



# Changes In Metabolism And Related Connectivity In Patients With Acrophobia Treated By Virtual Reality Therapy: A 18F-FDG PET Study Sensitized By Virtual Reality Exposure

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g and 2200g, 10-min. each) for obtaining the PLT concentrate in a small volume (0.5 ml) of plasma. After labeling, we evaluate DEPER parameters using Hemocitometry and AV parameters using cytofluorimetry, P-selectin membrane expression and trypan blue vital dyeing. The whole process was then replied as a Mediafill analysis and small amount of the final sample were thereafter tested for apyrogenicity and sterility. **Results:** The mean  $\pm$  DS results in the 20 samples by DEPER classification are: **Dose** of injected platelet  $4650 \pm 1358 \times 10^6$ , **Enrichment** factor of PLT  $16.7 \pm 2.2$ , **Purity** of labeled PLT as % of WBC<sub>NEUTR</sub> and RBC residual factor, respectively  $6 \pm 3.3\%$  and  $3.6 \pm 2.9\%$ , labeling **Efficiency** 70%, PLT **Recovery** 58 %. All functional tests showed normal platelet function, in particular AV classification demonstrates a vital PLT percentage at rest  $>99\%$ . All apyrogenicity and sterility tests showed normal results. **Conclusions:** our method seems to be fast, safe and efficient. The increase in labeled platelet absolute number allows to draw a smaller amount of blood volume in patient with thrombocytopenia, an higher labeling efficiency and consequently better quality images. The use of a commercial kit makes it easy and easily reproducible preserving biological function of platelet for war-ranting reliable and high quality exams.

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Tuesday, October 16, 2018, 11:30 - 13:00, Hall A

e-Poster Walk 9 - Neuroimaging: Neuroimaging

**E-PW081****In vivo Imaging of Microglial Activation in Patients with Clinical Suspected Progressive Supranuclear Palsy: A 18F-GE180 PET study**

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**Introduction:** Progressive supranuclear palsy (PSP) is a 4R-tauopathy with a severe clinical course. The pathophysiological processes are not sufficiently understood and a causal therapy for this life limiting disease is still missing. The neuropathological hallmark of PSP are accumulated tau protein fibrils that were claimed to be responsible for following neurodegeneration. Microglial activation has been shown to occur in PSP as another hallmark of the disease. Therefore, we aimed to establish in vivo imaging of microglial activity by 18kDa translocator protein (TSPO) PET. **Methods:** Seven patients with probable PSP according to current diagnosis criteria underwent 18F-GE180 TSPO PET. All images were scaled by the global mean and standardized uptake value ratios (SUVR) were generated in brain regions typically affected in PSP. Voxel-wise differences were calculated using seven healthy individuals (HC) serving as controls. Furthermore, we compared patterns of microglial ac-

tivity with 18F-THK5351 PET (tau/MAO-B ligand) deriving from previously imaged patients with PSP, matched for age and disease severity. **Results:** Significantly increased 18F-GE180 binding in PSP versus HC was found in the anterior cingulate gyrus ( $+22\%$ ,  $p < 0.001$ ), globus pallidus ( $+14\%$ ,  $p < 0.005$ ), and nucleus dentatus ( $+24\%$ ,  $p = 0.001$ ). Voxel-wise microglial activation matched known regions of disease affection in PSP except for the midbrain. Contrary 18F-THK5351-PET showed increased binding predominantly in the midbrain ( $+19\%$ ,  $p < 0.001$ ) and binding was also significantly elevated in brain regions with increased TSPO activity. **Conclusion:** TSPO-PET imaging in PSP patients is feasible and patterns of microglial activation correlated topologically with most brain regions known to be affected in PSP. The particularly low microglial activation in the midbrain compared to highest binding of tau/MAO-B ligands needs further investigation by specific ligands for tau and astrocytosis.

**E-PW082****Changes In Metabolism And Related Connectivity In Patients With Acrophobia Treated By Virtual Reality Therapy: A 18F-FDG PET Study Sensitized By Virtual Reality Exposure**

A. Verger<sup>1</sup>, E. Malbos<sup>2</sup>, E. Raynaud<sup>3</sup>, P. Mallet<sup>4</sup>, D. Mestre<sup>4</sup>, J. Pergandi<sup>4</sup>, S. Khalfa<sup>3</sup>, E. Guedj<sup>5</sup>; <sup>1</sup>Department of Nuclear Medicine, CHRU Nancy, Nancy, FRANCE, <sup>2</sup>Department of Psychiatry, APHM, Marseille, FRANCE, <sup>3</sup>Institute of Neurosciences, CNRS UMR7289, Marseille, FRANCE, <sup>4</sup>Institute of Movement Sciences, CNRS, Marseille, FRANCE, <sup>5</sup>Department of Nuclear Medicine, APHM, Marseille, FRANCE.

**Purpose:** Research into the underlying causes and treatment of acrophobia is of particular interest owing to its high prevalence, chronicity and cumulative social impact. Virtual reality exposure therapy (VRET) has shown its effectiveness in the treatment of this disease. The aim of this PET study was to characterize brain metabolism of patients with acrophobia, and investigate the impact of VRET on metabolic rate of glucose and related connectivity. **Methods:** Before VRET, 18 patients with acrophobia performed a brain 18F-FDG-PET sensitized by VR exposure during the radiopharmaceutical administration. Among them, 9 patients were tested again with PET during VR exposure after VRET. Clinical response to VRET was evaluated by subjective unit of discomfort (SUD) and behavioural avoidance test (BAT). Statistical Parametric Mapping-T-scores-maps were applied for comparison between patients and 18 age- and gender-matched healthy control subjects ( $p < 0.05$ , corrected for family wise error comparison), and for comparison between patients before and after VRET ( $p < 0.005$ , corrected for cluster volume). Metabolic connectivity was evaluated through inter-regional correlation analysis. **Results:** SUD and BAT were significantly improved in patients after VRET ( $p \leq 0.02$ ). Before therapy, patients with acrophobia showed a decreased of metabolism in bilateral medial temporal areas in comparison with controls. After VRET, patients presented an increased metabolism in left frontal superior gyri and left precentral gyrus, and an increase of metabolic connectivity between this region and occipital areas (respective coefficient of correlation before and after treatment

between left precentral gyrus and occipital areas of 0.24,  $p=0.34$  and 0.73,  $p=0.03$ ). **Conclusion:** These findings provide insight of the limbic involvement in acrophobia mental disorder, and the connectivity increase of visual-motor control system induced by VRET.

### E-PW083

#### Striatal Dopamine D<sub>2</sub> Receptors Changes in Patients of First-Episode Major Depressive Disorder and Correlation Analysis of Clinical Features

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**Purpose:** To study a group of patients with first-episode major depressive disorder (MDD) with the 11C-Raclopride PET/CT, to observe striatal dopamine D<sub>2</sub> receptors non-displaceable binding potential (BPND) changes of MDD and analyze the relationship between BPND and Hamilton depression rating scales (HAMD). **Subjects & Methods:** From December 2014 to December 2015, MDD patients and healthy controls who matched with MDD patients in age and gender underwent brain MRI and 11C-Raclopride PET/CT to make a prospective study. BPND of bilateral striatal dopamine D<sub>2</sub> receptors (SDDR) were calculated by molecular imaging and kinetic analysis toolbox (MIAKAT). BPND changes of bilateral SDDR and their relationship with HAMD were analyzed. Chi-squared test, paired-t test, two-sample t test and Pearson correlation analysis were used.

**Results:** A total of 20 MDD patients (8 males, 12 females, age:  $32.80 \pm 9.76$  years) and 20 healthy controls (9 males, 11 females, age:  $29.25 \pm 6.93$  years) were enrolled in this study. The brain tissues intake of 11C-Raclopride of the MDD group and control group were mainly distributed in bilateral striatum, and very few 11C-Raclopride was distributed in bilateral cerebral cortex and cerebellum. In MDD group, the BPND level of bilateral SDDR had no statistical differences ( $t=0.69, 0.35$ , both  $P>0.05$ ). In control group, the BPND level of bilateral SDDR had no statistical differences ( $t=0.28, 0.24$ , both  $P>0.05$ ). Compared with the control group, the BPND levels of bilateral SDDR of the MDD group were all reduced ( $t=3.13-4.41$ , all  $P<0.05$ ). The BPND of bilateral caudate nucleus and/or putamen D<sub>2</sub> receptors had correlation with HAMD total scores, anxiety/somatization factor scores, cognitive impairment factor scores, retardation factor scores and sleep disturbance factor scores ( $r=-0.688-0.453$ , all  $P<0.05$ ). **Conclusions:** The binding potential of SDDR of MDD is declined, and the BPND levels of SDDR are correlated with symptoms of depression. The abnormality of SDDR may be one of the important molecular mechanisms of the abnormality of midbrain-striatal dopamine reward circuits of MDD.

### E-PW084

#### The metabolic basis of psychosis in bipolar disorder

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Psychotic symptoms are a common feature in Bipolar Disorder (BD), especially during manic phases, and are associated

with a more severe course of illness. However, not all bipolar subject experience psychosis during the course of their illness, and this difference often guide assessment and pharmacological treatment. In this context, the aim of the present study is to elucidate, for the first time, the metabolic dysfunctions associated with psychosis in a group of bipolar patients with and without psychotic symptoms, using FDG-PET. Fifty bipolar patients with psychosis, 40 bipolar without psychosis, and 27 healthy controls were recruited and underwent an FDG-PET session. The statistical analyses were performed using Statistical Parametric Mapping (SPM12). The T1-series MR images were segmented according to GM, white matter and CSF probability maps to generate the normalization deformation field into the MNI space to be applied to the co-registered FDG-PET scan. Inference on brain glucose metabolism differences between groups was made using double-sided t-tests ( $p<0.01$ , cluster Family-Wise Error [cFWE] corrected with an extended threshold of at least 50 contiguous voxels). Compared to healthy controls, BD subjects showed decreased metabolism in several brain areas, including insula, middle and inferior temporal gyrus as well as middle and inferior occipital gyrus. Moreover, in the direct comparison between the two patient groups, we found that patients with psychosis had decreased metabolism in the right fusiform gyrus compared to patients without psychosis (all  $p<0.01$  cFWE corrected). Overall, our results suggest that metabolic alterations in brain regions involved in emotion regulation are a key feature of BD, regardless the presence of psychosis. Finally, we demonstrated that the metabolic reduction in fusiform gyrus is associated with that the presence of psychotic symptoms in BD, ultimately leading towards the idea that the fusiform gyrus might be considered a putative biomarker of psychosis.

### E-PW085

#### Molecular Mapping of Serotonergic and Dopaminergic Projections from Brainstem to Striatal Areas in Early Parkinson's disease Patients

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**Introduction:** Dopaminergic and serotonergic systems are involved in the pathophysiology of motor and non motor impairments in Parkinson's disease (PD) patients. The potential to evaluate serotonergic and dopaminergic targets in the brainstem (i.e. substantia nigra and raphe nuclei) has so far been challenged by methodological limitations. The aim of this study with high-resolution PET imaging and a dedicated methodology was to examine the relative loss of the serotonin (SERT) and the dopamine transporter (DAT) in the axonal terminals (striatum) as compared with cell bodies (substantia nigra) in early PD patients and control subjects. **Materials & Methods:** Twenty