Composite SUVR: a new method for boosting Alzheimer's disease monitoring and diagnostic performance, applied to tau PET

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PET signal ratio of data-driven composite-regions improves on stability of measurements over time, and better differentiates cognitive groups

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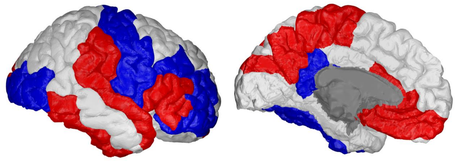
Abnormal tau protein accumulation in the brain is strongly linked to a multitude of neurodegenerative disorders including Alzheimer's Disease (AD), the most prevalent of the dementias.

An in vivo method for precise and robust location and quantification of tangles is absolutely essential for early and accurate diagnosis, disease monitoring, and prognosis.

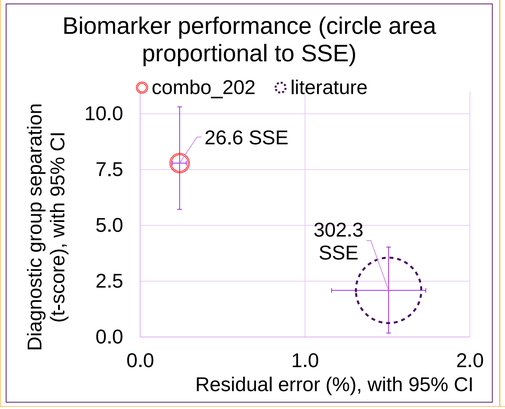
PET scans are used with tau-targeting radiotracers. Usually, regional or whole brain signal is assessed with respect to a reference region. However, it displays an erratic behaviour over time, even for cognitively unimpaired individuals.

A total of 91 individuals from ADNI are chosen: 58 cognitively normal (CN), 20 mild cognitive impairment (MCI) and 13 Dementia, from 35 different testing sites. All have 3 tau-PET scans (AV-1541) ~1 year apart.

Different combinations of regions are assessed for longitudinal stability (residual of a linear mixed effects model) and group separation (t-statistic as the contribution to the slope of being not CN.



Compared with the best performing combination of target and reference regions found in the literature, the exploration discovered combination of regions with improved metrics.



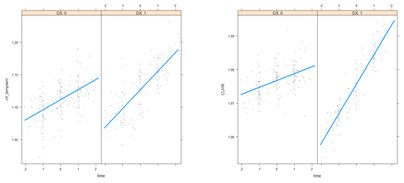
Relative tau-PET signal of composite brain regions can potentially be a biomarker with better longitudinal stability, achieving more linear results.

Additionally, the sample size estimate for a hypothetical clinical trial could be critically reduced.

This new approach to find useful composite regions could be extended to other data modalities, even with a multimodal approach.

Additional data and an analysis of the regions involved is key to validating the findings.

C. G. Schwarz et al., 2021



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