

[18F]FEPPA-PET/MRI Reveals an Association between Elevated Post-Acute Microglial Activity and Disrupted Microstructure in Cerebral White Matter within 6-Months Following Ischemic Stroke

Cerebral white matter (WM) injury after ischemic stroke is associated with post-stroke cognitive impairment (PSCI). Hybrid PET/MRI can shed insight into pathophysiological mechanisms linking chronic extralesional neuroinflammation, ischemic WM injury, and PSCI. This study used hybrid PET/MRI to investigate the relationship between [18F]FEPPA standardized uptake value ratio (SUVr) measurements of post-acute microglial activity and diffusion tensor imaging (DTI) measurements of microstructure integrity in brain WM regions at 6-months post-stroke. [18F]FEPPA-PET, DTI, and T2-weighted FLAIR were acquired at 6-months post-stroke in 16 elderly humans using hybrid PET/3T MRI. Infarcts and WM hyperintensities were manually segmented on FLAIR by neuroradiologists and excluded from the imaging analysis. Pearson correlation was used to assess the association between [18F]FEPPA-SUVr and DTI measurements in WM regions commonly implicated in PSCI. [18F]FEPPA-SUVr was elevated in brain regions ipsilateral to the infarct and these increases in SUVr were correlated with decreases in fractional anisotropy in several WM regions linked to PSCI. Hybrid PET/MRI is a valuable tool for probing post-acute changes in cerebral WM pathways following ischemic stroke. Future work will use advanced WM lesion quantification in a larger stroke cohort including cognitive assessments to further characterize post-acute alterations in WM microstructure, associations with chronic neuroinflammation and PSCI.

Field

Systems and applications

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