

Comparison of striatal longitudinal changes in amyloid deposition in non-demented elderly and Down syndrome

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Down syndrome (DS) predisposes individuals to early Alzheimer's disease (AD) and, using [¹¹C]PiB, a pattern of striatal amyloid (Ab) that is elevated relative to neocortical binding has been reported, similar to that of non-demented autosomal dominant AD mutation carriers. However, it is not known if change in striatal [¹¹C]PiB over time differs in a non-demented DS population when compared to change in a non-demented elderly (NDE) population.

Objective: To assess longitudinal changes in trajectories of Ab in a non-demented DS compared to an NDE cohort.

Methods: NDE (n=100, age=75 (6)) and DS (n=83, age=38(7)) who underwent [¹¹C]PiB -PET at baseline and over 2-5 years were included. The regional trajectories for striatum (AVS), frontal cortex (FRC) and precuneus (PRC) [¹¹C]PiB SUVR 50-70 (cerebellum reference, non-partial volume corrected) were explored over time using linear mixed effects models with fixed effects of time, cohort and time-by-cohort interactions and subject as random effect.

Results: Significant differences between DS and NDE cohort trajectories for all ROIs were observed (p<0.05), with DS showing a faster trajectory of accumulation in AVS compared to NDE as opposed to a slower trajectory of accumulation in FRC and PRC. The differences in amyloid deposition trajectories over time between DS and NDE were as follows (AVS: 0.15, 95%CI (0.03,0.28), FRC: -0.17, 95% CI (-0.27, -0.07), PRC -0.08, 95% CI (-0.18, 0.03)).

Discussion: DS and NDE participants differed significantly in longitudinal change in [¹¹C]PiB in both AVS and neocortical ROIs, with faster accumulation of Ab in DS relative to NDE in AVS and slower accumulation in neocortical regions. These data suggest that in addition to the previously reported distinct pattern of early striatal deposition not commonly seen in late onset AD, individuals with DS may also accumulate Ab at a rate faster in AVS than that seen in late onset disease.

Keywords: down syndrome, amyloid rates, normal aging amyloid deposition