EPIGENETICS OF BRAIN AGING AND COGNITIVE DECLINE

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Gene expression in the aging brain depends on transcription signals generated by senescent physiology, interacting with genetic and epigenetic programs. In turn, environmental factors influence epigenetic mechanisms, such that an epigenetic–environmental link may contribute to the accumulation of cellular damage, susceptibility or resilience to stressors, and variability in the trajectory of age-related cognitive decline. I will highlight DNA methylation as an epigenetic mechanism for gene regulation, distinguishing methylation sites (CpG, non-CpG, promoters and gene bodies). Examples will illustrate how DNA methylation can maintain neuronal integrity across the lifespan and stabilize gene expression associated with the maintenance of memory. However, with advancing age, this same process may interact with senescent physiology to limit plasticity, contributing to a loss in resiliency and cognitive decline.

Supported by NIH R01AG037984, R37AG036800, R01AG052258, R01AG049711 and the McKnight Brain Research Foundation

Keywords: Epigenetics, DNA methylation, memory, aging