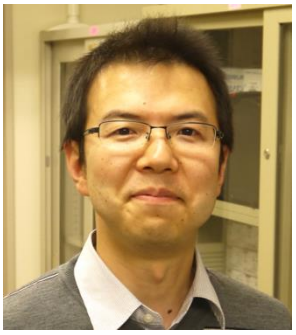
System Pathology for Neurological Disorders

Prof. Masaki Ueno, D.V.M., Ph.D.



Central nervous system (CNS) injuries due to stroke or trauma disrupt neural circuits and result in severe functional deficits. The brain and spinal cord have very limited capacity to reconstruct the circuits once it is damaged, and none of effective therapeutic methods have been developed so far. We previously demonstrated that spared motor and autonomic circuits are dynamically reorganized after injuries and influence the recovery process of functions. This suggests that controlling the rewiring of neural circuit would lead to make proper neuronal connections that achieve recovery. The goal of our study is to understand the process of rewiring and its underlying molecular mechanisms and neural functions. Our study will pave the way to develop novel strategies to regenerate neural circuits and restore functions.

Research interests

1. Regeneration and reorganization of neural circuits after stroke and spinal cord injury.
2. Neural circuit architecture and functions in the brain and spinal cord.
3. Brain-organ-immune interactions in CNS disorders.

Materials and methods for collaborations

1. Mouse models of stroke, brain and spinal cord injury.
2. Neural circuit labeling using viral tracers and genetically-modified mice.
3. Chemogenetic and optogenetic control of neural activities in specific neurons.
4. Kinematic analyses of motor behaviors.

Links to additional info

1. Ueno M, et al. Corticospinal circuits from the sensory and motor cortices differentially regulate skilled movements through distinct spinal interneurons. Cell Rep. 23(5): 1286-1300, 2018 . https://www.sciencedirect.com/science/article/pii/S2211124718305254?via%3Dihub
2. Ueno M, et al. Silencing spinal interneurons inhibits immune suppressive autonomic reflexes caused by spinal cord injury. Nat Neurosci. 19(6): 784-787, 2016. https://www.nature.com/articles/nn.4289
3. Ueno M, et al. Layer V cortical neurons require microglial support for survival during postnatal development. Nat Neurosci. 16(5): 543-551, 2013
4. Ueno M, et al. Intraspinal rewiring of the corticospinal tract requires target-derived BDNF and compensates lost function after brain injury. Brain. 135(4): 1253-1267, 2012.
5. Lab HP (English). http://www.bri.niigata-u.ac.jp/~system_neurodis/ueno/home-e.html