stimuli in either hemisphere (p < 0.05). The 170 ms face response localized to the left and right fusiform gyrus in each subject.
Quantitative evaluation of the tongue sensory disturbances is important clinically. Somatosensory evoked fields following tongue stimulation was applied to overcome the difficulty of using electrophysiological approach to the peripheral nerve in the oral area. Six patients with unilateral tongue deficits were recruited (6 right side). Abnormal sensation area and its symmetric normal sensation area were stimulated electrically using pin electrodes non-invasively. The same stimulus intensity was used for both sites, which was adjusted to 4 times sensory thresholds in the normal area. 600 times were averaged. The signals recorded by 204-channel planar gradiometers out of whole-head 306 sensors were used for analysis. The band pass was 0.1 to 990 Hz and the sampling rate was 2997 Hz. The mean amplitude between 10 and 150 ms for the root mean square (RMS) was calculated from the 18-channel over the contralateral hemisphere (RMS[10, 150]). To estimate the activated cortical response, we calculated the difference of RMS[10, 150] and RMS[-50, -5] and termed it as aRMS. (aRMS = RMS[10, 150] - RMS[-50, -5]). Although normal area stimulation elicited 2 to 4 responses in all subjects, abnormal area stimulation showed smaller response in 4 patients. The across-subject average of the aRMS for the normal and abnormal side stimulation were 7.02 ± 1.92 and 1.72 ± 1.59 fT/cm, respectively. Significant difference of the aRMS was recognized between the sides of stimulation. The cortical activation evoked by abnormal side was significantly smaller than that after normal area in all patients.