Neuroimaging

PP3184

A comparative value of T1 and T2-weighted magnetic resonance imaging (MRI) and transcranial sonography (TCS) in Parkinson’s disease: a prospective pilot study of 16 cases

K. Laučkaitė¹, D. Šurkienė¹, U. Matyženok², R. Gleiznienė², B. Gažauskienė³, A. Vaitkus¹, D. Rastenytė¹

¹Neurological, ²Radiological, ³Lithuanian University of Health Sciences, Kaunas, Lithuania

Introduction: The aim of the study was to: 1) evaluate quantitatively the diameter and plot of the substantia nigra (SN) on T1W and T2W MRI sequences for the patients with idiopathic Parkinson’s disease (IPD) and healthy controls; 2) to compare MRI and TCS parameters.

Methods: A prospective case-control study of 11 IPD patients and matched-to-IPD group 5 healthy subjects was performed at Kaunas Clinics in 2011-2013 according to an established imaging protocol. TCS was performed by one neurosonologist (2-5 MHz PA transducer, Voluson 730 Expert, GE, Austria), followed by brain MRI (1.5 T Magnetom Avanto, Siemens, Germany). The latter imaging was performed and measured by two radiologists at different time intervals.

Results: The majority in IPD group were male (n=8, 72.7%), the mean (±SD) age was 59.6±7.0y (min.48-max.69), symptom duration 5±3.6y.(min.2-max.12), and stage according to Hoehn-Yahr 2±0.8 (min.1-max.3). The main MRI findings are presented in Table 1. Bland-Altman plots revealed sufficient diagnostic agreement among MRI-SN and TCS-SN measurements, with more narrow limits for T1W than T2W (right x=0.088, left x=0.042, bilateral x=0.065). A significant correlation was found between T2W-SN proximal diameter and TCS-SN plot on the right side (r=-0.7, p=0.01).

Conclusions: When performing diagnostic MRI for the patients with IPD, the measurements of the SN diameter (mm) on T1W, but plot (mm²) on T2W sequences can be more informative. A sufficient diagnostic agreement was established between MRI-SN and TCS-SN, however the only significant negative correlation was found between T2W-SN diameter and TCS-SN plot on the right side.

Disclosure: Nothing to disclose

PP3185

Morphological brain changes in men and women with poststroke cognitive impairment

Y. Abramenko, N. Iakovlev, A. Skorodumova

Department of Neurology, Tver State Medical Academy, Tver, Russian Federation

Introduction: The association between ischemic stroke and cognitive impairment (CI) is well documented. The aim of the study was to find sex differences of neuroimaging brain changes in ischemic stroke patients with CI.

Methods: 52 women at the acute phase of ischemic stroke (mean age 64.3) and 36 matched by age and education men (mean age 65.0) without other severe medical conditions, psychiatric disorders or aphasia underwent neurological examination and magnetic resonance imaging (MRI); additional measurements included the Frontal Assessment Battery (FAB), Clinical Dementia Rating Scale, Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE). Types of CI were defined according to currently established criteria.

Results: The following spectrum of CI was revealed: subtle CI (15.3% in women vs. 13.9% in men), mild CI (38.5 vs. 16.7%), dementia (46.2% vs. 69.4) (p<0.05). According to the IQCODE prestroke CI occurred in 41.9% men and 29.1% women (p<0.05). The MRI has shown that prestroke CI group and men were characterized by more severe degree of internal cerebral atrophy whereas women surpassed men by the average rate of periventricular leukoaraiosis (p<0.05-0.01). In men, unlike women, positive correlations are revealed between the index of lateral ventricle bodies and the summary FAB score (r=0.39, p<0.05). Men had more often than women ischemic lesions in strategic areas like frontal lobe (48.7 vs. 33.1%), basal ganglia (23.3% vs. 13.3%), thalamus (27.7 vs. 17.8%).

Conclusions: The received data expand information about neuroimaging brain changes of men and women with poststroke CI.

Disclosure: Nothing to disclose
PP3186

Atypical language networks in epilepsy: the interaction with the epileptic network

M. Centeno¹, L. Croft², H. Cross², R. Pressler², C. Clark², T. Baldeweg², D. Carmichael²

¹Imaging and Biophysics Department, Epilepsy Unit, ²Institute of Child Health, University College London, London, United Kingdom

Introduction: Atypical language network location and/or lateralization have been reported in a relevant proportion of patients with epilepsy. The presence of structural lesion, early age of epilepsy onset and epilepsy severity have been associated with atypical language; however the underlying mechanisms of this phenomenon are still unknown. In this study we used fMRI to map both the epileptic network and the language network and analyse the correlation of these two as well as the effect of interictal epileptiform discharges (IED) on language activation.

Methods: An eight-year-old left handed girl with left frontal lobe epilepsy secondary to a left middle cerebral artery perinatal stroke underwent simultaneous EEG-fMRI and language fMRI. Maps of the epileptogenic network related to the IED and language maps for verb generation, picture naming and describing were generated using statistic parametric mapping.

Results: EEG-fMRI analysis showed bilateral frontal cortical areas and basal ganglia involvement during the generation and spread of IED. In particular, it revealed involvement of language relevant areas (inferior and middle frontal gyrus right>left). Crucially, these regions were not significantly activated during language fMRI. Instead, language activation in the structurally-intact (right) hemisphere was located more posteriorly and superiorly.

Conclusions: Lack of activation in this patient’s expected language areas (right inferior and middle frontal gyrus) may be explained by the overlap between the epileptic network and the language network. Interaction between epileptic and cognitive networks provides some insight to understand atypical organization on cognitive networks in patients with epilepsy.

Disclosure: Nothing to disclose

PP3187

White matter microstructural investigation of coherent motion perception with diffusion MRI

G. Csete¹, N. Szabó¹,², A. Rokszin³, E. Tóth¹, G. Braunitzer¹, G. Benedek³, L. Vécsei¹,², Z.T. Kincses¹,²

¹Albert Szent-Gyorgyi Medical Centre Department of Neurology, Szeged, Hungary, ²International Clinical Research Centre, St. Anne's University Hospital, Brno, Czech Republic, ³Department of Physiology, Faculty of Medicine, University of Szeged, ⁴MTA-SZTE Neuroscience Research Group, Szeged, Hungary

Introduction: Brain function and the underlying structure are in the highlight of neuroscience. Grey matter structures involved in motion detection in a noisy environment are well known from human functional imaging studies (Buchel et al., 1998). The functional connectivity between these nodes is a highly investigated property of the motion detection and attention networks (Buchel & Friston, 1997, Friston et al., 1997, Penny et al., 2004). However, the structural connectivity and its relation to the brain function is not well known yet (Johansen-Berg, 2010). In order to resolve this issue, we investigated the white matter microstructural background of motion discrimination with random dot kinetogram.

Methods: Parameters describing the white matter microstructure were estimated from high-angular resolution diffusion MRI data. Voxelwise fractional anisotropy in the white matter skeleton (Smith et al., 2007) was correlated with motion discrimination threshold in random dot kinetogram paradigm. Probabilistic tractography was used to reveal the connectivity of identified regions.

Results: Significant positive correlation was found between the motion discrimination threshold and the local fractional anisotropy in the posterior part of the right superior frontal gyrus, right juxta-cortical superior parietal lobule, left parietal white matter, left superior temporal gyrus and the left optic radiation. Pathways initiated from these seed regions passed over the segregated branches of the superior longitudinal fascicle, which are probably related to the dorsal and ventral attention networks (Corbetta & Shulman, 2002).

Conclusions: Our study calls attention to the tightly linked visual and attention systems and the correlation between brain structure and function.

Disclosure: Nothing to disclose
PP3188
Clinical correlations of microstructural changes in progressive supranuclear palsy
A. Giordano¹, A. Tessitore¹, G. Caiazzo¹, D. Corbo¹, R. De Micco¹, A. Russo¹, S. Liguori¹, M. Cirillo¹, F. Esposito², G. Tedeschi¹
¹Second University of Naples, Italy, Naples, ²Department of Medicine and Surgery, University of Salerno, Salerno, Italy

Introduction: In patients with progressive supranuclear palsy (PSP), previous reports have shown a severe white matter (WM) damage involving supra and infratentorial regions including cerebellum. In the present study, we investigated potential correlations between WM integrity loss and clinical-cognitive features of patients with PSP.

Methods: By using magnetic resonance imaging and diffusion tensor imaging (DTI) with Tract Based Spatial Statistic (TBSS) analysis, we analyzed WM volume in 18 patients with PSP and 18 healthy controls (HCs). All patients underwent a detailed clinical and neuropsychological evaluation.

Results: Relative to HCs, patients with PSP showed WM changes encompassing supra and infratentorial areas such as corpus callosum, inferior fronto-occipital fasciculus, midbrain, anterior thalamic radiation, fornix, superior cerebellar peduncle and superior longitudinal fasciculus. Among different correlations between motor-cognitive features and WM structural abnormalities, we detected a significant association between fronto-cerebellar WM loss and executive cognitive impairment in patients with PSP.

Conclusions: Our findings, therefore, corroborate the hypothesis that cognitive impairment in PSP may result from both “intrinsic” and “extrinsic” frontal lobe dysfunction, likely related to cerebellar disconnection.

Disclosure: Nothing to disclose

PP3189
Regional metabolic change in superior temporal gyrus in children with congenital sensorineural hearing loss: study by magnetic resonance spectroscopy (MRS)
L.X. Huang, W.B. Zheng, Y.T. Wang, H.Y. Zheng
Medical College of Shantou University, Shantou, China

Introduction: To study the changes of regional metabolic in superior temporal gyrus (STG) in children with congenital sensorineural hearing loss (SNHL) by magnetic resonance spectroscopy (MRS).

Method: In 54 individuals (1-5 years old) with congenital sensorineural hearing loss (SNHL) and 20 healthy controls (1-3 years old, n=10) and (3-5 years old, n=10), two regions of interest (ROIs) positioned in the superior temporal gyrus (STG) were investigated bilaterally using MRS. SNHL patients were divided into two groups: group A (1-3 years old, n=28) and group B (3-5 years old, n=26). N acetyl aspartate (NAA), N acetyl aspartate (NAA) / creatine (Cr), choline (Cho), choline (Cho) / creatine (Cr) in both side of superior temporal gyrus were calculated by MRS and analysed by LCmodel in all subjects.

Results: Compared with healthy control group(age-matched) MRS showed regional metabolic of NAA were decreased in group A, and Cho were increased in group B in superior temporal gyrus in children with congenital sensorineural hearing loss. There is statistically difference of NAA in STG between control group and patient group A (p<0.05), and statistically difference of Cho in STG between control group and patient group B (p<0.01).

Conclusions: Regional metabolic change in superior temporal gyrus in children with congenital sensorineural hearing loss may be corresponding to the lack of auditory input since birth, after 3 years old, increased of CHO might suggest that a loss of myelin and axonal fibers in SNHL patients. To gain optimal benefits, early implantation in prelingually deaf children is necessary.

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PP3190

Micro and macrostructural alteration of the subcortical structures in cluster headache: a neuroimaging study

A. Király1, Z.T. Kincses1,2, N. Szabó1,2, E. Tóth1, G. Csete1, P. Faragó1, A. Párdutz1, J. Tajti1, D. Szok1, L. Vécsei1,3

1Department of Neurology, Albert Szent-Gyorgyi Medical Centre, Szeged, Hungary, 2International Clinical Research Centre, St. Anne’s University Hospital, Brno, Czech Republic, 3MTA-SZTE Neuroscience Research Group, Szeged, Hungary

Objectives: Previous studies showed that basal ganglia involved in pain processing. Neuroimaging studies detected activation in basal ganglia in acute and chronic pain. Limited data is available in cluster headache; therefore, in the current study we examined deep brain structures in cluster headache patients.

Methods: High resolution T1-weighted and diffusion weighted MRI images with 60 directions were acquired from eleven patients with cluster headache and eleven age-matched healthy controls. Images were mirrored to make sure that all patients had the pain on the right side. VBM and FIRST analysis were used to measure the cortical thickness and the volume of the basal ganglia respectively. Group differences were evaluated with independent sample t-test. Intra-subject inter-structure correlations of basal ganglia volumes were investigated. Mean of the diffusion parameters of the basal ganglia were defined in each group. Correlation between basal ganglia volumes, mean diffusion parameters and cumulative number of headache days was examined.

Results: There were no differences in the volume of basal ganglia between the healthy and patients’ group. Volume of subcortical structures in cluster headache showed strong intra-subject inter-structure correlation. Diffusion parameters showed alteration (amygdala, pallidum, putamen) in patients compared to controls and correlation with attack/life was detected. No cortical changes were found in patients.

Discussion: Strong inter-structure volume correlation might mean the same rate of changes. The laterality specific diffusion alterations point to pain specific changes. Analysis of basal ganglia in cluster headache might offer a deeper insight into the pathomechanism of the pain processing in the disease.

 Disclosure: Nothing to disclose

PP3191

Diffusion tensor imaging and plaque volume quantitation of normal-appearing white and grey matter of the brain in clinically isolated syndrome: a longitudinal study

M. Kolasa1, U. Hakulinen2,3, M. Helminen4, S. Hagman1, M. Raunio2, M. Rossi2, A. Brander2, P. Dastidar2, I. Elovaara1

1Neuroimmunology Unit, University of Tampere, Medical School, 2Department of Radiology, Medical Imaging Centre, Tampere University Hospital, 3Department of Electronics and Communications Engineering, Tampere University of Technology, 4Science Centre, Pirkanmaa Hospital District and School of Health Science, University of Tampere, Tampere, 1Department of Neurology, Seinäjoki Central Hospital, Seinäjoki, Finland

Introduction: To investigate whether diffusion tensor imaging (DTI) measurements and brain lesion volume on conventional MRI of patients with clinically isolated syndrome (CIS) are associated with conversion to multiple sclerosis (MS) over a four-year follow-up period.

Methods: Twenty patients with CIS and 10 healthy controls were included in the study. The mean diffusivity (MD) and fractional anisotropy (FA) measures in 9 brain regions of normal-appearing white (NAWM) and grey matter (NAGM), together with volumes of brain T1 and FLAIR lesions, were assessed for up to four years.

Results: Over the follow-up period, MS was diagnosed in 11 of the 20 patients (55%). The baseline T1 and FLAIR lesion volumes but none of the DTI indices were associated with conversion to MS (T1: p=0.021; FLAIR: p=0.015). At baseline, both converting and nonconverting patients had lower FA in one NAWM region (the cerebral peduncle) and higher MD in three NAWM regions (the internal capsule, corona radiata anterior, and centrum semiovale) than controls. However, only converting patients had a lower FA in the caudate nucleus. Over the follow-up period, the worsening of DTI measurements was primarily observed in converting patients.

Conclusions: DTI abnormalities in NAWM and NAGM were already present in patients with CIS, but over the follow-up period, these changes worsened, especially in patients developing MS. A higher volume of T1 and FLAIR lesions but not the severity of DTI changes in NAWM or NAGM are predictive for conversion to MS.

 Disclosure: Nothing to disclose
PP3192

Early left atrial diastolic dysfunction measured by transthoracic echocardiography is a risk factor of atherosclerosis in cerebral infarction patients

Neurology, Japanese Red Cross Nagoya Daichi Hospital, Nagoa, Japan

Introduction: Last year we indicated that early cardiac diastolic dysfunction is related to development of atherosclerosis in acute cerebral infarction patients, using transthoracic echocardiography (TTE). In addition to our previous findings, this year we evaluated the actual left atrial volume as a parameter to assess developed left atrial dysfunction using 3D TTE.

Methods: We evaluated 320 patients hospitalized for acute atherosclerotic cerebral infarction from April 2012 to December 2013. Blood examination, TTE, and carotid ultrasonography were performed in the acute phase. Parameters representing systolic and diastolic cardiac function were assessed: left ventricular ejection fraction (EF), early inflow atrial wave (E), atrial contraction wave (A), and mitral annulus velocity (e’). We also evaluated left atrial volume of 43 patients using 3D TTE at the same time. Carotid atherosclerosis was measured as plaque score (PS). These parameters and fibronolysis marker D-dimer were statistically analyzed.

Results: E’ and E/A negatively correlated with PS. On the contrary, correlation of left atrial volume and PS were not statistically significant. Other parameters shown no significant correlation with PS or D-dimer.

Conclusions: E’ and E/A reflecting early cardiac diastolic dysfunction. Decrease of left atrial diastolic function leads to elevation of left ventricular end diastolic pressure and activation of sympathetic nervous system leading to damage of endothelial cells. Left atrial diastolic dysfunction are also observed as increased left atrial volume, but in the late phase. Our results suggests that decreased left atrial diastolic function in the early stage is associated with development and worsening of carotid atherosclerosis.

Disclosure: Nothing to disclose

PP3193

Subcortical atrophy and its relation to the white matter microstructural alterations in multiple sclerosis

E. Toth¹, Z.T. Kincses¹,², N. Szabó¹,², G. Csete¹, A. Király¹, P. Faragó¹, K. Bencsik¹, L. Vécsei¹,³
¹Department of Neurology, Albert Szent-Györgyi Clinical Center, University of Szeged, Szeged, Hungary, ²International Clinical Research Center, St. Anne’s University Hospital Brno, Brno, Czech Republic, ³Neuroscience Research Group of the Hungarian Academy of Sciences and University of Szeged, Szeged, Hungary

Introduction: MRI is a key approach for the diagnosis and the monitor of multiple sclerosis (MS). According to recent studies the subcortical atrophy is a sensitive MRI-marker of the disablement. The aim of our investigation is to reveal the connection between the white matter (WM) microstructural disintegration and the subcortical atrophy.

Methods: T1-weighted and FLAIR images and diffusion MRI data, with 60 directions were acquired in 31 RRMS patients and 31 age-matched controls on a 1.5 T MRI scanner. Subcortical atrophy was evaluated with a surface based segmentation approach (FIRST). WM microstructure was evaluated with track based spatial statistics (TBSS). Whole WM diffusion parameter changes as compared to the mean of the healthy were related to the subcortical atrophy.

Results: The statistical analysis revealed significant atrophy in case of the left (p<0.048) and right (p<0.024) caudate nucleus, the left (p<0.024) hippocampus, left (p<0.024) and right (p<0.036) putamen and the left (p<0.007) and right (p<0.048) thalamus.

Stepwise linear regression confirmed the FA in the area of the normal appearing white matter (NAWM) was the main predictor of the atrophy in case of the right and left caudate nucleus (p<0.004; p<0.011); the right and left hippocampus (p<0.007; p<0.010) the left pallidum (p<0.004); the right and left putamen (p<0.006; p<0.000308); the right thalamus (p<0.010; p<0.008).

Conclusions: According to our results the subcortical atrophy was primarily driven by the disintegration of the NAWM.

Disclosure: Nothing to disclose
Cortical activity modulation by botulinum toxin A in patients with post-stroke arm spasticity: real and imagined hand movement

T. Veverka¹, P. Hluštík¹, P. Hok¹, Z. Tüdös², P. Otruba¹, A. Krobot³, P. Kaňovský¹
¹Department of Neurology, ²Department of Radiology, ³Department of Physiotherapy, Palacky University and University Hospital, Olomouc, Czech Republic

Introduction: In post-stroke spasticity functional imaging may uncover modulation in central sensorimotor networks associated with botulinum toxin A (BoNT) therapy. Investigations were performed to localize brain activation changes in stroke patients treated by BoNT for arm spasticity using functional MRI (fMRI).

Methods: 14 ischemic stroke patients with hand weakness and spasticity were studied. Spasticity was scored by modified Ashworth scale (MAS). FMRI was performed 3 times: before (W0) and 4 (W4) and 11 weeks (W11) after BoNT. Group A: 7 patients with hand plegia, who imagined moving fingers. Group B: 7 age-matched patients able to perform sequential finger movement. Statistic analysis (FSL) yielded group session-wise statistic maps and paired between-session contrasts.

Results: BoNT transiently lowered MAS in W4 in both groups. In group A, activation of frontal premotor cortex dominated. At W4, ipsilateral cerebellum engaged and persisted at W11. Paired contrasts showed activation decrease in bilateral occipital cortex W0-W4 and left occipitoparietal increase W4< W11, resulting from occipital deactivation (also precuneus and medial orbitofrontal cortex) at W4. Group B additionally activated contralateral motor and parietal cortex and bilateral cerebellum. From W0 to W4, activation was markedly reduced, which persisted at W11. Paired contrasts confirmed differences W0>W4 (ipsilateral parietal, occipital and premotor) and W0>W11 (occipitoparietal). The effect of deactivation was limited.

Conclusion: Study of 2 age-matched groups with mild and severe weakness demonstrated different effect of BoNT-lowered spasticity on motor system engagement. Study supported by: IGA MH CR grant NT13575.

Disclosure: Nothing to disclose

Accelerated reconstruct MRI T2 map from sub-sampled K-space data using compressed sensing at 7.0 Tesla

G. Zhang¹, G. Xiao², Z. Dai¹, Z. Shen¹, S. Li¹, R. Wu¹
¹Second Affiliated Hospital, Shantou University Medical College, Shantou, ²Math and Applied Mathematical, Hanshan Normal University, Chaozhou, China

Introduction: We aim to use less k-space data to obtain high quality reconstructed MRI T2 map based Compressed sensing (CS) by optimized DWT-based nonlinear conjugate gradient (DWT-NCG) algorithm.

Methods: The phantom and in vivo SD mice brain experiments were conducted under an Agilent 7.0T animal MRI system. The T2 map was obtained by FSE pulse sequence. The frequency code of all the images was fixed to 256, and the based phase encoding was 256. We subsampled the k space data by altering phase encoding, namely 32, 64, 96, 128 and 192. We speedily reconstructed by optimized NCG algorithm using MATLAB software and closely analyzed the peak signal to noise ratio(PSNR) by comparing with the original image. Then corrected the gradient and update the number of iterations to modify the gradient image.

Results: After being compressed, the retained energy is 99.29%, and the number of zeros is 93.73%. By wavelet transformation, most coefficients are small. T2 map obtained from a reduced data set can be reconstructed precisely by optimized DWT- NCG algorithm when the accelerated factor is 4.

Conclusions: In this work, the optimized DWT-NCG algorithm of compressed sensing could accelerate MRI T2 map by reducing the number of acquired kspace data which can significantly achieve rapid high quality imaging in MRI at 7.0 Tesla. The performance of the proposed algorithm would especially meaningful to clinical application.

Disclosure: Nothing to disclose
**PP3196**

**A potential method for imaging GABA in vivo using chemical exchange saturation transfer**

T. Zhang, Z. Dai, Y. Jia, R. Wu  
Department of Medical Imaging, 2nd Affiliated Hospital, Shantou University Medical College, Shantou, China  

**Introduction:** To develop a novel MRI technique to measure gamma-aminobutyric acid (GABA) based on its chemical exchange saturation transfer (CEST) effect and to investigate the concentration dependent CEST effect of GABA in rat brain tumor model with blood brain barrier (BBB) disruption.  

**Methods:** CEST Z-spectra of GABA with different peak B1 amplitude and other metabolites (glutamine, myo-inositol, creatine and choline) were acquired at 7T, 37°C and pH7.0 respectively. CEST images of phantom consisting of test tubes with different concentrations of GABA solutions (pH7.0) and solutions of other metabolites were collected to investigate the concentration dependent CEST effect and the potential contributions from other.  

**Results:** CEST and 1HMRS data of rat brain with tumor were gathered at baseline and 0.5, 1.0, 1.5 and 2.0h following the injection of GABA solution and then analyzed using LCModel. CEST asymmetry of GABA was observed at ~2.75 parts per million downfield from bulk water. The CEST effect of GABA increased with the peak B1 amplitude but kept steady when peak B1 reached 255 Hz (6.0µT). The CEST effect of GABA was proportional to the GABA concentration at pH7.0 in vitro. CEST maps of GABA from a rat brain with tumor whose BBB was compromised showed a significant gradual increase in CEST effect after GABA injection, which was consistent with the 1HMRS data.  

**Conclusions:** These findings demonstrate the feasibility and potential to map changes in GABA concentration using CEST. It is likely that this method provides noninvasive images of GABA with excellent spatial and temporal resolution.  

**Disclosure:** Nothing to disclose

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**PP3197**

**Motion after-effect by means of circularvection depicts role of MST and OP2 in visual-vestibular interaction**

P. zu Eulenburg¹, M. Ruehl¹, T. Bauermann², M. Dieterich³,⁴  
¹Neurology, ²Neuroradiology, Johannes Gutenberg University, ³Neurology, Ludwig-Maximilians University, Mainz, ⁴Munich Cluster for Systems Neurology (SyNergy), German Center for Vertigo and Balance Disorders - IFBLMU, Munich, Germany  

**Objectives:** Several works have revealed a visual-vestibular interaction at the cortical level (1). Aim of this fMRI and videooculography (VOG) study was to induce egomotion and differentiate the phenomenons of torsional afternystagmus (tOKAN) and motion aftereffect (MAE) during circularvection (CV).  

**Methods:** The effects of CV were studied in 21 volunteers in a clinical 3T scanner. Data was analysed with SPM8. Eye movements were also recorded and analyzed offline by VOG to quantify tOKAN.  

**Results:** There was no significant correlation for the MAE with the duration and gain of tOKAN. FMRI analysis gave bilateral activations in the dorsal visual stream as well as deactivations in the posterior insular cortex (cyto-architectonic area Ig2). T-contrast results for the MAE in comparison to the visual stimulation showed bilateral activations in the medial superior temporal area (MST) and a deactivation of the right cytoarchitectonic area OP2.  

**Conclusions:** MAE due to CV is independent of tOKAN and may be based in area MST which has been reported to receive vestibular information (2). Visual motion deactivated multisensory structures in the posterior insula; during periods of MAE on the other hand we found a deactivation of the parietal operculum. The concurrent deactivation of the main cortical vestibular area OP2 during the MAE suggests that MST and OP2 could be the gateways for conflicting visual-vestibular information.  


**Disclosure:** Nothing to disclose

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**PP3198**

**Abstract withdrawn**
PP3199
Reversible splenial lesions of the corpus callosum in association with symptomatic epilepsy - two cases with different pathogenesis
P. Berlit, L. Kraayvanger, R. Weber
Department of Neurology, Alfred Krupp Krankenhaus, Essen, Germany

PP3200
Neuro-imaging in Behçet’s disease: a report of 5 cases
S. Younes\(^1\), Y. Cherif\(^1\), H. Haj Kacem\(^1\), O. Berriche\(^1\), S. Jerbi\(^2\), M.H. Sfar\(^1\)
\(^1\)Internal Medicine and Endocrinology, \(^2\)Radiology, Tahar Sfar University Hospital, Mahdia, Tunisia

PP3201
Neuroimaging findings in an adult patient with Hunter’s disease
2nd Department of Neurology, University of Athens, Medical School, Attikon University Hospital, Athens, Greece

PP3202
Sonographic findings of the ulnar nerve in patients with carpal tunnel syndrome
Y.J. Eom\(^1\), I.S. Joo\(^1\), M.H. Choi\(^1\), Y.K. Kim\(^2\)
\(^1\)Ajou University School of Medicine, Suwon, \(^2\)Dongtan Sacred Heart Hospital, Osan, Korea, Republic of

PP3203
Abstract withdrawn

PP3204
Diagnosis of carotid body paragangliomas by various imaging techniques and treatment
D.C. Jianu\(^1\)-\(^2\), S.N. Jianu\(^1\), L. Petrica\(^3\), S.M. Deme\(^4\)
\(^1\)Department of Neurology, University of Medicine and Pharmacy ‘Victor Babes’, \(^2\)Department of Neurology, Clinical Emergency County Hospital, \(^3\)Department of Ophthalmology, Military Emergency Hospital, \(^4\)Department of Nephrology, University of Medicine and Pharmacy ‘Victor Babes’, Timisoara, \(^5\)Department of Neurology, West University ‘Vasile Goldis’, Arad, Romania

PP3205
Quantitative EEG (Q-EEG) in posterior reversible encephalopathy syndrome (PRES) due to post-vaccination encephalopathy
G. Newman\(^1\), W.E. Kozachuk\(^1\), S. Hether\(^1\)-\(^2\), B.E. Gray\(^1\)
\(^1\)Research Department, The Neuroscience Team, Lutherville, \(^2\)Department of Psychology, Towson University, Towson, MD, United States

PP3206
Tracking of brain activation using EEG signals: a preliminary study
H. Nisar\(^1\), A.S. Malik\(^2\), D. Rafiullah\(^3\), S. Shim\(^4\), A. Bawakid\(^4\)
\(^1\)University Tunku Abdul Rahman, Kampar, \(^2\)University Teknologi PETRONAS, Tronoh, Malaysia, \(^3\)Comsats Institute of Information Technology, Islamabad, Pakistan, \(^4\)King Abdul Aziz University, Jeddah, Saudi Arabia
PP3207
Usefulness of susceptibility-weighted imaging for the detection of thrombus in acute cardioembolic stroke
M.-G. Park1, S.-J. Oh2, K.-P. Park3, S.K. Baik4
1Neurology, Pusan National University Yangsan Hospital, Pusan National University School of Medicine, Yangsan, 2Pohang Stroke and Spine Hospital, Pohang, 3Pusan National University Yangsan Hospital, Pusan National University School of Medicine, 4Radiology, Pusan National University Yangsan Hospital, Pusan National University School of Medicine, Yangsan, Korea, Republic of

PP3208
Activity in object manipulation network is sustained after acute tactile deafferentation: an fMRI study
E.L. Pavlova, Å. Hedberg, S. Gantelius, E. Ponten, H. Forssberg
Karolinska Institute, Stockholm, Sweden

PP3209
White matter atrophy in Parkinson's disease
A.M. Roceanu1, M. Onu2, L. Badea3, F. Antochi1, O.A. Bajenaru1
1Neurology Department, University Emergency Hospital Bucharest, 2Radiology Department, Hospital 'Theodor Burgehele', 3ICI, Bucharest, Romania

PP3210
Kings cardiac MIBG PD grading (KCMP) in clinically uncertain parkinsonism: reproducible and an easily characterized imaging tool
A. Sauerbier1, N. Mulholland2, N. Dimitrov1, G. Vivian2, B. Corcoran2, R. Chakravarty2, J. Jarosz3, K. Ray Chaudhuri1
1National Parkinson Foundation Centre of Excellence, Dept of Neurology, 2Dept of Nuclear Imaging, 3Dept of Neuroradiology, King's College Hospital and Kings Health Partners, London, United Kingdom

PP3211
Cerebral perfusion changes in patients with carotid artery stenosis after surgical revascularization
A. Sergeeva1, R. Konovalov1, M. Krotenkova1, M. Piradov2, S. Skryilev3, D. Sergeev2
1Neuroimaging, 2Neurocritical Care, 3Department of Vascular and Endovascular Surgery, Research Center of Neurology, Russian Academy of Medical Sciences, Moscow, Russian Federation

PP3212
Detection of acute ischemia with chemical exchange saturation transfer imaging based on gradient echo sequence
L. Shengkai, Z. Dai, G. Yan, R. Wu
Second Affiliated Hospital, Shantou University Medical College, Shantou, China

PP3213
Blooming artifact on 3T T2*-weighted MRI as a potential detector of multiple occlusions of cerebral arteries in acute stroke
Keimyung University Dongsan Hospital, Daegu, Korea, Republic of

PP3214
Wernicke's encephalopathy mimicking vasculitis and neoplasia
A. Ipekbayrak1, M. Çelebisoy1, M.F. Gelal2, H. Uluğut Erkoyun2
1Izmir Ataturk Education and Research Hospital, 2Izmir Katip Celebi University Ataturk Education and Research Hospital, Izmir, Turkey

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Auditory neural pathway evaluation on sensorineural hearing loss using diffusion tensor imaging
C.X. Wu, W.B. Zheng, L.X. Huang, S.J. Li
Medical College of Shantou University, Shantou, China
PP3216
An analysis of factors related to the accuracy of quantification of GABA levels in brain using LCModel software: a 7T 1H-MRS study in rats
Z. Shen¹, Q. Li², Y. Chen², R. Wu¹
¹Second Affiliated Hospital, Shantou University Medical College, ²Central Laboratory of Shantou University, Shantou, China

PP3217
Spatiotemporal evolution of blood brain barrier damage and associated changes of brain metabolites within the first 3h after ischemia onset
G. Yan, R. Wu
Second Affiliated Hospital, Shantou University Medical College, Shantou, China

PP3218
Study of whole brain MRI before cochlear implant assessment
H.Y. Zheng, W.B. Zheng, L.X. Huang, Y.T. Wang
Department of Radiology, The Second Affiliated Hospital, Medical College of Shantou University, Shantou, China

PP3219
Prognosis for cochlear implantation in children with myelin development delay
W.B. Zheng, L.X. Huang, H. Tan, C.X. Wu
Medical College of Shantou University, Shantou, China