Metabolic risks, white matter hyperintensities, and arterial stiffness in high-functioning healthy adults

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Arterial stiffness, an age-related feature and measured noninvasively by pulse wave velocity (PWV), is associated with a variety of cardiovascular diseases. Although white matter lesion (WML), representing cerebrovascular micro-angiopathy, is typically considered as a preclinical cardiovascular disease, little is know about the association between PWV and WML. The aim of this study is to examine the association between PWV and WML.

We examined the extent of white matter lesion on cranial magnetic resonance imaging of 93 participants (mean 72.46 years) from the annual Health Examination for the Elderly Program in the National Taiwan University Hospital. Two subtypes of WML including periventricular hyperintensity (PVH) and deep white matter hyperintensity (DWMH) were graded according to Fazekas et al. The brachial ankle PWV (baPWV) and heart-ankle PWV (haPWV) were measured using an automatic waveform analyzer.

PVH and DWHM were found in 71 (76%) and 58 (62%) participants. Various degree of WML was observed in 80 (86%) participants. Hypertension, use of anti-hypertensive medications, and elevated blood pressure were identified as risk factors of WML. The baPWV and haPWV were correlated with many metabolic risks, including systolic blood pressure, pulse pressure, and serum triglycerides. The baPWV and haPWV were greater in participants with higher grades of WML in the multivariate analyses. The receiver operating characteristics analyses demonstrated that area under curves for haPWV to identify moderate-to-severe PVH and DWMH were 0.78 (95% confidence interval [CI] 0.66?0.91) and 0.72 (95% CI 0.59?0.85), respectively.

Greater PWV is associated with higher grades of WML among high-functioning older adults. Our findings support the notionthat measurement of arterial stiffness is useful in clinical practice for detection of preclinical cerebrovascular disease.