Using Centiloid Volume of Interest (VOI) regions, GAAIN [^{11}C] PiB images (YC-0, n=34; AD-100, n=45) were processed using a PET-only method. Standard Uptake Value ratios (SUVr's) and Centiloid values for the VOI regions were calculated, and compared with published values by way of validation (Klunk et.al., 2015). The utility of PMOD's PET-only method was assessed by cross-compared to the PET/MRI method using the Centiloid standard CTX VOI. Subsequently, subjects from GE Healthcare's pivotal autopsy studies were evaluated using PMOD's PET-only method. Tissue-based autopsy measures were used in a Receiver Operating Characteristic (ROC) curve analysis to estimate the Centiloid value corresponding to boundaries used in CERAD pathology assessments in regards to AD classification. **Results:** For all subjects, we found the [^{11}C]PiB SUVr values were within recommended limits of the published set for the key reference region (whole cerebellum). When converted to Centiloid values, there was a high degree of correlation between the GAAIN data and values derived from PMOD. PET-only processing was applied to the autopsy-cohort [^{18}F]flutemetamol images. Centiloid values were compared to the tissue based neuritic plaque assessments. ROC analysis determined the CERAD designation boundary's in Centiloid units. **Conclusions:** PET-only image processing, such as the one established using PMOD, provide an alternate method of Centiloid processing, and is suitable for assessing subjects without MRI. The SUVr and Centiloid values obtained from our autopsy cohort proved suitable for determining the CERAD pathological boundaries in Centiloids equivalent units, indicating that [^{18}F]flutemetamol Centiloid values can be related to CERAD style stratification.

IC-P-004

A COMPARISON OF TECHNIQUES FOR QUANTIFYING AMYLOID BURDEN ON A COMBINED PET/MR SCANNER

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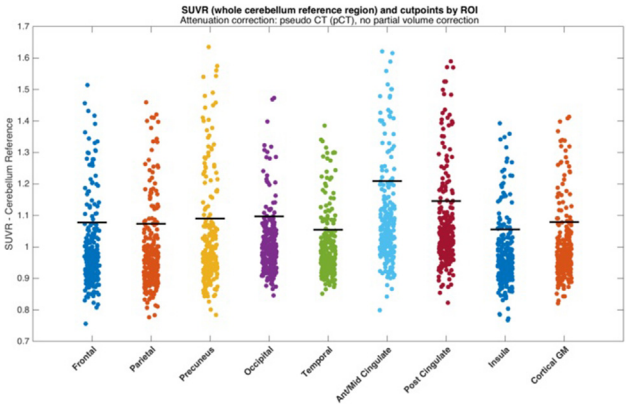

Background: Amyloid-specific PET tracers provide quantitative measurements for determining amyloid load in vivo. Many cut-points have been proposed to define amyloid positivity; those based on post-mortem pathology are highly specific, but may

Table
Mean cortical GM SUVR results, showing the mean and standard deviations of the two groups based on the defined cutpoints (99% of amyloid negative cluster). UTE=Ultrashort echo time method, the vendor-supplied method for attenuation correction. pCT=pseudo CT, the in-house method for attenuation correction that builds a synthetic CT image. PVC=Partial Volume Correction, performed using the Iterative Yang approach with a full-width half-maximum kernel of 6.8 mm and 10 iterations (Erlandsson, Phys. Med. Biol., 57(21): R119-159, 2012)

Reference ROI	Method	Amyloid Negative Mean (SD)	Amyloid Positive Mean (SD)	Cutpoint	% Amyloid Positive
Whole Cerebellum	pCT, no PVC	0.959 (0.053)	1.218 (0.100)	1.080	17.5%
	UTE, no PVC	0.996 (0.054)	1.255 (0.106)	1.120	18.5%
	pCT, no PVC	0.759 (0.059)	1.129 (0.183)	0.899	23.3%
	UTE, with PVC	0.784 (0.063)	1.153 (0.190)	0.917	24.5%
Cerebellar Grey Matter	pCT, no PVC	1.103 (0.077)	1.424 (0.113)	1.275	15.4%
	UTE, no PVC	1.156 (0.077)	1.485 (0.113)	1.326	14.7%
	pCT, with PVC	1.019 (0.109)	1.581 (0.267)	1.253	20.4%
	UTE, with PVC	1.053 (0.106)	1.574 (0.269)	1.260	24.1%
Pons	pCT, no PVC	0.575 (0.040)	0.754 (0.066)	0.664	15.8%
	UTE, no PVC	0.557 (0.037)	0.729 (0.058)	0.641	17.6%
	pCT, with PVC	0.462 (0.049)	0.729 (0.118)	0.574	18.8%
	UTE, with PVC	0.446 (0.046)	0.704 (0.105)	0.557	20.1%
Subcortical White Matter	pCT, no PVC	0.541 (0.036)	0.688 (0.053)	0.621	17.5%
	UTE, no PVC	0.535 (0.035)	0.677 (0.049)	0.611	16.8%
	pCT, with PVC	0.444 (0.055)	0.705 (0.105)	0.565	17.8%
	UTE, with PVC	0.443 (0.050)	0.739 (0.150)	0.558	19.5%

not be sensitive to the initial signs of amyloid deposition. Cut-points are also highly dependent on many analytical issues including: region of interest (ROI), reference region, partial volume correction, and the statistical criteria for choosing the cut-point. In the absence of CT scanning, quantifying amyloid load with combined PET/MR scanners requires novel techniques for attenuation correction. We examined these aspects in a large UK sample of individuals born in the same week in 1946, all scanned on the same PET/MR scanner. **Methods:** PET and MR data were acquired on 250 participants enrolled in Insight 1946, a sub-study of the MRC National Survey of Health and Development (NSHD). Scanning was performed on a Siemens Biograph PET-MR scanner using 18F-florbetapir. PET images were reconstructed from 50 to 60 minutes post-injection using two different attenuation correction techniques: an ultrashort echo time (UTE) and a pseudo CT (pCT) method. Volumetric T1 MR data were parcellated into ROIs and co-registered to PET to compute standard uptake value ratios (SUVR) against four commonly used reference regions, with and without partial volume correction. Cut-points for amyloid positivity were created by fitting Gaussian mixture models (with 1 to 3 clusters) and using the 99th percentile of the Gaussian representing the amyloid negative population. **Results:** 240 participants with suitable T1 and amyloid PET data were included in the analysis. The mixture modelling for cortical ROIs typically resulted in 2 clusters, confirming the expected bimodal distribution of amyloid deposition. Across the different reference regions, the rate of amyloid positive individuals was consistently 15 – 18% without PVC correction and 19-23% with PVC correction (Table). Precuneus and posterior cingulate SUVRs classified slightly more participants as amyloid positive, while those based on occipital lobe were much lower (Figure). Subcortical ROIs provided inconsistent evidence of bimodal distributions. **Conclusions:** Quantification of SUVR based measures of amyloid load using data acquired on PET/MR produces consistent rates of amyloid positivity across a variety of analysis options.

IC-P-005 CONCORDANCE BETWEEN CEREBROSPINAL FLUID AMYLOID-β AND [^{18}F]FLORBETABEN PET IN AN UNSELECTED COHORT OF MEMORY CLINIC PATIENTS

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Background: A decreased amyloid-ß 1-42 (Aß$_{42}$) in cerebrospinal fluid (CSF) and increased Aß tracer uptake in the brain, as measured using positron emission tomography (PET), could support a clinical diagnosis of Alzheimer's disease (AD). The purpose of this study was to investigate the concordance between CSF biomarkers and [^{18}F]Florbetaben (FBB) PET in an unselected sample of memory clinic patients. **Methods:** From March 2015 to November 2016, [^{18}F]FBB PET was offered to all patients visiting our memory clinic. A total of 104 AD patients, 43 non-AD patients, 61 patients with mild cognitive impairment (MCI) and 99 normal controls (NC) with available CSF and [^{18}F]FBB PET were included. CSF biomarkers were considered abnormal when either Aß$_{42}$ was $<$640 nl/L or the ration of Aß$_{42}$ and tau (tau/Aß$_{42}$ CSF ratio) was $>$ 0.52. [^{18}F]FBB scans were visually rated as normal or abnormal. Concordance between CSF Aß$_{42}$ and [^{18}F]FBB PET was determined across diagnostic groups. For concordant and discordant cases with abnormal [^{18}F]FBB PET, total tau and ptau were compared within diagnostic groups. **Results:** Overall concordance between CSF Aß$_{42}$ and [^{18}F]FBB PET was 81%, and between CSF ratio and [18F]FBB PET it was 88%. When discordant, PET was abnormal in 86% of the cases. Within groups, concordance of CSF Aß$_{42}$ and [^{18}F]FBB PET was highest for NC (86%), followed by AD (81%), non-AD (81%) and MCI (72%). Concordance between CSF ratio and [^{18}F]FBB PET was higher (AD:91%, MCI:90%, NC:90%, non-AD:81%). There was no difference in CSF total tau and ptau levels between concordant and discordant MCI and AD patients with abnormal [^{18}F]FBB PET (Table 1). **Conclusions:** In this unselected cohort of memory clinic patients we found a high concordance between CSF Aß$_{42}$ and [^{18}F]FBB PET. The combination of CSF Aß$_{42}$ and total tau provided better concordance than Aß$_{42}$ alone. Discordant MCI and AD patients, based on [^{18}F]FBB PET positivity alone, showed increased CSF total tau and ptau values and Aß$_{42}$ values near the cut-off, suggesting that

Table 1
Comparison of concordant and discordant cases within diagnostic groups with abnormal [^{18}F]FBB

	NC concordant	NC discordant	MCI concordant	MCI discordant	AD concordant	AD discordant
n	9	12	13	16	64	18
Age (±SD)	65 ± 6	64 ± 7	62 ± 7	68 ± 6	65 ± 7	63 ± 7
Gender (% male)	4 (44%)	7 (58%)	8 (62%)	8 (50%)	33 (51%)	7 (39%)
MMSE (±SD)	29 ± 4	27 ± 4	27 ± 2	27 ± 2	22 ± 4	22 ± 3
APOE, E4 carrier (%)	5 (56%)	5 (42%)	11 (85%)	11 (69%)	64 (70%)	11 (61%)
CSF* Aß$_{42}$ (IQR)	594 (73)	733 (460)	488 (177)	732 (197)	537 (124)	722 (95)
CSF* total tau (IQR)	630 (764)	394 (477)	619 (217)	640 (492)	642 (486)	680 (546)
CSF* ptau (IQR)	85 (62)	60 (57)	73 (27)	85 (44)	81 (41)	82 (56)

NC, normal controls; MCI, mild cognitive impairment; AD, Alzheimer's disease; SD, standard deviation; IQR, interquartile range.
* median.