

Hippocampal and Amygdalal Brain Changes in Young-Old and Very-Old with Alzheimer's Disease: Associations with Neuropsychological Functioning

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Background: Structural and functional decline associated with normal aging has led some investigators to suggest that less Alzheimer's disease (AD) pathology may be needed to produce pathologic cognitive decline in the Very-Old compared to the Young-Old (Terry et al., 1999). Bondi et al. (2003) recently reported that, when AD patients are compared to their age-appropriate control groups, the profile of neuropsychological deficits associated with AD in the Very-Old is less severe from that in the Young-Old. **Objective:** To assess possible interactions between age and disease on structural decline, we examined volumes of structures affected early in AD: the hippocampus and the amygdala. **Method:** Seventy-six individuals were assigned to one of four groups based on age and diagnosis: (1) Young-Old NC and AD groups included individuals ages 70 or younger, and (2) Very-Old AD and NC groups comprised of individuals ages 75 or greater. **Results:** The two AD groups significantly differed on raw volumes and their respective age-corrected z-scores for both the hippocampus ($p = .004$) and the amygdala ($p = .031$); Very-Old AD demonstrated significantly more atrophy (mean hippocampus z-score = -2.08 ; mean amygdala z-score = -1.92) relative to Young-Old AD (mean hippocampus z-score = -1.18 ; mean amygdala z-score = -1.32). However, these findings differed from their neuropsychological performances. Specifically, we found that the two AD groups significantly differed on their age-corrected z-scores on tests of memory (all $ps < .001$) in the opposite direction, with Very-Old AD performing significantly better than Young-Old AD relative to their age-appropriate normal control groups, despite significantly greater atrophy relative to their control group. **Conclusions:** Results suggest future research is needed to refine the pattern of deficits expected in the Very-Old and to validate such deficits with imaging techniques. In addition, these results do not support the hypothesis that less AD pathology is needed to evince comparable cognitive deficits in the Very-Old compared to the Young-Old. However, future volumetric studies should further assess this question in other neocortical association areas.

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Demographics				
	<u>Young-Old NC</u>	<u>Very-Old NC</u>	<u>Young-Old AD</u>	<u>Very-Old AD</u>
<i>n</i>	15	18	16	27
Age	60.40 (6.94)	78.61 (3.17)	64.31 (4.98)	78.19 (2.27)
Education	14.80 (2.62)	15.33 (3.50)	14.88 (2.50)	13.30 (3.98)
DRS Total Score	140.00 (3.19)	140.53 (2.35)	109.75 (17.14)	108.36 (17.09)