

# Neuropathology in Typical Aging and Dementia

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## BRIEF REPORT

Alzheimer's disease (AD), Dementia with Lewy Bodies (DLB) is the second most prevalent form of neurodegenerative dementia; however, many individuals with DLB also have AD pathology. Imaging indicators that anticipate the contribution of Alzheimer's disease to the dementia state in DLB may be useful in making treatment decisions and monitoring response to therapies targeting disease-specific pathology. The pathologic diagnosis of DLB is done using both AD and Lewy body (LB) pathologies, according to the Third Report of the DLB Consortium criteria. Patients with limbic LBs, for example, are classified as high probability DLB if they have low likelihood AD, but as low likelihood DLB if they have high likelihood AD. As a result, identifying AD and LB pathology in vivo is important for DLB differential diagnosis.

Hippocampal atrophy on MRI is linked to neurofibrillary tangle (NFT) pathology in Alzheimer's disease. DLB is often distinguished by normal hippocampus volumes on MRI and intact hippocampal neurons at post-mortem. DLB has also been linked to a decrease in dorsal mesopontine grey matter (GM) and amygdala volume. These findings, however, were confined to patients with a clinical or pathologic diagnosis of DLB and did not include patients with mixed AD and LB pathology. In the population, AD is frequently coexisting with LB disease, which serves as the conceptual basis for the present DLB diagnostic criteria. Our objective was to determine whether MRI measures of focal atrophy are associated with the neuropathological classification of DLB.

The topographic distribution of Alzheimer's type disease, particularly neurofibrillary degeneration, is considered to proceed in a predictable pattern. It begins in the medial temporal limbic regions,

then spreads to the neocortical association areas, and finally affects the main neocortex. Some researchers have developed a mechanism for staging AD pathology, and this topographic staging approach has been integrated into the National Institute on Aging's and the Reagan Institute Working Group's recent consensus guidelines for the post-mortem diagnosis of AD. Although pathologic alterations in Alzheimer's disease begin in the medial temporal lobe, researchers have turned to imaging technologies focusing on this part of the brain for early detection and characterization of the disease. MRI-based volume measurements of the hippocampus have become a widely established technique. The hippocampus is one of the first medial temporal limbic structures to be implicated in Alzheimer's disease, and its borders are accurately and consistently defined in all three orthogonal anatomic planes. This allows for accurate volume measurements of the hippocampus atrophy associated with Alzheimer's disease.

Hippocampal atrophy measured by MRI correlates with both functional markers of AD severity and performance on formal neuropsychological testing instruments, particularly those focusing on memory. Both clinical symptoms of Alzheimer's disease and MRI measures of hippocampal shrinkage are thought to be affected by the illness's underlying pathologic stage. However, post-mortem verification of the hypothesised connections between pathologic stage, imaging evaluation of pathologic stage, and clinical symptom severity has been limited. Furthermore, most investigations of diagnostic imaging sensitivity and specificity have used clinical diagnoses as the "gold standard" against which imaging data are evaluated. There is no research comparing the diagnostic specificity of imaging techniques for Alzheimer's disease to other dementing diseases using pathologic criteria as the gold standard.

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