The Role of Age and Gender in Caudate Nucleus Volume Change
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The caudate nucleus is a subcortical gray matter structure that is a part of the basal ganglia and plays a role in motor function, associative and procedural learning, as well as inhibitory control. There is converging evidence that the size of the caudate nucleus (i.e., volume) decreases with age. However, the degree to which the caudate nucleus volume changes over time is unclear. For example, one longitudinal study showed that the caudate shrinks 0.83% annually in a sample of adults examined over a five year period (Time1: Age M=52, range=20-77; Time 2: Age M=57, range=25-82). Two cross-sectional studies also showed significant differences in caudate volume between young (Age M=27, range=15-39) and older adults (Age M=52, range=41-65), with one reporting a 5% difference. However, some studies that examine age-related changes in caudate volume are limited by small samples, measurement techniques that could be biased in their volume estimates as they rely on measuring only a subset of the structure, and restricted age ranges. Therefore, one goal of the current study is to document the degree of volume change of the caudate nucleus across the life-span, in a large sample (estimated N>100) of neurotypical individuals ranging in age from 17 to 60 years of age. Furthermore, there are conflicting findings about how gender interacts with age in terms of subcortical gray matter volume change, with one study showing greater change for male than female brains, but another showing no difference in the degree of change between males and females. As such, whether gender interacts with age will also be examined. Our hypothesis is that the volume of the caudate nucleus will decrease with age. Further, we will test whether there is a statistically significant interaction between gender and age with regard to predicting volume change. We will use brain images obtained through structural Magnetic Resonance Imaging (MRI) and analyze them with the FreeSurfer software suite, which employs an automated region-of-interest based technique to capture caudate nucleus volumes. We will use hierarchical regression to address the study's aims. Implications of these findings for structural and functional neuroimaging research will be discussed.