

ICFO COLLOQUIUM BRIAN W. POGUE 'The roles of optical imaging in medical diagnosis and therapy'

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November 24, 2017

Friday, November 24, 2017, 12:00. ICFO Auditorium

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Brian Pogue is Professor of Engineering, Physics and Surgery at Dartmouth College, having a PhD in Medical Physics from McMaster University, Canada, and completing a post-doctoral fellowship at the Harvard Medical School. At Dartmouth since 1996, he served as Dean of Graduate Studies at Dartmouth 2008-2012, and currently is Director of MS & PhD Programs at the Engineering School, and leads the Center for Imaging Medicine at the Dartmouth-Hitchcock Medical Center. His work is focused on optical imaging systems for surgery and radiation therapy guidance, in which he has published 300+ peer-reviewed and 400+ conference papers. This work is funded by the National Institutes of Health (NCI &

NIBIB) as well as the Department of Defense Breast Cancer Research Program. Dr Pogue is on editorial boards for Physics in Medicine & Biology, Medical Physics and Breast Cancer Research, and is an elected Fellow of the Optical Society of America (OSA) and the American Institute of Medical and Biological Engineers (AIMBE). In 2018 he will become the Editor-in-Chief of the Journal of Biomedical Optics, SPIE Press

The discovery of new imaging systems to guide medical, surgical and radiological intervention is still undergoing substantial change. In this talk, an overview of the market and directions of optical imaging will be reviewed as it is used in medicine today. The scope of optical systems varies widely from macroscopic to sub-microscopic, making optical systems harder to think of in terms of a single modality. Yet the strength of optical imaging contrast is that it is inherently sensitive to both the molecular features of tissue as well as the sub-microscopic scattering structures of tissue. Optical imaging systems are ubiquitous throughout most medical practice, and optical imaging represents the largest single modality used in medicine today. Yet, its breadth in terms of a diversity of detection features continues to growth. Specific examples of imaging systems and developments ongoing will be highlighted.

In particular, the future strengths of optical imaging in terms of detecting the molecular & cellular features of cancer will be reviewed. Developments in macroscopic surgical guidance will be discussed in more detail. Fluorescence imaging with molecular reporters and customized fluorescence imaging systems that work with room lights on will be demonstrated. This approach to imaging in surgery provides the surgeon with information which is not visible, and augments their guidance based upon white light imaging and touch. Additionally, a fundamentally new way to visualize radiation dose delivery in real time is demonstrated with Cherenkov light imaging. Examples of video capture of radiotherapy will be shown in soft tissue and large area dosimetry, where this is challenging and inaccurate today. In addition to this work, Cherenkov-based luminescence emission imaging will be shown as a tool for molecular imaging in tissue.

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