

In vivo longitudinal observation of intraepidermal nerve fibers in the toe of mouse
Jye-Chang Lee¹, Cheng-Tung Yen², and Chi-Kuang Sun^{1,3,4}

¹Department of Electrical Engineering and Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei, 10617, Taiwan

² Department of Life Science, National Taiwan University, Taipei, 10617, Taiwan

³Molecular Imaging Center & Graduate Institute of Biomedical Electronic and Bioinformatics, National Taiwan University, Taipei, 10617, Taiwan

⁴Institute of Physics & Research Center for Applied Sciences, Academia Sinica, Taipei, 11529, Taiwan

E-mail : 2jcleee@gmail.com

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ABSTRACT:

The advantages of two-photon microscopy, e.g., long light penetration, few light scattering, minimal phototoxicity, make it suitable for the in vivo observation on morphological details of intraepidermal nerve fibers and terminals. In this study, we demonstrate the feasibility of repetitive observation on the same group of fibers and terminals in the toe of the Nav1.8-tdTomato transgenic mice longitudinally. We apply the spare nerve injury model in which two sciatic nerve branches (tibial nerve and common peroneal nerve) were cut while the sural nerve was kept intact [1]. The sham treatment made skin incision, separated the thigh muscles while kept the sciatic nerve intact. In vivo two-photon microscopic observations revealed that the Nav1.8-tdTomato nerve fiber plexus forms a sheet beneath the stratum basale with terminal fibers emerged vertically and terminated into the epidermis. The penetration depth of the two-photon microscopic system can provide good quality image over 200 μ m. The depth covers the innervation range of the Nav1.8-tdTomato-expressed nerve fibers in the epidermis of the mouse toe. During the 42 days period of observation, dynamic changes associated with the spare nerve injury was revealed by analysis of the Nav1.8-tdTomato fluorescent and the second harmonic generation signals. This work is sponsored by MOST 103-2221-E-002-137-MY3, MOST 104-2745-B-002-001

Reference:

- [1] Decosterd, I. and C.J. Woolf, Spared nerve injury: an animal model of persistent peripheral neuropathic pain. *Pain*, 2000. **87**(2): p. 149-158.