Influence of meningeal lymphatic vessels on brain mechanisms

Masashi Matsuoka¹, Yasue Mitsukura², Tomoe Ishikawa³, Masato Yasui³

¹Mitsukura lab., School of Integrated Design engineering, Graduate School of Science and Technology, Keio Univ., ²System Design Engineering, Department of Science and Engineering, Keio Univ., ³Department of Pharmacology School of Medicine, Keio Univ.

The central nervous system has been considered as an organ devoid of lymphatic vessels. Meningeal lymphatic vessels were discovered and it is thought that elucidating mechanism of these vessels contributes to the studies on neurodegenerative diseases such as Alzheimer’s disease and multiple sclerosis. Previous researches focused on material flow in the brain and excretion of proteins and immune cells. There are few researches directly investigating the relationship between the brain and meningeal lymphatic vessels. Our research focused on structure of brain cells and neural activities. Meningeal lymphatic vessels connect to the deep cervical lymph nodes (dcLNs). Ligating efferent lymphatic vessels of dcLNs lead to the reduction of cerebrospinal fluid (CSF) drainage. Electrocorticography (ECoG) was recorded for 8 weeks and glial cells and synapses were immunostained in mice 1, 4 and 8 weeks after ligation. Results showed that reducing lymphatic flow concerned neural activities.