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Cross-Sectional Brain Volumetrics in the Rhesus Macaque: Effects of Age and Sex

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Keywords

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Abstract

The number of US individuals affected by dementia is expected to rise significantly during the next decade, as the age of the population continues to increase. Unfortunately, the underlying causes of dementia are poorly understood and currently there are no effective therapies. Furthermore, the prevalence of dementia is higher in women than in men, yet the cause of this sex difference is unclear. To help shed light on underlying causal mechanisms of dementia there is a great need for the development of appropriate animal models. To this end, we evaluated the rhesus macaque as a model of human aging by performing cross-sectional T1-weighted structural MRI brain scans of male and female animals across a wide age range. Our goal was to assess volumetric differences due to sex and age (N=74; 37 males, aged 5-29 years, 37 females aged 6-32 years). Using the INIA19 template, we assessed a number of brain regions functionally related to cognition and memory and which decline with age, including the prefrontal cortex and hippocampus, along with other regions of interest. Volumes were all normalized to total brain volume to allow for comparison between animals of varying size due to gender and individual differences. To date this is the most comprehensive dataset prepared of in vivo rhesus macaque brain volumes and will provide novel insight into the changes occurring in the macaque brain during aging, with a focus on differences due to biological sex. By observing these changes in macaques and comparing them to those observed in humans we will determine the value of the rhesus macaque as a comparative model of aging in humans.