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Editorial Open Access

White Matter and Disease: Does Brain have a Role in Initiating Diseases

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Editorial

The brain is composed of two parts according to matter content known as gray matter and white matter. While the gray matter is composed of nerve cells, nerve fibers and myelin are the constituents of the white matter [1].

Myelin is considered a crucial part of the white matter. Alterations in the myelin sheath leads to abnormalities of impulse conduction ending with disorders in the brain functions [2].

According to the study of Lin et al. [3] the location of white matter closed to the watershed area supplied by arterial blood makes it susceptible to ischemic damage. It has been indicated that ischemia in white matter to be associated with increased uptake of oxygen [4]. Several studies have suggested that hemodynamic changes are possibly involved in white matter ischemia [5,6].

Several studies reported that the lesions of white matter (WMLs) are considered as asymptomatic lesions [7,8]. There are two types of WMLs. The first type is deep subcortical white matter (DSWMH), while the second type is periventricular (PVH) hyper-intensities. From a clinical point of view, WMLs have the potential of escalating the risk of ischemic stroke, dementia, and death [9,10]. WMLs are associated with different risk factors such as age, hypertension, diabetes, chronic kidney disease, and carotid stenosis [11-13].

White matter disease plays a crucial role in modern medicine [14]. It has been associated with several diseases including stroke [15-17], vascular cognitive impairment [17,18] and dementia [19,20].

Recent studyby Shen et al. [21] indicated to an association between changes in the structure of white matter and depression.

From my past experience, I conducted a study and found functional alterations in white matter to play an important role in the pathology of white matter. We found that the expression of inducible nitric oxide synthase (iNOS) to have similar patterns under physiological conditions in both white matter and gray matter, but under diabetic conditions, a shift in the expression of iNOS was noted in white matter and we concluded that the expression of iNOS in white matter may explain both the progression of diabetes and the generation of diabetic neuropathies. We think that other molecular changes in white matter including decreased expression of heat shock protein (Hsp70) accompanied with increased expression of iNOS are both possibly involved in making other organs to be more likely to develop diseases [22].

Taken together, in modern medicine, much attention was given to gray matter on the account of white matter [23]. It seems that white matter disease plays important roles in developing diseases and further studies are required in both functional and structural levels. Therapeutic approaches targeting white matter may produce new treatment options for diseases.

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