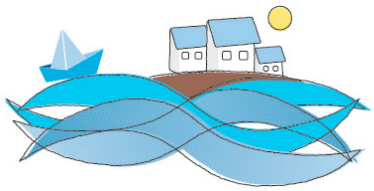

Mediterranean Thematic Workshops in Advanced Molecular Imaging

Contribution ID: **45** Type: **Oral**

Metabolic brain networks in neurodegenerative dementias

Wednesday 7 September 2022 10:45 (15 minutes)

Neurodegenerative dementias are a group of slowly progressing neurological disorders with the most common being dementia due to Alzheimer's disease (AD) and dementia with Lewy bodies (DLB). Despite different main pathology and symptoms, there can be a substantial overlap in concomitant pathology and clinical presentation and misdiagnosis is not uncommon even at specialized dementia clinics. Metabolic brain imaging with 2-[18F]fluoro-2-deoxy-D-glucose positron emission tomography (FDG PET) is an imaging technique that provides in vivo information about synaptic (dys)function. The latter arises due to accumulation of abnormally folded proteins and precedes neuronal death. Application of multivariate approaches to FDG PET analysis have enabled identification and validation of disease-specific metabolic patterns, which expression can be prospectively quantified. Using clinical and imaging data from over 500 participants from different centres, we identified, validated and explored diagnostic and prognostic values of disease-related metabolic brain patterns. AD-related pattern (ADRP) is characterized by reduced metabolic activity in temporoparietal regions and precuneus with co-varying increased metabolic activity in the cerebellum, pons and sensorimotor cortex. Pattern expression scores can differentiate between AD and healthy controls, they correlate with measures of cognitive impairment, increase linearly with time and predict progression from mild cognitive impairment to dementia. DLB-related pattern (DLBRP) is characterized by reduced metabolic activity in occipital, parietal and temporal cortices and precuneus with co-varying increased metabolic activity in basal ganglia, medial temporal lobe, cerebellum and pons. Pattern expression scores can differentiate between DLB and healthy controls, they correlate with measures of cognitive impairment and survival time. Furthermore, after accounting for topographic overlap between ADRP and DLBRP, we can accurately differentiate between AD and DLB patients. Lastly, we recently showed that a differential algorithm based on pattern expression scores and machine learning can achieve similar sensitivity and specificity to visual reading of an expert clinician.

Topic Selection

Brain Imaging

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Session Classification: Clinical/Accessibilty and data sharing

Track Classification: AI and large data sets