

The SuperAging Research Initiative: A multisite consortium focused on identifying factors promoting extraordinary cognitive aging

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Abstract

Background: The designation of SuperAger is reserved for individuals age 80+ who have episodic memory capacity that would be considered at least average for those 2-3 decades younger. The presence of such outliers raises questions of fundamental importance to the neurobiology of brain aging. Have these superior memory performers resisted age-related changes, or have they simply started from a much higher baseline? Do they have identifiable peculiarities of genetic background? Is there something special about their brain structure or perhaps their resistance to age-related processes such as neurofibrillary degeneration and amyloid deposition? These are the questions that were initially addressed by the Northwestern SuperAging Project, which identified unique results encompassing cognitive, psychosocial, molecular, and neuropathologic markers that characterize SuperAgers. Obstacles to further progress have been the relative rarity of this phenotype and, consequently, the barriers to racial diversity in the cohort.

Methods: To address these challenges, we established the SuperAging Research Initiative, a multicenter study focused on increased minority representation, to identify behavioral, health, biologic, genetic, environmental, socioeconomic, psychosocial, neuroanatomic, and neuropathologic factors associated with SuperAging.

Results: Here we provide the organizational structure and progress to date of the SuperAging Research Initiative, which includes three Cores (Administrative/Biostatistics, Clinical/Imaging, and Biospecimen/Neuropathology) and two Research Projects. Enrollment (n = 500) is planned across four US Sites located in Illinois, Wisconsin, Michigan, and Georgia, and a Canadian Site in Southwest Ontario, with a focus on enrollment of Black SuperAgers and Cognitively Average Elderly Controls with similar demographics. **Project 1** uses state-of-the-art wearable technology to obtain quantitative everyday measurements of life sleep, physical activity, autonomic responsivity, and social engagement to determine whether SuperAgers have

relatively preserved physiologic and behavioral 'complexity' compared to Controls.

Project 2 focuses on transcriptomic, genetic, and protein profiling to examine central and peripheral immune and inflammatory system parameters of SuperAgers.

Conclusions: By identifying factors contributing to superior memory performance in old age, outcomes may help isolate modifiable factors that promote healthspan and perhaps also prevent age-related brain diseases such as Alzheimer's disease.