EVENT ABSTRACT

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Identifying brain network dysfunctions during epileptogenesis in a model of temporal lobe epilepsy

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Introduction

About 65 million people worldwide have epilepsy, of which half of the patients suffer from acquired forms. Post-traumatic epilepsy (PTE) often occurs following a latent period of months to years (epileptogenesis) as a consequence of a brain insult. Although this latent period clearly represents a therapeutic window, we have not been able to stratify patients at risk for developing PTE. The aim of this study is to determine network alterations associated with the process of epileptogenesis by means of translocator protein (TSPO) PET scans, a biomarker of neuroinflammation, in the kainic acid-induced status epilepticus (KASE) model.

Methods

18F-PBR111 PET and T2 MRI scans from 8 control and 16 KASE rats acquired 2 weeks after Status Epilepticus (SE) (latent phase) were taken. Stratification between KASE animals without seizures (n=3) and with spontaneous seizures (n=10) was done by means of video-EEG recordings 3 months after SE (chronic phase). The PET ratio (r50′) was derived as previously validated1. In addition, correlation maps and brain networks were obtained from the TSPO PET r50′ data.

Results

18F-PBR111 PET binding (r50′) in the individual volume of Interests (VOIs) 2 weeks post-SE was highly increased in KASE compared to control animals. In addition, some VOIs statistically differed between KASE animals with seizures and without. Finally, correlation maps and brain networks between PET brain regions differed between control, KASE without seizures, and KASE with seizures.

TSPO correlation maps and brain networks based on TSPO PET imaging showed promise for differentiating KASE animals, which developed epilepsy from those who did not and controls. In addition, we are studying more animals to further validate whether these approaches could be useful in identifying network dysfunctions that may lead to development of epilepsy.

Keywords: 18F-PBR111, TSPO, Temporal Lobe Epilepsy (TLE), Kainic acid induced status epilepticus (KASE), Brain network analysis

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