We opened the gate to more accurate diagnosis and new treatment of Neuromyelitis optica (NMO), a disease resembling multiple sclerosis (MS)

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Neuromyelitis optica (NMO) is a chronic neurological disease, characterized by recurrent optic neuritis and myelitis, sometimes causing blindness, numbness and limb paralysis. Although NMO resembles MS in some aspects, drugs for MS do not work well in NMO. We have recently revealed that "*anti-interleukin 6 antibody*", a drug currently being used for rheumatoid arthritis, might be effective for treating NMO. Interleukin 6 (IL-6) is a substance that modulates inflammation and immune reactions. This work was released online in PNAS on Feb 14, 2011*.

****Chihara N, Aranami T, Sato W, Miyazaki Y, Miyake S, Okamoto T, Ogawa M, Toda T, and Yamamura T: Interleukin 6 signaling promotes anti-aquaporin 4 autoantibody production from plasmablasts in neuromyelitis optica. PNAS early edition; Feb 14, 2011***

NMO is now thought to be an autoimmune disorder, which is caused by circulating substance called autoantibody. Autoantibody in NMO would bind to the protein "*aquaporin 4*" expressed by neuronal cells called astrocytes. Once bound by the *aquaporin 4* antibody, astrocytes change the shape and functions, leading to serious damage of nervous structure. We have shown first that lymphocytes called "*plasmablasts*" are increased in the blood of NMO patients. We then confirmed that the *plasmablasts* are responsible for production of the *aquaporin 4* antibody having potentials to kill the astrocytes. When we added the anti-interleukin 6 antibody (anti-IL-6), the plasmablasts died more rapidly in test tubes and production of anti-aquaporin 4 antibody was suppressed, meaning that the treatment with the anti-IL-6 antibody may have some beneficial effects for patients with NMO.

It was previously thought that NMO and MS belong to the same disease category. However, more scientists now believe that NMO is substantially different from MS, since drugs effective for treating MS do not work well in NMO. Our work published in PNAS showed that *plasmablasts* producing pathogenic antibody are increased only in NMO, highlighting the uniqueness of NMO. Moreover, it predicts that a drug blocking the function of IL-6 (anti-IL-6 antibody) could be efficacious for NMO. We are now preparing for conducting clinical trial to verify the effect of anti-IL-6 antibody treatment for NMO with support from the Ministry of Health, Labour and Welfare.

We suggest that measuring anti-aquaporin 4 antibody, *plasmablast* number, and IL-6 in the blood is important for choosing proper treatment of people who may have multiple sclerosis (MS) or NMO. Only our MS Center is currently capable of treating patients based on the results of these important tests. If you are interested in consulting our medical team, please contact us by e-mail.

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