and potentially in healthy controls via affordable and widely available multi-modal-MRI. Our previous publications indicate that hippocampal volume is by itself a poor predictor of amyloid status, although a signature pattern of regional brain atrophy including hippocampal atrophy does associate with Aβ+ and this signal is stronger if ApoE-ε4-status is included in the model. An even stronger signal is obtained with CBF-measures from ASL-MRI; and the combination of atrophy and CBF is even better yet.

ORAL SESSIONS: IC-O3 EMERGING TECHNIQUES

IC-O3-01 THE CENTILOID SCALE: STANDARDIZATION OF AMYLOID IMAGING MEASURES

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Background: With multiple radiopharmaceuticals and analysis techniques available for amyloid PET imaging, it is difficult to compare or pool results among studies and provide quantitative values for clinicians to apply to their patients. To overcome these problems, a method for standardized expression of quantitative amyloid imaging data has been developed by a multinational coalition of academic and commercial amyloid PET researchers. In line with the metric system, the method provides a measure that is independent of tracer or analysis technique, that ranges from zero (no amyloid) to 100 (the mean of patients with sporadic AD). The units are called centiloids. **Methods:** A standard method to convert 11C-PiB SUVR to centiloids was devised. Scans from young normals aged < 45 and sporadic AD patients (minus outliers) were analyzed in standard space with a single large cortical ROI defined by subtracting the mean normal scan from the mean AD scan. Several reference regions are under evaluation. This dataset and ROI will be freely available to download. To convert any current or new analysis method output to centiloids, one simply downloads the standard data set and ROI (freely available to download) and creates a linear equation to transform the new method results on the standard dataset to match the standard method centiloid results. For new tracers, collection of PiB and new tracer studies in the same individuals is required in normals aged <45 and across a range of positive individuals. The acquired scans are analysed with the centiloid method converting the PiB results to centiloids and a linear equation is calculated to convert the new tracer results to matching centiloids. These datasets and the correction equation are then made freely available to download. Other sites can use these data to validate their analysis methods and apply the tracer conversion equation to their scans. **Results:** The centiloid conversion method has been applied to several F-18 amyloid tracers using available data sets. **Conclusions:** Expected benefits include the ability to pool large datasets irrespective of the amyloid tracer employed, better prognostic information based on standardized, quantitative results and meaningful comparison of the effectiveness of anti-amyloid therapies.

IC-O3-02 PLAQUE-BINDING MAGNETIC NANOPARTICLES FOR EARLY DIAGNOSIS OF ALZHEIMER'S DISEASE BY MAGNETIC RESONANCE IMAGING (MRI)

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Background: Alzheimer's disease (AD) is an incurable and progressive neurodegenerative disorder. It is very important to identify patients as early as possible in the disease course in order to initiate treatment before irreversible brain injury takes place. The current commercially available diagnostic imaging method is positron emission tomography (PET). However, this method experiences problems of high cost, short half-life of radioactive dyes and low spatial resolution. Thus, we sought to develop a non-toxic nanoparticle to target amyloid plaques for visualization by a more affordable, more accessible, and non-radioactive method, magnetic resonance imaging (MRI), for early diagnosis of AD. **Methods:** An iron oxide core was coated by a layer of curcumin through hydrogen-bonding and was encapsulated by polyethylene glycol-polylactic acid (PEG-PLA) co-block polymer and polyvinylpyrrolidone (PVP) by a multi-inlet vortex mixer (MIVM). The nanoparticles were injected into a femoral vein of Tg2576 APP overexpressing and control mice (12 months old, n=3 for Tg 2576, n=2 for control). All mice were examined by 7T MRI 5 hours after the injection, and the brains were harvested for ex-vivo histochemistry to locate iron oxide and amyloid plaques. The toxicity and effects on brain function of the nanoparticles were tested by injecting 3 mice with blank nanoparticles (without iron core) and another 3 mice with iron oxide nanoparticles. Contextual fear conditioning (CFC) was recorded before and 7 days after injection. **Results:** The mean diameter of iron oxide nanoparticles in suspension was ~80 nm. The MRI images showed black spots throughout brains of all Tg2576 mice but not controls. The survival rate was 100% for both iron oxide and blank nanoparticle groups 7 days after injection. The CFC results showed no significant difference in memory between groups. The iron oxide found in the brains of Tg2576 mice was co-localized with amyloid plaques. The distances between iron oxide and amyloid plaques were significantly ($p<0.001$) less than distances between random points and the closest plaques. **Conclusions:** Our novel iron oxide nanoparticle formulation demonstrated AD specificity in Tg2576 mice. It displayed no adverse effects on mouse brain function. The formulation can be further investigated for early diagnosis of AD.

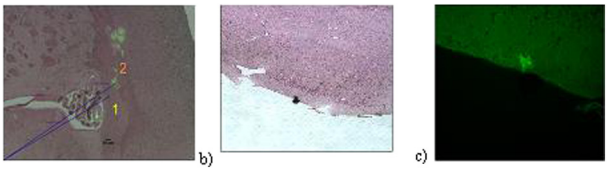

Figure 1. a) Histochemically stained Aβ plaques (marked as 2 on the image) and magnetic iron oxide (marker as 1 on the image) found on adjacent superimposed sections, b) Bright view of iron oxide found in Tg2576 mouse brain after in vivo injection, c) Fluorescent view of the same particles found in b) proved that curcumin was still intact on the iron oxide surface.

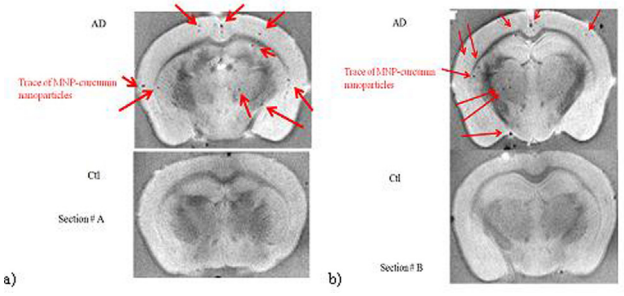

Figure 2. MRI images of trasgenic mouse brain vs control. a) and b) are adjacent images. Many black spots (magnetic nanoparticle (MNP)-curcumin complex) were found (arrows) in AD but not control, consistent with our finding from histochemical staining.

IC-O3-03 THE RELATIONSHIP BETWEEN HIPPOCAMPAL ATROPHY AND NEUROPATHOLOGY MARKERS: A 7T MRI STUDY

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