Laser Scissors And Tweezers Qpm Microscope For Biomedical Applications

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BRIEF DESCRIPTION

FULL DESCRIPTION

When an injury occurs to the brain, neural and non-neural cells in the brain interact with each other to maintain the brain's normal function. In this regard, astrocytes, the most numerous cells in the CNS, play a crucial role to maintain the stable equilibrium between ions, maintain homeostasis of water and blood flow, recycle the neurotransmitters and supply the nutrition that cells need to remain healthy.

There exists a need and desire for improved imaging and improved study and manipulation of nerve cells and other cells in the nervous system such as astrocytes and other astroglial cell types. There also exists a need for improved methods to analyze cellular trauma and repair in TBI as well as in a significant number of other disease systems such as Alzheimer's, Parkinson's, and Huntington's Disease, just to name a few.

Systems and methods are provided for quantitative phase imaging of samples including fluids and cells. In one embodiment, a process is provided for analyzing cells and cellular organelles during shockwave injury and afterwards. The process and system configurations can enable the measurement of the damage and recovery processes of the cells, intracellular dynamics, and quantitative changes in the membrane thickness in real time. In addition, fluorescent microscopy can be added to the system to localize and quantify changes in calcium and other molecular components during and after shockwave injury, thus providing a unique combination of imaging modalities to study traumatic brain injury (TBI) as well as many other cellular trauma conditions.

Disclosed and described herein are systems, methods and configurations for a quantitative phase microscope (QPM) system. In one embodiment, a QPM system includes a structural unit configured to retain a sample, and a laser system configured to perform at least one of a laser scissor and laser tweezer operation on the sample. The QPM system also includes a quantitative phase microscope (QPM) configured to image the sample.

According to embodiments, a QPM system includes a structural unit configured to retain a sample, a laser system configured to perform at least one of a laser scissor and laser tweezer operation on the sample, and QPM configured to image the sample. In one embodiment, the system includes a controller configured to control the laser system, and control the QPM. According to another embodiment, the structural unit includes a dichroic plate configured as transparent to the laser system and reflective to the output of the QPM. In one embodiment, the laser system is configured to output a shockwave output to the sample to simulate trauma in the sample. The laser system is configured to simulate and analyze trauma on cellular structures and organelles. In yet another embodiment, the QPM system is configured to image and analyze at least one astrocyte of the sample. The system may be configured to perform one or more processes including controlling, by a controller, a laser system to perform at least one of a laser scissor and laser tweezer operation on a sample. The process may also include controlling imaging by a quantitative phase microscope (QPM) to image the sample.

SUGGESTED USES



OTHER INFORMATION

CATEGORIZED AS

» **Imaging**
» Medical

RELATED CASES

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ADVANTAGES

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,698,520	07/11/2023	2019-225

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