Longitudinal intravital visualization of neurovascular unit (NVU) in mouse model

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ABSTRACT: Neurovascular unit (NVU) consists of endothelial cells, pericytes, astrocytes and neurons plays an important role in brain homeostatsis [1]. There are increasing evidence that many neurodegenertive disease patients have suffered abnormal neurovascular function and neuroinflammation [2]. However, it has not yet been clearly analyzed how NVU changes after the onset of inflammation over time. In this work, we newly established double transgenic mice using NG2-DsRed pericyte-reporter mouse and Aldh1l1-GFP astrocyte-reporter mouse. Additionally, with *in vivo* fluorescence labeling of brain endothelial cell with intravenous injection of fluorophore conjugated lectin or anti-CD31 antibody, we could successfully visualize cellular structure of NVU *in vivo*. Utilizing cranial imaging window method and a customized intravtial confocal microscopy system, we could observe cellular-level alteration of NVU for 2 months after the induction of neuroinflammation with neuro-toxic chemical, 3-nitropropionic acid (3-NP), or Rose Bengal-induced phototoxicity. Dynamic cellular-level changes in pericyte coverage, vascular diameter and astrocyte distirubution were quantitively monitored. The newly established imaging strategy of NVU can be useful approaches to further investigate cellular dynamics of NVU in various physiological or pathological conditions *in vivo.*

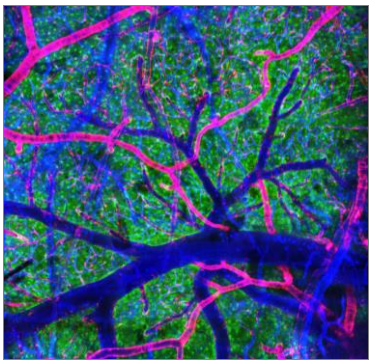

Figure. *In vivo* imaging of NVU (Maximal Intensity Projection. Green: Astrocytes, Red: Pericytes, Blue: Endothelial cells).

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