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# Effects of curcumin on the hyperphosphorylated tau protein and microtubule associated-protein 2 in Alzheimer's disease

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Neurofibrillary tangles (NFTs) are aggregates of paired helical filament tau (PHF-tau) that are most commonly known as a marker of Alzheimer's disease (AD). However, little is known about PHF-tau relationship to the microtubule associated-protein 2 (MAP2). Due to the structural similarity of tau and MAP2, and a large amount of serine and threonine phosphorylation sites they contain, they not only have the common protein kinase, but they have a common phosphate enzyme PP-2A. In present study, we detected the relative quantification, location and proportion of PHF-tau and MAP2 in the brain specimens of AD patients. We found that the tau phosphorylation at serine 202 and threonine 205 was significantly increased in hippocampal and cortex of the brain, and the PHF-tau accumulation was always accompanied by a decrease of MAP2. The exact relationship between PHF-tau and MAP2 was confirmed with the quantitative examination. Curcumin can be as a treatment drug for AD, and can be used as fluorescent protein stain. We detected an accurate colocalization of curcumin and P-tau and MAP2 in the brain sections of AD patients, implying that curcumin could specially combine with the PHF-tau and MAP2. We confirmed that curcumin might up-regulate MAP2 level after Aβ exposure, and suppress the Aβ-induced tau hyperphosphorylation *in vitro*. Therefore, curcumin can be considered as a specific therapeutic agent in the tauopathies of AD.

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