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ABSTRACT BOOK

Oral Communication Session 1 : LATE & Alzheimer's disease

C01.1

Clinical and molecular correlates of LATE 18F-FDG-PET pattern in amnestic Mild Cognitive Impairment

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Introduction: This study aimed to test the ability to visually detect the characteristic medial temporal and limbic hypometabolic pattern of limbic age-related TDP-43 encephalopathy (LATE) in 18F-FDG-PET of patients with amnestic mild cognitive impairment (aMCI) and evaluate its prognostic value.

Methods: We included 70 patients with aMCI who underwent 18F-FDG-PET, amyloid-PET, tau-PET, and structural MRI, as well as baseline and follow-up cognitive evaluations. 18F-FDG-PET scans were analyzed visually with single-subject maps, categorized as normal, AD-like, LATE-like, or other neurodegenerative diseases, while blinded from other data. Clinical and biomarker features as well as cognitive trajectories were compared between groups.

Results: 25 scans were classified as normal, 25 as AD-like, 12 as LATE-like, and 8 as others. Patients with AD-like patterns were younger, had lower MMSE, inferior-to-medial temporal metabolism ratio, and greater hippocampal atrophy and cortical tau load than subjects with normal scans. Patients with LATE-like patterns had lower MMSE scores and more hippocampal atrophy than subjects with normal scans. Patients with LATE-like patterns were significantly older, had greater inferior-to-medial temporal metabolism ratio, greater amygdalar atrophy, and lower cortical tau load than subjects with AD-like patterns. Only subjects classified as AD-like showed a faster cognitive decline than negative scans.

Conclusion: LATE-like hypometabolic pattern in aMCI can identify a subgroup of subjects distinct from AD and controls in terms of clinical severity, medial temporal atrophy, cortical tau load, and cognitive decline, supporting the utility of 18F-FDG-PET as biomarker that provides inferential support for the specific detection of LATE.

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C01.2

FDG PET LATE-like pattern findings in subjects with amnestic-predominant MCI.

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Describe the incidence of medial temporal hypometabolism as a pattern of possible Limbic-Predominant Age-Related TDP-43 encephalopathy (LATE), as well as its clinical characteristics, amyloid load and conversion to Alzheimer Disease (AD) dementia in a cohort of patients with amnestic-predominant mild cognitive impairment (aMCI).

We studied 326 aMCI patients (mean age 72.5±7.1;MMSE 26.2±2,8; 61% males;56% amyloid positivity) who underwent FDG and Amyloid PET at diagnosis, with a clinical follow-up (24.4±16.3 months). FDG-PET patterns of hypometabolism were visually evaluated using a voxel-based analysis against an age-adjusted normality database and classified as LATE-like (medial-temporal), AD and Mixed (AD+LATE). Statistical parametric analysis (SPM12) was performed to analyse differences between patterns and compared to a healthy subject population. Amyloid-PET using approved radiotracers were visually classified as positive/negative and processed to calculate composite SUVr and converted to the Centiloid scale. Differences in clinical characteristics, amyloid load and conversion to AD-dementia were explored using SPSS.

LATE-like pattern was present in 37 patients (11.3%), AD-pattern in 89 patients (27.3%), and Mixed in 61 patients (18.7%). The remaining 139 patients (42.6%) presented non-AD patterns and were excluded from the analysis. SPM12 analysis confirmed significant higher medial-temporal hypometabolism in LATE-like group, while the hypometabolism of posterior cingulate and parieto-temporal cortex were more significant in the AD followed by Mixed group. LATE-like group exhibited higher MMSE scores ($p<0.02$), lower percentage of amyloid positivity ($p<0.001$) and Centiloid values than in AD and Mixed groups ($p<0.001$). Conversion to AD-dementia was slower in LATE-like group (median: 55.4-months) than AD (27-months; $p=0.001$; HR=0.29[0.14-0.63]) and Mixed groups (45-months; $p=0.04$; HR=0.43[0.2-0.91]). Although, non-significant statistical differences were observed between Mixed and AD groups ($p=0.11$).

LATE-like pattern in FDG-PET is not uncommon and occurs in cognitively less-affected aMCI subjects with lower brain amyloid load and a slower conversion to AD-dementia than those with typical AD or Mixed pattern.

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C01.3

The speed limits of tau pathology progression in Alzheimer’s disease

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Introduction: Modification of 14 risk factors has been linked to a 50% reduction of all dementia cases, suggesting that these factors may inevitably be linked to the progression of Alzheimer’s disease (AD) pathology. Here, we tested the influence of four modifiable risk factors (education, hypertension, body-mass-index (BMI), neuropsychiatric symptom severity (NSS)), genetic determinants (ApoE4 status, sex) and initial pathological burden on the spatial progression and local amplification of tau pathology.

Methods: Data of 162 amyloid-positive individuals were included, for whom longitudinal [18F]AV-1451-PET scans, baseline information on global amyloid load, ApoE4 status, BMI, hypertension, education, NSS and demographic information were available in ADNI. All [18F]AV-1451 PETs were intensity-standardized (reference: inferior cerebellum), z-transformed (control sample: 147 amyloid-negative subjects), subsequently thresholded (z-score > 1.96) and converted to volume-maps. Based on these volume-maps, tau-changes over time were assessed as 1) tau-speed (i.e. newly affected volume at follow-up), and 2) tau-level-rise (i.e. tau increase in previously affected volume). These two measures were entered as dependent variables in separate linear mixed effects models including four baseline risk factors (BMI, education, hypertension, NSS), baseline amyloid-burden, tau-volume or tau-burden, ApoE4 status, clinical stage, sex, and age as predictors. Next, we tested the interactive effects between baseline amyloid or tau-burden with the four modifiable factors on either tau-speed or tau-level-rise, respectively.

Results: Faster tau-speed was linked to higher BMI, female sex, ApoE4-status, and baseline tau-volume. The effect of baseline tau-volume on tau-speed was driven by greater global amyloid-burden. In terms of tau-level-rise, we observed that lower hypertension and BMI were linked to a slower increase in tau-burden. A load-dependent effect of baseline amyloid and tau-burden was found. Higher amyloid and BMI as well as lower education and higher tau-burden were linked to greater tau-level-rise.

Conclusion: Education, BMI and hypertension differentially influence tau-speed and level-rise by its interaction with initial pathological burden. Timely modification may overall slow tau’s progression. Moreover, differential consideration of tau-speed and tau-level-rise may provide novel means to study treatment effects of currently tested drug compounds against AD.

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C01.4

Neflamapimod effect on neuroinflammation in AD . A PET clustered approach.

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Introduction: The VIP study is a phase two trial disease using TSPO PET scan to detect the modification of neuroinflammation related to neflamapimod treatment in Alzheimer's Disease (AD) patients.

This work proposes to analyse such modifications using a SVCA (Supervised Clustering Algorithm) approach.

Methods: This study is conducted at Toulouse and include two studies: VIP(NCT03435861) for the study of neuroinflammation and Coma3d(NCT03482115) from which healthy subjects were used for the definition of SVCA classes. For VIP, 2 groups of patients were defined and compared. Placebo group 14 subject (7 HAB and 7 MAB aged 59-82 years) and Treatment group 11 subjects (5MAB and 6HAB aged 57-80 years). From the Coma3d study, a cohort of 18 healthy subjects (10 HAB and 8 MAB, aged 20–75 years) was included for SVCA class definition.

Images acquisitions were performed using a Philips 3T MRI (T1) scanner and a Siemens Truepoint HD scanner for TSPO PET (18F-DPA-714) acquired in 32 frames in 1 hour. For VIP, PET imaging was conducted at baseline (v0) and three months later (v3). All T1 images were segmented using Freesurfer and coregistered to PET images using spm12. We performed the creation of pseudo-reference region using SVCA algorithms (DOI:10.1007/s00259-021-05309-z). PET quantifications were performed using SRTM2 model (Pmod v3.9), and paired t-test parametric maps were created to compare v3 versus v0 for both group (placebo and treatment).

Results : Our first results suggest a diminution of the neuroinflammation for treatment group. On the other hand, in placebo group we observed a trend to augmentation of the neuroinflammation.

Conclusions: The use of neflamapimod appears to reduce neuroinflammation in AD patients, as suggested by our findings. To strengthen these findings, future studies should consider increasing the number of patients in each subgroup and evaluating the long-term effects of this treatment over an extended period.

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C01.5

Centiloid Scaling for Evaluation of Brain Amyloid PET Imaging in MCI Patients: Agreement and Added Value to Standard Visual Reading

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Introduction: Centiloid (CL) scale is a standardized metric for quantifying Amyloid-PET acquired with different tracers. The aim of this study was to investigate the agreement of the CL scale with visual reading.

Methods: We retrospectively reviewed 162 patients (69 females, 93 males; 71.3±6.2 years) with Mild Cognitive Impairment who underwent Amyloid-PET scans with available radiotracers (22 18F-florbetaben, 52 18F-flutemetamol, 88 18F-florbetapir). Patients were classified as “positive” or “negative” according to each technical specification by two trained nuclear medicine physicians independently and by consensus in those cases of disagreement. Images were processed using a commercially available solution to calculate SUVRs using tracer-specific “target/reference” regions, which were then converted to the Centiloid scale using appropriate SUVR-to-Centiloid conversion equations. Receiver operating characteristic (ROC) analysis was performed to analyse the agreement with the visual reading, and the optimal CL cut-off was determined as the value that maximized the Youden’s J index of the ROC curve. Based on the sensitivity and specificity values of the ROC, a CL “grey zone” was determined.

Results: Inter-reader’s concordance was high (κ=0.89), and reader consensus resulted in 107 subjects being visually classified as “positive” (CL=60.8±28.1), while 55 subjects were classified as “negative” (CL=-7.5±20.5, $p<0.05$). The ROC analysis yielded excellent agreement with visual-based classification (AUC>0.98), a corresponding optimal cut-off value CL=26, and a “grey zone” CL=[11;39] (sensitivity and specificity <100%). In 8 cases with disagreement between independent readers, Centiloid classified 3 cases as clearly positive (CL>39), 1 as negative (CL<11), and 4 in the “grey zone”.

Conclusions: There is excellent agreement between visual reading and CL values. However, the CL scale provides an additional value to aid decision making in cases where visual classification of patients is doubtful or borderline.

Oral Communication Session 2: Movement disorders & COVID

C02.1

Correlation of brain perfusion and tau PET using [18F]PI-2620 with [18F]FDG-PET metabolism in patients with progressive supranuclear palsy.

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INTRODUCTION: 4RTau-PET [18F]PI-2620 may show brain perfusion in the early phase as a possible surrogate for neuronal injury ([18F]FDG-PET). The aim of our study was to investigate the possible correlations between 4R-tau deposition and brain perfusion using [18F]PI-2620-PET, and the FDG-PET metabolic patterns in patients with PSP.

METHODS: We prospectively studied PSP patients (Movement Disorder Society PSP criteria) with a dynamic [18F]PI-2620-PET and [18]FDG-PET.

Carotid artery image-derived input functions were generated over the 60-minute dynamic [18F]PI-2620-PET. Volume of distribution was calculated using Logan plot, referred to inferior cerebellum grey matter, and distribution volume ratios (DVR) were obtained.

Early images from 0.5-2.5min p.i of [18F]PI-2620 were used to calculate regional standardized uptake value ratios (Perfusion-SUVr) and correlated with corresponding quantification of [18F]FDG-PET (FDG-SUVr).

We applied a previously defined PSP-related pattern (PSPRP) into the [18]FDG-PET scans and obtained the individual expression score using a multivariate analysis.

RESULTS: 19 patients with PSP (11 men;Age 72±6.9;PSP Rating Scale score 41.5±17.2), were subclassified as 10-PSP-RS and 9-PSP-Non-RS (2-parkinsonian,1-speech&language,4-frontal,1-oculomotor,1-postural instability).

No differences in DVR values between PSP-RS and PSP-Non-RS were found in globus pallidus (PSP-RS 1.2±0.1;[1.15-1.34],PSP-non-RS 1.3±0.2;[1.09-1.58]), putamen (PSP-RS 1.2±0.0;[1.09-1.24],PSP-non-RS 1.3±0.1;[1.13-1.41]) and caudate (PSP-RS 0.8±0.1;[0.58-0.89],PSP-non-RS 0.8±0.1;[0.71-0-93]).

Correlation coefficients between PI-2620-Perfusion-SUVr and FDG-SUVr were R2=0.69 in putamen, and R2=0.86 in caudate.

[18F]FDG-PET PSPRP expression score was higher in PSP patients than in controls (5,9±1.61 vs HC value,p<0,05). PSPRP expression scores in PSP-RS 6.2±2 and PSP-Non-RS 5.7±1.1 showed no significant differences(p>0.05).

CONCLUSIONS: [18F]PI-2620-PET may help the diagnosis of PSP patients by adding specificity of 4R-tau deposition, but with mild differences between subtypes. Additionally, there is a moderate to strong correlations between perfusion of [18F]PI-2620-PET and [18F]FDG-PET metabolism in PSP patients with a high expression of PSPRP.

Oral Communication Session 2: Movement disorders & COVID

C02.2

PET-AMYLOID AS BIOMARKER OF WHITE MATTER DAMAGE IN NEWLY DIAGNOSED MULTIPLE SCLEROSIS

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Aim: To evaluate amyloid uptake in damaged (DWM) and normal-appearing white matter (NAWM) in patients with newly diagnosed multiple sclerosis (MS) and the relation to clinical status.

Material and methods: Observational, prospective study including patients with recent MS onset (Jan/2023-Feb/2024). Participants evaluation includes: neurological examination, disability (EDSS), neuropsychological (SDMT) and quality of life (EQ-5D) assessment, brain MRI and [18F]-florbetaben PET in early (0-10') and late phase (90') post-i.v. Patients were classified as having highly active MS if they had ≥2 relapses (with/without sequelae) and increasing lesional burden, or a relapse with severe sequelae (EDSS score≥ 2). MRI and PET images were co-registered, and results are presented as standardized uptake values (SUV), and ratio using NAWM as the reference region (SUVRwm).

Results: Twenty patients were included (35.05±10.72 years; 75% women). We found, both in early- and late-phase, a lower mean SUVmax in DWM compared to NAWM ($p<0.01$) in all patients and lower mean SUVRwm in early vs. late-phase ($p<0.01$). SUVmax in NAWM in early-phase of 18F-florbetaben PET correlated with EQ-5D index (rho:-0.453, $p=0.045$) and SDMT (rho: 0.482, $p= 0.031$). In the highly active onset group compared to non- highly active group, a lower mean SUVmax in DWM and SUVRwm was observed in both early- and late-phase ($p<0.05$). Considering only highly active onset patients, SUVRwm correlated with EDSS score (rho = -0.591, $p=0.043$).

Conclusion: Preliminary results of this work in progress suggest that amyloid PET could be a promising tool to monitor myelin changes in patients with MS and may have a predictive role in disease activity and progression.

Oral Communication Session 2: Movement disorders & COVID

C02.3

Decreased functional network connectivity in post-COVID patients with high neuroinflammatory activity: a multimodal imaging study

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Introduction: The underlying pathophysiological mechanisms of post-COVID syndrome are poorly understood. Some post-COVID patients show neuroinflammation. In other conditions, such as Multiple Sclerosis, the presence of neuroinflammatory activity is linked to altered functional network connectivity patterns. We aimed to assess differences in resting state functional network connectivity (rs-FC) between post-COVID individuals i) with and without neuroinflammation on translocator protein (TSPO) PET, and ii) with and without persistent neurocognitive complaints.

Methods: We included a total of 47 individuals (age 49±9 years, 62% female) who suffered a SARS-CoV-2 infection 27±9 months prior to study participation. All participants fulfilled questionnaires and underwent a fully quantitative 60-minute dynamic [18F]DPA-714 PET scan with arterial sampling and 3T MRI including a T1-weighted sequence and resting-state functional sequence (rs-fMRI). Participants were grouped based on presence of neuroinflammation on TSPO PET and based on presence of complaints (severe fatigue and difficulty concentrating) according to the Checklist of Individual Strength (CIS). Using the rs-fMRI, 20 resting state networks (RSN) were estimated within the whole sample through a group-level independent component analysis using FSL-MELODIC. General linear models were used to test for differences within rs-FC between groups.

Results: Neuroinflammation on TSPO PET was present in twelve participants (26%) and persistent complaints were reported in 33 (70%) participants. In participants with neuroinflammation, connectivity within the visual peripheral (N=3151 voxels with PFWE<0.05) and dorsal attention networks (N=29 voxels with PFWE<0.05) was lowered. Furthermore, we found decreased connectivity in two clusters of voxels for participants with persistent complaints compared to participants without, namely in the visual peripheral component (N=721 voxels with PFWE<0.05) and in a default mode component encompassing the precuneus (N=123 voxels with PFWE<0.05).

Conclusion: This study is the first to assess differences in rs-FC in post-COVID individuals with and without neuroinflammation on TSPO PET. We demonstrate that neuroinflammation in post-COVID patients is linked to altered rs-FC in networks central to higher order cognitive functions. Studies into the long-term development of these changes are crucial to understand its impact on an individual and societal level.

Oral Communication Session 2: Movement disorders & COVID

C02.4

Brain 18F-FDG-PET abnormalities and their associations with neuropsychological assessment in patients with post-COVID-19 conditions

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Introduction: This study aims to longitudinally investigate the associations between brain 18F-FDG-PET hypometabolism and neuropsychological assessment (NPA) in patients with post-COVID-19 conditions (PCCs).

Methods: Patients with PCC and confirmed neurological impairment were prospectively included and underwent both brain 18F-FDG-PET and NPA at inclusion and one year later. The identified hypometabolic clusters after quantitative voxel-by-voxel group analyses were correlated with the NPA results.

Results: Twenty-three patients (51.0 ± 9.5 years; 9 women) were included. Brain 18F-FDG-PET metabolism was correlated with the results of the Hamilton Anxiety Rating Scale (HARS), episodic memory, executive function and autonomy tests (p-voxel <0.005; p-cluster <0.05 uncorrected). Two cerebellar hypometabolic clusters were found in patients with PCC at inclusion and one year later (p-voxel <0.005; p-cluster <0.05 corrected). Cerebellar hypometabolism was associated with an abnormal HARS test at one year ($p \leq 0.04$) but not at inclusion. At one year, no brain metabolic recovery and no significant improvement in NPA tests were observed.

Conclusion: Brain 18F-FDG-PET metabolism is associated with the results of neuropsychological tests in patients with PCC. Similarly, brain 18F-FDG-PET hypometabolism and impairment in NPA tests did not significantly improve one year later.

Oral Communication Session 2: Movement disorders & COVID

C02.5

Reorganization of brain connectivity in post-COVID condition: A 18F-FDG PET study

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A hypometabolic brain pattern has been reported in patients with post-COVID condition. The aim of this study was to investigate reorganization in metabolic connectivity in patients with post-COVID condition (PCC).

Methods. One hundred eighty-eight patients who underwent brain 18F-FDG PET for PCC were retrospectively included from two university hospital centres. These patients were age- and sex-matched to 120 healthy controls who underwent brain 18F-FDG PET before the COVID-19 outbreak. A voxel-based group comparison between patients and controls was performed (p-voxel at 0.005 uncorrected, p-cluster at 0.05 FWE corrected). Interregional correlation analyses (IRCA) of the identified clusters as well as sparse inverse covariance estimations (SICEs) at whole-brain scaling were also conducted. Both analyses were performed at the group level for all patients and then secondarily according to the postinfection delay; 88 and 100 patients, respectively, had a delay of less than or greater than 9 months (±9 M).

Results. Three hypometabolic clusters, namely, the right frontotemporal, right and left cerebellar, were identified from the voxel-based group comparisons of PCC patients. Within this hypometabolic PCC pattern, a modification in metabolic connectivity was observed in patients compared with controls, which was more marked in the +9 M group than in the -9 M group. On the other hand, the graph analysis revealed a decrease in connectivity efficiency metrics in the PCC.

Conclusion. Metabolic connectivity is modified in patients with PCC within the hypometabolic post-COVID-19 network, with lasting reorganization evolving over time, suggesting functional adaptation.

Oral Communication Session 3: Technical approaches & Alzheimer´s disease

C03.1

Deep Learning-Based Generation of Amyloid and Tau PET from Structural MRI

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Background: The biological diagnosis of Alzheimer's disease (AD) depends on biomarkers for its hallmark pathologies: beta-amyloid deposition (A) and tau accumulation (T). These are most reliably detected using positron emission tomography (PET). However, PET may not always be feasible due to cost, radiation exposure, and limited accessibility in some clinical settings or trials. Patterns of neurodegeneration, visible on more accessible structural MRI, are associated with A and T changes, but do not directly reflect their spatial distribution. In this study, we assessed whether deep learning can leverage structural information from MRI to generate amyloid and tau PET scans ("MRI-to-PET translation"), either alone or combined with additional patient information.

Method: The dataset included 1,663 amyloid PET (18F-AV45) and 728 tau PET (18F-AV1451) scans, paired with corresponding MRIs acquired within 90 days (mean age = 75 years). Both datasets included cognitively normal and impaired participants from the Alzheimer's Disease Neuroimaging Initiative. Data were split into 75% training and 25% testing sets, with 250 training scan pairs used to identify the most informative patient features. For pre-processing, PET and MRI data were co-registered and spatially normalized. The CNN employed an encoder-decoder architecture with latent layers to incorporate patient features such as age, sex, education, APOE genotype, and MMSE scores. An iterative patient feature selection process was employed, and the model was trained with and without the optimal feature set to generate amyloid and tau scans from MRI. Performance was evaluated using the mean absolute error (MAE) and structural similarity index (SSIM).

Results: MRI-to-PET translation was accurate without additional patient features (MAE: 0.084 (A)/0.063 (T); SSIM: 0.936 (A)/0.880 (T)). Incorporating patient features improved accuracy, with age and APOE genotype aiding amyloid PET translation and age and MMSE scores improving tau PET translation (MAE: 0.072 (A)/0.056 (T); SSIM: 0.942 (A)/0.914 (T)). Further validation of regional patterns and clinical utility is ongoing.

Conclusion: This study demonstrates that routinely available MRI, combined with patient data, can estimate spatial distributions of AD pathology visualized by PET. This approach provides surrogate markers to complement workflows where PET is unfeasible, potentially facilitating early diagnosis and treatment monitoring.

Oral Communication Session 3: Technical approaches & Alzheimer´s disease

C03.2

Evaluating two distinct preprocessing methods for 18F-flortaucipir PET for Alzheimer's disease detection

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Introduction: Despite the emerging clinical and research relevance of tau imaging, there is no consensus on a reference pipeline for the quantification of tau PET and the optimal preprocessing method remains unclear. Our study aims to assess the comparability of two different PET preprocessing methods, respectively in native and standard spaces, in quantifying tau deposition and in their ability to identify discriminate Alzheimer's disease (AD) patients.

Methods: This study included 209 subjects from the Geneva Memory Center including cognitively unimpaired (CU) and cognitively impaired (CI) patients for whom T1-MRI, 18F-flortaucipir and amyloid PET images were available within one year (CU=61, mild cognitive impairment [MCI]=114, dementia=34). Images were processed using two methods: 1) preprocessing in native space using PETSurfer and the inferior cerebellum as the reference region; 2) preprocessing in MNI standard space, using MATLAB and the cerebellar crus as the reference region. Standardized uptake value ratios (SUVRs) were extracted from the Desikan-Killiany atlas, and AD regions of interest (ROIs) were measured including AD-related areas (meta-ROIs) and Braak regions. We tested correlations between SUVRs obtained with the two methods. Receiver operating characteristic analyses (ROC) were performed to compare the discriminative power of SUVRs in meta-ROIs obtained with the two processing pipelines between amyloid-negative CU and amyloid-positive CI individuals.

Results: In all regions, the correlations were good and significant ($r>0.5$, $p<0.05$). Strong positive correlations were found between the two methods in AD meta-ROIs and advanced Braak staging regions (meta-ROI-1 $r=0.8$, $p<0.05$; BraakIII-IV $r=0.9$, $p<0.05$; BraakV-VI: $r=0.9$, $p<0.05$), while the correlation was lower in earlier Braak staging regions ($r<0.6$, $p<0.05$). Both methods were able to discriminate between amyloid-negative CU and amyloid-positive CI (AUC>0.7), but SUVR obtained in native space had significantly higher areas under the curve (AUC) in the meta-ROIs and in the ROIs of the early Braak stages ($p<0.5$) compared to standard space processing.

Conclusion: Our findings suggest that, although the two methods perform similarly in quantifying advanced AD pathology, the processing in native space has a higher discriminative power to detect tau pathology, namely in the regions of initial tau deposition, providing a more accurate quantification and especially in early disease stages.

Oral Communication Session 3: Technical approaches & Alzheimer´s disease

C03.3

Development and clinical validation of a new brain-dedicated positron emission tomograph.

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Aim/Introduction: Conventional PET-CT equipment is often saturated due to the high demand for preferential oncological studies. The development of a brain-dedicated PET would allow greater accessibility for PET studies in patients with neurodegenerative disease. Furthermore, this would allow for a broadening of clinical indications in addition to enabling improvements in sensitivity and spatial and temporal resolution, and, therefore, better quantification of small areas and nuclei, among other advantages.

Materials and Methods: A total of 422 studies were performed in 211 patients (mean age 70.78±9.57(27-89)), 57.3% of whom were women. They were referred from the Neurology Department of the Hospital Clínico San Carlos for 18F-FDG PET-CT. The patients underwent a brain imaging study in the conventional PET-CT scanner and subsequently in the dedicated PET scanner after signing the informed consent form. Two nuclear physicians with more than 15 years of experience in neuroimaging evaluated the images without clinical information from the patients, establishing the degree of hypometabolism of the main brain regions and an image-based diagnose. The percentage of agreement between the PET and the clinical diagnosis was estimated for both scans. The percentage of agreement and Cohen's Kappa between both scanners were also evaluated.

Results: The diagnostic ability with PET vs. clinical diagnosis (degenerative vs. non-degenerative cause) was 82.35% in the dedicated PET and 75.55% using the conventional PET-CT. Similarly, the agreement with the broad diagnosis of neurodegenerative diseases was 80.3% for the dedicated PET vs 75.23% for the conventional PET-CT. The inter-evaluator concordance percentage for degenerative vs. non-neurodegenerative was 83.8% in dedicated PET and 76.7% in conventional PET-CT.

Conclusion: We found good concordance of the dedicated tomograph with conventional PET-CT equipment, having even slightly superior diagnostic capacity. These findings validate the clinical use of this new dedicated brain PET for the diagnosis of neurodegenerative diseases.

References: None

Oral Communication Session 3: Technical approaches & Alzheimer´s disease

C03.4

Glymphatic dysfunction is associated with structural network alterations in people with amyloid-PET positivity

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Background: The glymphatic system clears brain waste via cerebrospinal fluid (CSF) perivascular routes, maintaining homeostasis, but its function is disrupted in neurological disorders such as Alzheimer's disease (AD). The Diffusion Tensor Imaging along the perivascular space (DTI-ALPS, Taoka et al. 2017) index serves as a non-invasive proxy for glymphatic functioning. This study investigates the relationship between DTI-ALPS and structural network disturbances in people with dementia depending on amyloid positivity.

Methods: 104 subjects underwent brain DWI and amyloid PET scans using a PET/MR integrated system (3T, Siemens Biograph mMR). 86 of them had complete MRI data of sufficient quality and were selected for further analysis. Subjects were divided in two groups on the basis of qualitatively evaluated amyloid positivity on PET: 42 AMY+ (sex: 21F, age: 67.9 ± 8.2 years) and 44 AMY-(sex: 19F, age: 66.8± 7.4). Diffusivity was evaluated at the level of the lateral ventricle body in spherical ROIs placed in projection and associative fibers to obtain the DTI-ALPS index. Whole-brain tractograms were generated through anatomically-constrained probabilistic tractography as implemented in MRtrix3. Tractograms were parcellated using the Yan cortical atlas augmented by the Tian subcortical atlas. We evaluated information transfer across the structural connectome using the characteristic path length (CPL) index.

Results: The AMY+ group exhibited a lower DTI-ALPS index as compared to AMY- group (two-sample t-test, t=+2,76, p=0.005). The CPL was significantly higher in the (+) group as compared to the (-) one (two-sample t-test, t = -2.70, pval = 0.006). DTI-ALPS and CPL showed a significant negative association (Spearman's ρ =-0.37, pval= 0.023).

Conclusions: Glymphatic system is impaired in people with cognitive decline and positive amyloid PET and so is global information transfer along the structural connectome. Using DTI-ALPS as a proxy for brain clearance we demonstrated an association between glymphatic dysfunction and impaired global network functioning indexed by CPL.

Oral Communication Session 3: Technical approaches & Alzheimer´s disease

C03.5

Individual sparse inverse covariance estimation biomarker: a new connectivity tool in PET imaging

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Studies of connectivity are increasingly used in PET imaging even if mostly investigated at the group level. The aim of this study was to develop an individual connectivity biomarker from sparse inverse covariance estimation (SICE) to discriminate Alzheimer's disease (AD) from cognitively normal (CN) patients.

Methods. Four-hundred and eighty-five patients with brain [18F]-FDG PET images were extracted from the ADNI database (191 CN, 77 ± 6.0 years old, 294 AD, 75 ± 8.2 years old). For each patient, a dementia prognosis index (DPI) based on a ratio of uptake values in regions of interest known to be hypometabolic in Alzheimer's disease to regions known to be stable, an individual expression of an AD or CN metabolic covariance patterns obtained with principal component analysis (PCA), and an individual likelihood index of belonging to AD or CN sparse inverse covariance estimation (SICE) matrices were calculated. Leave-one out analyses were performed to class each subject from our cohort individually, with thresholds maximizing sensitivity and specificity extracted from areas under the curves, to calculate diagnostic performances for the three methods.

Results. DPI, PCA and SICE presented sensitivities of 80%, 80% and 89%, specificities of 80%, 85% and 84% and accuracies of 80%, 82% and 87% respectively to discriminate between AD and CN patients. The fusion of the 3 methods obtained with a majority of votes increased diagnostic performances of DPI ($p<0.001$) and PCA ($p<0.001$) but not SICE methods.

Conclusion. Individual SICE index is efficient for the discrimination between AD and CN subjects with significant increase diagnostic performances when added to more classical analyses based on regional metabolism (DPI) or connectivity analyses (PCA). Further studies are needed to investigate this individual connectivity tool in populations that are more difficult to diagnose.

Oral Communication Session 3: Technical approaches & Alzheimer´s disease

C03.6

Ultrashort early-frame amyloid- and tau-PET (Vizamyl and PI2620) as surrogates for FDG-PET

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Introduction: A/T/N classification of Alzheimer's disease can be determined with amyloid-PET (A), tau-PET (T), and FDG-PET (N) and early-phase amyloid- or tau-PET may define N status. We investigated optimal early time-frames for amyloid and tau scans as an FDG proxy using a sensitive PET system (GE HealthCare Omni Legend).

Methods: 15 patients (67.6±5.8years, 6 women, mild cognitive impairment/mild dementia) underwent FDG (n=15), [18F]Vizamyl (n=9, 68.1±6.4years, 2 women) and/or [18F]PI2620 (n=10, 67.3±5.6years, 5 women) scanning with the Omni Legend PET/CT (32cm axial FOV). Scans were acquired 30-40min post injection of ±100MBq FDG, 0-20min and 90-110min pi of 150±10%MBq [18F]Vizamyl, and 0-20min and 40-60min pi of 150±10%MBq [18F]PI2620. Early-phase PET scans were reconstructed in 31 frames (12x5sec, 6x10sec, 6x30sec, 6x1min, 1x5min). Frontal, occipital, parietal, and temporal VOIs (left and right hemisphere) were delineated using a simplified Hammers atlas in Pmod. Correlations between amyloid/tau and FDG based on all time-frames were calculated and the optimal 5 time-frames were selected for further analysis.

Results: Global cortical correlations between amyloid/tau and FDG were >0.85 between 1-3min. The correlation declined after 3.5min for tau and after 10min for amyloid. For both, highest correlation was found for the 1-2min window, with correlations of frontal, occipital, parietal, and temporal regions of 0.65, 0.68, 0.95, 0.91 for amyloid and 0.66, 0.64, 0.96, 0.86 for tau. Similar correlations were observed irrespective of amyloid or tau status (4 Aβ+, 5 tau+). Ultrashort 1min reconstructions (OSEM i8s4 2mm) showed sufficient image quality for clinical interpretation although comparisons with FDG-PET need to be made.

Conclusions: High agreement was found between early-phase amyloid-/tau-PET reconstructions and FDG scans. Ultrashort early-phase PET scans could be applicable using high-sensitivity PET/CT systems. Future work will include more data, apply deep learning to generate pseudo-FDG from amyloid/tau scans, and use three-dimensional stereotactic surface projections for visual comparability assessment.

Oral Communication Session 3: Technical approaches & Alzheimer´s disease

C03.7

One modality to rule them all? Comparison of amyloid, tau, and FDG PET for the prediction of decline in different cognitive domains

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Background: Alzheimer's disease (AD) research leverages PET imaging—amyloid (Aβ)-, fluorodeoxyglucose (FDG)-, and tau-PET—to predict cognitive decline. These modalities align with the A/T/N framework, which categorizes AD pathology respectively into amyloidosis, tau pathology, and neurodegeneration. However, their relative predictive accuracies across cognitive domains remain unclear. Clarifying this can optimize PET use and guide personalized AD interventions.

Aims: The study (1) compares the accuracy of the three PET modalities and (2) assesses decline rates across cognitive domains by A/T/N statuses.

Methods: Data from 335 participants from ADNI, including CN, MCI, and AD, were analyzed. All participants had available data for all three PET modalities. Longitudinal changes in cognitive domains were assessed using linear mixed-effects models with PET biomarkers, combinations of modalities, and A/T/N profiles as predictors. The models controlled for age, sex, education, and baseline diagnosis, and included interactions with time. Marginal R^2 values quantified the variance explained by each modality and their combinations.

Results: Tau-PET had the highest predictive accuracy for memory (R^2 = 0.50) and language (R^2 = 0.29), while tau- and FDG-PET were equally effective for executive functions (R^2 = 0.35) and global cognition (R^2 = 0.40). Aβ-PET showed the lowest predictive accuracy across domains. Combining modalities yielded minimal additional variance explained. A+T+ biomarker profiles were associated with the fastest decline across all domains ($p < 0.001$).

Conclusion: Tau-PET demonstrated the highest predictive accuracy for memory and language, while tau- and FDG-PET performed comparably for executive functions and global cognition. The lack of significant improvements with combined PET modalities aligns with the hypothesis that single modalities, particularly tau-PET, may sufficiently capture cognitive decline in specific domains. These findings highlight how reducing reliance on multimodal imaging can streamline applications, lower costs, and simplify protocols in both clinical and research settings, while emphasizing domain-specific approaches and the role of pathological processes in cognitive decline.

Oral Communication Session 3: Technical approaches & Alzheimer´s disease

C03.8

PatienSpace: Neuroimaging biomarker learning using generative AI applied to Alzheimer's disease and related disorders

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Introduction: The diagnosis of Alzheimer's disease (AD) is challenging due to its heterogeneous presentation and similarities with related disorders. This study proposes PatientSpace, a novel topological representation of subjects built from 18FDG-PET and MRI data, leveraging generative AI techniques.

Materials and methods: 18FDG-PET and MRI data from 253 cognitively normal (CN) subjects, 475 AD patients and 138 subjects with frontotemporal dementia (FTD) were used to train a variational autoencoder couple with auxiliary tasks for diagnosis classification and age prediction. The latent space (PatientSpace) was represented as a graph, where nodes correspond to subjects and edges reflect distances to their neighbors. A consistency criterion was added to the loss function to ensure that neighboring nodes share similar neuroimaging. A K-nearest neighbors (k = 5) classifier was used to classify 35 % of the subjects. Additionally, a longitudinal external database of 481 mild cognitive impairment (MCI) subjects was projected into the PatientSpace to investigate the progression of MCI to dementia (MCI-converters) versus non-converters.

Results: PatientSpace effectively separated subjects into 3 clusters corresponding to CN, AD and FTD. Within the AD cluster, neuroimaging and age-related heterogeneity were evident, with early-onset AD (age < 65 years) distinguishable from late-onset cases. Classification accuracy was high: CN (Sensitivity, Se = 0.95, Specificity Sp = 0.93), AD (Se = 0.94, Sp = 0.94) and FTD (Se = 0.83, Sp = 0.87). Non converters MCI were predominantly located in the CN cluster, with trajectories influenced by aging. In contrast, MCI converters transitioned from the CN clusters to the AD cluster over time.

Conclusion: PatientSpace, driven by generative AI, provided robust differentiation between AD, FTD and CN, while also offering insights into the progression of MCI to dementia. This approach could enhance our understanding of the clinical phenotypes of AD and FTD and assist in predicting disease evolution.

Oral Communication Session 4: Brain tumors & Miscellaneous

C04.1

The integrated, molecular-morphologic meningioma grading is related to somatostatin receptor expression in PET

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Introduction: The newly proposed integrated molecular-morphologic meningioma grading has demonstrated superior predictive accuracy for tumor recurrence compared to traditional morphologic (WHO) grading. This study is the first to investigate the association between the molecular-morphologic score (MMS) and somatostatin receptor (SSR) expression using PET imaging.

Methods: We retrospectively screened our internal database for patients with available MMS who underwent SSR-PET for residual tumor assessment shortly after surgery. Inclusion criteria required a residual tumor (isocontour volume of interest with a 40% maximum uptake threshold) of at least 0.5 ml. PET measurements of the residual tumor included SUVmax, SUVmean, and SUVs normalized to the superior sagittal sinus and contralateral meninges.

Results: A total of 31 patients were included in the study. Based on WHO grading, 30 patients had G2 tumors, and 1 had a G3 tumor. According to the MMS, 4 patients were low-risk, 20 were medium-risk, and 7 were high-risk. Most PET measurements were non-normally distributed ($p < 0.05$, Kolmogorov-Smirnov test). All PET measurements showed significant positive correlations with the MMS ($p < 0.05$), with the strongest correlation observed for SUVmax (Spearman $r = 0.64$, $p < 0.001$).

Conclusions: MMS is significantly associated with SSR expression in PET imaging, providing potential value for therapy planning. Ongoing database expansion aims to establish PET-based thresholds for risk stratification.

Oral Communication Session 4: Brain tumors & Miscellaneous

C04.2

RESPONSE ASSESSMENT TO PROTON THERAPY IN BRAIN GLIOMAS USING [18F]-DOPA PET/CT.

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INTRODUCTION: Proton therapy (PT) of brain tumors provides highly conformal radiation with minimal exposure to healthy tissue, facilitating preservation of cognitive and endocrine function while maintaining effective tumour control. However, the experience with amino acid PET/CT to assess the tumor response is limited so far. The aim of this study was to evaluate patients undergoing PT according to PET RANO 1.0 criteria using [18F]-DOPA PET/TC.

METHODS: We retrospectively analyzed patients with different glioma subtypes treated with PT who underwent a [18F]-DOPA PET/TC for PT planning and follow-up. The PET analyses included assessment of the tumour-to-striatum (TSRmax) and tumour-to-normal-brain (TBRmax) ratios. Follow-up scans of an individual lesion were classified as PET-based progressive disease (PET-PD), stable disease (PET-SD), partial response (PET-PR), or complete response (PET-CR) according to the PET RANO 1.0 criteria. Definitive diagnosis was made on the basis of biopsy and/or imaging follow-up. The location, timing and quantification of radiation necrosis were recorded.

RESULTS: 12 patients with histologically proven astrocytoma (n=5), oligodendroglioma (n=2), glioblastoma (n=3), diffuse pediatric-type high-grade glioma (n=1), and polymorphous low-grade neuroepithelial tumor of the young (n=1) were analyzed. The median time elapsed between the planning PET/CT scan and the subsequent procedure (PT) was 18.3 days. At follow-up, 16 lesions were identified as PET-PD, 7 as PET-SD, 5 as PET-PR and 6 as PET-CR, according to PET-RANO 1.0 criteria, with a 93% agreement with the final diagnosis. Notably, eight distant areas of RN were identified in the periventricular white matter (3), corpus callosum (2), thalamus (2), and cingulum (1). In these cases, mean TSRmax and TBRmax value was 2.18 and 1.72, respectively. One lesion could not be definitively diagnosed. The median time for the appearance of RN areas was 15 months (range 1-20). Complete resolution of RN areas was observed in only one patient at 6.2 months. Two patients showed improvement of their lesions at 22.3 and 10.5 months. One patient showed no improvement after the current follow-up period (1.3 months).

CONCLUSIONS: PET-RANO 1.0 is a reliable tool for assessing tumour response in gliomas treated with PT using [18F]-DOPA PET/TC. Interestingly, PT-treated gliomas show a specific form of RN, a possible consequence of the high energy deposition near the distal end of the Bragg peak.

Oral Communication Session 4: Brain tumors & Miscellaneous

C04.3

The predictive potential of 18F-FET PET in patients with post-surgical residual mass of high grade glioma

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Purpose: to determine the diagnostic and predictive potential , in terms of overall (OS) and progression free survival (PFS), of 18F-FET PET in patients with primary high grade glioma (HHG) after surgical resection and before radio-chemotherapy.

Methods: 32 patients [(15 M;17 F; ≤ 50 y n=9 (28.1%); > 50 y n=23 (71.9%)] with HGG WHO3 n = 6 (18.7%) and WHO4 n = 26 (81.3%) associated with IDH mutation in n = 5 (15.6%) or MGMT methylated in n = 13 (40.6%) underwent a PET scan after surgical resection. Semi-quantitative parameters including tumor-to-brain ratios (TBRmax cut-off value > 1.6 for post-surgical residual mass), SUVmax, uptake volumes and metabolic tumour volumes (MTV) have been taken into account. Univariate analyses and Mantel-Cox log-rank test were used to identify independent variables associated with OS and PFS comparing differences in Kaplan-Meier survival curves (KM).Relationship between parameters was also investigated with Pearson correlation.

Results: For OS and PFS (p = 0.005 – 0.0001), results showed high prediction value associated with the WHO grade, IDH mutation and MGMT methylated , age, and PET findings (TBR max, MTV, uptake volumes). The Kaplan-Meier curve highlighted a longer OS and PFS for patients with HGG WHO3, age >50 y, IDH mutation (compared to tumor with wild type mutation), TBRmax (range 3.42 – 6.00), MTV (range 306640 - 15876) and volumes (range 7530 – 76660 cc) values respectively higher than the median cut-off values (4.02, 40245, 18035, respectively). A significant negative exponential correlation was found between PET parameters and both OS and PFS (p<0.0001).

Conclusion: This preliminary work suggests that several clinical and molecular parameters, including molecular neuro-imaging findings, may predict PFS and OS in patients with HGG WHO3-4. A multimodal approach including FET-PET may improve the oncological outcome in glioma patients.

Oral Communication Session 4: Brain tumors & Miscellaneous

C04.4

Prognostic value of [18F]FDG PET in immune effector cell–associated-neurotoxicity syndrome (ICANS).

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Introduction: Chimeric antigen receptor (CAR) T-cell therapy is currently indicated for treatment of diffuse large B-cell lymphoma (DLBCL). Some of its common treatment-related toxicities are cytokine release syndrome (CRS) and immune effector cell–associated-neurotoxicity syndrome (ICANS), being the later one of CAR-T's life-threatening complications. The aim of our study is to evaluate the prognostic value of [18F]FDG PET in the acute phase of ICANS.

Methods: Prospective study, including 26 patients with DLBCL treated with CAR-T therapy. Whole-body and brain [18F]FDG PET/CT scans were performed pre-treatment and 30 days post-therapy. In cases of suspected ICANS another brain PET scan was conducted. All images were preprocessed (normalized and smoothed). We used SPM to perform different group analysis (ICANS to baseline group, ICANS to 30days group and baseline to 30days group). We also performed multiple regression analysis in order to correlate the hypometabolism to the burden of disease and clinical symptoms. We did single subject analysis of the ICANS patients to evaluate the changes in the cortical metabolism over time.

Results: The mean age was 59±12 years, with a male-to-female ratio of 18:8. 22/26 patients developed CRS and 13/26, all with prior CRS, showed symptoms of ICANS. The most common symptoms were bradypsychia, tremor and disorientation, starting on average on the 6th day post-infusion. Urgent brain PET scans were performed on 10 of the 13 ICANS patients. PET images were able to identify the pattern of cortical hypometabolism in the acute phase and to correlate it with the grade. The cortical hypometabolism tends to normalize at 30 days, although some hypometabolic areas persist.

Conclusions: Brain [18F]FDG PET might have a predictive value in cases of immune effector cell–associated-neurotoxicity syndrome (ICANS). More studies are needed to investigate the changes in cortical metabolism over time and the possible effects on cognitive function.

Oral Communication Session 4: Brain tumors & Miscellaneous

C04.5

BRAIN METABOLIC CONTRIBUTION IN CANVAS

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INTRODUCTION: Cerebellar ataxia, neuropathy and vestibular areflexia syndrome (CANVAS) is a progressive late-onset ataxic disorder caused mainly by a recessive expansion in replication factor C subunit 1 (RFC1).

In addition to the classical pathological triad of cerebral atrophy, bilateral vestibular hypofunction and somatosensory impairment, CANVAS is often accompanied by other clinical features, such as autonomic dysfunction or cough. Cognitive impairment has recently been considered as a possible component of the phenotype, most commonly associating deficits in executive function, language, visuospatial cognition and emotion-affect regulation.

METHODS: In order to determine the metabolic compromise in the brain and the possible prevalence of cognitive impairment, we studied a cohort of 27 patients with confirmed RFD1 expansion, performing a 18F-fluorodeoxyglucose PET/CT (FDG-PET), assessing both visual and quantitatively the presence, distribution and grade of hypometabolism in the cerebral and/or cerebellar cortex. The patients' clinical examination was compared to the results of the FDG-PET imaging.

RESULTS : In our series, 66,7% of the cohort showed cerebellar hypometabolism (18/27), being severe in 25% (7/27), mild in 25% and moderate in 14,8% (4/27). The vermis was affected in 37% (10/27), most often severely (22,2%, 6/27). The metabolism in the pons was also evaluated, being decreased in 44,4% (12/27), mainly in a mild to moderate degree (37%, 8/27).

Clinical signs of gait disorder were present in 24/27 of the patients and were significantly associated with cerebellar hypometabolism ($p<0.05$). Additionally, only 33% of patients showed cerebral hypometabolism (9/27), specifically in the medial and/or lateral prefrontal cortex, but cognitive decline was only detected in 1/27 patients.

CONCLUSIONS: Our preliminary analysis identified metabolic decline in cerebellar metabolism, coincident with the presence of gait disorders. No relevant cognitive decline was found in our series, and the follow up and neuropsychological studies would help to clarify the clinical phenotype and patients management.

Oral Communication Session 4: Brain tumors & Miscellaneous

C04.6

Metabolic and fluid biomarkers support a microglia-mediated inflammatory signature in ALS

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Introduction. Amyotrophic lateral sclerosis (ALS) is an incurable neurodegenerative disease caused by motor neuron degeneration. ALS pathogenesis involves the interaction of neuronal and non-neuronal mechanisms, particularly those related to metabolic and immune pathways. Moreover, sensitive and specific biomarkers are needed: both blood or cerebrospinal fluid (CSF) biomarkers and neuroimaging techniques including hybrid 18F-FDG PET/MRI have shown promise. Here, we combine clinical measurements, CSF biomarkers, and 18F-FDG PET/MRI metabolic analysis to unravel the role of reactive microglia in ALS pathogenesis.

Methods. 25 ALS cases and 10 healthy controls underwent cerebrospinal fluid sampling to determine the concentrations of chitinases (CHITs), proteins produced by reactive microglia, and neurofilaments, a marker of neuronal damage. 18F-FDG PET/MRI scan was also performed in all patients and 20 controls to explore brain metabolism. The analysis results were integrated with patients' clinical data.

Results. First, ALS patients present with higher CSF levels of NFL and CHITs compared to controls, and they display increased 18F-FDG metabolism in the medulla oblongata and pons. Moreover, levels of CHIT1 correlate with 18F-FDG metabolism in these regions, and CHI3L2 with medulla oblongata metabolism. From a clinical perspective, CHI3L2 and medulla oblongata metabolism correlate with the ALS Functional Rating Scale - Revised (ALSFRS-r) scores and the delta-ALSFRS-r score.

Conclusions. Our findings suggest a potential relationship between corticospinal tract hypermetabolism, microglial activation and disease severity, further strengthening the hypothesis that neuroinflammation and activated microglia play a central role in ALS pathogenesis.

Oral Communication Session 4: Brain tumors & Miscellaneous

C04.7

Differential diagnosis of occipital hypometabolism with 18F-FDG PET-CT: dementia with Lewy bodies or posterior cortical atrophy?

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Aim/Introduction: Posterior cortical atrophy (PCA) and Dementia with Lewy bodies (DLB) are neurodegenerative entities both associated with occipital metabolism on 18F-FDG PET-CT studies. Relative sparing of posterior cingulate has been described as a differentiating feature of Lewy body Dementia, but although some additional areas have been described (ej. frontal in DLB), the literature is sparse and series are small (Whitwell JL et al. JNM, 2017). We aimed to identify differential regional patterns of 18F-FDG PET-CT hypometabolism that allow differential diagnosis of PCA and DLB.

Materials and Methods: 22 patients with a diagnosis of PCA and 61 with disgnosis of DLB, who underwent 18F-FDG PET-CT scans between may-2012 and november-2024 were included. The pattern of involvement of both entities was analyzed based on voxels with SPM12, T test for two independent samples ($p<0.001$). Regional hypometabolism was assessed compared with a control cohort (n= 62). The covariates were sex and age.

Results: The mean age of patients with PCA was 61.55 years (sd 6,617); 77.3% women, DLB mean age of 74.93 (sd 7,127); 45.9% women. Compared to healthy controls, a lower bilateral temporo-parieto-occipital metabolism was observed in both groups. The DLB group showed lower metabolism compared to the PCA in the frontal lobe (bilateral superior frontal gyrus, superior, medial and orbital frontal lobe, and right anterior cingulate). Regarding DLB, PCA showed lower metabolism in the right occipital, temporal, cuneus/precuneus, superior parietal, and right fusiform and angular gyri.

Conclusion: DLB and PCA show an important overlap in the pattern of hypometabolism that makes differential diagnosis difficult based solely on visual assessment, but the extent of hypometabolism at the frontal lobe or the greater right involvement suggests the diagnosis of DLB or PCA respectively.

Oral Communication Session 4: Brain tumors & Miscellaneous

C04.8

Predictive value of FDG-PET in primary progressive aphasia

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Primary progressive non-fluent primary aphasia (PPNFA) may be the onset of several neurodegenerative diseases. These symptoms may progress to syndromes such as frontotemporal dementia (FTD), corticobasal degeneration (CBD) or progressive supranuclear palsy (PSP). The aim of this study was to investigate the time to onset of a second deficit and to assess whether variations in brain metabolism observed on initial PET/CT-18F-FDG can predict progression to the different clinical syndromes.

Retrospective study including 67 patients diagnosed with APPNf between 2011-2022, who had PET/TC-18F-FDG acquired at first symptom manifestation. Images were normalized to a brain template and whole brain uptake in PMOD software. Subsequently, images from patients in different progression groups were compared with a group of healthy controls using Statistical parametric mapping (SPM), corrected for multiple comparisons.

Of the 67 patients (56% women; mean age: 72 years), 17 developed PSP, 7 CBD, 13 FTD and 3 ALS, the latter not included in the analysis. When analyzing the images in SPM and comparing the different groups with controls, we observed that patients in all groups showed hypometabolism affecting to different degrees the frontal lobe, temporal lobe and insula. However, patients who developed CBD showed a right prevalence and involvement of the caudate and putamen, patients with PSP did not present this laterality but showed hypometabolism in the thalamus and central sulcus. Patients who progressed to FTD showed the characteristic pattern of this syndrome with left laterality and preservation of the basal ganglia.

In summary, brain PET/CT-18F-FDG can contribute to predict which syndrome patients diagnosed with APPNf will develop, by showing specific patterns of metabolic alteration months before they progress.

Rapide fire session

RF001

During the COVID-19 lockdown, negative-emotion Twitter posts were associated to metabolic PET changes within the brain's fear network.

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The COVID-19 pandemic has significantly impacted mental health, with the lockdown period particularly amplifying feelings of fear, sadness, and uncertainty. This study investigates the brain metabolic changes associated with the psychological context of the French COVID-19 lockdown, leveraging sentiment analysis of emotional expressions on X/Twitter posts. A composite negative-emotion score was derived from daily sentiment analysis of tweets during the 55-day lockdown period, and its correlation with brain metabolism was analyzed using 18F-FDG PET imaging in 95 patients with neurological conditions. The results revealed a negative correlation between the daily negative-emotion score and metabolism in the right ventromedial prefrontal cortex (vmPFC) and anterior cingulate cortex (ACC). Metabolic connectivity analysis identified a limbic-dominant network involving the amygdala, hippocampus, thalamus, and basal ganglia.

This study highlights the sensitivity of the vmPFC/ACC to emotion societal stressors, and may underly the cerebral substrate of increased psychological and psychiatric disorders reported during the lockdown. Further research is needed to confirm these findings in broader populations and to explore their longitudinal consequences.

Rapide fire session

RF002

Improving Diagnostic Accuracy in Parkinsonism: Optimal Z-Score Thresholds for DaT SPECT Semi-Quantitative Analysis.

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Introduction: A cut-off of -2 z-score for semi-quantitative measures has been arbitrarily established to define a pathological DaT SPECT in patients with suspected neurodegenerative parkinsonism. We aimed to study more accurate z-score threshold for DaT SPECT semi-quantification to discriminate neurodegenerative parkinsonism (NP) and non-neurodegenerative parkinsonism (NNP).

Methods: 168 patients undergoing DaT SPECT during 2018 were enrolled (57 Parkinson's Disease, 40 essential tremor [ET], 9 Parkinson Plus [PPlus], 9 Dementia with Lewy Bodies [DLB], 14 drug-induced Parkinson's, 6 vascular Parkinson's and 33 with other non-degenerative causes). Semi-quantification was computed by DaTQUANT® software. ROC analyses were performed to identify most accurate z-score threshold and clinical diagnosis at five years follow-up was used as gold standard.

Results: Posterior putamen with a z-score cut-off of -1.59 showed the better accuracy to differentiate between NP and NNP (sensitivity 0.95, specificity 0.89). Posterior putamen with a z-score cut-off of -1.86 demonstrated the highest accuracy to differentiate between PD and ET (sensitivity 0.97, specificity 0.89). The striatum mean (z-score cut-off -1.01) was the most accurate parameter to support the diagnosis of DLB patients (sensitivity 0.90, specificity 1.00), while left putamen mean (z-score cut-off -1.46) was the most accurate parameter in PPlus patients. Putamen to caudate ratios and asymmetry measures were useful to detect PD patients, while not DLB and PPlus patients.

Conclusion: Different striatal regions and cut-offs for z-score of DaT SPECT semi-quantification should be considered to support the diagnosis across of neurodegenerative parkinsonism. The proposed cut-offs improve the sensitivity, while maintaining an acceptable specificity with respect to the -2 z-score.

Rapide fire session

RF003

High resolution FDG brain template from a Spanish population.

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Aim/Introduction: Positron emission tomography (PET) may be a useful tool as a biomarker of neurodegeneration. Following the clinical validation of a new dedicated brain PET, we aimed to build an FDG-PET image template of our population for quantification optimization in future projects. In addition, to enable regional quantification, we created a map of brain regions of interest (ROIs) over this new template.

Materials and Methods: A total of 167 patients with neurological symptoms referred from the Neurology Department underwent a PET study on dedicated brain PET equipment. The processing of the images for the creation of a brain template was performed with PMOD and Statistical Parametric Mapping (SPM) software. The images were automatically aligned in PMOD to subsequently calculate the average image in SPM. To generate the ROI map, the normalization of our template to the AAL (Automated Anatomical Labeling) was calculated and the inverse transformation was applied to the AAL ROI map. Each region was manually examined and modified to assure the correct overlap with the template. In addition, a midbrain ROI was added.

Results: After image processing, we obtained an FDG-PET brain template with 1 mm3 voxels and a 268x268x152 matrix to use as a reference for PET image normalization. In addition, we generated a map with 66 ROIs for quantification and a mask to exclude possible extra-parenchymal regions with FDG uptake.

Conclusion: The development of a brain template with images acquired on the dedicated brain PET is of great utility for application in new equipment with improved resolution. In addition, the inclusion of patients of a wide range of age and pathologies will allow the standardization of any FDG-PET neuroimaging in our department.

References: None.

Rapide fire session

RF004

Brain Volumetric Changes 1 year after SGbariatric surgery.

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Introduction: Obesity is one of the most significant health concerns of the twenty-first century. One of the most efficacious mechanisms to reduce body weight is the sleeve gastrectomy. The aim of this study is to analyze the postoperative anatomical changes 1year after sleeve gastrectomy (SG) in Hispanic females (HF).

Methods: A total of 19 SG Hispanic female patients (average age 39) participated in the study. MPRAGE anatomical scans were acquired using a 3 T Siemens Skyra scanner before surgery and 1 year after SG. Cortical reconstruction and volumetric segmentation was performed with the Freesurfer image analysis suite, which is documented and freely available for download online (http://surfer.nmr.mgh.harvard.edu). This processing method includes motion correction and averaging, removal of non-brain tissue using a hybrid watershed/surface deformation procedure, segmentation of the subcortical white matter and deep gray matter volumetric structures including hippocampus, amygdala, caudate, putamen, ventricles.

Results: Our results indicate SG in Hispanic females results in the following structural changes: increased hippocampus, amygdala, cerebral white matter and cerebellar volumes.

Conclusions: Structural changes in hippocampus, amygdala, cerebral white matter and cerebellar volumes take place after SG. These changes may influence perceptions and relationships with food, body habitus, and feelings associated with eating.

Rapide fire session

RF005

The role of 68Ga-DOTATOC PET/CT in meningiomas and their extension post Proton therapy treatment.

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Meningiomas are often located in inaccessible sites and often cannot be completely resectable.

Proton therapy (PT) remains a valid option for tumor mass control. Diagnostic imaging is essential for the prognostic and therapeutic implications of these tumors. PET/CT evaluates the most active part of the tumor and can help in a non-invasive approach in the pre and post

treatment period, for diagnostic and prognostic purposes.

We retrospectively evaluated 22 patients (mean age 57; range 40-83 years) with recurrent meningiomas, (5 G1, 14 G2 and 3 G3), 13 females and 9 males, located in the area around the clivus or the cranial convexity, who underwent on PET-CT before and after PT treatment.

We performed 15 minutes of image acquisition one hour after injection of the

radiopharmaceutical 68Ga-DOTATOC. The volume of interest (VOI) was placed on all the disease sites, in the area of clivus, or in the area of convexity, including the tumor borders, and trying to exclude the pituitary gland. Non-parametric tests as (median test, Student's t-test, Kruskal-Wallis test, and Mann-Whitney test) have been performed in order to evaluate differences between the pre and post-treatment SUVmax and MTV values.

None of the tests applied demonstrated statistically significant differences in the SUVmax grading categories, G1 vs G2-G3. Even the difference between the SUV max before and after therapy did not show statistically significant differences (P = 0.548), with media value SUV max 17.01 vs. 18.29, and mediana SUVmax, 15.8 vs. 16.2. In contrast to this data, there was a significant difference in metabolic volume of the MTV tumor of 20%, especially for the G2 group, with a reduction in volume in cm^3 about 22% and media SUVmax, 54.5 vs. 42.9; mediana SUVmax 18 vs. 10.3.

The reduction of tumor volume makes us reflect on the importance of the post-treatment with 68Ga-DOTATOC PET/CT as a supplement to magnetic resonance imaging to have a complete overview of the effectiveness of the therapy. This data could help to confirm the diagnosis of residual

disease and influence subsequent treatment planning and follow-up.

Remembering PET/CT 68Ga-Dotatoc's very high sensitivity in identifying minimal disease residues, which MRI would struggle to find.

With no mention of the extremely high sensitivity of 68Ga-Dotatoc PET/CT in identifying minimal disease residuals that would be difficult to detect on MR.

Rapide fire session

RF006

Temporal Dynamics of Reward and Motor Network Reorganization After Stroke.

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Background: Stroke is a leading cause of acquired disability worldwide, with recovery heavily dependent on reorganizing cerebral networks and overcoming learning challenges. Although the benefits of behavioral rehabilitation are well established, the exact role of the brain's reward network and its potential link to motor learning in stroke survivors remains unclear.

Previous research suggests that recovery is strongly associated with the functionality of the cerebral reward network, which is often impaired in the early post-ischemic period (Wagner et al., 2023). The present study hypothesizes that the sensitivity and connectivity of the reward system after stroke are influenced by time. Furthermore, connectivity changes extend beyond the behavioral system to include the motor system. In addition, individual recovery of the reward network is expected to correlate with improvements in motor learning ability, highlighting the dynamic interaction between these systems in recovery after stroke.

Methods: A cohort study was conducted with 24 acute stroke patients. Participants were assessed at two time points: 2–7 days post-stroke and 3 months post-stroke. Reward system functionality was measured using the Monetary Incentive Delay Task, combined with magnetoencephalography for connectivity analysis. Motor learning was evaluated through the Sequence Reaction Task.

Results: Stroke survivors initially showed reduced reward sensitivity at the first post-stroke assessment, requiring greater incentives to achieve improvement. Analysis of changes in reward sensitivity between the first and second assessments, as well as connectivity changes and motor learning, is ongoing.

Conclusions: Establishing a connection between stroke, reward sensitivity, and motor learning ability provides valuable insights into why some stroke survivors face persistent challenges despite rehabilitation. To advance and optimize rehabilitation strategies, a deeper understanding of the recovery process of the reward system and the underlying neural mechanisms is essential.

Rapide fire session

RF007

Theragnosis with [177Lu]Lu-DOTA-TATE in Meningiomatosis.

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INTRODUCTION: Meningiomas are the most common extra-axial tumors and the most frequent primary tumors of the central nervous system. Surgery is the primary treatment, followed by radiotherapy. However, the presence of somatostatin receptors allows potential treatment with radionuclide-labeled peptides, such as [177Lu]Lu-DOTA-TATE. We present two female patients with cerebral meningiomas treated using this approach. Scintigraphy with [99mTc]Tc-EDDA-TRYCINE-HYNIC-TOC was performed in patient 1, and PET/CT with 68Ga-DOTATOC in patient 2 to confirm somatostatin receptor overexpression.

METHODS: Patient 1, a 54-year-old woman, was diagnosed with a WHO grade 2 sphenoid meningioma in 2004, followed by multiple surgeries and adjuvant radiotherapy. In December 2021, progression of lesions in the temporal and parietal regions was observed. After standard therapies failed, treatment with [177Lu]Lu-DOTA-TATE was initiated. Four doses were administered between February and August 2022. Patient 2, with disseminated cerebral meningiomatosis, was not a candidate for surgery, and the meningiomas showed sustained growth on MRI. Two doses of treatment were administered, after which the patient discontinued therapy. Radiological response, quality of life, and adverse effects were assessed.

RESULTS: Patient 1 showed radiological stability on MRI for 12 months, with improvement in quality of life and self-care. Patient 2 reported no adverse effects, but other parameters could not be assessed.

CONCLUSIONS: [177Lu]Lu-DOTA-TATE remains an investigational therapy for meningiomatosis. In our patients, no significant adverse effects were observed, and the patient who completed treatment experienced symptomatic improvement for 12 months.

Rapide fire session

RF008

MRI Findings of Internal Carotid Artery Signal Loss in Advanced Moya Moya Disease (Stages 3-4): Evidence of Diffuse Intracranial Vasculopathy.

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INTRODUCTION: Moya Moya disease (MMD) is a progressive cerebrovascular disorder characterized by stenosis and occlusion of the internal carotid arteries (ICAs) and their branches. The classification of MMD into different stages, particularly stages 3 and 4 according to Suzuki, indicates advanced disease with severe vessel involvement. Stage 3-4 MMD is associated with significant ischemic complications and poor prognosis. MRI findings play a crucial role in assessing the extent of vasculopathy, with particular attention to the absence of signal in the internal carotid artery (ICA), which reflects diffuse intracranial arterial involvement.

METHODS: In this study, we evaluated a cohort of patients diagnosed with Moya Moya disease, focusing on those in stages 3 and 4 according to Suzuki's grading system. We performed magnetic resonance imaging (MRI) with high-resolution angiography to assess the status of the internal carotid arteries and intracranial vasculature. The presence or absence of signal in the ICA was carefully analyzed and correlated with clinical outcomes.

RESULTS: MRI analysis revealed a significant absence of signal in the internal carotid arteries in patients with stage 3 and 4 Moya Moya disease. This absence suggests complete or near-complete occlusion of the ICA, with compensatory collateral circulation through the circle of Willis. Additionally, diffuse vasculopathy was observed in the intracranial arteries, characterized by narrowing, irregularities, and stenosis of the middle cerebral artery (MCA) and other distal branches, consistent with advanced MMD.

CONCLUSIONS: The absence of signal in the internal carotid arteries on MRI in patients with stage 3 and 4 Moya Moya disease signifies advanced vascular involvement and is a strong indicator of severe intracranial vasculopathy. This finding is essential for evaluating the progression of the disease and guiding treatment strategies. Further research is needed to understand the precise mechanisms underlying this advanced stage of the disease and to develop targeted therapeutic interventions.

Rapide fire session

RF009

Neuroimaging in Long COVID: A Scoping Review of Current Trends and Future Directions.

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PhD in medical imaging

Introduction: Long COVID, characterized by persistent symptoms after acute SARS-CoV-2 infection, often involves neurocognitive impairments such as brain fog, memory loss, and fatigue. Neuroimaging techniques, including positron emission tomography (PET) and magnetic resonance imaging (MRI), have become critical for investigating underlying physiological changes. PET studies provide insights into brain metabolism, while advanced MRI techniques such as diffusion tensor imaging (DTI) and functional MRI (fMRI) reveal structural and connectivity changes. This comprehensive review consolidates current knowledge and identifies future research priorities in this field.

Methodology: A structured search of PubMed, Scopus, and Web of Science (2020–2024) identified 45 studies, of which 30 met the inclusion criteria of presenting imaging findings in adult Long COVID patients. Data on imaging modalities, study design, sample demographics, and key findings were extracted and analyzed.

Results: Among the 30 studies, PET and structural MRI were the most frequently utilized modalities. PET studies revealed regional hypometabolism, particularly in the frontal and temporal lobes, correlating with cognitive dysfunction. MRI findings indicated changes in brain volume and connectivity, though advanced techniques such as DTI and fMRI were underutilized. Combining PET with advanced MRI techniques could offer complementary insights into structural-functional relationships in Long COVID. However, variability in patient cohorts, imaging protocols, and reported outcomes hindered comparability across studies.

Conclusion: Neuroimaging has provided valuable insights into the impacts of Long COVID on brain structures and functions. Standardized protocols and multimodal approaches integrating PET with advanced MRI techniques are essential to improving research comparability and diagnostic utility. Future research should prioritize longitudinal studies that track patients' recovery, integrating imaging protocols with clinical and molecular biomarkers and leveraging advanced modalities to uncover subtle brain changes associated with Long COVID.

Rapide fire session

RF010

Brain 18FDG-PET link to 123I-MIBG cardiac washout in movement disorders: a pilot study.

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Introduction: Cardiac denervation may manifest several years prior to the onset of motor symptoms in some movement disorders such as Parkinson's disease, yet its underlying mechanism remains unclear. This study aimed to examine the relationship between brain metabolism and cardiac denervation within the framework of movement disorders.

Methods: Four patients underwent both a brain PET scan using 18F-FDG and a myocardial innervation scintigraphy with 123I-MIBG. 18F-FDG were spatially normalized and to the whole brain activity. On the other hand, 123I-MIBG washout rates were calculated using early and late myocardial uptake. Multiple regression analysis between brain 18F -FDG uptake and 123I-MIBG cardiac washout values was performed using SPM12.

Results: Two patients were diagnosed with Parkinson's disease, one with atypical essential tremor and the remaining with Lewy body dementia. SPM results showed a negative correlation between 18F-FDG PET and 123I-MIBG scintigraphy in striatal regions ($r = -0.96$; $p = 0.04$), the cerebellum ($r = -0.98$; $p = 0.02$), and the pons ($r = -0.929$; $p = 0.074$).

Conclusion: Cardiac denervation appears to be correlated with hypometabolism in subregions of the brainstem, striatal nuclei, and cerebellum. Thus, brain metabolic alteration might drive cardiac denervation in movement disorders. Further validation of these findings through prospective trials is necessary.

Rapide fire session

RF011

High-throughput hardware event-builder architecture for 3-gamma imaging PET.

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In this paper, our objective is to contribute to the development of a new Positron Emission Tomography (PET) approach in order to reduce the impact on patients. PET is a diagnostic system based on a functional imaging technology. It employs radioactive substances called radio-tracers to visualize and measure changes in different metabolic processes. There is a constant push to reduce both the radioactive dose injected to the patient and the duration of a PET scan.

Achieving these and providing real time images require an innovative imagery principle. In this paper, we present our contribution to a new 3-photon gamma imaging, with the presentation of a high-throughput hardware event-builder architecture, and its integration in the final PET architecture named XEMIS 3.

Rapide fire session

RF012

On the stratification of individuals' EEG connectivity in the context of cognitive disorders.

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Introduction: Electroencephalography (EEG) analysis for dementia is mainly performed in the literature using statistical and supervised learning methods. Nevertheless, dementia diagnosis is still challenging due to heterogeneous phenotypes across patients. Therefore, we propose a data-driven approach with a clustering method to identify meaningful subgroups associated with EEG connectivity phenotypes.

Methods: The study involves clinical data of 32 patients with Subjective Cognitive Impairment (SCI), 46 patients with Alzheimer's Disease (AD) and 17 patients with Vascular Dementia (VaD). We estimate the connectivity in 8 regions (prefrontal, frontal left, central, frontal right, temporal left, parietal, temporal right and occipital), using Dynamic Time Warping (DTW). Compared to Phase Lag Index, we observed that DTW is more powerful because it takes into account both amplitude and phase strength between signals. Then, we generate five clusters of the individuals, described in 8 dimensions, using a hierarchical clustering. The clusters are ranked by decreasing connectivity.

Results: In all frequency bands, Cluster 5 (lowest connectivity) contains the majority of VaD patients (65%). Alpha 1 shows the highest Adjusted Rand Index indicating the relevance of the clustering in such band. Cluster 1 (highest connectivity) contains the majority of SCI (54%) and 33% of the AD patients. Clusters 2, 3 and 4 (three levels of moderate connectivity) contain mostly AD patients, with 40% of AD belonging to Cluster 2. Cluster 1 and Cluster 2 gather 82% of SCI patients.

Conclusions: Our DTW-based approach allows to stratify the population into meaningful profiles according to the individuals' EEG connectivity. AD patients show more disparate profiles than SCI and VaD. This suggests that AD patients are more heterogeneous regarding their EEG connectivity. Our work indicates that EEG could be a useful neuroimaging technique for a refined characterization of individuals, necessary in precision medicine.

Rapide fire session

RF013

Sacral Chordoma: Pathophysiology, Imaging Characteristics, and Treatment Challenges.

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INTRODUCTION: Chordoma is a rare malignant tumor arising from remnants of the notochord, most commonly affecting the sacrum. These tumors grow slowly but are locally invasive, often causing significant morbidity due to their proximity to vital structures, such as the rectum, bladder, and sacral nerve roots. Despite advances in imaging, achieving complete surgical resection remains challenging, and recurrence rates are high. Radiation therapy is often used as an adjunct, but its efficacy is limited.

METHODS: Diagnosis of sacral chordoma relies on imaging, with CT scans showing a lobulated mass with calcifications and MRI providing detailed soft tissue evaluation to assess local extension. Biopsy confirms the diagnosis, identifying characteristic physaliferous cells. Surgical resection is the mainstay of treatment but is complicated by local invasiveness. Adjuvant radiation therapy is sometimes used to reduce recurrence but with variable outcomes.

RESULTS: Sacral chordomas typically present as large, expansile masses, causing pain, neurological deficits, or dysfunction in nearby organs. Histologically, they consist of large, vacuolated cells arranged in lobules. Although slow-growing, these tumors are often advanced at diagnosis, complicating surgical removal. Recurrence is common, especially when resection is incomplete.

CONCLUSIONS: Sacral chordomas pose a significant treatment challenge due to their invasive nature and high recurrence rates. Advanced imaging plays a critical role in diagnosis and surgical planning, but complete resection remains difficult. Research into targeted therapies and novel treatments is essential to improve outcomes and reduce recurrence.

Rapide fire session

RF014

Validation of a brain-dedicated PET scanner for amyloid imaging.

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INTRODUCTION: With the advent of new anti-amyloid therapies, a considerable increase in brain PET studies is expected. Amyloid tracers make it possible to select candidates for therapy and evaluate their efficacy. Moreover, quantitative analysis of these images can improve diagnostic reliability and is essential for response assessment. The aim of this work is to compare the image quality and resolution of Siemens Biograph mCT (wbPET) vs PET dedicated to CareMiBrain (CMB) brain.

MATERIAL AND METHODS: Ten amyloid-PETs were included in this study, of which 7 were healthy controls without known neurological pathology and 3 patients with a definitive diagnosis of neurodegenerative disorder. An 18F-Florbetaben PET-CT was first performed on the Siemens wbPET machine 90 minutes after injection and consecutively after signing the informed consent on the dedicated CMB machine. PET images were normalized to 18F-florbetapir template and SUV-corrected in Pmod 4.1. Subsequently, image contrast was quantified using the centiloid cortex ROI and an ROI manually drawn in the white matter. In addition, centiloid was calculated for each image applying the following formula: (153.4*ratio cortex/cerebellum)-154.9. The results were compared using the Student's t-test.

RESULTS: The white matter-to-cortex ratio shows a similar contrast between both systems (1.53 vs. 1.53, p = 0.94). However, centiloid calculation shows expected values in Siemens images (controls: [-27, -1]; patient: [59, 93]), whereas a higher variability is observed in CMB images with values not corresponding to the centiloid scale (controls: [-12, 35]; patients: [99, 523]).

CONCLUSIONS: Image quality on the brain-dedicated PET is sufficient for clinical diagnosis with contrast similar to our reference equipment (Siemens). However, the centiloid calculated with CMB images is overestimated, probably due to underestimation of the reference region because of its proximity to the field-of-view limits.

Rapide fire session

RF015

Dynamic FDG-PET Demonstrates Higher Sensitivity Than Static Acquisition in Patients with Mild Cognitive Impairment.

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Background: FDG-PET has gained attention in the last years as a tool for early diagnosis of neurodegenerative diseases. To this aim, a standard static scan is performed. However, dynamic acquisitions have previously proven higher sensitivity in preclinical studies. This study aims to compare static and dynamic FDG acquisitions value for diagnose of neurodegenerative diseases in a clinical setting.

Methods: 12 patients with cognitive impairment were subjected to a 30-min dynamic FDG acquisition immediately followed by a 10-min static study (standard protocol). FDG uptake (SUVR) and kinetic parameters (Ki and MRGlu) were calculated for each patient and normalized to whole brain values using Pmod software. Then, normalized values were compared to our control population and hypometabolic regions were identified (at least 2 standard deviations).

Results: Both, static and dynamic scans showed at least one hypometabolic region in all the patients. However, kinetic analysis showed a greater number of hypometabolic areas compared to static standard analysis (155 vs 108 regions in 12 patients).

Discussion: In this pilot study, dynamic acquisition and kinetics analysis showed higher sensitivity to hypometabolic regions than the standard protocol in nuclear medicine. Thus, dynamic studies might enable earlier dementia diagnosis.

Rapide fire session

RF016

The soft signs : analysis of basal ganglia, thalamus and cerebellum glycolytic metabolism in epilepsy patients.

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Introduction: [18F]FDG PET is used in the pre-surgical assessment of patients with focal drug-resistant epilepsy to localize the epileptogenic zone (EZ). The visual evaluation relies on cortical metabolism but structures such as the basal ganglia, thalamus, and cerebellum are also involved in epileptic network. The study aimed to determine their localizing and prognostic values.

Methods: Retrospective study including 130 patients operated for drug-resistant focal epilepsy with a presurgical [18F]FDG PET. Standardized visual analysis was performed by two readers and the discordances were reviewed by a third one. We analyzed the concordance between 1) regional asymmetries and localization of the EZ, 2) regional asymmetries and the surgical outcome (Engel score), among all patients and according to 2 subgroups (TLE and ETLE).

Results: 130 patients, age 41±11.3 years (median), median age at onset 14 years, median time to surgery 17 years and follow-up time of 51 months. 94/130 patients (72%) had temporal lobe epilepsy (TLE) and 36/130 (28%) extra-temporal lobe epilepsy (ETLE). The Engel score at last follow-up was 1 in 88/130 (68%). Thalamic hypometabolism was ipsilateral to the epileptic zone (EZ) in 84% of the patients (p=0.63), for the caudate hypometabolism it was 66% (p=0.15), for the putaminal hypometabolism it was 66% (p=0.271). The cerebellar cortex hypometabolism was contralateral to the epileptic zona in 79% of the patients in the whole group (p=0.037). Results were similar in the TLE and ETLE subgroups analysis. Neither thalamic, caudate, putaminal or cerebellum asymmetries was associated with the surgical outcome.

Conclusions: Hypometabolism of the basal ganglia, the thalamus, and cerebellum in epileptic patients could support the EZ localization. Their prognostic value is still to be studied.