OP-635

Risk Models for Patients Undergoing Radiation Therapy, Taking into Account Pathology, Deterministic and Stochastic Radiation Effects

W. Bolch; University of Florida, Advanced Laboratory for Radiation Dosimetry Studies (ALRADS), Gainesville, UNITED STATES OF AMERICA.

1603 Wednesday, October 17, 2018, 08:00 - 09:30, Hall 3

Joint Symposium 26 - Translational Molecular Imaging & Therapy / IFCARS: Computer Assisted Image and Radioguided Intervention in Surgery and Radiology

OP-636

Trends in Computer Assisted Intervention

A. Melzer; University Leipzig, Innovation Center Computer Assisted Surgery, Leipzig, GERMANY.

OP-637

Robotic Imaging and Augmented Reality for Computer Assisted Interventions

N. Navab; Technical University of Munich, Computer Aided Medical Procedures & Augmented Reality, Munich, GERMANY.

OP-638

Portable Gamma-Ray and NIR-Devices for ImageAssisted Surgery Using Hybrid Tracers

F. van Leeuwen; Leiden University Medical Center, LUMC, Leiden, NETHERLANDS.

OP-639

Pairing SPECT/CT to PET/CT as Roadmap for Radioguided Intervention - Match the Tracers, Find the Metastasis

M. Schottelius; Technical University of Munich, Department of Pharmaceutical Radiochemistry, Munich, GERMANY.

OP-640

ROUND TABLE: Incorporating Imaging and Machine Intelligence in the Operating Room - Portable and/or Fixed Equipment? Will Interventional Workflows be Affected?

S. Vidal-Sicart; Hospital Clínic, Department of Nuclear Medicine, Barcelona, SPAIN.

OP-641

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A. Melzer; University Leipzig, Innovation Center Computer Assisted Surgery, Leipzig, GERMANY.

OP-642

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N. Navab; Technical University of Munich, Computer Aided Medical Procedures & Augmented Reality, Munich, GERMANY.

OP-643

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OP-644a

ROUND TABLE: Incorporating Imaging and Machine Intelligence in the Operating Room - Portable and/or Fixed Equipment? Will Interventional Workflows be Affected?

H. U. Lemke; Technical University Berlin, Berlin, GERMANY.

OP-644b

ROUND TABLE: Incorporating Imaging and Machine Intelligence in the Operating Room - Portable and/or Fixed Equipment? Will Interventional Workflows be Affected?

R. Valdés Olmos; Leiden University Medical Centre, Interventional Molecular Imaging Laboratory and Nuclear Medicine Section, Department of Radiology, Leiden, NETHERLANDS.

1605 Wednesday, October 17, 2018, 08:00 - 09:00, Hall X

M2M: Neuroinflammation & Brain Imaging

OP-645

Early and longitudinal microglial activation but not fibrillar amyloid accumulation predict cognitive outcome and synaptic density in PS2APP mice

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Introduction: Microglial activation is one hallmark in the pathophysiology of neurodegenerative diseases. However, results are still inconclusive whether neuroinflammation has beneficial or detrimental effects on cognitive outcome. 18kDa translocator protein (TSPO) PET imaging now facilitates to monitor regional alterations of microglial activity in vivo. Therefore, we objected to correlate serial measures of TSPO and amyloid PET with the terminal cognitive assessment in the PS2APP amyloid mouse model. **Methods:** N=10 PS2APP (TG) mice and N=7 C57Bl/6 (WT) mice were imaged from 8 to 13 months of age by TSPO PET (F-18-GE180) and amyloid PET (F-18-Florbetaben). Morris water maze (MWM) was performed at 13.5 months of age. Z-score differences were obtained voxel-wise for TG mice versus WT mice at each time-point. Z-score images of serial PET were summed to an area under the curve (AUC) map for each individual TG mouse. Baseline and AUC maps of TSPO activation and amyloidosis were correlated voxel-wise with findings of cognitive testing deriving from MWM. The entire forebrain and brain regions associated with spatial learning were likewise evaluated to investigate general effects. Immunohistochemical and biochemical experiments were performed at study termination. Synaptic density served as a validation marker for MWM. **Results:** TG mice indicated a distinct poorer performance in MWM when compared to WT at 13 months of age (distance: +436%, p<0.01 / escape latency: +244%, p<0.001). A better cognitive outcome was associated with higher TSPO activation at baseline in the forebrain (R = 0.71, p<0.05) and even stronger in brain areas involved in spatial learning (R = 0.82, p<0.01). Peak clusters of the amygdala and entorhinal cortices showed a very strong association between the baseline TSPO signal and terminal MWM performance (R = 0.95, p<0.001). Higher longitudinal TSPO activation by AUC maps tended to correlate with a better clinical outcome in the forebrain (R = 0.45, p=n.s.), and in brain areas involved in spatial learning (R = 0.60, p=n.s.). Peak clusters of longitudinal TSPO activation in hippocampal areas were significantly associated with terminal MWM performance (R = 0.68, p<0.05). Synaptic density showed similar correlations and validated MWM results. Fibrillar amyloidosis did not correlate with the cognitive outcome neither at baseline nor considering the whole imaging period (all R < 0.3). **Conclusions:** Early and longitudinal microglial response seems beneficial for preserving the cognitive performance in PS2APP mice. Fibrillar amyloidosis was in contrast not associated with cognitive performance.

OP-646

[^{18}F]NEBIFQUINIDE: First in vivo experiences of a new third generation TSPO PET tracer

N. Berroterán-Infante, *L. Fetty, M. Hacker, A. Haug, W. Wadsak, M. Mitterhauser; Medical University of Vienna, Vienna, AUSTRIA.*

Introduction & Aim: ***In vivo*** imaging of the translocator protein (TSPO) has received particular attention as potential biomarker of glia activation, which has been reported in a variety of neurodegenerative disorders. Nevertheless, TSPO PET imaging is still challenging due to the lack of adequate tracers. In detail, high non-specific binding and a single nucleotide polymorphism in the ***TSPO*** gene, which causes a heterogeneous binding affinity of the tracers in a genotype-dependent manner, have limited the applicability of TSPO imaging so far. Hence, the aims of this work were the radiosynthesis and ***in vivo*** evaluation of a new TSPO PET tracer with optimized properties. **Methods:** The affinity of NEBIFQUINIDE towards the TSPO was determined in a competitive experiment using platelets membranes from genotyped subjects (all three genotypes were used: two homozygous and one heterozygous) as described elsewhere [1]. Subsequently, ^{18}F-labeling at the pyridine moeity was performed using microwave heating. ***In vitro*** evaluation included affinity to α1-AGP and log ***P*** measurements, which were determined using spin desalting columns and a HPLC method, respectively. Subsequently, μPET/CT studies were performed in C57BL/L mice after injection of approximately 10 MBq of freshly prepared [^{18}F]NEBIFQUINIDE. After 60 minutes dynamic scan, animals were sacrificed and the activity of the organs of interest was counted. Additionally, the amount of intact tracer in brain, lungs and liver was determined using radio-HPLC. Results No significant difference was found between the Ki values of NEBIFQUINIDE for all genotype groups (Ki = 6±1 nM). [^{18}F]NEBIFQUINIDE was successfully synthesized with an uncorrected RCY (end of bombardment) of 32±4 % and a molar radioactivity of 196±26 GBq/μmol (n=3). Binding to α1-AGP and log ***P*** were significantly reduced in comparison to the established TSPO PET tracer (***R***)-[^{11}C]PK11195. Biodistribution experiments revealed significantly higher accumulation of the tracer [^{18}F]NEBIFQUINIDE in TSPO-rich organs as lungs and heart. Moreover, no significant radiometabolism was found in the selected organs, since more than 93 % of the activity corresponded to intact [^{18}F]NEBIFQUINIDE. In vivo specific binding was demonstrated by displacement of [^{18}F]NEBIFQUINIDE after injection of cold PK11195. **Conclusions:** The presented results point towards the suitability of the new TSPO PET tracer, [^{18}F]NEBIFQUINIDE, for additional ***in vivo*** evaluations in animals models and humans, especially due to the low sensitivity of [^{18}F]NEBIFQUINIDE towards the TSPO polymorphism. **References:** [1] Owen, D et al; ***J Cereb Blood Flow Metab***; 2012; 32:1-5

OP-647

Metabotropic Glutamate Receptor Subtype 5 Is Altered In Lps-induced Murine Neuroinflammation Model And In Brains Of AD And ALS Patients

A. Müller Herde, *R. Schibli, S. M. Ametamey; ETH Zurich, Zurich, SWITZERLAND.*

Purpose: Neuroinflammation is an important feature in the pathogenesis and progression of neurodegenerative diseases such as Alzheimer's disease (AD) and amyotrophic lateral sclerosis (ALS). Peripheral administration of lipopolysaccharide (LPS) in mice provokes central inflammation. To understand the effects of LPS on mGluR5 expression in the brain, we administered LPS to different mouse strains and performed PET imaging at different time points. Furthermore, the expression level of mGluR5 in neurodegenerative disease was investigated in post-mortem human brains of AD and ALS and compared to controls. **Methods:** C57BL/6 and CD1 mice were injected intraperitoneally with either 10 mg/kg LPS or vehicle. After 1 and 5 days TSPO