

Development and Validation of Cerebral White Matter Hyperintensity Probability map of Elderly Koreans

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Background and Purpose: Although previously constructed white matter hyperintensity(WMH) probability maps of healthy older adults exist, they have several limitations in representing the distribution of WMH in healthy older adults, especially Asian older adults. We developed and validated a WMH probability map (WPM) of healthy older Koreans and examined the age-associated differences of WMH.

Methods: We constructed WPM using development dataset that consisted of high-resolution 3D fluid-attenuated inversion recovery images of 5 age groups (60–64 years, 65–69 years, 70–74 years, 75–79 years, and 80+ years). Each age group included 30 age-matched men and women each. We tested the validity of the WPM by comparing WMH ages estimated by the WPM and the chronological ages of 30 healthy controls, 30 hypertension patients, and 30 stroke patients.

Results: Older age groups showed a higher volume of WMH in both hemispheres ($p < 0.001$). About 90% of the WMH were located in periventricular space in all age groups. With advancing age, the peak of the distance histogram from the ventricular wall of the periventricular WMH shifted away from the ventricular wall, while that of deep WMH shifted toward the ventricular wall. The estimated WMH ages were comparable to the chronological ages in the healthy controls, while being higher than the chronological ages in hypertension and stroke patients.

Conclusions: The WPM may serve as a standard atlas in research on WMH of older adults, especially Asians.

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