

## PREFACE

## A new horizon of cerebral white matter hyperintensity in geriatric medicine

### Preface

The successful management of geriatric syndromes is the current most important challenge in Japan, a country with an ever-expanding super-aged society. Cognitive decline, falls, and urinary incontinence are geriatric symptoms that dramatically increase in elderly persons aged 75 and over. Regarding the etiology of these geriatric conditions, substantial concern has been raised in relation to cerebral white matter hyperintensity (WMH). WMH is prevalent in the aging brain and is recognized as one of the neuroimaging features of cerebral small vessel disease. Evidence of the clinical significance of WMH has accumulated in the last few decades, and it is now widely accepted as a risk for developing stroke, dementia and functional decline with limited prognosis.

The pathophysiological nature of WMH is not fully understood. However, to our knowledge, it largely originates from structural and functional changes of cerebral microvessels. Aging, hypertension, and smoking have been indicated as potential risks for WMH, while diabetes, dyslipidemia, inflammation, oxidative stress, and sleeping disorders may accelerate the development of WMH in the elderly. A preventive strategy for WMH by controlling these risk factors may contribute to the success of comprehensive treatment for several geriatric syndromes.

To date, understanding of WMH has expanded as MRI facilities have become widely available around the world. However, many questions still remain unanswered before physicians will be able to incorporate knowledge of WMH into routine clinical practice. For instance, even in the presence of considerable white matter changes found on MRI, clinical symptoms are not always observed. The exact reasons for this discrepancy need to be clarified. Second, physicians often have difficulty evaluating WMH because of inter-rater variability. Visual rating and computer-based volumetric measurement have been used, but both have several limitations. Third, we still need evidence from prospective intervention trials to establish a preventive strategy for the propagation of WMH.

This supplemental issue of *Geriatrics & Gerontology International* aims to systematically organize the recent

progress on the clinical relevance and risk factors for WMH. This issue is composed of five reviews and eight research articles. Tomimoto reviews the pathological mechanism underlying why the loss of integrity of nerve fibers in the white matter induces neuropsychological symptoms. Pantoni *et al.* review the main results of the Leukoaraiosis And DISability (LADIS) Study, a European multicenter study which contributed substantially to clarify the clinical significance of WMH. Saji *et al.* describe the relationship between arterial stiffness and WMH, and summarize the roles of WMH in Japanese elderly with cognitive decline. Nagai *et al.* and Tamura *et al.* review the impact of hypertension, particularly focusing on visit-to-visit blood pressure variability, and diabetes mellitus on cognitive impairment and cerebral microvascular injury, respectively.

“Volumetric analyses of cerebral white matter hyperintensity lesions on magnetic resonance imaging in a Japanese population undergoing medical check-up” by Honda *et al.* reports the age-associated growth patterns of WMH in Japanese people. Regarding risk factors for WMH, Nagai *et al.* reveal the correlation between serum eicosapentanoic acid / arachidonic acid ratio and severity of WMH. Hatanaka *et al.* investigate the impact of peripheral oxidative stress markers on cognitive function. Kokubo and Shimizu *et al.* demonstrate the association of nighttime blood pressure and left ventricular diastolic dysfunction with WMH. “Severity of white matter hyperintensities in elderly subjects of mid-eighties and its relationship with the hemodynamic and cardiac parameters” by Todoroki *et al.* demonstrates risks for WMH in individuals in their mid-eighties. Ogama *et al.* suggest a new visual-rating method for WMH analysis. Finally, Fukuyama *et al.* report the altered blood flow in cerebral perforating arteries of rodent models of diabetes using synchrotron radiation microangiography.

The editors expect that this supplement will help the readers of *Geriatrics & Gerontology International* to understand the clinical significance of WMH and to obtain some beneficial insights into the care of elderly with WMH.

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