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Optical Diagnostic and Biophotonic Methods from Bench to Bedside

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The seventh Inter-Institute Workshop on Optical Imaging from Bench to Bedside was held at the National Institutes of Health (NIH) in Bethesda, Maryland, on September 15–16, 2011, with generous support from diverse institutes and centers within NIH. These included the National Heart, Lung, and Blood Institute (NHLBI), National Institute of Biomedical Imaging and Bioengineering (NIBIB), National Institute of Child Health and Human Development (NICHD), and the National Institute of Neurological Disorders and Stroke (NINDS).

This year's workshop was dedicated to Professors Britton Chance and Mamoru Tamura, two great scientists who played major roles in shaping our field. Both passed away during the year preceding the conference. Dr. Tamura trained in the Chance laboratory as a Johnson Foundation Postdoctoral Fellow from 1971–1974. He spent most of his professional career as a professor in the Research Institute of Applied Electricity and Electronic Science at Hokkaido University, Japan. Dr. Tamura helped establish the biomedical optics community in the Asia-Pacific region and made significant contributions to diffuse optical tomography and myoglobin spectroscopy. Dr. Chance's story is well known to the biomedical optics community. He was a professor at the University of Pennsylvania who trained and inspired several generations of scientists in *in vivo* imaging and spectroscopy, spanning from microscopy to diffuse optics and magnetic resonance imaging. Dr. Chance has been the subject of a JBO special section [*J. Biomed. Opt.* **5**(2), 115–118 (2000)], a recent JIOHS special issue [*J. Innovative Optic. Health Sci.* **4**(2), v (2011)], and a memorial Web site established by the University of Pennsylvania (<http://www.brittonchance.org/>).

More than 400 people attended the workshop, including university researchers, students, government scientists, and industrial entrepreneurs and scientists from the United States and abroad. Scientific presentations by Dr. Robert Balaban (scientific director of the NHLBI) and Dr. Richard Leapman (scientific director of NIBIB) showed the continuous enthusiasm of NIH's intramural research programs for biophotonics and biomedical optics. The two-day program included 8 sessions with 26 oral presentations by outstanding leaders in the community, ~100 poster presentations, and 2 panel discussions. Oral presentations were divided between organ site and advanced imaging technologies. The session topics included brain, eye, breast, microcirculation, image-guided intervention/surgery, minimally invasive technologies, and molecular probes and targets. This structure was designed to emphasize emerging bench-to-bedside concepts, define unmet clinical needs, and identify barriers to clinical translation.

Two panel discussions were dedicated to 1) noninvasive imaging of brain function and injury, with a special emphasis on traumatic brain injury, and 2) standardization of optical techniques in terms of design, performance, safety, regulation, and efficacy.

The 2011 NIH Workshop Bench-to-Bedside Pioneer Award was awarded to Professor Claude Boccara of the Institut Langevin at École Supérieure de Physique et de Chimie Industrielle (ESPCI) in Paris, where Professor Boccara has consistently been one of the most innovative and productive scientists in our field. Since 1982 at ESPCI, Professor Boccara has contributed to the advance of optical sciences as Director of Laboratoire d'Optique, then Dean of Research with Pierre-Gilles de Gennes (Nobel laureate in physics) and Jacques Prost. The NIH Pioneer award specifically recognizes his work on understanding the physics of small objects, which has led to extremely sophisticated technologies in microscopy and spectroscopy. Professor Boccara joins previous awardees Professors Britton Chance, John Parrish, Brian Wilson, and Tayyabba Hasan as the fifth NIH Inter-Institute Bench to Bedside Pioneer.

The papers included in this special section reflect the composition of the workshop by presenting novel technologies for imaging disease. These manuscripts report exciting progress in several areas, including using optical coherence tomography for disease diagnosis and minimally invasive image-guided surgery, the development of diffuse optical imaging and spectroscopy for noninvasive functional brain imaging, and multimodality cancer imaging technologies that can be used for early detection and therapeutic guidance. Many of the papers submitted demonstrate that significant barriers to clinical translation can be overcome by focusing advanced biophotonics technology development on long-standing clinical problems and needs.

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Special Section Guest Editors