

Jonathan A. N. Fisher, Ph.D.

Assistant Professor, New York Medical College
Adjunct Scientist, U.S. FDA

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Education:

Ph.D., Physics, August 2007
University of Pennsylvania, Philadelphia, PA

B.A. with Honors in Physics, Minor in English, May 2000
University of Pennsylvania, Philadelphia, PA

Employment and Professional Experience:

- 2014 – present New York Medical College, Valhalla, NY
Assistant Professor
Department of Physiology
- 2016 – present U.S. Food and Drug Administration, Silver Spring, MD
Adjunct Scientist
Center for Devices and Radiological Health
Division of Biomedical Physics
- 2014 – 2016 U.S. Food and Drug Administration, Silver Spring, MD
ORISE Faculty Fellow
Center for Devices and Radiological Health
Division of Biomedical Physics
- 2007 – 2014 The Rockefeller University, New York, NY
Postdoctoral Associate
Mentor: A. J. Hudspeth, M.D., Ph.D.
Laboratory of Sensory Neuroscience and Howard Hughes Medical Institute
- 2001 – 2007 University of Pennsylvania, Philadelphia, PA
Graduate Researcher
Advisor: Arjun G. Yodh, Ph.D.
Department of Physics and Astronomy
Dissertation: “Linear and Non-Linear Fluorescence Imaging of Neuronal Activity”
- Summer 2002 Los Alamos National Laboratory, Los Alamos, NM
Visiting Graduate Research Fellow
Advisors: John S. George, Ph.D. and David Rector, Ph.D.
Biological and Quantum Physics Group
- 1998 – 2000 University of Pennsylvania, Philadelphia, PA
Undergraduate Researcher
Experimental Astrophysics
Advisor: Mark J. Devlin, Ph.D.
Department of Physics and Astronomy

Grants and Fellowships:

- 2016 NSF (Award No. 1641133, \$79,905; Fisher, PI) Micro- and macro-scale validation of diffuse correlation spectroscopy for monitoring functional hemodynamics in the microvasculature of the cerebral cortex
- 2015 NSF (Award No. 1541612, \$79,768; Fisher, PI) Multimodal characterization of quantitative biomarkers for traumatic brain injury measured via portable device technology
- 2015 FDA Medical Countermeasures (\$245,000; Fisher, co-PI)
Application of Somatosensory Evoked Potentials to the Diagnosis of Mild TBI: A Translational Approach
- 2013 Richard Lounsbery Foundation (\$99,470, Fisher, PI) Visualizing neuroimaging data in immersive display environments
- 2013 Kickstarter (\$27,314, 448 backers; Fisher, PI) Neurodome: dome-format exploration of the brain
- 2011 American Hearing Research Foundation Grant (\$20,000; Fisher, PI)
Novel optical techniques for investigating active hearing in the mammalian cochlea
- 2008 Bristol-Myers Squibb Postdoctoral Fellowship in Basic Neurosciences (\$156,000, 3-year)
- 2003 Graduate School of Arts and Sciences Travel Grant (U. Penn)
- 1999 Nassau Grant for Undergraduate Research (U. Penn)

Pending (recommended for funding):

- 2017 NSF (Fisher, PI) Decoding dynamic abnormalities in cerebral hemodynamic responses obtained from near-infrared optical diagnostics

Honors and Awards:

- 2015 FDA / Center for Devices and Radiological Health (CDRH) Director's Special Citation Award
"For the development of multiple research avenues to assess the long-term reliability of neural prostheses"
- 2015 Japanese Science and Technology Forum (STS) Future Leader
Representative for North America
- 2013 Blavatnik Award for Young Scientists
One of two winners at the postdoctoral level; \$30,000 unrestricted funds awarded
- 2006 Optical Society of America New Focus / Bookham Student Award
For excellence and leadership in optics; one of seven finalists selected internationally
- 2006 GAPSA-Provost's Award for Interdisciplinary Innovation (U. Penn; \$6000)
- 2001 Nominated for Dean's Award for Distinguished Teaching (U. Penn)
- 2000 William E. Stephens Memorial Prize (U. Penn Physics Department Award)
Awarded to graduating physics major demonstrating most promise as scientist

Grant Review Services:

National Institutes of Health, Common Fund: Stimulating Peripheral Activity to Relieve Conditions (SPARC) Next Generation Tools and Technologies, 2018.

U. S. Department of Veterans Affairs: Rehabilitation Research & Development Career Development Panel, 2017-present (FACA review board member)

Defense Advanced Research Projects Agency (DARPA): HAPTIX Program (Hand Proprioception & Touch Interfaces for Prosthetic Limbs), 2014.

FDA Regulatory Services:

Co-authored consults on medical device Premarket Notification (510(k)) submissions, Investigational Device Exemption (IDE) applications, Premarket Approval (PMA) applications, as well as Pre-submission (“Q-sub”) applications. Technologies included non- or minimally invasive neural stimulation devices and neural prostheses.

Professional Activities and Memberships:

Member, Society for Neuroscience
Member, Optical Society of America
Member, SPIE (The Society of Photo-Optical Instrumentation Engineers)
Member, The American Association for the Advancement of Science (AAAS)
Member, The New York Academy of Sciences
Member, Blavatnik Award Alumni Council (NYAS)
Member, The International Planetarium Society (IPS)

Reviewer, *Proceedings of the National Academy of Sciences of USA*
Reviewer, *Journal of Neuroscience*
Reviewer, *Scientific Reports*
Reviewer, *NeuroReport*
Reviewer, *Neuroscience Letters*
Reviewer, *Physics in Medicine and Biology*
Reviewer, *Medical Physics*
Reviewer, *Journal of Neuroscience Methods*
Reviewer, *Biophysical Journal*
Reviewer, *Optics Letters*
Reviewer, *Optics Express*
Reviewer, *Applied Optics*
Reviewer, *Journal of Optics*

Consulting Activities:

2012 - Hybra Advance Technology: *toward development of wireless, bone-conduction headset that delivers high-quality personal audio without obstructing ambient sound*

Governmental Policy Related Activities:

2007 - Invited committee member, *Governors Island Science and Technology (GIST) ad hoc advisory committee, headed by Alan J. Gerson, NYC Council Member*

Refereed Journal Publications:

J. A. N. Fisher, I. Gumenchuk, 2018. Low-intensity focused ultrasound alters the latency and spatial patterns of sensory-evoked cortical responses *in vivo.*, *Journal of Neural Engineering* [in press].

H. Jang, S. Huang, D. X. Hammer, L. Wang, M. Ye, C. G. Welle, **J. A. N. Fisher**, 2017. Alterations in neurovascular coupling following acute traumatic brain injury. *Neurophotonics* 4(4) 045007.

S. Huang*, **J. A. N. Fisher***, M. Ye, Y. Kim, R. Ma, M. Nabili, V. Krauthamer, M. Myers, T. Coleman, and C. G. Welle. Wearable, epidermal sensor technology for detecting ultrasonic perturbation of sensory brain activity. *IEEE Transactions on Biomedical Engineering*, [*equal contribution, in press].

J. A. N. Fisher, S. Huang, M. Ye, M. Nabili, W. B. Wilent, V. Krauthamer, M. Myers, C. G. Welle, 2016. Real-Time Detection and Monitoring of Acute Brain Injury Utilizing Evoked Electroencephalographic Potentials. *IEEE Transactions on Neural Systems & Rehabilitation Engineering* 24(9): 1003-1012.

S. Huang, **J. A. N. Fisher**, M. Ye, M. Nabili, Y. Kim, R. Ma, Y-S Kim, T. Coleman, E. F. Civillico, V. Krauthamer, and M. Myers. 2015. Detecting Ultrasound-Induced Brain Injury in the Mouse with a Novel Flexible Epidermal Electrode Array. *Neurotherapeutics* 12(3): 683-684.

J. A. N. Fisher, F. Nin, T. Reichenbach, R. Uthaiyah, A. J. Hudspeth. 2012. The spatial pattern of cochlear amplification. *Neuron* 76(5): 989-997. [cover]

[Above article reviewed in: T. Ren and P. G. Gillespie. 2012. Probing the cochlear amplifier by immobilizing molecular motors of sensory hair cells. *Neuron* 76(5): 868-870.]

F. Nin, T. Reichenbach, **J. A. N. Fisher**, A. J. Hudspeth. 2012. The contribution of active hair-bundle motility to nonlinear amplification in the mammalian cochlea. *Proceedings of the National Academy of Sciences of USA* DOI: 10.1073/pnas.1219379110.

K. Susumu, **J. A. N. Fisher**, J. Zheng, D. N. Beratan, A. G. Yodh, M. J. Therien. 2011. Two-photon absorption properties of proquinoidal D-A-D and A-D-A quadrupolar chromophores. *Journal of Physical Chemistry A* 115(22): 5525-5539.

J. A. N. Fisher, L. Kowalik, A. J. Hudspeth. 2011. Imaging electrical resonance in hair cells. *Proceedings of the National Academy of Sciences of USA* 108(4): 1651-1656.

J. A. N. Fisher, K. Susumu, M. Therien, A. G. Yodh. 2009. One- and two-photon absorption of highly conjugated multiporphyrin systems in the two-photon Soret transition region. *Journal of Chemical Physics* 130(13):134506.

J. A. N. Fisher, J. R. Barchi, C. G. Welle, G-H. Kim, P. Kosterin, A. L. Obaid, A. G. Yodh, D. Contreras, B. M. Salzberg. 2008. Two-photon excitation of potentiometric probes enables optical recording of action potentials from individual mammalian nerve terminals *in situ*. *Journal of Neurophysiology* 99: 1545-1553. [Highlighted in *Innovative Methodology* section]

J. A. N. Fisher, V. A. Marchenko, A. G. Yodh, R. F. Rogers. 2005. Spatiotemporal activity patterns during respiratory rhythmogenesis in the rat ventrolateral medulla. *Journal of Neurophysiology* 95: 1982-1991.

J. A. N. Fisher, B. M. Salzberg, A. G. Yodh, 2005. Near infrared two-photon cross sections of voltage-sensitive dyes. *Journal of Neuroscience Methods* 148: 94-102.

J. A. N. Fisher, E. F. Civillico, D. Contreras, A. G. Yodh. 2004. *In vivo* fluorescence microscopy of neuronal activity in three dimensions by use of voltage-sensitive dyes. *Optics Letters* 29(1): 71-73.

Chapters in Books:

J. A. N. Fisher, C. G. Welle (2017). Real-time monitoring of acute brain injury by evoked electroencephalography. In: C. S. Cox (Ed.): *Pre-Clinical and Clinical Methods in Brain Trauma Research*. Springer. [In press].

J. A. N. Fisher, B. M. Salzberg. (2015). Two-photon excitation of fluorescent voltage-sensitive dyes: Monitoring membrane potential in the infrared. *In*: M. Canepari, D. Zecevic, and O. Bernus (Eds.): *Membrane potential imaging in the nervous system and in the heart*. Springer.

J. A. N. Fisher, B. M. Salzberg. (2010). Monitoring membrane voltage using two-photon excitation of fluorescent voltage-sensitive dyes. *In*: M. Canepari & D. Zecevic (Eds.): *Membrane Potential Imaging in the Nervous System: Methods and Applications*. Springer.

Doctoral Thesis:

J. A. N. Fisher. 2007. *Linear and Non-Linear Fluorescence Imaging of Neuronal Activity*. Department of Physics and Astronomy, University of Pennsylvania, Philadelphia, PA.

Invited Talks:

UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER, 2018
Department of Neurology and Neurotherapeutics, Dallas, TX

DALLAS SYMPHONY ORCHESTRA, 2018
SOLUNA: Music & The Brain, Dallas, TX

LEHIGH UNIVERSITY, 2017
Department of Bioengineering, Bethlehem, PA

NEW YORK MEDICAL COLLEGE (2017 Keynote Address, Summer Trainees in Academic Research Program)
Valhalla, NY

iED SUMMIT (Immersive Education), 2016
Denver Museum of Nature and Science, Denver, CO

INSTITUTE FOR PHOTONIC SCIENCES (ICFO), 2016
L4H Seminar, Barcelona, Spain

IBM THOMAS J. WATSON RESEARCH CENTER, 2016
Yorktown Heights, NY

IMMERSIVE WORLDS CONFERENCE, 2016
Baruch Performing Arts Center, New York, NY

iX SYMPOSIUM (Immersion / Experience), 2015
Société des Arts Technologiques (SAT), Montréal, Canada

DENVER MUSEUM OF NATURE AND SCIENCE, 2015
Gates Planetarium, Denver, CO

CALIFORNIA ACADEMY OF THE SCIENCES, 2014
Morrison Planetarium, San Francisco, CA

JOHNS HOPKINS UNIVERSITY, SCHOOL OF MEDICINE, 2013

Center for Hearing and Balance Seminar, Baltimore, MD

U.S. FOOD AND DRUG ADMINISTRATION, 2013
Division of Physics, Silver Spring, MD

SENSE TO SYNAPSE (Biophysical and Molecular Mechanisms of Perception), 2013
Columbia University, New York, NY

HUNTER COLLEGE, 2013
Physics Department Colloquium, New York, NY

NIH / NATIONAL INSTITUTE ON DEAFNESS AND OTHER COMMUNICATION DISORDERS 2013
Institute Seminar, Bethesda, MD

NEW YORK MEDICAL COLLEGE, 2013
Department of Physiology Seminar, New York, NY

COURANT INSTITUTE OF MATHEMATICAL SCIENCES (NYU), 2013
Biomathematics / Computational Biology Colloquium, New York, NY

COLUMBIA UNIVERSITY, 2012
Neural Engineering Seminar, Department of Biomedical Engineering, New York, NY

BRANDEIS UNIVERSITY, 2012
Physics department colloquium, Waltham, MA

NEW YORK UNIVERSITY SCHOOL OF MEDICINE NEUROSCIENCE INSTITUTE, 2012
SPINES Neuroscience Seminar, New York, NY

SPIE PHOTONICS WEST (Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues), 2012
San Francisco, CA

LEHIGH UNIVERSITY, 2011
Department of Biological Sciences, Bethlehem, PA

UNIVERSITY OF ROCHESTER, 2011
Biomedical Engineering Department Seminar, Rochester, NY

UNIVERSITY OF PENNSYLVANIA, 2011
"Advances in Biomedical Optics" Seminar Series, Philadelphia, PA

YALE UNIVERSITY, 2011
Neuroscience Seminar, Department of Biological and Biomedical Sciences, New Haven, CT

COLUMBIA UNIVERSITY, 2011
"Neuro Lunch" Neuroscience Seminar, New York, NY

BARD COLLEGE, 2011
Annandale-on-Hudson, NY

UNIVERSITY OF MESSINA, 2008
Department of Physiology, Messina, Italy

WEIZMANN INSTITUTE OF SCIENCE (Neurobiology Department Seminar), 2007

Department of Neurobiology, Rehovot, Israel

HUMBOLDT UNIVERSITY, 2005

Bernstein Center for Computational Neuroscience, Berlin, Germany

CHARITÉ UNIVERSITY, 2005

Department of Experimental Neurology, Berlin, Germany

GORDON RESEARCH CONFERENCE (Lasers in Medicine and Biology), 2004

Kimball Academy, NH

Meeting Abstracts:

2018 PAUL WOOLF MD PEDIATRIC RESEARCH SYMPOSIUM, 2018, Valhalla, NY

I. Gumenchuk, D. R. Busch, A. G. Yodh, R. I. Jacobson, **J. A. N. Fisher**. Noninvasive measurements of hemodynamic and electrophysiological activity during auditory processing tasks in pediatric subjects with post-traumatic headache.

SOCIETY FOR NEUROSCIENCE, 2017, Washington, DC (dynamic poster)

Neurodome: Immersive neuroscience education through exploring 3D brain data in digital domes

J. A. N. Fisher

SOCIETY FOR NEUROSCIENCE, 2017, Washington, DC (oral presentation)

H. Jang, L. Wang, S. Huang, M. Ye, D. X. Hammer, C. G. Welle, **J. A. N. Fisher** (*presenting author*)

Classifying acute brain injury based on noninvasive measurements of neurovascular sensory reactivity

U.S. FOOD AND DRUG ADMINISTRATION SCIENCE SYMPOSIUM, 2017, Silver Spring, MD

H. Jang, M. Ye, S. Huang, D. X. Hammer, C. G. Welle, **J. A. N. Fisher**. Quantitative biomarkers for brain injury measured via electroencephalography and diffuse optical correlation spectroscopy

NATIONAL CAPITAL AREA TRAUMATIC BRAIN INJURY RESEARCH SYMPOSIUM, 2017, Bethesda, MD

H. Jang, M. Ye, S. Huang, D. X. Hammer, C. G. Welle, **J. A. N. Fisher**. Brain injury acutely modifies sensory-evoked hemodynamic and electrophysiological responses in mice

SOCIETY FOR NEUROSCIENCE, 2016, San Diego, CA

H. Jang, S. Huang, M. Ye, D. X. C. G. Welle, D. X. Hammer, **J. A. N. Fisher**. Alterations in sensory-activated cerebral blood flow following brain injury.

SOCIETY FOR NEUROSCIENCE 2016, San Diego, CA

I. Gumenchuk & **J. A. N. Fisher**. Acute and chronic tissue effects of focused ultrasound neuromodulation assessed at the cellular and bulk-tissue scale.

[Installation] ACM SIGGRAPH, VR Village, 2015, Los Angeles, CA,

J. A. N. Fisher. Neurodome (*360-degree Immersion Dome*)

U.S. FOOD AND DRUG ADMINISTRATION SCIENCE FORUM, 2015, Silver Spring, MD

M. Ye, M. Nabili, **J. A. N. Fisher**, S. Huang, Y. Kim, E. F. Civillico, V. Krauthamer, M. Myers, C. G. Welle. Evaluation of electrophysiological biomarkers for the diagnosis of mild brain injury in a novel mouse model.

AMERICAN SOCIETY FOR EXPERIMENTAL NEUROTHERAPEUTICS, 2015, Washington, DC

M. Ye, M. Nabili, **J. A. N. Fisher**, S. Huang, Y. Kim, E. F. Civillico, V. Krauthamer, M. Myers, C. G. Welle. Electrophysiological signatures of mild brain injury in a novel mouse model.

SOCIETY FOR NEUROSCIENCE, 2014, Washington, DC

J. A. N. Fisher, S. Huang, M. Ye, M. Nabili, E. F. Civillico, V. Krauthamer, M. Myers, C. G. Welle. Modification of somatosensory evoked potentials following focal traumatic brain injury in the mouse.

INTERNATIONAL PLANETARIUM SOCIETY CONFERENCE. 2014, Beijing, China

J. A. N. Fisher, P. McPike, M. SubbaRao, D. Arnberg, J. Nises, M. Dayan, J. D. Salvi, A. Steiner. "Neurodome: Visualizing neuroimaging data in immersive, full-dome planetarium environments."

ASSOCIATION FOR RESEARCH IN OTOLARYNGOLOGY, 2013, Baltimore, MD

J. A. N. Fisher, F. Nin, T. Reichenbach, R. Uthaiyah, A. J. Hudspeth. The spatial pattern of cochlear amplification.

PHOTONICS WEST (SPIE), 2012, San Francisco, CA

J. A. N. Fisher, F. Nin, T. Reichenbach, R. Uthaiyah, A. J. Hudspeth. Interferometric measurement of traveling waves in the mammalian cochlea *in vivo* combined with photo-deactivation of prestin, a cellular force-generating protein.

MECHANICS OF HEARING, 2008, Keele University, Keele, UK

J. A. N. Fisher, L. Kowalik, A. J. Hudspeth. Stroboscopic fluorescence imaging of electrical resonance in the chicken's basilar papilla.

OPTICAL IMAGING OF BRAIN FUNCTION, 2005, Bad Honnef, Germany

J. A. N. Fisher, E. F. Civillico, V. A. Marchenko, D. Contreras, B. M. Salzberg, R. F. Rogers, A. G. Yodh. Spontaneous and stimulated neural activity patterns *in vivo* and *in situ* revealed by 3D fluorescence microscopy with potentiometric dyes.

IMAGING NEURONS & NEURAL ACTIVITY, 2005, Cold Spring Harbor Labs, NY

J. A. N. Fisher, A. Reid, B. M. Salzberg, E. F. Civillico, D. Contreras, A. G. Yodh. Two-photon microscopy using voltage-sensitive dyes.

PHOTONICS WEST (SPIE), 2005, San Jose, CA

J. A. N. Fisher, E. F. Civillico, D. Contreras, A. G. Yodh. Spatiotemporal dynamics of mouse cortical response to whisker stimulation *in vivo* measured in three-dimensions by voltage-sensitive dye imaging.

SOCIETY FOR NEUROSCIENCE, 2004, San Diego, CA

V. Marchenko, **J. A. N. Fisher**, A. G. Yodh, D. Rector, and R. F. Rogers. Optical recording of respiratory-related activity from the ventrolateral medulla of artificially-perfused juvenile rats.

SOCIETY FOR NEUROSCIENCE, 2004, San Diego, CA

J. A. N. Fisher, B. M. Salzberg, A. G. Yodh. Two-photon fluorescence excitation cross-sections of voltage-sensitive dyes from 790 – 1050 nm.

BIOMED (OSA) 2004, Miami, FL

J. A. N. Fisher, E. F. Civillico, D. Contreras, A. G. Yodh. 2004. *In vivo* fluorescence microscopy of neural activity in three dimensions using voltage-sensitive dyes. (featured in "Frontiers in Spectral Microscopy" section)

PHOTONICS WEST (SPIE) 2003, San Jose, CA

J. A. N. Fisher, E. F. Civillico, D. Contreras, D. M. Rector, J. S. George, B. M. Salzberg, L. Finkel, A. G. Yodh. Fluorescence imaging of neuronal activity of mouse somatosensory cortex *in vivo* using a depth-specific GRIN lens probe and voltage-sensitive dyes.

ECI 2003, Banff, Canada

J. A. N. Fisher, E. F. Civillico, D. Contreras, A. G. Yodh. *In vivo* fluorescence microscopy of neuronal activity in three dimensions using voltage-sensitive dyes.

SOCIETY FOR NEUROSCIENCE 2003, New Orleans, LA

E. F. Civillico, N. Roy, **J. A. N. Fisher**, M. Harvey, A. G. Yodh, D. Contreras. Spatiotemporal properties of cortical responses to electrical stimulation at different frequencies studied with voltage-sensitive dyes *in vivo*.

BIOMED (OSA) 2002, Miami, FL

J. A. N. Fisher, D. M. Rector, J. S. George, D. Contreras, R. F. Rogers, B. M. Salzberg, L. Finkel, A. G. Yodh. Fluorescence potentiometric depth-specific imaging of neuronal systems.

Additional Information:

- Concert pianist, Carnegie Hall debut at Weill Recital Hall 2007, presented by Artists International

- Director and co-founder of the Neurodome project (neurodome.org), which promotes neuroscience education through immersive display technology.