P06.02

An EEG study of visual-sensory integration in schizophrenia

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In this study we investigate neuronal processing and organization of the rubber hand illusion (RHI) with EEG evoked responses. The RHI is an illusion in which tactile sensations are referred to synthetic alien limb, it was proposed that this illusion speaks of a three-way interaction (i.e., integration) among vision, touch and proprioception. Going from pre-illusion condition to an illusion state a marked dipole (i.e., depolarization of electrical recording) over the central (parietal) and occipital regions is evident in control subjects. This dipole is evident at early processing intervals that probably reflect information processing of lower-level neuronal hierarchical systems. In schizophrenic patients these relations of hierarchical organization during the formation of the RHI are significantly altered. Early wave-forms of the evoked responses do not differ at the illusion-states compared to non illusion epochs. The conditions associated with the illusion prevails only after 0.4 milliseconds. From this work it seems that the hierarchical organization of information processing in schizophrenic patients is disturbed compared to controls.

P06.03

Effects of VNS on rCBF in patients with treatment-resistant depression

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Background: This study examines the effects of Vagal Nerve Stimulation (VNS) on regional cerebral blood flow (rCBF) utilizing HMPAO-SPECT. VNS is under investigation as a therapy for treatment-resistant depression. However, the physiologic underpinnings of this intervention have not been elucidated in a depressed population.

Method: All eight patients met criteria for treatment-resistant depression. They were randomly assigned to a control/active treatment group. Each patient received three SPECT scans: prior to implantation, after the acute-phase (12 weeks), and after 6-months follow-up. An eyes and ears closed paradigm was used; and images were reconstructed by back-projection utilizing a Butterworth filter and analyzed using SPM99.

Results: The study remains blinded, precluding control vs. active comparisons. Upon completion of the acute phase, one patient has met responder criteria. As compared to the non-responders, the responder demonstrates significantly increased perfusion to ant. cingulate ($p<0.05$) and L. orbito-frontal cortex ($p<0.01$), and decreased to R. mid. temporal gyrus ($p<0.01$).

Conclusions: These preliminary results demonstrate rCBF changes in brain regions implicated in depression. Control vs. active group comparisons and long-term follow-up data will also be presented as available.

P06.04

Metabolic abnormalities of severe, chronic treatment resistant depression post VNS implant

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Background: Severe, chronic treatment resistant depression (trD) carries high morbidity, mortality, and cost. Markers for trD will enable early identification and specialized treatments such as Vagus Nerve Stimulation (VNS). This study tests the hypothesis that hypometabolism of Genual/Pregenual anterior cingulate (ACC) is a trait marker for trD receiving VNS implant.

Methods: Eight trD patients received VNS implant. No stimulation during the 1st two weeks. Eight matched normal controls and VNS patients underwent FDG PET scans. The VNS group had the following characteristics: mean Ham-D > 31; average duration of illness: 20 years; failure of antidepressant trials: > 2; VNS patients received PET scan 7–10 days after the implant. Minimal medication changes were allowed during the study. Grand mean images were created and the analysis was performed using satoshi.

Results: Significant hypometabolic regions in between-group (i.e., VNS-control) were observed: Pregenual/Genual Anterior Cingulate (BA 24/32), Posterior Cingulate (BA 31), Superior Frontal (BA 8), Medial Frontal, Inferior Temporal, Middle Temporal gyri and Parahippocampus.

Conclusions: Hypometabolism of Genual/Pregenual anterior cingulate seems to be the marker for trd among patients who received VNS without stimulation and without medication washout.

P06.05

Changes in brain metabolism in response to chronic vagus nerve stimulation for depression and association with clinical response

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Background: Stimulation of the vagus nerve (VNS) through an implanted electronic device reduces depression. Currently, a double-blinded study is evaluating VNS in refractory depression. Studies have demonstrated reversible changes in cerebral blood flow in depressed human brains in response to pharmacotherapy and electroconvulsive therapy. We hypothesize similar findings with VNS: we measured differences in blood flow in the prefrontal cortex, anterior cingulate gyrus, and basal ganglia (brain regions previously shown to have alterations in depression).

Methods: Using PET and labeled 18F-fluorodeoxyglucose, brains of 9 patients were scanned at baseline and after 3 and 6 months of VNS. The Hamilton Rating Scale for Depression (HAM-D) was administered at these times also.

Results: (Results will be available by conference.) Statistical parametric mapping for changes in metabolism will be used to compare these selected regions of brain: prefrontal cortex, anterior cingulate gyrus, and basal ganglia before and after stimulation.

Anticipated Conclusions: VNS stimulation for depression is asso-ciated with change in metabolism in these brain regions. Clinical response as defined by reduction of HAM-D by 50% was associated with these changes.

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