Docket #: S14-203

COLM: a microscope for rapid, high resolution imaging of large intact tissue

Dr. Karl Deisseroth and Dr. Raju Tomer have developed a CLARITY optimized light-sheet microscope (COLM) for rapid, high-resolution imaging of large intact tissue samples. CLARITY, a tissue clearing technique developed by the inventors, enables visualization of both three-dimensional structure and fine molecular details of intact whole tissues. This ability to access information from large intact samples has created both new opportunities and new challenges. One major challenge has been to image large intact tissues in a practical feasible time-frame. Existing microscopes are too slow and can damage the signal emitting capabilities of a sample. To overcome these challenges the inventors have created a new microscope called COLM. It is optimized for use with the CLARITY technique, much faster than existing microscopes and minimizes photo damage. COLM may be used for structural and molecular analysis of large assembled biological systems, including intact mammalian brains.

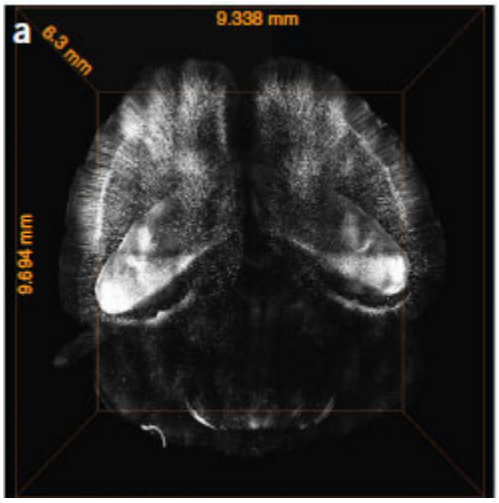

Image of a whole mouse brain acquired using COLM.

Stage of research
The inventors used COLM to image an entire mouse brain at very high resolution.

Applications

- Imaging
  - Neuroscience
    - Image intact brain to determine underlying neuronal architecture
    - Disease studies- image diseased vs. normal brain
  - Research
    - Structural and molecular analysis of large assembled biological systems, including organs

Advantages

- Integration with CLARITY to allow imaging of large intact tissues, including entire brains
- Fast: 400-500 times faster than state of the art Confocal microscopes
  - Minimizes photo bleaching
  - Accelerates data collection
- High cellular and subcellular resolution even 5-6mm deep in tissue

Publications

- Tomer R, Ye L, Hsueh B, Deisseroth K. Advanced CLARITY for rapid and high-resolution imaging of intact tissues. Nat Protoc. 2014 Jul;9(7):1682-97. doi: 10.1038/nprot.2014.123. Epub 2014 Jun 19.

Patents

- Published Application: 20170068086
- Issued: 10,746,981 (USA)

Innovators

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