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ALZHEIMER'S IMAGING CONSORTIUM
POSTER PRESENTATIONS
IC-P

IC-P-001 STUDIES ON THE USE OF MRI TO DETECT β-AMYLOID LOAD IN THE BRAINS OF 5XFAD ALZHEIMER'S MODEL MICE

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Background: A rapid method capable of detecting early signs of Alzheimer's Disease would revolutionise diagnosis, treatment and outcome of this neurodegenerative disease. **Methods:** We have used the 5XFAD mice model of Alzheimer;s Disease developed by Oakley et al (2006) to see if MRI can be used to detect changes. 5XFAD and wild-type mice were imaged in a 4.7 T Varian horizontal-bore MRI system to generate T1 quantitative maps using the spin-echo multi-splice sequence. **Results:** Scanning was followed by immunostaining for GFAP, Iba-1 and beta-amyloid, which showed that amyloidosis developed at 2.5 months in the FAD mouse, and gliosis at 5 months, but not in the wt mice. However, MRI T1 relaxation times were not significantly different to those of age-matched wt mice, indicating that MRI T1 alone would not be a sensitive method of detecting disease initiation or progression (Spencer et al., 2016). In attempts to enhance the MRI response in T1 or T2 node, we synthesised Gd-complexed beta-amyloid-binding contrast agents, comprising peptides from the b-amyloid sequence that were found to have high self-aggregating affinity for b-amyloid itself, covalently linked to DOTA, complexed to an atom of ^{157} gadolinium; biodistribution of ^{153}-Gd labelled analogue of the contrast agent was found to preferentially distribute to liver in mice, with very little adsorbed into brain, so focussed ultrasound and reagent co-injection with microbubbles was used to gain an enhance MRI T1 profiile in the 5XFAD mice compared to WT mice (Matharu et al. 2015) **Conclusions:** MRI T1 was not sufficient to detect amyloidosis or gliosis in 5XFAD Alzheimer mice models. Uptake of a contrast agent could be a useful method to gain visualisation of beta-amyloid deposits at early stages of Alzheiemer's Matharu B, Spencer N, Howe F, and Austen B (2015) Gadolinium-complexed Ab-binding contrast agents for MRI diagnosis of Alzheimer's Disease. Neuropeptides 53 http://dx.doi.org/10.1016/j.npep.2015.07.001 Oakley H, et al (2006) J Neurosci 26)40); 10129-10140 Spencer NG, Lovell DP, Elderfield K, Austen B and Howe FA. (2016) Can MRI T1 be used to detect early changes in 5XFAD Alzheimer's mouse brain. Magn Reson. Mater.Phy http://dx.doi.org/1007/s10334-016-0593-9.

IC-P-002 EFFICACY OF [18F]FLUTEMETAMOL 10-MINUTE VERSUS 20-MINUTE SUMMATION IMAGING METHOD: VISUAL ASSESSMENT AND QUANTITATIVE VALIDATION

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Background: With progressive implementation of amyloid PET imaging in clinical settings, issues regarding elderly pts compliance during scan have been proposed. [18F]flutemetamol (Vizamyl™) was recently approved to assess β-amyloid neuritic plaque density in cognitively impaired patients. The primary mean of assessing [18F]flutemetamol scans in clinical settings is by visual evaluation, using the late 20-min summation image, displayed using a rainbow colour scale. However, this acquisition time frequently appears too much long for people cognitively compromised. Aim of the study was to compare early 10-min (E-10min) to late 20-min (L-20min) summation images to assess potential use of the E-10min acquisition method in the clinical context. **Methods:** Ten patients with diagnosis of MCI and dementia syndrome, using the new NIA-NIH criteria, were submitted to [18F]flutemetamol PET scan. Neuropsychological battery (abstract reasoning, memory, attention, language, praxis and visuo-perceptive functions), Geriatric Depression Scale and Summary Performance Physical Battery were assessed. Hand-Grip strength was measured by manual dynamometer. All patients underwent brain MRI or CT scan in the previous 3 months. PET scan began 90 minutes after injection of 185 MBq [18F]flutemetamol. using a whole-body hybrid system Discovery IQ (GE Healthcare) operating in 3D detection mode. PET images were visually interpreted by 2 board-certified independent nuclear medicine physicians. To validate visual results, we performed quantitative assessment of [18F]flutemetamol uptake using CortexID Suite (GE Healthcare) software implemented in Advantage GE workstation. CortexID Suite produces a Z-score surface map that highlights areas and degree of beta amyloid tracer uptake. The severity is measured in standard deviations from normal controls. **Results:** Visual assessment didn't change in any patient comparing E-10min vs L-20min independently of the reference region (pons/cerebellum). Quantitative analysis confirm visual assessment conclusion, in fact assessing E-10min vs L-20min with a Pair T test using Bonferroni correction and p=0.01, results are not statistically different. This means that, comparing E-10min vs L-20min, we have the same data for all areas of the Cortex ID Suite. **Conclusions:** Our results show that acquisition time may be reduced to 10 min without decreasing diagnostic accuracy in the clinical context. Moreover, quantitative analysis confirm robustness of acquired data for research utilization.

IC-P-003 DETERMINING THE UTILITY OF PMOD IMAGE QUANTIFICATION SOFTWARE FOR PROCESSING [^{11}C]PIB AND [^{18}F] FLUTEMETAMOL IMAGES IN A PET-ONLY PIPELINE TO GENERATE SUVR FOR QUANTIFICATION ON THE CENTILOID SCALE

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Background: Utilising a standardised quantitative imaging analysis scale, Centiloid, for comparing β-amyloid imaging tracers in Alzheimer's disease (AD) has been promoted by the Global Alzheimer's Association Information Network (GAAIN), with established process pipelines reported (Rowe et al., 2016). We previously reported data confirming Centiloid pipeline implementation in PMOD Image Quantification Software produced results highly concordant with the GAAIN data. However, these pipelines require both PET and MRI images for processing. MRIs were not obtained for end-of-life subjects in GE Healthcare's pivotal registration studies for [^{18}F]Flutemetamol Injection. Therefore, for these subjects we evaluated the utility of PMOD for application in PET-only image analysis. **Methods:**