BILLING CODE: 4140-01-P

DEPARTMENT: DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health

ACTION: Notice

SUMMARY: The invention listed below is owned by an agency of the U.S. Government and is available for licensing and/or co-development in the U.S. in accordance with 35 U.S.C. 209 and 37 CFR part 404 to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing and/or co-development.

ADDRESSES: Invention Development and Marketing Unit, Technology Transfer Center, National Cancer Institute, 9609 Medical Center Drive, Mail Stop 9702, Rockville, MD, 20850-9702.

FOR FURTHER INFORMATION CONTACT: Information on licensing and co-development research collaborations, and copies of the U.S. patent applications listed below may be obtained by contacting: Attn. Invention Development and Marketing Unit, Technology Transfer Center, National Cancer Institute, 9609 Medical Center Drive, Mail Stop 9702, Rockville, MD, 20850-9702, Tel. 240-276-5515 or email ncitechtransfer@mail.nih.gov. A signed Confidential Disclosure Agreement may be required to receive copies of the patent applications.

SUPPLEMENTARY INFORMATION: Technology description follows.

Title of invention: Optical trap methods to determine the viscoelastic properties of complex materials, including biological materials

Description of Technology: Optical traps (optical tweezers) have been used to characterize gels and other materials and recently have even shown the ability to characterize the viscoelastic properties of living cells. An optical trap includes a focused laser beam able to trap a small bead at its focus. However, issues of image spatial resolution and limited depth of interrogation have prevented application of an optical trap to measure microrheological (flow of matter) properties in complex (non-uniform) materials, such as multi-cellular systems or living organisms.

Inventors at NIH have developed optical trapping procedures that provide significant improvements in spatial resolution and tissue depth. These improvements are particularly important for examining clinically relevant tissue samples. The viscoelastic measurements obtained using the disclosed systems and methods have a surprisingly high contrast-to-noise ratio compared to prior methods of obtaining viscoelastic measurements for complex materials. The increased contrast-to-noise ratio allows for more sensitive detection of changes in viscoelastic properties across materials than what was possible using prior methods. Thus, the disclosed systems and methods can be used to measure the properties of a wide variety of complex materials (such as biological materials), from 3D tissue culture models to tissue in or from living zebrafish to mammals, such as mice and humans.

Potential Commercial Applications:

- Microrheological measurements can increase knowledge of the cancer microenvironment.
- Diagnosis and/or treatment of a condition or disease associated with tissue/cell remodeling, including tumor state.
- Determine the effectiveness of a particular compound or treatment or regimen (e.g cosmetic products for reducing wrinkles, scarring, etc.).
- Evaluate wound healing.

Value Proposition:

- Increased sensitivity in the detection of changes in viscoelastic properties across materials.
- Improvements in spatial resolution and tissue depth.
- Localized, precise application of force compared to magnetic bead microrheology.
- Greater dynamic range and can probe outside the thermal energy range compared to passive, thermally driven techniques.
- Selection of multiple probe sites at once allows for increased throughput.
- Automated probe selection reduces assay time.

Development Stage:

Basic

Inventor(s):

Kandice Tanner, Ph.D. (NCI); Benjamin Blehm, Ph.D. (NCI); and Alexus Devine, B.S. (NCI)

Intellectual Property:

HHS Reference No. E-251-2015/0-US-01

US Provisional Application 62/198,554 (HHS Reference No. E-251-2015/0-US-01) filed July 29, 2015 entitled "Optical Trap for Rheological Characterization of Complex Materials".

Publications:

Blehm BH, et al. In vivo tissue has non-linear rheological behavior distinct from 3D biomimetic hydrogels, as determined by AMOTIV microscopy. Biomaterials. 2016 Mar;83:66-78.

Licensing and Collaboration Opportunity: Researchers at the NCI seek licensing and/or co-development research collaborations for development of the technology to predict drug treatment based on the mechanical signature and another opportunity for cosmetic applications.

Contact Information:

Requests for copies of the patent application or inquiries about licensing, research collaborations, and co-development opportunities should be sent to John D. Hewes, Ph.D., email: john.hewes@nih.gov.

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John D. Hewes, Technology Transfer Specialist, Technology Transfer Center, National Cancer Institute

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