osIR-LEGO: Construction of An Open Source Spatiotemporal Gene Induction System by Focused IR Laser Irradiation

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KEY WORDS: DIY Microscope, Local heat shock, Spatiotemporal gene induction, near infrared laser, Heat shock response

Abstract

InfraRed Laser Evoked Gene Operator (IR-LEGO) is a spatiotemporal gene induction system utilizing a heat shock response (HSR), focused irradiation of near infrared laser (1460 – 1480 nm) [1]. In the IR-LEGO system, cells/tissues are locally heated by focused IR laser irradiation through microscope objective, and heated cells/tissues, then, become to be expressed gene of interests via HSR. Furthermore, HSR is conserved among various organisms. IR-LEGO can be applied to various organisms such as medaka, zebrafish, Iberian ribbed newt, A. thaliana [2, 3], and various experiments such as cell lineage tracing and gain of function with single-cell resolution. For these reasons, IR-LEGO has a possibility to be powerful technique for various research fields. However, almost all research reports which utilize IR-LEGO is published by Japanese researcher. Recently, a few foreign researchers published reports which use simple self-constructed IR-LEGO system, but still limited. For those who is not professional of optics and microscopy, it is difficult to construct IR-LEGO optical system. In the present study, we show how to construct IR-LEGO as a DIY microscope, and evaluate it.

Reference

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