DOI: 10.1002/alz.042182

BIOMARKERS

POSTER PRESENTATIONS

Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

Neuroimaging / Normal brain aging

Neural-cognitive changes across the lifespan: Evidence from reference ability neural network (RANN)

Georgette Argiris | Yaakov Stern | Christian Habeck

Columbia University, New York, NY, USA

Correspondence
Georgette Argiris, Columbia University, New York, NY, USA.
Email: gla2116@cumc.columbia.edu

Abstract

Background: Cognitive functions and their underlying neural substrates change across the lifespan (for a review, see Grady et al., 2012). In an attempt to capture these changes, most prior work utilizing a cross-sectional approach have investigated age-group differences in behavioral performance or neural activations related to particular functions. In the present study, we aimed to quantify neural changes in the brain associated with four principal cognitive domains by considering age as a continuous factor and linking regions displaying the greatest change in each domain with behavioral performance.

Method: We collected behavioral and fMRI data from 240 cognitively-healthy community-dwelling adults between the ages of 21 and 80 on a battery of tests relating to the four domains or "reference abilities" (i.e., Episodic Memory, Fluid Reasoning, Processing Speed, Vocabulary; see Stern et al., 2014). We applied a Gaussian kernel, centered on each year of life in our sample, in order to generate weights that would allow us to construct a brain map for each target age, derived from the weighted activations across all participants (Ericsson et al., 2008). Subsequent subtraction of these maps allowed us to quantify the age-related differences, Δ=T(age) - T(age+1), in each domain.

Result: Results indicated significant differences between successive ages around 40 years of age in two of the four domains: Fluid Reasoning and Processing Speed. Furthermore, for each domain, we selected those voxels for which change was the greatest and performed correlations between voxel activations and behavioral performance. For Episodic Memory, we observed significant positive correlations between behavior and activation namely in the bilateral rolandic operculum, thalamus, right postcentral gyrus, and left supramarginal gyrus, whereas for Processing Speed, we observed significant negative correlations largely in the supplementary motor area, left postcentral gyrus, right precentral gyrus, and cerebellum crus VI.

Conclusion: These findings emphasize the utility of analyzing lifespan changes along a continuum and reveal significant differences, suggesting a significant peak change, that is similar across domains.