Program

Advances in Optics for Biotechnology, Medicine and Surgery XVII

October 15-19, 2023
Tomar, Portugal

Conference Chairs:

Frederic Leblond
Polytechnique Montreal, Canada

Mark Niedre
Northeastern University, USA

Conference Co-Chairs

Summer Gibbs
Oregon Health and Science University, USA

David Cuccia
Modulim, Inc., USA

Jonathan Liu
University of Washington, USA

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Previous conferences in this series:

Future Directions for Lasers in Medicine and Surgery
February 26-March 3, 1989
Palm Coast, Florida
Conference Chairs:
Ronald W. Waynant, FDA, USA
Ashley J. Welch, University of Texas-Austin, USA

Future Directions for Lasers in Medicine and Surgery II
February 24-March 1, 1991
Palm Coast, Florida
Conference Chairs:
Thomas F. Deutsch, Wellman Labs, MA General, USA
Ronald W. Waynant, FDA/CDRH, USA

Future Directions for Lasers in Medicine and Surgery III
February 27-March 4, 1993
Palm Coast, Florida
Conference Chair:
Joseph T. Walsh, Jr., Northwestern University, USA

Lasers in Medicine and Surgery IV
July 9-14, 1995
Snowbird, Utah
Conference Chairs:
Sharon Thompisen, University of Texas, USA
George Pettit, USDA

Advances in Optical Technology for Medicine and Surgery V
July 13-18, 1997
Snowbird, Utah
Conference Chairs:
Irving J. Bigio, Los Alamos National Laboratory, USA
Kenton W. Gregory, Oregon Medical Laser Center, USA
Bruce J. Tromberg, Beckman Laser Institute, UC Irvine, USA

Advances in Optics for Biotechnology, Medicine and Surgery VI
Aug. 1-6, 1999
Kailua-Kona, Hawaii
Conference Chairs:
David Benaron, Stanford University, USA
Eva M. Sevick-Muraca, Purdue University, USA
Arjun G. Yodh, University of Pennsylvania, USA

Advances in Optics for Biotechnology, Medicine and Surgery VII
July 22-27, 2001
Banff, Alberta, Canada
Conference Chairs:
Daniel Farkas, University of Pittsburgh, USA
Michele Follen, University of Texas, Anderson Cancer Center, USA
Michael Patterson, Hamilton Regional Cancer Center/McMaster University, Canada
Previous conferences in this series:

**Advances in Optics for Biotechnology, Medicine and Surgery VIII**  
August 3-7, 2003  
Banff, Alberta, Canada  
*Conference Chairs:*  
Molly Brewer, University of Arizona, USA  
Thomas Foster, University of Rochester, USA  
James Fujimoto, Massachusetts Institute of Technology, USA

**Advances in Optics for Biotechnology, Medicine and Surgery IX**  
July 24-28, 2005  
Copper Mountain, Colorado  
*Conference Chairs:*  
Stephen M. Hahn, University of Pennsylvania, USA  
Vasilis Ntziachristos, Harvard University, USA  
Brian Wilson, University of Toronto, Canada

**Advances in Optics for Biotechnology, Medicine and Surgery X**  
June 10-14, 2007  
Naples, Florida, USA  
*Conference Chairs:*  
Guillermo Tearney, Harvard University, USA  
Samuel Achilefu, Washington University, USA  
Paul M.W. French, Imperial College, London, UK

**Advances in Optics for Biotechnology, Medicine and Surgery XI**  
June 28-July 2, 2009  
Burlington, Vermont, USA  
*Conference Chairs:*  
Stephen A. Boppart, University of Illinois at Urbana-Champaign, USA  
Jeremy C. Hebden, University College London, UK  
Laura Marcu, University of California, Davis, USA

**Advances in Optics for Biotechnology, Medicine and Surgery XII**  
June 5-8, 2011  
Naples, Florida, USA  
*Conference Chairs:*  
Elizabeth Hillman, Columbia University, USA  
Daniel Elson, Imperial College London, UK  
R.C. Thomson, Vanderbilt University, USA

**Advances in Optics for Biotechnology, Medicine and Surgery XIII**  
June 2-5, 2013  
Lake Tahoe, California, USA  
*Conference Chairs:*  
James W. Tunnell, University of Texas at Austin, USA  
Maryann Fitzmaurice, Case Western University, USA  
A.C. Boccara, ESPCI-Paris Tech., France
Previous conferences in this series:

Advances in Optics for Biotechnology, Medicine and Surgery XIV
June 14-17, 2015
Vail, Colorado, USA
Conference Chairs:
Rainer Leitgeb, Medical University of Vienna, Austria
Richard Levenson, University of California – Davis, USA
Laura Waller, University of California, Berkeley, USA

Advances in Optics for Biotechnology, Medicine and Surgery XV
July 23-26, 2017
Snowmass Village, Colorado, USA
Conference Chairs:
Peter So, Massachusetts Institute of Technology, USA
Kate Bechtel, Triple Ring Technologies, USA
Ivo Vellekoop, University of Twente, The Netherlands
Michael Choma, Yale University, USA

Advances in Optics for Biotechnology, Medicine and Surgery XVI
June 2-6, 2019
Quebec, Canada
Conference Chairs:
Erin Buckley, Emory University/Georgia Institute of Technology, USA
Christophe Moser, Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Brian Pogue, Dartmouth College, USA
David Sampson, University of Surrey, United Kingdom
Conference Sponsors

Intuitive Surgical

QUEL Imaging
Sunday, October 15, 2023

17:30 – 18:30    Conference check-in
18:30 – 19:30    Welcome reception (with music)
19:30 – 21:00    Dinner
21:00 – 22:00    Social Hour (Lobby Bar)

NOTES

- Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.
- Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).
- Speakers – Please leave at least 3 minutes for questions.
- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.
- After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.
Monday, October 16, 2023

07:30 – 08:30 Breakfast and Discussion Time

08:30 – 08:40 Conference Welcome – Conference Chairs

Session 1: Optics in Surgical Interventions I
Session Chair: Frederic Leblond

08:40 – 09:10 Can near infrared nerve-specific imaging improve surgical outcomes?
Summer Gibbs, Oregon Health and Science University, USA

09:10 – 09:40 Seeing early cancer in a new light with hyperspectral endoscopy
Sarah Bohndiek, University of Cambridge, United Kingdom

09:40 – 10:10 Advanced optical imaging for surgical vision
Sylvain Gioux, Intuitive Surgical, Switzerland

10:10 – 10:40 Intraoperative detection of insufficient surgical margins in head and neck cancer resection using dual aperture fluorescence ratio imaging
Kenneth Tichauer, Illinois Institute of Technology, USA

10:40 – 11:10 Coffee Break (Lobby Bar) and Discussion Time

Session 2: Optics in Surgical Interventions II
Session Chair: Brian Wilson

11:10 – 11:40 What role in surgery for Raman spectroscopy?
Frederic Leblond, Polytechnique Montreal, Canada

11:40 – 12:10 Development of imaging probes for fluorescence guided surgery of GI and endocrine tumors
Michael Bouvet, University of California San Diego, USA

12:10 – 12:40 TBA
Pablo Valdes, University of Texas Medical Branch, USA

12:40 – 13:10 Beyond tumor-to-background ratios: Methods for improved decision making in fluorescence guided surgery
Kimberley Samkoe, Thayer School at Dartmouth, USA

13:10 – 14:30 Lunch

Session 3: Microscopic Imaging in Biomedicine I
Session Chair: Melissa Skala

14:30 – 15:00 Non-destructive 3D pathology and analysis for precision medicine
Jonathan Liu, University of Washington, USA

15:00 – 15:30 Low-cost, in vivo microscopy
Dongkyun Kang, University of Arizona, USA

15:30 – 16:00 Autofluorescence lifetime imaging to monitor immune cell metabolism and function
Melissa Skala, Morgridge Institute for Research, USA
Monday, October 16, 2023 (continued)

16:00 – 16:30  
**Cell tracking in vivo: From hematopoietic stem cells to mature leukocytes**  
Charles P. Lin, Wellman Center for Photomedicine, Massachusetts General Hospital, USA

16:30 – 18:00  
Coffee Break and **Poster Session I** (Convento Room)

**Session 4: Microscopic Imaging in Biomedicine II**  
Session Chair: Kenneth Tichauer

18:00 – 18:30  
**Label-free fluorescence lifetime techniques for image-guided interventions**  
Laura Marcu, University of California, Davis, USA

18:30 – 19:00  
**Fast mid-infrared imaging with non-degenerate two-photon absorption**  
Eric Potma, University of California, Irvine, USA

19:00 – 19:30  
**Investigating cellular metabolic changes in response to therapy using two-photon excited autofluorescence**  
Narasimhan Rajaram, University of Arkansas, USA

19:30 – 21:00  
Dinner

21:00 – 22:00  
Social Hour (Lobby Bar)
Tuesday, October 17, 2023

07:30 – 08:30  Breakfast and Discussion Time

**Session 5: Vascular Imaging and Biofluid Studies**  
Session Chair: Summer Gibbs

08:30 – 09:00  
**Towards fluorescence molecular in vivo liquid biopsy of circulating tumor cells**  
Mark Niedre, Northeastern University, USA

09:00 – 09:30  
**Minimally-invasive surgical application of multispectral and polarization resolved imaging**  
Dan Elson, Imperial College, United Kingdom

09:30 – 10:00  
**Extreme imaging cytometry - From instrumentation to AI acceleration**  
Kevin Tsia, The University of Hong Kong, Hong Kong

10:00 – 10:30  
**Shortwave infrared imaging and spectroscopy in the time and spatial frequency domains**  
Darren Roblyer, Boston University, USA

10:30 – 11:00  
Coffee Break (Lobby Bar) and Discussion Time

**Session 6: Optics in Neurosciences and Neuropathology I**  
Session Chair: Kimberly Samkoe

11:00 – 11:30  
**Minimally invasive monitoring of the central nervous system**  
David Busch, University of Texas Southwestern, USA

11:30 – 12:00  
**High-resolution imaging of myelin loss and degradation in neurodegenerative diseases with birefringence microscopy**  
Irving Bigio, Boston University, USA

12:00 – 12:30  
**Optical spectroscopy for real-time neuronavigation during deep brain stimulation surgeries**  
Daniel Côté, CERVO Brain Research Center, Université Laval, Canada

12:30 – 14:00  
Lunch

14:00 – 18:00  
Excursion – Guided tour of the Convento de Cristo

**Session 7: Optics in Neurosciences and Neuropathology II**  
Session Chair: Daniel Côté

18:30 – 19:00  
**Non-invasive evaluation of microvascular and endothelial function with hybrid near-infrared spectroscopies**  
Turgut Durduran, ICFO-The Institute of Photonic Sciences, Spain

19:00 – 19:30  
**Assessing cerebrovascular insufficiency and neural risk with diffuse optical methods**  
Maria Angela Franceschini, Massachusetts General Hospital, Harvard Medical School, USA

19:30 – 20:00  
**Changes in neurovascular coupling as an indicator of cerebral health**  
Jana Kainerstorfer, Carnegie Mellon, USA
Tuesday, October 17, 2023 (continued)

20:00 – 21:30  Dinner

21:30 – 22:30  Social Hour (Lobby Bar)
Wednesday, October 18, 2023

07:30 – 08:30  Breakfast and Discussion Time

Session 8:  Automated Learning Approaches in Biomedicine
Session Chair: Narasimhan Rajaram

08:30 – 09:00  Multimodal computational pathology
Faisal Mahmood, Harvard Medical School, USA

09:00 – 09:30  Real-time label-free AI-enhanced digital histopathology using SLAM microscopy
Stephen Boppart, University of Illinois Urbana-Champaign, USA

09:30 – 10:00  Multimodal computational colonoscopy
Nicholas Durr, Johns Hopkins University, USA

Session 9:  Imaging Device Standards and Tissue Phantoms
Session Chair: Dongkyun Kang

10:00 – 10:30  Phantoms to accelerate technology development and standardization in Biophotonics
Stefan Andersson-Engels, Tyndall National Institute, Ireland

10:30 – 11:00  Tools to build consensus and accelerate clinical translation of intraoperative fluorescence imaging
Ethan LaRochelle, QUEL Imaging, USA

11:00 – 11:30  Coffee Break (Lobby Bar) and Discussion Time

Session 10:  Nanomedicine
Session Chair: Mark Niedre

11:30 – 12:00  Nanobody-based fluorescent contrast agents for rapid and specific intraoperative tumor visualization
Sophie Hernot, Vrije Universiteit Brussel, Belgium

12:00 – 12:30  Multifunctional porphyrin-lipid nanoparticles for cancer theranostics: From discovery to first-in-human and beyond
Brian Wilson, University Health Network, Canada

12:30 – 14:00  Lunch

14:00 – 15:30  Free Time / Discussions

15:30 – 17:00  Coffee Break and Poster Session II (Convento Room)

Session 11:  Contributed Talks
Session Chair: Jonathan Liu

17:00 – 17:20  The tauVIVO time-domain fluorescence imaging system for the simultaneous imaging of ICG and targeted NIR tracers
Hans Ingelberts, Vrije Universiteit Brussel, Belgium
Wednesday, October 18, 2023 (continued)

17:20 – 17:40  Fluorescence depth quantification using spatial frequency imaging and deep learning reconstruction
Michael Daly, Princess Margaret Cancer Centre, Canada

17:40 – 18:00  Near infrared fluorescent anti-mucin antibodies target and brightly label colonic polyps in CPC-APC mice
Kristin Cox, UC San Diego, USA

18:00 – 18:30  Free Time

18:30 – 19:30  Wine Tasting

19:30 – 21:00  Conference Banquet

21:00 – 22:00  Social Hour (Lobby Bar)
Thursday, October 19, 2023

07:30 – 09:00  Breakfast and Discussion Time

Session 12: Clinical Translation of Emerging technologies
Session Chair: Jana Kainerstorfer

09:00 – 09:30  Coherent spatial imaging of hemodynamics
Bernard Choi, University of California, Irvine, USA

09:30 – 10:00  Monitoring radiotherapy with functional OCT: Microvascular responses and correlations with MRI
Alex Vitkin, University of Toronto / Princess Margaret Cancer Centre, Canada

10:00 – 10:30  Computational approaches for model-based Diffuse Optical Tomography
Hamid Dehghani, University of Birmingham, United Kingdom

10:30 – 11:00  Low-cost optoacoustics? Prospects for miniaturizing and democratizing optoacoustic imaging systems in biomedical research and the clinics
Cagla Ozsoy, ETH Zurich, Switzerland

11:00  Coffee break and boxed lunches available

Check-out (by 12 Noon) and Departure
Poster Presentations

1. **A low-cost, compact device for monitoring tissue oxygen consumption using speckle contrast optical spectroscopy**
   Andres Quiroga, ICFO, Spain

2. **Preliminary investigation of non-invasive blood pressure estimation using speckle contrast optical spectroscopy**
   Ariane Garrett, Boston University, USA

3. **A combined frequency domain near infrared spectroscopy and diffuse correlation spectroscopy system for monitoring the sternocleidomastoid muscle**
   Carlos Gomez, Boston University, USA

4. **Measurements of human cerebral blood flow changes with speckle contrast optical spectroscopy**
   David Boas, Boston University, USA

5. **Fiber-based wavelength-swept spontaneous Raman spectroscopy for brain tissue classification**
   Elahe Parham, CERVO Brain Research Center, Université Laval, Canada

6. **Creating Open-Source software packages for Raman spectrum processing and analysis**
   Guillaume Sheehy, Polytechnique Montreal, Canada

7. **Guiding nanoparticle enhanced photothermal therapy for cancer with photoacoustic thermal imaging and diffuse optical tomography**
   Ivan Kosik, University Health Network Toronto, Canada

8. **Polarized light microscopy for quantitative assessment of colorectal cancer: Can we predict local recurrence?**
   Kseniia Tumanova, University of Toronto, Canada

9. **High-density speckle contrast optical tomography of cerebral blood flow of the adult brain**
   Lisa Kobayashi-Frisk, ICFO - The Institute of Photonic Sciences, Spain

10. **Monitoring of cerebral autoregulation during early mobilization towards personalization of post-stroke mobilization**
    Lisa Kobayashi-Frisk, ICFO-The Institute of Photonic Sciences, Spain

11. **Tissue classification of breast cancer by hyperspectral unmixing**
    Lynn-Jade Jong, Netherlands Cancer Institute, Netherlands

12. **A smartphone autofluorescence imaging platform and classification algorithm for the early detection and referral of oral lesions in primary care settings**
    Ruchika Mitbander, Rice University, USA

13. **Excitation-emission characterization of ICG in biologically relevant solutions**
    Sophie Lyon, QUEL Imaging, USA

14. **Addressing the effects of skin tone on photoacoustic imaging**
    Thomas Else, CRUK Cambridge Institute, University of Cambridge, United Kingdom

15. **Optical measurement of a guidewire displacement during percutaneous coronary interventions**
    Thomas Shooner, Laval University, Canada