Biomedical Optics (BIOMED)

Topical Meeting and Tabletop Exhibit

Collocated with:

Digital Holography and Three-Dimensional Imaging (DH)
Laser Applications to Chemical, Security and Environmental Analysis (LACSEA)

March 16-19, 2008
Hilton St. Petersburg Bayfront
St. Petersburg, Florida, USA

Postdeadline Submissions Deadline: February 19, 2008 at 12:00 p.m. EST (17.00 GMT)
Hotel Reservation Deadline: February 12, 2008
Pre-Registration Deadline: February 21, 2008

Spring Optics and Photonics Congress

Join your colleagues March 16-20 in St. Petersburg, Florida!

Collocated Topical Meetings

Biomedical Optics (BIOMED)
Digital Holography and Three-Dimensional Imaging (DH)
Laser Applications of Chemical, Security and Environmental Analysis (LACSEA)

Dates and Location	Important Deadlines
March 16-20, 2008 Hilton St. Petersburg Bayfront St. Petersburg, Florida, USA	**Postdeadline Submissions Deadline:** February 19, 2008 at 12:00 p.m. EST (17.00 GMT) **Hotel Reservation Deadline:** February 12, 2008 **Pre-Registration Deadline:** February 21, 2008

To find out more about how to exhibit at one of these meetings, please contact Anne Jones at 202.416.1942 or email ajones@osa.org. Reserve your exhibit space today!

Exhibitors

Advanced Research Technology
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Swamp Optics
Time-Bandwidth Products

Topics to be Discussed

BIOMED Topics

- Methods for Diffuse Optical Imaging and Tomography
- Methods for Optical Spectroscopy and Spectroscopic Imaging
- Optical Coherence Tomography
- Optical Microscopy Techniques
- Photonic Biomedical Nanotechnology
- Optics in Neuroscience
- Optics in Diagnostics and Clinical Translation

DH Topics

- Digital holography theory and systems
- Diffractive optics
- Optical data storage
- Phase unwrapping and phase retrieval
- Computer generated holograms
- Spatial light modulators for holography
- Incoherent digital holography
- Holographic optical elements
- 2D and 3D pattern recognition
- Optical correlators
- Three-dimensional imaging and

- Optics in Molecular and Small Animal Imaging
- Optical Therapeutics

LACSEA Topics

- Laser-analytical Systems
- New Optical and Photonic Sources
- Laser-analytical Optics
- Prediction and Theoretical Treatment of UV, VIS, NIR, MIR and THz Spectra
- Application of Laser-analytical Systems to chemical, biophysical and biochemical analysis, homeland security and environmental measurements in industry as well as basic research.

processing

- Three-dimensional display
- Stereo-matching and stereoscopic cameras
- 2D-3D content conversion
- Shape and deformation measurement
- Polarization analysis
- Holographic imaging and microscopy
- Holographic nanofabrication methods
- Holographic optical micro-manipulation

About Optics and Photonics Congresses

OSA created Optics and Photonics Congresses, clusters of new and established **topical meetings** in order to bring together leaders among communities within optics.

Corporate Sponsors

About BIOMED

There are few basic biological science studies that are not touched by biomedical optics. Optical methods play a critical role in biotechnologies ranging from genomics to cell-based assays to *in vivo* imaging and therapies. In light of this, the importance of biomedical optics has never been greater. The upcoming Biomedical Optics meeting covers the diversity of cutting edge biomedical research and brings together leading scientists, engineers and physicians engaged in biological and medical research using optical methods. With over 400 attendees, this *must-attend* meeting affords attendees the opportunity to interact one-on-one with oral presenters, along with multiple poster sessions allowing for lively discussions of the latest research.

Biomedical Optics (BIOMED) Meeting Topics To Be Considered:

Methods for Diffuse Optical Imaging and Tomography

- Diffuse Imaging and Spectroscopy: Clinical and *in vivo* Applications
- Instrumentation for Diffuse Optical Imaging
- Theoretical Methods and Image Reconstruction for Optical Tomography
- Photoacoustic Tomography
- Diffuse Fluorescence Tomography
- Fluorescence Lifetime Tomography and Imaging
- Diffuse Correlation Spectroscopy
- Transport-Regime Modeling and Imaging

Methods for Optical Spectroscopy and Spectroscopic Imaging

- Fluorescence Spectroscopy and Imaging
- Phosphorescence Spectroscopy and Imaging
- Reflectance Spectroscopy and Imaging
- Mie Scattering Spectroscopy and Imaging
- Raman Spectroscopy and Imaging
- Multi-Modal Spectroscopy and Imaging
- Tissue Biochemistry
- Spectroscopy and Imaging in Tissue Engineering

Optical Coherence Tomography

- OCT Technology Development
- OCT Light Source Development
- Ultrahigh Resolution and Ultrahigh Speed OCT
- Functional OCT (Doppler, Polarization Sensitive and Others)
- Contrast Enhancement Techniques in OCT
- Optical Coherence Microscopy
- Phase Sensitive OCT Technology
- Biomedical and Clinical Applications of OCT

Optical Microscopy Techniques

- Microscopy *in vivo*
- Spectral Microscopy

- Multiphoton Microscopy
- Nonlinear Microscopy
- Novel Forms of Microscopy

Photonic Biomedical Nanotechnology

- Metal Nanoparticles
- Quantum Dots
- Inorganic/Organic Hybrid Materials
- Multifunctional Nanoparticles
- Surface Enhanced Raman Scattering and Surface Enhanced Fluorescence
- Single Molecule Techniques
- Nanoscale Microscopies
- *In vitro* and *in vivo* Nanoparticle Applications

Optics in Neuroscience

- Optical Instrumentation and Technology in the Neurosciences
- Functional Imaging Techniques
- Optical Imaging within Multimodal Neuroimaging
- Biophysics and Physiology of Functional Neuroimaging
- Neuron Biology

Optics in Diagnostics and Clinical Translation

- Translational Research in the areas of:
  - Optical Spectroscopy (Fluorescence, Reflectance, Raman)
  - Multi-Spectral Imaging
  - Endoscopic Microscopy
  - Diffuse Optical Absorption and Scatter Tomography

Optics in Molecular and Small Animal Imaging

- Novel Molecular and Functional Contrast Agents
- *In vivo* Imaging of Molecular Reporters
- Whole Body Imaging of Small Animals
- Intravital Microscopy
- Dynamic Functional Imaging
- Molecular And Functional Imaging Applications

Optical Therapeutics

- Low Level Laser Therapy
- Photodynamic Therapy
- Interstitial Laser Hyperthermia and Interstitial Photocoagulation
- Laser Tissue Ablation and Optical Breakdown

BIOMED Program Committee

Gregory Faris; *SRI Intl., USA,* **General Chair**
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Lihong Wang; *Washington Univ. in St. Louis, USA,* **Vice Chair**

Methods for Diffuse Optical Imaging and Tomography
Elizabeth M. Hillman; *Columbia Univ., USA,* **Chair**
Turgut Durduran; *Univ. of Pennsylvania, USA.*
Amir H. Gandjbakhche; *NIH, USA.*
Adam Gibson; *Univ. College London, UK.*
Alexander D. Klose; *Columbia Univ., USA.*
Brian Pogue; *Dartmouth College, USA.*

Methods for Optical Spectroscopy and Spectroscopic Imaging
Irene Georgakoudi; *Tufts Univ., USA,* **Chair**
Arjen Amelink; *Erasmus Univ., Netherlands.*
Laura Marcu; *Univ. of California at Davis, USA.*
Eric O. Potma; *Univ. of California at Irvine, USA.*
Nirmala Ramanujam; *Duke Univ., USA.*
Adam Wax; *Duke Univ., USA.*

Optical Coherence Tomography
Wolfgang Drexler; *Cardiff Univ., UK,* **Chair**
Peter E. Andersen; *Risoe Natl. Lab, Denmark.*
Johannes F. de Boer; *Wellman Ctr., Massachusetts General Hospital, Harvard Medical School, USA.*
Jim Fujimoto; *MIT, USA.*
Rainer A. Leitgeb; *Ecole Polytechnique Fédérale de Lausanne, Switzerland.*
Adrian Podoleanu; *Univ. of Kent at Canterbury, UK.*
Maciej Wojtkowski; *Inst. of Physics, N. Copernicus Univ., Poland.*

Optical Microscopy Techniques
Tony Wilson; *Univ. of Oxford, UK,* **Chair**
Alberto Diaspro; *Univ. of Genoa, Italy.*
Stefan Hell; *Max Planck Inst., Germany.*
Erik Manders; *Univ. of Amsterdam, Netherlands.*
Jerome Mertz; *Boston Univ., USA.*
Ammasi Periasamy; *Univ. of Virginia, USA.*

Optical Therapeutics
Lothar Lilge; *Ontario Cancer Inst., Canada,* **Chair**
Raimund Hibst; *Inst. fur Lasertechnologien, Germany.*
Jean-Claude Kieffer; *INRS-Energie Materiaux et Telecom, Canada.*

Optics in Diagnostics and Clinical Translation
Rebecca Richards-Kortum; *Rice Univ., USA,* **Chair**
Andrew J. Berger; *Inst. of Optics, Univ. of Rochester, USA.*
Thomas Foster; *Univ. of Rochester, USA.*
Anita Mahadevan-Jansen; *Vanderbilt Univ., USA.*
Andrew Rollins; *Case Western Reserve Univ., USA.*
Andres F. Zuluaga; *Remicalm LLC, USA.*

Optics in Molecular and Small Animal Imaging
Joseph P. Culver; *Washington Univ. in St. Louis, USA,* **Chair**
Peter Choyke; *Ctr. for Cancer Res., NIH, USA.*
Charles Lin; *Wellman Labs of Photomedicine, Massachusetts General Hospital, Harvard Medical School, USA.*
Bradley Rice; *Xenogen Corp., USA.*
Giannis Zacharakis; *Foundation for Res. and Technology Hellas (FORTH), Inst. of Electronic Structure and Laser (IESL), Greece.*

Optics in Neuroscience
Arno Villringer; *Charite Univ. Medical Ctr., Humboldt Univ., Germany,* **Chair**
David Boas; *Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital, USA.*
David T. Delpy; *Univ. College London, UK.*
Winfried Denk; *Max Planck Inst. for Medical Res., Germany.*
Andreas Hielscher; *Columbia Univ., USA.*

Photonic Biomedical Nanotechnology
Rebekah Drezek; *Rice Univ., USA,* **Chair**
Ji-Xin Cheng; *Purdue Univ., USA.*
Xingde Li; *Univ. of Washington, USA.*
Hedi Mattoussi; *NRL, USA.*
Konstantin V. Sokolov; *Univ. of Texas MD Anderson Cancer Ctr., USA.*

BIOMED Invited and Tutorial Speakers by Topic Category

Methods for Diffuse Optical Imaging and Tomography

Plenary Speaker

BSuF3, Optical Imaging of Breast Cancer from an Industrial Perspective; *Martin B. van der Mark[1], Leon Bakker[1], Michiel van Beek[1], Claas Bontus[2], Bernhard Brendel[2], Rick Harbers[1], Thomas Koehler[2], Anais Leproux[1], Tim Nielsen[2], Marjolein van der Voort[1], Falk Uhleman[2], Andrea Wiethoff[3], Ronny Ziegler[2], Andy Ziegler[2], Kai Licha[4], Lueder Fels[4], Martin Pessel[4], Stephanie van de Ven[5], Sjoerd Elias[5], Willem Mali[5], Peter Luijten[5]; [1]Philips Res. Europe-Eindhoven, The Netherlands, [2]Philips Res. Europe-Hamburg, Germany, [3]Philips Medical Systems-Best, The Netherlands, [4]Bayer-Schering Pharma, Germany, [5]Univ. Medical Ctr. Utreacht, The Netherlands.*

Tutorial Speaker

BSuC1, Recent Advances in Optical Tomographic Imaging; *Andreas Hielscher; Columbia Univ., USA.*

Invited Speakers

BSuC2, Clinical Translational Impact of Diffuse Optics in Breast Cancer; *Bruce Tromberg; Univ. of California at Irvine, USA.*

BMA2, High Resolution Photoacoustic Imaging for Characterizing Vascular Anatomy and Function; *Paul C. Beard; Univ. College London, UK.*

Methods for Optical Spectroscopy and Spectroscopic Imaging

Tutorial Speaker

BTuB1, Seeing inside the Body with Microendoscopy and Endoscopic Microscopy; *Gary Tearney; Wellman Ctr. for Photomedicine, Massachusetts General Hospital, USA.*

Invited Speakers

BTuA3, The Role of Light Scattering Spectroscopy in Spectral Diagnosis of Disease; *Michael S. Feld[1], Condon Lau[1], Obrad Scepanovic[1], Sasha McGee[1], Jelena Mirkovic[1], Chung-Chieh Yu[1], Steve Fulghum[2], James Tunnell[3], Irene Georgakoudi4, Kate Bechtel[1]; [1]MIT Spectroscopy Lab, USA, [2]Newton Labs Inc., USA, [3]Univ. of Texas at Austin, USA, [4]Tufts Univ., USA.*

BWD1, Multimodality Nonlinear Optical Imaging; *Ji-Xin Cheng; Purdue Univ., USA.*

Optical Coherence Tomography

Tutorial Speaker

BMB1, Fourier Domain OCT and its Applications; *Joseph Izatt; Dept. of Biomedical Engineering, Duke Univ., USA.*

Invited Speakers

BMB2, Ophthalmic Applications of Birefringence and Flow Contrast Optical Coherence Tomography; *Yoshiaki Yasuno; Univ. of Tsukuba, Japan.*

BTuB2, Interferometric Spectrally Encoded Endoscopy; *Dvir Yelin[1], Brett E. Bouma[2], John J. Rosowski[3], Michael E. Ravicz[3], Guillermo J. Tearney[2]; [1]Technion, Israel, [2]Wellman Ctr. for Photomedicine, USA, [3]Massachusetts Eye and Ear Infirmary, USA.*

Optical Microscopy Techniques

Tutorial Speaker

BTuA1, High Throughput Tissue Imaging and Bioinformatics; *Peter T. C. So; MIT, USA.*

Invited Speakers

BMF1, Contrasts and Resolution in Light Sheet Based Microscopy (SPIM, DSLM, LSFM); *Ernst Stelzer; European Molecular Biology Lab, Germany.*

BTuA2, Dual-Color Superresolution Imaging Using Genetically Expressed Probes; *Hari Shroff[1], Catherine G. Galbraith[2], James A. Galbraith[3], Helen White[1], Jennifer Gillette[4], Scott Olenych[5], Michael W. Davidson[5], Eric Betzig[1]; [1]Howard Hughes Medical Inst., Janelia Farm Res. Campus, USA, [2]Natl. Inst. of Dental and Craniofacial Res., NIH, USA, [3]Natl. Inst. of Neurological Disorders and Stroke, NIH, USA, [4]Natl. Inst. of Child Health and Human Development, NIH, USA, [5]Natl. High Magnetic Field Lab and Dept. of Biological Science, Florida State Univ., USA.*

Photonic Biomedical Nanotechnology

Tutorial Speaker

BSuA1, Nanoparticles in Molecular Imaging of Cancer: Opportunities and Challenges; *Konstantin V. Sokolov; Univ. of Texas MD Anderson Cancer Ctr., USA.*

Invited Speakers

BSuA2, Darkfield Microspectroscopy: From Single Nanoparticle Biosensing to Live Cell Molecular Imaging; *Adam Wax; Dept. of Biomedical Engineering, Duke Univ., USA.*

BWA3, Multifunctional QDs for Molecular Imaging and siRNA Delivery; *Xiaohu Gao; Univ. of Washington, USA.*

Optics in Neuroscience

Tutorial Speaker

BME1, When the Brain Turns Red or Pale: Introduction to Non-Invasive Optical Brain Imaging; *Jens Steinbrink, Hellmuth Obrig; Charité Univ. Medicine, Germany.*

Invited Speakers

BME2, Multidimensional Functional Optical Imaging of the Brain; *Elizabeth M. Hillman; Columbia Univ., USA.*

BTuA4, **The Glass Brain: Visualization of Neuronal Networks in the Whole Mouse Brain by Ultramicroscopy**; *Hans-Ulrich Dodt, N. Jährling, K. Becker; Vienna Univ. of Technology, Austria.*

Optics in Diagnostics and Clinical Translation

Plenary Speakers

BSuF2, Optical Molecular Imaging to Aid in Cancer Screening: Challenges of Clinical Translation; *Rebecca Richards-Kortum[1], David Javier[1], Sharmila Ananda[2], Ann Gillenwater[2]; [1]Rice Univ., USA, [2]MD Anderson Cancer Ctr., USA.*

BSuF4, Clinical Molecular Imaging in the Gastrointestinal Tract; *Thomas D. Wang; Univ. of Michigan, USA.*

Tutorial Speaker

BWA1, Optical Technologies for Early GI Cancer Detection: Many Ways to Skin a Cat? *Brian C. Wilson; Univ. of Toronto, Canada.*

Invited Speakers

BMA4, Optical Biomarkers in Breast Cancer; *Nirmala Ramanujam; Dept. of Biomedical Engineering, Duke Univ., USA.*

BWA2, Fluorescence Imaging and Spectroscopy for Oral Cancer Detection; *Ann M. Gillenwater; Univ. of Texas MD Anderson Cancer Ctr., USA.*

Optics in Molecular and Small Animal Imaging

Tutorial Speaker

BMA1, Photoacoustic Microscopy and Computed Tomography; *Lihong V. Wang; Washington Univ. in St. Louis, USA.*

Invited Speakers

BMA3, Activatable Fluorescence Probes for the Cancer-Cell Specific Molecular Imaging of Cancer; *Hisataka Kobayashi; Natl. Cancer Inst., NIH, USA.*

BSuF1, Applications and Directions in Fluorescence Guided Surgical Interventions; *Stephen J. Lomnes; GE Global Res., USA.*

Optical Therapeutics

Tutorial Speaker

BWB1, Developing Conformal Therapy Treatment Planning for Photodynamic Therapy; *Lothar Lilge[1,2], Augusto Rendon[1,2]; [1]Ontario Cancer Inst., Canada, [2]Univ. of Toronto, Canada.*

Invited Speakers

BWA4, Effects of Low Intensity Laser Light on Wound Healing in the Rat; *Ethne L. Nussbaum, Tony Mazzulli, Kenneth P. H. Pritzker, Facundo Las Heras, Lothar Lilge; Univ. of Toronto, Canada.*

BWB2, To Be Announced; *Jean-Claude Kieffer; INRS Énergie, Matériaux et Télécommunications, Canada.*

Agenda of Sessions

	Grand Bay Ballroom North	Grand Bay Ballroom South	Harborview	Williams/Demens Room
Saturday, March 15, 2008				
4:00 p.m.–6:00 p.m.	**Registration (in Main Lobby)**			
Sunday, March 16, 2008				
6:30 a.m.–6:30 p.m.	**Registration (at Conference Registration Desk)**			
7:50 a.m.–8:00 a.m.	BIOMED Opening Remarks			
8:00 a.m.–10:00 a.m.	BSuA • Nanoparticle Probes for Molecular Imaging	BSuB • Optical Imaging of Breast Cancer		
10:00 a.m.–10:30 a.m.	**Coffee Break (St. Petersburg Ballroom)**			
10:00 a.m.–4:00 p.m.	**Exhibits Open (St. Petersburg Ballroom)**			
10:30 a.m.–12:30 p.m.	BSuC • Methods for Diffuse Optical Imaging	BSuD • Optical Techniques in the Clinic		
12:30 p.m.–1:30 p.m.	**Lunch Break**			
1:30 p.m.–3:30 p.m.	BSuE • BIOMED Poster Session I (Foyer)			
3:30 p.m.–4:00 p.m.	**Coffee Break (St. Petersburg Ballroom)**			
4:00 p.m.–6:30 p.m.	BSuF • Plenary I: Workshop on Contrast for *in vivo* Imaging			
Monday, March 17, 2008				
7:00 a.m.–6:00 p.m.	**Registration (at Conference Registration Desk)**			
7:30 a.m.–10:00 a.m.	BMA • Plenary II: Strategies for Functional Imaging and Diagnostics			
7:50 a.m.–8:00 a.m.			DH Opening Remarks	LACSEA Opening Remarks
8:00 a.m.–10:00 a.m.			DMA • 3-D Imaging I	LMA • Atmospheric Spectroscopy and NIR Laser-Based Sensing
10:00 a.m.–10:30 a.m.	**Coffee Break (St. Petersburg Ballroom)**			
10:00 a.m.–4:00 p.m.	**Exhibits Open (St. Petersburg Ballroom)**			
10:30 a.m.–12:30 p.m.	BMB • OCT and Ophthalmic Applications	BMC • Reconstruction Methods for Diffuse Optical Tomography	DMB • 3-D Imaging II	LMB • MIR Laser-Based Trace Gas Sensing
12:30 p.m.–1:30 p.m.	**Lunch Break**			
1:30 p.m.–3:30 p.m.	BMD • BIOMED Poster Session II (Foyer)		DMC • Digital/Electronic Holography	LMC • New Laser Materials and OPG/OPO/OPA Systems
3:30 p.m.–4:00 p.m.	**Coffee Break (St. Petersburg Ballroom)**			
4:00 p.m.–6:00 p.m.	BME • *In vivo* Imaging for Neuroscience	BMF • Advances in Microscopy		
4:00 p.m.–6:00 p.m.	**JMA • Joint DH and LACSEA Poster Session (Foyer)**			
6:30 p.m.–8:00 p.m.	**Conference Reception (St. Petersburg Ballroom)**			

Key to Shading	
DH Sessions	(light shading)
LACSEA Sessions	(dark shading)
BIOMED Sessions	No Shading

	Grand Bay Ballroom North	Grand Bay Ballroom South	Harborview	Williams/Demens Room
Tuesday, March 18, 2008				
7:00 a.m.–6:00 p.m.	**Registration (at Conference Registration Desk)**			
7:30 a.m.–10:00 a.m.	BTuA • Plenary III: Imaging and Diagnostics in Tissue			
8:00 a.m.–10:00 a.m.			DTuA • Integral Photography and Imaging: 3-D Systems	LTuA • Tunable Laser Sources and Trace Gas Sensing
10:00 a.m.–10:30 a.m.	**Coffee Break (St. Petersburg Ballroom)**			
10:00 a.m.–4:00 p.m.	**Exhibits Open (St. Petersburg Ballroom)**			
10:30 a.m.–12:30 p.m.	BTuB • Methods in Microendoscopy	BTuC • Light for Therapeutics and Diagnostics	DTuB • Digital Holographic Microscopy	LTuB • Cavity Spectroscopy and Innovative Techniques
12:30 p.m.–1:30 p.m.	**Lunch Break**			
1:30 p.m.–3:30 p.m.	BTuD • Optical Cancer Diagnostics	BTuE • Functional Neural Imaging	DTuC • Digital Holography and Holographic Microscopy (until 3:15)	LTuC • THz and Novel Imaging Techniques
3:30 p.m.–4:00 p.m.	**Coffee Break (St. Petersburg Ballroom)**			
4:00 p.m.–6:00 p.m.	BTuF • BIOMED Poster Session III (Foyer)			LTuD • Postdeadline Papers
Wednesday, March 19, 2008				
7:00 a.m.–6:00 p.m.	**Registration (at Conference Registration Desk)**			
7:30 a.m.–10:00 a.m.	BWA • Plenary IV: Molecular Imaging and Therapeutics			
8:00 a.m.–10:00 a.m.			DWA • 3-D Displays and Systems	LWA • Coherent Anti-Stokes Raman Spectroscopy
10:00 a.m.–10:30 a.m.	**Coffee Break (St. Petersburg Ballroom)**			
10:00 a.m.–4:00 p.m.	**Exhibits Open (St. Petersburg Ballroom)**			
10:30 a.m.–12:30 p.m.	BWB • Optical Therapeutics	BWC • Techniques for Functional Neural Imaging	DWB • Holographic Interferometry, Modulators, Filters, and Materials	LWB • Combustion Imaging
12:30 p.m.–12:40 p.m.			DH Closing Remarks	
12:30 p.m.–1:30 p.m.	**Lunch Break**			
1:30 p.m.–3:30 p.m.	BWD • Methods for Spectroscopy and Microscopy	BWE • Molecular Imaging Using Fluorescence		LWC • New Spectroscopic Approaches for Combustion Diagnostics
3:30 p.m.–4:00 p.m.	**Coffee Break (St. Petersburg Ballroom)**			
4:00 p.m.–6:00 p.m.	BWF • Optical Coherence Tomography: Novel Techniques and Functional Imaging	BWG • Instrumentation and Techniques for Tissue Imaging		
6:00 p.m.–6:10 p.m.	BIOMED Closing Remarks			
Thursday, March 20, 2008				
7:30 a.m.–3:30 p.m.	**Registration (at Conference Registration Desk)**			
8:00 a.m.–10:00 a.m.				LThA • Biothreat Detection
10:00 a.m.–10:30 a.m.	**Coffee Break (Foyer)**			
10:30 a.m.–12:30 p.m.				LThB • Explosives Detection and Imaging
12:30 p.m.–1:30 p.m.	**Lunch Break**			
1:30 p.m.–3:30 p.m.				LThC • LIBS and Explosives Detection
3:30 p.m.–3:40 p.m.				LACSEA Closing Remarks

Biomedical Optics (BIOMED) Abstracts

•Saturday, March 15, 2008•

Main Lobby
4:00 p.m.–6:00 p.m.
Registration Open

•Sunday, March 16, 2008•

Conference Registration
6:30 a.m.–6:30 p.m.
Registration Open

Grand Bay Ballroom North
7:50 a.m.–8:00 a.m.
BIOMED Opening Remarks

BSuA • Nanoparticle Probes for Molecular Imaging

Grand Bay Ballroom North
8:00 a.m.–10:00 a.m.
BSuA • Nanoparticle Probes for Molecular Imaging
Konstantin V. Sokolov; Univ. of Texas MD Anderson Cancer Ctr., USA, Presider

BSuA1 • 8:00 a.m. Tutorial
Nanoparticles in Molecular Imaging of Cancer: Opportunities and Challenges, *Konstantin V. Sokolov; Univ. of Texas MD Anderson Cancer Ctr., USA.* Nanotechnology offers unique opportunities for cancer detection, therapy and the ability to monitor therapeutic interventions. I will highlight this potential in context of challenges that need to be overcome in clinical applications of nanoparticles.

BSuA2 • 8:45 a.m. Invited
Darkfield Microspectroscopy: From Single Nanoparticle Biosensing to Live Cell Molecular Imaging, *Adam Wax; Dept. of Biomedical Engineering, Duke Univ., USA.* Darkfield microspectroscopy enables detailed studies of the plasmonic features of noble metal nanoparticles. Shifts of the plasmon resonance of individual nanoparticles can be exploited for sensing applications or to achieve molecular imaging using targeted immunolabelling.

BSuA3 • 9:15 a.m.
Biodegradable Nanoshells for Optical Contrast and Controlled Release, *Timothy Troutman, Marek Romanowski; Univ. of Arizona, USA.* Liposome-supported arrays of gold nanodots exhibit plasmon resonance, making them useful as contrast agents in optical imaging techniques and degradable to components of clearable size. Encapsulated volume can be released with high energy incident light.

BSuA4 • 9:30 a.m.
Stabilized Micellar Formulation of Indocyanine Green for Near-Infrared Imaging, *Victoria B. Rodriguez, Scott M. Henry, Allan S. Hoffman, Patrick S. Stayton, Suzie H. Pun, Xingde Li; Univ. of Washington, USA.* We report micellar formation indocyanine green (ICG) nano complex. The nano-complex has a small size (30-40nm), low cytotoxicity and low critical micelle concentration (1 mg/L), and significantly improves ICG thermal and photostability.

BSuA5 • 9:45 a.m.
Photonic Shell-Crosslinked Nanoparticle Probes for Optical Imaging and Monitoring, *Nam S. Lee[1], William L. Neumann[2], John N. Freskos[2], Tim A. Marzan[2], Jeng J. Shieh[2], Richard B. Dorshow[2], Karen L. Wooley[1]; [1]Washington Univ. in St. Louis, USA, [2]Imaging Solutions, Covidien, USA.* Photonic shell-crosslinked nanoparticles (SCKs) were prepared *via* crosslinking between fluorophores and micelles. These unique photonic SCKs will be discussed, including their abilities to undergo pH-sensitive swelling/deswelling, which affects enhancement/quenching of the fluorescence.

BSuB • Optical Imaging of Breast Cancer

Grand Bay Ballroom South
8:00 a.m.–10:00 a.m.
BSuB • Optical Imaging of Breast Cancer
Nimmi Ramanujam; Biomedical Engineering Dept., Duke Univ., USA, Presider

BSuB1 • 8:00 a.m.
***In vivo* Breast Cancer Characterization and Therapy Monitoring Using Diffuse Optical Methods Based on Endogenous Optical/Exogenous Fluorescence Contrast,** *Regine Choe[1], Soren D. Konecky[1], Alper Corlu[1], Kijoon Lee[1], Turgut Durduran[1], Chao Zhou[1], Brian J. Czerniecki[2], Julia C. Tchou[2], Angela DeMichele[2], Mark A. Rosen[2], Mitchell D. Schnall[2], Britton Chance[1], Arjun G. Yodh[1]; [1]Univ. of Pennsylvania, USA, [2]Hospital of Univ. of Pennsylvania, USA.* Characterization of tumor-to-normal endogenous optical contrast from 3-D diffuse optical tomography, neoadjuvant chemotherapy monitoring with additional blood flow information, and 3-D fluorescence DOT with exogenous contrast agent injection are presented.

BSuB2 • 8:15 a.m.
Spectrally Constrained Optical Breast Imaging with Co-Registered X-Ray Tomosynthesis, *Qianqian Fang[1], Stefan A. Carp[1], Juliette Selb[1], Richard Moore[1], Daniel B. Kopans[1], Eric L. Miller[2], Dana H. Brooks[3], David A. Boas[1]; [1]Massachusetts General Hospital, USA, [2]Tufts Univ., USA, [3]Northeastern Univ., USA.* We imaged 65 patients with a combined optical and tomosynthesis imaging system. The bulk optical properties from 72 healthy breasts and the reconstructed images using a spectrally-constrained algorithm for healthy and tumor breasts are reported.

BSuB3 • 8:30 a.m.
Time-Resolved Optical Mammography from 635 to 1060 nm for Collagen Quantification, *Paola Taroni, Arianna Giusto, Antonio Pifferi, Lorenzo Spinelli, Alessandro Torricelli, Rinaldo Cubeddu; Dept. of Physics, Politecnico di Milano, Italy.* We upgraded our time-resolved optical mammograph, adding a longer wavelength (1060 nm) to aid collagen quantification. Images were collected from volunteers at 7 wavelengths between 635 and 1060 nm, deriving breast tissue composition (including collagen).

BSuB4 • 8:45 a.m.
3-D MR Guided NIRS: Optimization of Computation and Breast Interface for *in vivo* Imaging, *Colin M. Carpenter, Subhadra Srinivasan, Brian W. Pogue, Shudong Jiang, Hamid Dehghani, Keith D. Paulsen; Dartmouth College, USA.* 3-D MRg-NIRS imaging of breast cancer has been studied in simulation and *in vivo* using parallel plate and circular geometries. Optimal methods to minimize errors in measurement and modeling are presented.

BSuB5 • 9:00 a.m.
Design of a Digital Optical Tomography System for Dynamic Breast Imaging, *Yang Li[1], Andres M. Bur[1], Christopher J. Fong[1], Molly L. Flexman[1], Rabah A. Abdi[2], Randall L. Barbour[2], Andreas H. Hielscher[1]; [1]Columbia Univ., USA, [2]SUNY Downstate Medical Ctr., USA.* We present the design of an optical breast imaging system based on digital conversion, processing, and filtering techniques. The system consists of 128 silicon photodiode detectors, 64 excitation points, and 4 near-infrared laser diodes.

BSuB6 • 9:15 a.m.
Fluorescence and Reflectance Spectroscopy and Spectral Imaging for Evaluating Surgical Margin Status during Breast Cancer Resection, *Matthew D. Keller[1], Shovan K. Majumder[1], Mark C. Kelley[2], Ingrid M. Meszoely[2], Fouad I. Boulous[3], Anita Mahadevan-Jansen[1]; [1]Dept. of Biomedical Engineering, Vanderbilt Univ., USA, [2]Div. of Surgical Oncology and Endocrine Surgery, Vanderbilt Univ. Medical Ctr., USA, [3]Div. of Surgical Pathology, Vanderbilt Univ. Medical Ctr., USA.* Fluorescence and reflectance spectroscopy and spectral imaging were used to try to evaluate the status of surgical margins following partial or total mastectomies. Classification thus far has achieved 96% specificity and 85% sensitivity.

BSuB7 • 9:30 a.m.
Dynamic Functional and Mechanical Response of Breast Tissue to Compression, *Stefan Carp, Juliette Selb, Qianqian Fang, Richard Moore, Daniel Kopans, Elizabeth Rafferty, David Boas; Massachusetts General Hospital, USA.* We characterize the functional and mechanical response of breast tissue to external compression by optically monitoring tissue chromophore concentrations in parallel with tissue reaction force measurements. We estimate tissue metabolism using a partial occlusion model.

BSuB8 • 9:45 a.m.
Elastic Scattering Spectroscopy Scanning of Sentinel Lymph Nodes for Intraoperative Diagnosis of Breast Cancer Metastases, *Martin R. Austwick[1,2,3], Santosh Somasundaram[1], Wayne Chicken[1], Benjamin Clark[1], Charles A. Mosse[1], Mary Falzon[2], Gabrijela Kocjan[2], Irving Bigio[3], Mohammed Keshtgar[1], Stephen Bown[1]; [1]Natl. Medical Laser Ctr., Univ. of College London, UK, [2]Pathology Dept., Royal Free and Univ. College Medical School, UK, [3]Dept. of Biomedical Engineering, Boston Univ., USA.* Sentinel Node biopsy is a clinical technique for detecting metastatic spread in breast cancer. We demonstrate how Elastic Scattering Spectroscopy scanning is sensitive to malignant morphological changes and can be used for rapid intraoperative diagnosis.

St. Petersburg Ballroom
10:00 a.m.–10:30 a.m.
Coffee Break

St. Petersburg Ballroom
10:00 a.m.–4:00 p.m.
Exhibits Open

BSuC • Methods for Diffuse Optical Imaging

Grand Bay Ballroom North
10:30 a.m.–12:30 p.m.
BSuC • Methods for Diffuse Optical Imaging
Gregory Faris; SRI Intl., USA, Presider

BSuC1 • 10:30 a.m. **Tutorial**
Recent Advances in Optical Tomographic Imaging, *Andreas Hielscher; Columbia Univ., USA.* Practical examples encountered in clinical and preclinical imaging such as monitoring of tumor growth and regression as well as arthritic disease progression will be presented.

BSuC2 • 11:15 a.m. **Invited**
Clinical Translational Impact of Diffuse Optics in Breast Cancer, *Bruce Tromberg; Univ. of California at Irvine, USA.* Abstract not available.

BSuC3 • 11:45 a.m.
NIR Oximetry for Characterization of Tissues in Diabetics, *Shudong Jiang[1], Benjamin B. Williams[2], Nadeem Khan[2], Brian B. Pogue[1], Harold M. Swartz[2]; [1]Thayer School of Engineering, Dartmouth College, USA, [2]Dept. of Diagnostic Radiology, Dartmouth Medical School, Dartmouth College, USA.* The dynamic processes of forced hyperoxia and hypoxia in the plantar surface of the foot were characterized by a combined approach using NIR spectroscopy and electron paramagnetic resonance with great reproducibility.

BSuC4 • 12:00 p.m.
Recovery of Indocyanine Green Boli in the Cortex of Adult Humans from Time-Resolved *in vivo* Fluorescence Measurements, *Heidrun Wabnitz[1], Alexander Jelzow[1], Rainer Macdonald[1], Hellmuth Obrig[2], Jens Steinbrink[2]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Charité-Univ.-Medizin Berlin, Germany.* Indocyanine green bolus tracking to assess cerebral perfusion may benefit from fluorescence detection. We present a novel approach to depth-discriminated retrieval of the bolus shape by empirical estimation of time-resolved intra- and extracerebral sensitivity functions.

BSuC5 • 12:15 p.m.
Time-Resolved 3-D Optical Imaging of Electrical Wave in Pig Myocardium, *Bogdan G. Mitrea[1], Marcel Wellner[1,2], Arvydas Matiukas[1,3], Arkady Pertsov[1]; [1]Dept. of Pharmacology, State Univ. of New York, USA, [2]Physics Dept., Syracuse Univ., USA, [3]Dept. of Physics, Kaunas Univ. of Technology, Lithuania.* We report a fast laser-scanning system for imaging rapidly propagating electrical waves inside the ventricular wall with 1 ms time resolution. The system uses a novel biaxial scanning algorithm and near-infrared voltage-sensitive dyes.

BSuD • Optical Techniques in the Clinic

Grand Bay Ballroom South
10:30 a.m.–12:30 p.m.
BSuD • Optical Techniques in the Clinic
Rebecca Richards-Kortum; Rice Univ., USA, Presider

BSuD1 • 10:30 a.m.
Detection and Follow-up of Neonatal Brain Injuries with FD-NIRS, *Andrea Surova, P. Ellen Grant, Juliette Selb, Elizabeth Warren, Nadege Roche-Labarbe, Maria Angela Franceschini; Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital, USA.* We use Frequency-Domain Near-Infrared Spectroscopy to detect brain injuries in neonates by noninvasively measuring cerebral oxygenation and blood volume. Correlation of our data with subsequent diagnoses suggests the effectiveness of FD-NIRS as a bedside monitor.

BSuD2 • 10:45 a.m.
Blood Flow Responses to Photodynamic Therapy with Two Photosensitizers: Photofrin and Motexafin Lutetium (MLu), *Guoqiang Yu[1,2], Theresa M. Busch[1], Turgut Durduran[1], Chao Zhou[1], Xiaoman Xing[1], Timothy Zhu[1], Jarod C. Finlay[1], S. Bruce Malkowicz[1], Stephen M. Hahn[1], Arjun G. Yodh[1]; [1]Univ. of Pennsylvania, USA, [2]Univ. of Kentucky, USA.* Diffuse correlation spectroscopy has been applied for real-time monitoring of tumor blood flow responses to photodynamic therapy using two photosensitizers: Photofrin and Motexafin lutetium (MLu). The different photosensitizers exhibited different blood flow dynamics during PDT.

BSuD3 • 11:00 a.m.
Non-invasive Measurement of Cerebral Autoregulation of Acute Ischemic Stroke Patients with Diffuse Correlation/Wave Spectroscopy, *Turgut Durduran, Chao Zhou, Brian L. Edlow, Guoqiang Yu, Regine Choe, Meeri N. Kim, Brett L Cucchiara, Mary E. Putt, Qaisar Shah, Scott E. Kasner, Joel H. Greenberg, John A. Detre, Arjun G. Yodh; Univ. of Pennsylvania, USA.* The development of diffuse correlation/wave spectroscopy for non-invasive measurement of blood flow allowed measurement of cerebral autoregulation in acute ischemic stroke by comparing infarcted and healthy hemispheres.

BSuD4 • 11:15 a.m.
Disruption of Dynamic Cerebral Autoregulation in Ischemic Stroke Patients Assessed by Continuous-Wave NIRS, *Juliette J. Selb[1], Susanne Muehlschlegel[2], Solomon G. Diamond[3], Mari Angela Franceschini[4], Lee H. Schwamm[2], David A. Boas[4]; [1]Athinoula Martinos Ctr. for Biomedical Engineering, Massachusetts General Hospital, USA, [2]Massachusetts General Hospital, USA, [3]Dartmouth College, USA, [4]Athinoula Martinos Ctr. for Biomedical Engineering, Massachusetts General Hospital, USA.* NIRS-monitored spontaneous cerebral oscillations in healthy subjects and stroke patients showed good correlation between hemispheres at cardiac frequency in both groups, but significantly reduced correlation at respiratory frequency for patients, possibly revealing impaired cerebral autoregulation.

BSuD5 • 11:30 a.m.
Diffuse Optical Measurements of Cerebral Blood Flow and Oxygenation in Patients after Traumatic Brain Injury or Subarachnoid Hemhorrage, *Meeri N. Kim[1], Turgut Durduran[1,2], Suzanne Frangos[3], Erin M. Buckley[1], Chao Zhou[1], Guoqiang Yu[1], Brian L. Edlow[4], Eileen Mahoney-Wilensky[3], M. Sean Grady[3], Josh Levine[4], John A. Detre[4], Joel H. Greenberg[4], Arjun G. Yodh[1]; [1]Dept. of Physics, Univ. of Pennsylvania, USA, [2]Dept. of Radiology, Univ. of Pennsylvania, USA, [3]Dept. of Neurosurgery, Univ. of Pennsylvania, USA, [4]Dept. of Neurology, Univ. of Pennsylvania, USA.* In order to explore its feasibility as a bedside monitor, a hybrid diffuse optical device was used to measure cerebral blood flow and oxygenation in patients with traumatic brain injury or subarachnoid hemorrhage.

BSuD6 • 11:45 a.m.
Frequency-Domain Optical Imaging with GHz Multipixel Detection, *Uwe J. Netz[1], Jürgen Beuthan[1], Andreas H. Hielscher[2]; [1]Charité-Univ.-Medizin Berlin, Germany, [2]Columbia Univ., USA.* A GHz frequency-domain optical imaging system enables 2-D detection of phase and amplitude information. Performance and frequency dependence was investigated using optical tissue phantoms for small geometries relating to small animal and finger joint imaging.

BSuD7 • 12:00 p.m.
Simultaneous Multi-Wavelength Laminar Optical Tomography Imaging of Dermal Lesions, *Sean A. Burgess[1], Baohong Yuan[1], Matthew B. Bouchard[1], Désirée Ratner[2], Elizabeth M. C. Hillman[1]; [1]Columbia Univ., USA, [2]Columbia Univ. Medical Ctr., USA.* We report on a laminar optical tomography system developed for imaging skin cancer. The system simultaneously measures absorption at three wavelengths to extract depth resolved information for invasion depth determination and lesion boundary mapping.

BSuD8 • 12:15 p.m.
Optically-Calibrated Functional Magnetic Resonance Imaging, *Theodore J. Huppert[1,2], Solomon G. Diamond[3,2], David A. Boas[2]; [1]Univ. of Pittsburgh, USA, [2]Massachusetts General Hospital, USA, [3]Dartmouth College, USA.* We describe how diffuse optical imaging can be used to enhance functional magnetic resonance imaging by providing additional temporal and spectroscopic information. We apply this model to experimental data from concurrent fMRI and optical measurements.

12:30 p.m.–1:30 p.m.
Lunch Break

BSuE • BIOMED Poster Session I

Foyer
1:30 p.m.–3:30 p.m.
BSuE • BIOMED Poster Session I

BSuE1
Optimization of Surface-Enhanced Luminescence for Bioassays, *Chia-Pin Pan, Traci Brooks, Abneesh Srivastava, Gregory W. Faris; SRI Intl., USA.* We are developing silver nanoparticle surface-enhanced lanthanide chelate luminescence as a proximity bioassay. We have studied different organic linkers and preparation procedures to attach covalently fluorescence dyes and lanthanide chelates to the nanoparticles.

BSuE2
Near-Infrared Quantum Dots Imaging in the Mouse Brain, *Jeongkyu Youn[1], Nayoun Won[2], Sungjee Kim[2], Jee Hyun Choi[1]; [1]Korea Inst. of Sci. and Tech., Republic of Korea, [2]Dept. of Chemistry, POSTECH, Suriname.* Near-infrared fluorescence quantum dot (QD) was applied to the mouse brain *in vivo* to determine the sensitivity and the maximum detectable depth of QD. We also monitored the clearance of QD over time.

BSuE3
Paper Withdrawn

BSuE4

Quantification of Dendrimer Nanoparticle Targeting on Tumor Cells by Two-Photon Excitation Fluorescence through a Dual-Clad Optical Fiber, *Yu-Chung Chang*[1], *Thommey P. Thomas*[2], *Jing Yong Ye*[1,2], *Alina Kotlyar*[2], *Zhengyi Cao*[2], *Istvan J. Majoros*[2], *James R. Baker, Jr.*[2], *Theodore B. Norris*[1,2]; [1]*Ctr. for Ultrafast Optical Science, Univ. of Michigan, USA,* [2]*Michigan Nanotechnology Inst. for Medicine and Biological Sciences, Dept. of Internal Medicine, Univ. of Michigan, USA.* We report the use of a dual-clad optical fiber to conduct quantitative two-photon excited fluorescence measurements *in vitro* and *in vivo* inside tumors. The ability to detect nanomolar concentrations of targeting nanoparticles is demonstrated.

BSuE5

Paper Withdrawn

BSuE6

Development of a Novel Hyperspectral Darkfield Microscopy System for Characterization of Nanoparticle Sensors, *Matthew J. Crow, Adam Wax; Duke Univ., USA.* We present a novel hyperspectral darkfield microscopy scheme that utilizes an epi-illumination light train for improved characterization of the sensing capacity of noble metal nanoparticles. Validation experiments are presented to characterize the new system.

BSuE7

Temporal Binding Affinity of Immunotargeted Nanoparticles for Potential Point of Care Diagnostic Applications, *Lissett R. Bickford*[1], *Joseph Chang*[1], *Kun Fu*[1,2], *Ying Hu*[1], *Tse-Kuan Yu*[2], *Rebekah A. Drezek*[1]; [1]*Rice Univ., USA,* [2]*MD Anderson Cancer Ctr., USA.* We demonstrate the potential of using nanoparticles for point of care cancer diagnostic imaging applications by achieving optical contrast between normal and cancerous epithelial cells at minimal incubation times through optimization of nanoshell-cell conjugations.

BSuE8

The Use of Gold Nanoshells in Cancer Imaging and Therapy, *James Chen Yong Kah*[1], *Rachel Cheng Yi Wan*[2], *Tzu-Hao Chow*[3], *Malini Carolene Olivo*[4], *Subodh G. Mhaisalkar*[2], *Colin J. R. Sheppard*[1]; [1]*Div. of Bioengineering, Natl. Univ. of Singapore, Singapore,* [2]*School of Materials Science and Engineering, Nanyang Technological Univ., Singapore,* [3]*School of Electrical and Electronic Engineering, Nanyang Technological Univ., Singapore,* [4]*Div. of Medical Sciences, Natl. Cancer Ctr. Singapore, Singapore.* This paper describes the synthesis and application of gold nanoshells as promising molecular contrast agent in reflectance based imaging and potential photothermal cancer therapeutics with enhanced cellular destruction in combination with photodynamic therapy.

BSuE9

Use of Lectin-Conjugated Nanoparticles for Detection of Cell Death, *Rostyslav Bilyy*[1], *Andriy Tomyn*[1], *Olga Zelikova*[2], *Natalia Mitina*[2], *Alexander Zaichenko*[2], *Rostyslav Stoika*[1]; [1]*Inst. of Cell Biology, Natl. Acad. of Sciences of Ukraine, Ukraine,* [2]*Lviv Polytechnic Natl. Univ., Ukraine.* Developed fluorescein-containing latex nanoparticles with conjugated lectin molecules were utilized for detection of dying cells; their binding with cells is based on novel plasma membrane marker of cell death—change in glycoprotein exposure level.

BSuE10

Gold Nanoparticles as Contrast Agent for *in vivo* Photoacoustic Tomography of Tumor, *Qizhi Zhang*[1], *Nobutaka Iwakuma*[1], *Matthew Delano*[2], *Parvesh Sharma*[1], *Changfeng Wu*[3], *Jason McNeil*[3], *Stephen R. Grobmyer*[1], *Huabei Jiang*[1]; [1]*Univ. of Florida, USA,* [2]*Universoty of Florida, USA,* [3]*Clemson Univ., USA.* We demonstrate that gold nanoparticles can be utilized as a good contrast agent for *in vivo* tumor (human breast cancer, BT474) imaging with photoacoustic tomography (PAT) in an animal model.

BSuE11

Fibronectin Adsorption to Nanopatterned Silicon Surfaces, *Ildar Salakhutdinov, Pamela J. VandeVord, Olena Palyvoda, Howard W. Matthew, Hitesh Handa, Guangzhao Mao, Gregory W. Auner, Golam M. Newaz; Wayne State Univ., USA.* This study investigated the adsorption of fibronectin to a rectangular diffraction grating silicon surface with 350 nm period and a corrugation depth of 90 nm. Results demonstrated a significantly positive effect on the fibronectin binding.

BSuE12

Characterization of Magnetic Properties of Magnetite (Fe_3O_4) Nanoparticles Synthesized by Co-Precipitation Process at Room Temperature, *Mohammad E. Khosroshahi, Mohammadreza Tahriri; Amirkabir Univ. of Technology, Iran (Islamic Republic of).* Synthesis of Fe_3O_4 nanoparticles was carried out by chemical solution method at room temperature. The results indicated particles of ~ 40 nm using 0.9 M NaOH at 750 rpm and saturation magnetization of 82 emu/g.

BSuE13

Sensitivity and Specificity of 3-D Optical Mammography, *Louise C. Enfield, Adam P. Gibson, Nick L. Everdell, Jeremy C. Hebden, Simon R. Arridge, Anita Sharma, Richard Sainsbury, Michael Douek, Mohammed Keshtgar; Univ. College London, UK.* Optical tomography is being developed to detect and specify disease in the female breast. Assessors were trained to interpret optical images, then presented with images from further patients.The sensitivity was 85.8% and the specificity 66.8%.

BSuE14
3-D Optical Mammography of the Uncompressed Breast, *Adam P. Gibson[1], Louise C. Enfield[1], Martin Schweiger[1,2], Simon R. Arridge[2], Michael Douek[3], Jeremy C. Hebden[1]; [1]Dept. of Medical Physics and Bioengineering, Univ. College London, UK, [2]Dept. of Computer Science, Univ. College London, UK, [3]Dept. of Surgery, Univ. College London, UK.* We have successfully performed optical tomography of the uncompressed breast on 52 volunteers with breast lesions. We describe a new method for image reconstruction which draws prior information from the optical image itself.

BSuE15
How Feedback from Human Subjects Can Enhance Clinical Performance of Optical Mammography, *Norma Morris, Jeremy C. Hebden, Louise C. Enfield, Adam P. Gibson, Anita Sharma, Victoria Armstrong; Univ. College London, UK.* We report findings of a study aiming to improve research process and outcomes by eliciting detailed feedback on their experience from patient-volunteers taking part in early clinical evaluation of an optical breast imaging system.

BSuE16
Effects of Compression on Transillumination Measurements of Blood Flow and Chromophore Concentrations in Human Breast Tissue, *David R. Busch[1], Chao Zhao[1], G. Yu[1], Regine Choe[1], Turgut Durduran[1,2], Mark Rosen[2], Mitchell D. Schnall[2], Arjun G. Yodh[1]; [1]Univ. of Pennsylvania, USA, [2]Hospital of the Univ. of Pennsylvania, USA.* We combine diffuse optical spectroscopic and correlation measurements of human breast tissue under compression. We expect a contrast between healthy (organized) and cancerous (chaotic) vascular response. Initial results suggest significant flow changes under compression.

BSuE17
Pressure-Enhanced Near-Infrared Breast Imaging of Normal Subjects, *Shudong Jiang, Brian W. Pogue, Ashley M. Laughney, Keith D. Paulsen; Thayer School of Engineering, Dartmouth College, USA.* Fast frame rate frequency domain tomography of normal breast tissue showed correlation between applied pressure and total hemoglobin, water and scattering amplitude, but no significant changes in tissue oxygen saturation and scattering power

BSuE18
Next Generation Heterodyne Multi-Spectral Breast Imager, *Han Y. Ban[1], Kijoon Lee[2], Soren D. Konecky[1], Regine Choe[1], Arjun G. Yodh[1]; [1]Univ. of Pennsylvania, USA, [2]Nanjang Technological Univ., Singapore.* We describe a Diffuse Optical Tomography breast imaging device. Frequency domain heterodyne measurements are made by modulating a laser source and detecting the transmitted light with a gain-modulated image intensifier coupled to a CCD.

BSuE19
Simultaneous Bilateral Optical Tomography of Vascular Dynamics of the Breast Using High-Density Sensing Arrays, *Christoph H. Schmitz[1], Rehman Ansari[2], Rabah Al Abdi[2], Randall Andronica[2], Randall L. Barbour[2,3]; [1]NIRx Medizintechnik GmbH, Germany, [2]SUNY Downstate Medical Ctr., USA, [3]NIRx Medical Technologies LLC, USA.* Instrumentation is described allowing simultaneous bilateral diffuse optical imaging of the breasts' vascular dynamics with high spatial probe density. We introduce concurrent measurement of tissue displacement, allowing for monitoring of external and internal tissue pressure.

BSuE20
Hemodynamically Constrained Dynamic Diffuse Optical Tomography under Mammographic Compression, *Eleonora Z. Vidolova[1], Stefan Carp[2], Eric Miller[3], David Boas[4], Dana Brooks[1]; [1]Northeastern Univ., USA, [2]Massachusetts General Hospital, Athinoula A. Martinos Ctr. for Biomedical Imaging, USA, [3]Tufts Univ., USA, [4]Massachusetts General Hospital, USA.* We analyze a hemodynamically constrained metabolic model, describing temporal changes of oxygen saturation in the breast due to mammographic-like compression. We test how the recovery of metabolic parameters is influenced by measurement characteristics and approximations.

BSuE21
Effect of Tilted Chest-Wall on Breast Lesion Reconstruction, *Yasaman Ardeshirpour, Minming Huang, Quing Zhu; Univ. of Connecticut, USA.* In this paper, we have investigated the effect of the tilted chest-wall under the breast tissue and the mismatch between the titled-interface of the lesion and reference sides on the reconstruction of a target.

BSuE22
Reconstruction of Sequential Male Breast Images for Early Detection of Tissue Structural Changes by Multi-Probe Laser Reflectometry, *P. S. Pandian[1], M. Kumaravel[2], Megha Singh[3]; [1]Biomedical Engineering Div., Indian Inst. of Technology, Madras, India, [2]Central Electronics Ctr., Indian Inst. of Technology, Madras, India, [3]Ctr. for Biomedical Engineering, SGN Educational Foundation, India.* The reflectance profiles and optical parameters are obtained by a laser reflectometer and Monte Carlo simulation of tissues.These images are helpful in therapeutic measures by photodynamic therapy to affected tissues.

BSuE23

Shadow Effect of Large Lesions in Optical Tomography Breast Imaging, *Chen Xu, Quing Zhu; Electrical and Computer Engineering Dept., Univ. of Connecticut, USA.* When a highly-absorbing lesion is imaged with optical tomography in reflection geometry, most photons are absorbed by top portion of lesion. We use photon-tracking technique to quantify this light-shadow effect as function of target size.

BSuE24

Phosphorescence Lifetime Tomography in Optically Heterogeneous Media, *Sofia V. Apreleva, Sergei A. Vinogradov; Univ. of Pennsylvania, USA.* We have previously demonstrated that phosphorescence lifetime imaging (PLI) allows determination of oxygen in homogeneously absorbing/scattering media. Herein we show that PLI can perform equally well in heterogeneous environments relying only on measurements of phosphorescence.

BSuE25

Mechanism of the Ultrasonic Modulation of Fluorescence in Turbid Media, *Baohong Yuan[1], John Gamelin[2], Quing Zhu[2]; [1]Catholic Univ. of America, USA, [2]Univ. of Connecticut, USA.* The interaction of a focused ultrasound beam with fluorescent molecules excited by a modulated light source was investigated. Components with new frequencies occur because of nonlinear interactions and can be used for lifetime imaging.

BSuE26

Incorporation of Structural Apriori Information in Fluorescence Molecular Tomography, *Damon E. Hyde[1], Ralf Schulz[2], Eric Miller[3], Dana Brooks[1], Vasilis Ntziachristos[2]; [1]Northeastern Univ., USA, [2]GSF - Natl. Res. Ctr. for Environment and Health, Germany, [3]Tufts Univ., USA.* We examine the use of X-ray CT anatomical structure as prior information in obtaining fluorescence molecular tomography (FMT) reconstructions. Results indicate that structural information drastically improves reconstructions when imaging spatially dispersed targets.

BSuE27

Differential Optical Imaging Using Vasoactive Agents for Cancer Detection, *Sanhita S. Dixit, Kenneth T. Kotz, Ashley D. Gibbs, Juan M. Orduna, Zishan Haroon, Khalid Amin, Gregory W. Faris; SRI Intl., USA.* Infrared transillumination is used to detect cancerous tissue in a human xenograft mouse model. Vasoactive agents are used to provide exogenous contrast by altering response from blood chromophores hemoglobin and oxyhemoglobin.

BSuE28

Recovery of Absolute Absorption Coefficient Maps of Heterogeneous Media by Photoacoustic Tomography Coupled with Diffusion Optical Reconstruction Algorithm, *Zhen Yuan, Qiang Wang, Huabei Jiang; Dept. of Biomedical Engineering, Univ. of Florida, USA.* We describe novel reconstruction methods that allow for quantitative recovery of optical absorption coefficient of heterogeneous media using photoacoustic measurements. Images of optical properties are obtained from both diffusion equation-based-regularized Newton method and photoacoustic data.

BSuE29

High Resolution Imaging of Optical Absorption Coefficient in Multi-Centimeter-Size Turbid Media Using Combined Photoacoustic and Diffusing Light Measurements, *Lu Yin, Qiang Wang, Huabei Jiang; Dept. of Biomedical Engineering, Univ. of Florida, USA.* We introduce a method that can provide high resolution images of optical absorption coefficient from PAT. Acoustic measurements in PAT are combined with DOT measurements to separate the product of absorption coefficient and photon density.

BSuE30

Source and Detector Fiber Optimization for Depth Sensitivity in Endoscopic Near Infrared Tomography, *Matthew E. Eames[1], Daqing Piao[2], Hamid Dehghani[1]; [1]Univ. of Exeter, UK, [2]Oklahoma State Univ., USA.* Endoscopic Optical tomography is a technique for noninvasive tissue-specific cancer detection in internal organs. This study demonstrates that multiple arrays of fibers within an elliptic-shaped probe increases contrast compared to single array within a cylindrical-probe.

BSuE31

Sagittal-imaging Trans-rectal Optical Tomography Reconstruction with Structural Guidance: Initial Simulative Study, *Guan Xu[1], Cameron Musgrove[1], Charles F. Bunting[1], Hamid Dehghani[2], Daqing Piao[1]; [1]School of Electrical and Computer Engineering, Oklahoma State Univ., USA, [2]School of Physics, Univ. of Exeter, UK.* The reconstruction of sagittal trans-rectal optical tomography for prostate imaging is presented with assumption of structural guidance from trans-rectal ultrasound. The spatial prior combined with Jacobian weighing improves the recovery of lesion depth.

BSuE32

A Proposed Deep Tissue Imaging Scheme Based on Turbidity Suppression Optical Phase Conjugation, *Emily J. McDowell, Zahid Yaqoob, Changhuei Yang; Caltech, USA.* We propose an imaging scheme based on turbidity suppression optical phase conjugation (TSOPC), allowing for depth selective targeting of planes within a turbid medium.

BSuE33

Globally Convergent Reconstruction Algorithm for Diffusion Tomography of Prostate, *Hua Shan[1], Natee Pantong[1], Jianzhong Su[1], Hanli Liu[1], Michael V. Klibanov[2]; [1]Univ. of Texas at Arlington, USA, [2]Univ. of North Carolina at Charlotte, USA.* A new method is presented for reconstruction of optical coefficient from NIRS data with continuous-wave sources. This Globally Convergent Reconstruction scheme has a potential for monitoring prostate cancers with multi-focal inclusions in highly heterogeneous backgrounds.

BSuE34

Diffusion vs. Monte Carlo for Image Reconstruction in Mesoscopic Volumes, *Amir K. Iranmahboob, Elizabeth M. C. Hillman; Lab for Functional Optical Imaging, Dept. of Biomedical Engineering, Columbia Univ., USA.* Diffusion is an attractive choice for imaging in scattering media, yet it is not valid in small or highly absorbing volumes. We explore its validity on image-reconstruction of absorption and scattering contrast in mesoscopic volumes.

BSuE35

An Efficient Jacobian Reduction Method for Image Reconstruction Using Diffuse Optical Tomography, *Matthew E. Eames[1], Brian W. Pogue[2], Phaneendra K. Yalavarthy[2], Hamid Dehghani[1,2]; [1]Univ. of Exeter, UK, [2]Thayer School of Engineering, Dartmouth College, USA.* Using a Jacobian reconstruction method using experimental data, we show a dramatic increase in image reconstruction time in 3-D DOT, without detriment to image quality.

BSuE36

3-D Image-Guided NIR Absorption and Scatter Tomography Using Boundary Element Method, *Subhadra Srinivasan, Colin Carpenter, Brian W. Pogue, Keith D. Paulsen; Thayer School of Engineering, Dartmouth College, USA.* A boundary element method (BEM) was developed for image-guided NIR tomography, using only surface discretization. Fluence was calculated on a patient specific mesh, and reconstruction recovered optical properties (mean error = 6%) in multi-layered media.

BSuE37

Heuristic Analytical Solution of the Time Dependent Radiative Transfer Equation for a Semi-Infinite Medium, *Fabrizio Martelli[1], Angelo Sassaroli[2], Antonio Pifferi[3], Alessandro Torricelli[3], Lorenzo Spinelli[4], Giovanni Zaccanti[1]; [1]Dept. di Fisica, Univ. degli Studi di Firenze, Italy, [2]Dept. of Biomedical Engineering, Tufts Univ., USA, [3]Politecnico di Milano, Italy, [4]Inst. for Photonics and Nanotechnologies, Consiglio Nazionale delle Ricerche, Italy.* The Green's function of the time dependent radiative transfer equation for the semi-infinite medium is derived by an heuristic approach based on the extrapolated boundary condition and an almost exact solution for the infinite medium.

BSuE38

Normalized Adult Head Model for the Image Reconstruction Algorithm of NIR Topography, *Hiroshi Kawaguchi, Eiji Okada; Dept. of Electronics and Electrical Engineering, Keio Univ., Japan.* A normalized head model to estimate spatial sensitivity profiles is constructed for image reconstruction of NIR topography. The image reconstructed with the normalized head model is almost equivalent to that with the customized head model.

BSuE39

A PDE-Constrained Optimization Approach to Optical Tomography, *Xuejun Gu, Andreas H. Hielscher; Columbia Univ., USA.* We report on the first formulation of the inverse problem in optical tomography within the framework of PDE-constrained optimization and combine Newton's method and Krylov subspace solvers, which reduce memory requirements and increase convergence speed.

BSuE40

Parallelization of Transport-Theory Based Optical Tomography Algorithms by Domain Decomposition, *Xuejun Gu, Andreas H. Hielscher; Columbia Univ., USA.* We applied a domain-decomposition method that provides a suitable framework for parallelization of optical tomographic algorithm based on frequency-domain radiative transfer equation. This leads to substantial reduction in memory requirements and increased computation speed.

BSuE41

Source Estimation with Spatial Filter for Fluorescence Diffuse Optical Tomography, *Shinpei Okawa, Yukio Yamada; Univ. of Electro-Communications, Japan.* A spatial filter which estimates a fluorescent source is proposed. Some simulations in CW cases demonstrate that the spatial filters with an update of the forward model successfully localize the distribution of the sources.

BSuE42

Light Transport in Soft Tissue Based on Simplified Spherical Harmonics Approximation to Radiative Transport Equation, *Michael K. Chu[1], Alexander D. Klose[2], Hamid Dehghani[1]; [1]Univ. of Exeter, UK, [2]Dept. of Radiology, Columbia Univ., USA.* The SP_n approximation is implemented into NIRFAST. Results are presented on a small geometry and are shown for SP_1, SP_3 and SP_5. Further work is underway to test the accuracy using Monte Carlo data.

BSuE43

Efficient Solving of Linear Equation Systems for Image Reconstruction in Multispectral Diffuse Optical Tomography, *Bernhard Brendel, Tim Nielsen; Philips Res. Europe, Germany.* We present a modified ART algorithm for reconstruction in multispectral diffuse optical tomography that convergences much faster than conventional ART and CG methods. The comparison of the algorithms is based on reconstruction of simulated data.

BSuE44

Nonlinear Reconstruction of Continuous Wave Diffuse Optical Tomography Using Fitted Diffusion Coefficients, *Ronny Ziegler[1,2], Bernhard Brendel[1], Andy Ziegler[1], Tim Nielsen[1], Herbert Rinneberg[3]; [1]Philips Res. Europe - Hamburg, Germany, [2]Free Univ. of Berlin, Germany, [3]Physikalisch-Technische Bundesanstalt, Germany.* We present a nonlinear DOT reconstruction using CW data collected in cup geometry. An estimated breast shape with fitted optical properties is used as a start image to reach convergence of the nonlinear reconstruction algorithm.

BSuE45

A Simple Convergence Condition for the Born Series in the Forward Problem of Optical Tomography, *Vadim A. Markel[1], John C. Schotland[2]; [1]Dept. of Radiology, Univ. of Pennsylvania, USA, [2]Dept. of Bioengineering, Univ. of Pennsylvania, USA.* We provide a sufficient condition for the convergence of the Born series in the forward problem of optical tomography. The condition depends only on upper bound for the inhomogeneity but not its spatial extent.

BSuE46

Bayesian Techniques in Fluorescence Tomography, *Chaincy Kuo, Brad W. Rice; Xenogen Corp., Caliper Life Sciences, USA.* Fluorescence tomography problems can be ill-posed, particularly when background fluorescence is high. We propose methods to improve robustness and present a new algorithm which reduces the intensity of artifacts.

BSuE47

Fluorescence Diffuse Optical Tomography: A Model Reduction by a Wavelet-Multiresolution Method, *Anne Frassati[1], Anabela da Silva[1], Jean-Marc Dinten[1], Didier Georges[2]; [1]CEA-Léti-Minatec Recherche Technologique, France, [2]Control Systems Dept., GIPSA-lab, France.* The forward model for diffuse optical tomography is established by solving coupled partial differential equations by the finite element method. The aim is to reduce the computation time by using a wavelets decomposition.

BSuE48

Light Propagation in Biological Tissue: A Multiscale Approach, *Alwin Kienle, Jan Schäfer, Rene Michels; Inst. of Lasertechnologies in Medicine and Metrology, Germany.* Light propagation in biological tissue is investigated in three scales. Maxwell equations are applied to consider the tissue's microstructure. Based on these results transport theory and diffusion theory are used to handle large tissue volumes.

BSuE49

Optimal Selection of the Regularization Parameter for Optical Topography Image Reconstruction, *Teresa M. M. Correia, Adam P. Gibson, Jeremy C. Hebden; Univ. College London, UK.* Deblurring and optical topography inverse problems were used to identify an adequate method to select the regularization parameter. The L-curve, the weighted Full Width Half Maximum and the weighted contrast methods produce meaningful image reconstructions.

BSuE50

On the Transition from Ballistic to Diffusive Transport in Highly Scattering Turbid Slabs as Observed in the Angular Spectrum: Monte Carlo Simulations, *Yaqin Chen[1,2], Jörg Peter[1], Wolfhard Semmler[1], Ralf B. Schulz[1,3]; [1]German Cancer Res. Ctr., Germany, [2]Britton Chance Ctr. for Biomedical Photonics, Wuhan Natl. Lab for Optoelectronics, China, [3]Inst. for Biomedical and Molecular Imaging (IBMB), GSF Natl. Ctr. for Health and Environment, Germany.* We study light transport in turbid slabs by an angle-resolved transmission measurement technique. Monte Carlo results show two distinct slopes in attenuation curves, contributing to change from ballistic to diffuse regime with increasing slab thickness.

BSuE51

A Simplified Spherical Harmonics Approximated-Radiation Transport Model for Three Dimensional (3-D) Photon Migration in Small Volume Tissues, *Zhen Yuan[1], Xinhua Hu[2], Huabei Jiang[1]; [1]Dept. of Biomedical Engineering, Univ. of Florida, USA, [2]Dept. of Physics, East Carolina Univ., USA.* We derived simplified spherical harmonics approximated-radiation transport equations in 3-D. We solved the P3 approximated-transport equations using FE methods. We observed the developed model can improve diffusion approximation solutions in transport-like homogeneous or heterogeneous medium.

BSuE52

Telegrapher's Equation for Light Transport in Tissue with Substantial Absorption, *Reindert Graaff[1], Bernhard J. Hoenders[2]; [1]Dept. of Biomedical Engineering, Univ. Medical Ctr. Groningen and Univ. of Groningen, Netherlands, [2]Inst. for Theoretical Physics, Univ. of Groningen, Netherlands.* The applicability of the Telegrapher's Equation was investigated for increasing the accuracy of time-resolved diffusion theory for substantial absorption. The solution in steady-state is accurate within 10% for tissue-equivalent scatterers with any absorption coefficient.

BSuE53

Monte Carlo Model for Incoherent Light Propagation in Human Skin, *Jorge Carlos Gonzalez Trujillo, Jose Angel Mendez Gamboa, Mario Perez Cortes; Univ. Autonoma de Yucatán, Mexico.* We developed a Monte Carlo simulation code for white light absorption and scattering into a seven-layered human skin model. We also model a tumor inside skin and we observed light behavior by its presence.

BSuE54

Comparative Investigation into the Influence on the Measured Radiance Due to Inclusion Location, Size and Contrast for NIR Diffuse Optical Imaging System, *Min-Chun Pan[1], Chien-Hung Chen[1], Liang-Yu Chen[1], Min-Cheng Pan[2]; [1]Natl. Central Univ., Taiwan, [2]Tungnan Univ., Taiwan.* This study investigates the influence on the measured radiance due to an inclusion location, size, and contrast to find regularity with three defined measures for a criterion of judging the limit on the measuring system.

BSuE55

Noninvasive Diffuse Optical Measurement for Monitoring Hemodynamic Response of Radiation Treatment in Head and Neck Tumors, *Shih-Ki Liu[1], Regine Choe[1], Soren D. Konecky[1], Turgut Durduran[1], Ulas Sunar[1], Alex Kilger[2], Harry Quon[2], Britton Chance[2], Arjun G. Yodh[1]; [1]Dept. of Physics and Astronomy, Univ. of Pennsylvania, USA, [2]Dept. of Radiation Oncology, Univ. of Pennsylvania, USA.* This study further explores the feasibility of diffuse optical spectroscopy (DOS) and diffuse correlation spectroscopy (DCS) to measure hemodynamic responses of head and neck tumors during the chemotherapy and radiation therapy.

BSuE56

Diffuse Light Quantification of Peripheral Artery Disease (PAD), *Xiaoman Xing[1], Emile R. Mohler[1], Turgut Duduran[1], Chao Zhou[1], Gwen Lech[1], Arjun Yodh[1], Guoqiang Yu[1,2]; [1]Univ. of Pennsylvania, USA, [2]Univ. of Kentucky, USA.* A diffuse optical instrument has been developed and applied for quantification of skeletal muscle blood flow and oxygenation in patients with peripheral artery disease (PAD). The hemodynamic information differentiates the normal from diseased tissues.

BSuE57

NIRS-Based Quantitative Measurement of Autoregulatory Effects on Microvascular Hemoglobin Oxygenation: Assesment of Differences between Non-Diabetic and Type II Diabetic Subjects, *Onyeoziri R. Nwanguma[1], Harry L. Graber[1,2], Rahul Valluru[1], Randall L. Barbour[1,2]; [1]SUNY Downstate Medical Ctr., USA, [2]NIRx Medical Technologies, LLC, USA.* By examining oxy- and deoxy-hemoglobin NIRS image time series, we have derived indices of the competency of autoregulation. Applying these to data from forearms of type II diabetics and normal subjects reveals statistically significant differences.

BSuE58

Monitoring Muscle Hemodynamics by Time-Domain Near Infrared Spectroscopy during Muscle Contractions Induced by Functional Electrical Stimulation, *Davide Contini[1], Lorenzo Spinelli[1], Alessandro Torricelli[1], Rinaldo Cubeddu[1], Franco Molteni[2], Simona Ferrante[3], Alessandra Pedrocchi[3], Giancarlo Ferrigno[3]; [1]IIT, ULTRAS-INFM-CNR and IFN-CNR, Dept. di Fisica, Politecnico di Milano, Italy, [2]Ctr. di Riabilitazione Villa Beretta, Ospedale Valduce, Italy, [3]NITLAB - TBMLAB, Dept. di Bioingegneria, Politecnico di Milano, Italy.* A time-domain NIRS multichannel system was used to monitor hemodynamic changes in the muscle of six healthy volunteers and four hemiplegic patients during knee flex-extension induced by functional electrical stimulation for rehabilitation purposes.

BSuE59

Detecting Rheumatic Arthritis by Artificial Intelligent Multi-Parameter Classifications of Optical Tomographic Images, *Christian D. Klose[1], Alexander D. Klose[1], Alexander Scheel[2], Uwe Netz[3], Jochen Beuthan[3], Andreas H. Hielscher[1]; [1]Columbia Univ., USA, [2]Univ. of Göttingen, Germany, [3]Free Univ. of Berlin, Germany.* We demonstrate that sensitivity and specificity in detecting rheumatoid arthritis from optical tomographic images can be greatly increased when an artificial intelligent multi-parameter classifications method, called Self-Organizing Mapping (SOM), is used.

BSuE60

Development of a Broadband Multi-Detector NIRS System for Measuring Regional Cerebral Blood Flow, *Mamadou Diop[1,2], Jonathan Elliott[1], Kenneth Tichauer[1,2], Lynn Keenliside[1], Ting-Yim Lee[1,2], Keith St Lawrence[1,2]; [1]Lawson Health Res. Inst., Canada, [2]Dept. of Medical Biophysics, Univ. of Western Ontario, Canada.* Cerebral blood flow can be measured by broadband spectroscopy using water absorption to determine the optical pathlength. An 8-channel system was developed and its ability to track regional flow was tested in a phantom.

BSuE61

NIRS-Based Quantitative Measurement of Autoregulatory Effects on Microvascular Hemoglobin Oxygenation: Concept, Simulations and Experimental Control Studies, *Harry L. Graber[1,2], Yong Xu[1,2], Yaling Pei[2], Randall L. Barbour[1,2]; [1]SUNY Downstate Medical Ctr., USA, [2]NIRx Medical Technologies, LLC., USA.* A general approach is described, wherein the method of functional diffuse optical tomography is used to study responses of vascular autoregulation at a previously unrecognized level of detail. Method validation findings also are presented.

BSuE62

Activation of Lateral Prefrontal Cortex during a Complex Cognitive Task, *Ceyhun E. Kirimli[1], Suna Sumer[2], Sinem B. Erodgan[1], Nermin Topaloglu[1], Ata Akin[1]; [1]Bogazici Univ., Turkey, [2]Uskudar American Acad., Turkey.* FNIRS was used to monitor the physiological changes in the PFC of 10 high school students given a verbal test. Lateral prefrontal cortex, responsible for working memory was observed to be the most activated region.

BSuE63

Hypofrontality in Schizophrenics Evaluated by Near Infrared Spectroscopy, *Sinem Serap[1], Hasan Herken[2], Ata Akin[1]; [1]Inst. of Biomedical Engineering, Bogazici Univ., Turkey, [2]Pamukkale Univ., Turkey.* In this study total of 13 schizophrenic patients and 13 healthy controls were evaluated with fNIRS. The purpose was to measure oxyhaemoglobin and deoxyhaemoglobin concentrations from both groups to support "hypofrontality" hypothesis in schizophrenics patients.

BSuE64

Evaluation of Co-Activation of Antagonistic Muscles Using Near Infrared Spectroscopy, *Burcu S. Erdogan[1], Can A. Yucesoy[1], Peter A. Huijing[2,3], Ata Akin[1]; [1]Bogazici Univ., Turkey, [2]Univ. Twente, Netherlands, [3]Vrije Univ., Netherlands.* Effects of co-activation of isometrically active antagonistic wrist muscles was investigated using near infrared spectroscopy (NIRS). Our results show that NIRS is a promising tool for enhancing our understanding of muscle mechanics during activity.

BSuE65

A Multimodal Non-Invasive Technique for Monitoring Physical Fatigue, *Vishal Saxena[1,2]; [1]AppWave, USA, [2]Univ. of Southern California, USA.* This paper investigates a multimodal imaging approach to study muscle physiology under physical stress. An imaging technique (near-infrared spectroscopy and mid-infrared imaging) is used to monitor the physiological changes that occur during physical fatigue.

BSuE66

Time-Resolved Transmittance of Small Samples: Investigation of Bone Tissue for Diagnostic Purposes, *Paola Taroni[1], Daniela Comelli[1], Andrea Farina[1], Antonio Pifferi[1], Alwin Kienle[2], Eduardo Margallo-Balbás[3], P. J. French[3], Leo J. van Ruijven[4]; [1]Dept. of Physics, Politecnico di Milano, Italy, [2]Inst. für Lasertechnologien in der Medizin und Meßtechnik, Germany, [3]TU Delft, Electronic Instrumentation Lab, Netherlands, [4]Dept. of Functional Anatomy, Academic Ctr. for Dentistry Amsterdam, Netherlands.* Absorption spectra of bone samples, and in turn bone tissue composition, were estimated from time-resolved spectroscopy combined with a model of light propagation in small volumes. Bone optical properties show significant correlation with biological properties.

BSuE67

Time-Resolved *in vivo* Spectroscopy of Human Prostate Evaluated Using White Monte Carlo, *Erik Alerstam[1], Tomas Svensson[1], Margrét Einarsdóttír[2], Katarina Svanberg[2], Stefan Andersson-Engels[1]; [1]Lund Univ., Dept. of Physics, Sweden, [2]Lund Univ. Hospital, Dept. of Oncology, Sweden.* We report on the possibility to do reliable and accurate *in vivo* spectroscopy of human prostate, using time-resolved spectroscopy in combination with Monte Carlo-based data evaluation.

BSuE68

Quantitative Cerebral Metabolism Measurements with NIRS: Application to Neonatal Brain Injury, *Kenneth M. Tichauer[1,2,3], Jennifer Hadway[1,2], Daisy Y. L. Wong[4], R. Jane Rylett[4], Ting-Yim Lee[1,2,3], Keith St. Lawrence[1,2,3]; [1]Lawson Health Res. Inst., Canada, [2]Imaging Res. Labs, Robarts Res. Inst., Canada, [3]Dept. of Medical Biophysics, Univ. of Western Ontario, Canada, [4]Cell Biology Res. Group, Robarts Res. Inst., Canada.* A near-infrared technique has been developed to measure cerebral metabolic rate of oxygen quantitatively and non-invasively at the bedside. The ability of these measurements to diagnose hypoxic-ischemic insult severity was assessed in the newborn piglet.

BSuE69

Water State Measurements on Turbid Thick Tissue Phantoms and *in vivo* Breast Tissues Using Broadband Diffuse Optical Spectroscopy, *So Hyun Chung[1,2], Albert E. Cerussi[1], Catherine Klifa[3], Hyeon-Man Baek[4], Özlem Birgul[4], Gultekin Gulsen[4], Sean I. Merritt[5], David Hsiang[6], Bruce J. Tromberg[1,2]; [1]Beckman Laser Inst., Univ. of California at Irvine, USA, [2]Dept. of Biomedical Engineering, Univ. of California at Irvine, USA, [3]Magnetic Resonance Science Ctr., Radiology, Univ. of California at San Francisco, USA, [4]Tu and Yuen Ctr. for Functional Onco-Imaging, Dept. of Radiological Sciences, Univ. of California at Irvine, USA, [5]Masimo Corp., USA, [6]Dept. of Surgery, Univ. of California at Irvine Health Care, USA.* Molecular disposition of water has been measured non-invasively in the NIR using Diffuse Optical Spectroscopy in thick tissues. The water binding state has provided significant pathological information of breast tissues.

BSuE70

Transillumination Breast Spectroscopy (TiBS): Near-Infrared Optical Spectroscopy to Monitor Bulk Tissue Changes for Breast Cancer Risk Reducing Interventions, *Samantha N. Dick[1], Kristina Blackmore[1], Ellen M. Greenblatt[2], Lothar Lilge[1,3]; [1]Ontario Cancer Inst., Univ. Health Network, Canada, [2]Reproductive Biology Unit, Mount Sinai Hospital, Canada, [3]Div. of Biophysics and Bioimaging, Univ. of Toronto, Canada.* Transillumination Breast Spectroscopy (TiBS) uses near-infrared technology to monitor physiologic changes in bulk breast tissue. Interim analysis demonstrates TiBS's sensitivity towards minor changes on tissue composition, enabling monitoring for efficacy of risk reducing interventions.

BSuE71

Percent Breast Density Using Transillumination Breast Spectroscopy and Partial Least Squares Regression Methods, *Kristina M. Blackmore[1], Lothar Lilge[2]; [1]Mount Sinai Hospital, Canada, [2]Ontario Cancer Inst., Canada.* The ability of transillumination breast spectroscopy to predict percent density is demonstrated using partial least squares regression methods. Optical spectroscopy provides an alternative to mammography assessed density permitting frequent and early use.

BSuE72

Accuracy of the Frequency-Domain Multi-Distance Method to Retrieve the Brain Absorption Coefficient at Different Ages: Monte-Carlo Simulations, *Juliette J. Selb[1], David A. Boas[1], Ellen Grant[2], Maria Angela Franceschini[1]; [1]Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital, USA, [2]Dept. of Radiology, Massachusetts General Hospital, USA.* Using Monte-Carlo simulations in realistic head models segmented from MRI scans, we determine the accuracy of the multi-distance frequency-domain method to recover the brain absorption coefficient from premature infants to adults.

BSuE73

Measurements of Hemoglobin Concentrations in the Human Forehead Using Time-Resolved Reflectance, *Louis Gagnon[1,2], Juliette Selb[3], David A. Boas[3], Rick D. Hoge[2], Frédéric Lesage[1,2]; [1]Inst. de Génie Biomédical, Ecole Polytechnique de Montréal, Canada, [2]Ctr. Recherche Inst. Universitaire de Gériatrie de Montréal, Canada, [3]Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital, USA.* We present *in vivo* measurements of baseline physiology done on the forehead of five subjects with a time-resolved system. Baseline oxyhemoglobin, deoxyhemoglobin, and total hemoglobin concentrations and oxygen saturation are recovered and compared to literature.

BSuE74

Scattering Characterization of TiO_2/Polyurethane Phantom Using Frequency-Domain Optical Imaging, *Banghe Zhu[1], Steven Regalado[1], Vivian Sueiras[1], Thu Huong Nguyen[1], Steven L. Ponder[2], Anuradha Godavarty[1]; [1]Florida Intl. Univ., USA, [2]Imaging Diagnostic Systems Inc., USA.* An optical imaging system employing frequency domain photon migration (FDPM) technique is used to characterize the TiO_2/polyurethane optical phantoms. A standardized model relating the reduced scattering coefficient and the concentration of TiO_2 scatters is derived.

BSuE75

Spectral Extension of Time-Resolved Transmittance Spectroscopy up to 1100 nm for the *in vivo* Quantification of Collagen in Breast Tissue, *Paola Taroni, Andrea Bassi, Daniela Comelli, Antonio Pifferi, Rinaldo Cubeddu; Dept. of Physics, Politecnico di Milano, Italy.* The extended optical characterization of collagen (610-1080 nm) revealed an absorption peak (1020 nm) of interest to quantify collagen *in vivo*, as shown by the first absorption spectra of breast measured over the same range.

BSuE76

A Hybrid Multi-Distance Phase and Broadband Spatially Resolved Algorithm for Resolving Absolute Concentrations of Chromophores in the Near-Infrared Light Spectrum: Results from Studies in Dynamic Phantoms, *Ilias Tachtsidis[1], Terence S. Leung[1], Bilal Tahir[1], Clare E. Elwell[1], Matthias Kohl-Bareis[2], Markus Gramer[2], Chris E. Cooper[3]; [1]Univ. College London, UK, [2]RheinAhrCampus Remagen, Germany, [3]Univ. of Essex, UK.* We report a novel methodology that combines NIR multi-distance frequency and broadband spectrometers to quantify chromophores in a turbid media by using spatially resolved algorithm. Preliminary results showed good agreement between theoretical and calculated concentrations.

BSuE77

Investigating Cross-Talk in Cytochrome C Oxidase Concentration Quantification Using Near Infrared Spectroscopy in a Two-Layered Model, *Terence S. Leung[1], Ilias Tachtsidis[1], Clare E. Elwell[1], Martin Tisdall[2], Caroline Pritchard[2], Martin Smith[2], Chris Cooper[3]; [1]Dept. of Medical Physics and Bioengineering, Univ. College London, UK, [2]Natl. Hospital for Neurology and Neurosurgery, UK, [3]Dept. of Biological Sciences, Univ. of Essex, UK.* The cross-talk issue in the quantification of concentration changes in oxidized cytochrome c oxidase in the human head has been investigated using a two layered model representing the scalp/skull and brain layers.

BSuE78

The Spatial Sensitivity Profile for Various Source Detector Separations in NIR to Eliminate Skin Effect in Brain Imaging, *Ahu N. Turkoglu, Ayse E. Ercan, Omer Sayli, Deniz Nevsehirli, Ata Akin; Bogazici Univ., Turkey.* We investigated the contribution of photons crossing the surface by liquid phantom experiments and MCML simulations. The first 3mm is found to be negligible in an array probe design eliminating skin contamination on NIRS measurements.

BSuE79

Comparison of Parametric and Non-Parametric Data Analysis Packages for Near-Infrared Spectroscopy Functional Activation Studies, *Anna Blasi[1], Peck Hui Koh[1], Clare E. Elwell[1], Sarah Fox-Lloyd[2], Sotaro Shimada[3]; [1]Univ. College London, UK, [2]Ctr. for Brain and Cognitive Development (CBCD), Babylab, School of Psychology, Birkbeck College, Univ. of London, UK, [3]Meiji Univ., Japan.* NIRS data from functional activation studies in two infants was processed using parametric and non-parametric approaches for optical topography signal analysis. The choice of analysis approach and data rejection strategies are important.

BSuE80

Steady-State Reflectance Spectroscopy Used to Quantify Hemodynamic and Optical Properties of Tissue: Demonstration of Heterogeneities of Human Prostrates, *Dheerendra Kashyap[1], Disha Peswani[1], Jeffrey A. Cadeddu[2], Hanli Liu[1]; [1]Univ. of Texas at Arlington, USA, [2]Univ. of Texas Southwestern Medical Ctr. at Dallas, USA.* Heterogeneities in hemoglobin derivative concentrations and light scattering properties taken from *ex vivo* human prostate glands are demonstrated by using steady-state, single source-detector separation (1-3 cm) reflectance spectroscopy.

BSuE81

Fluorescence Lifetime Discrimination of Two Fluorophores with a Full-Field Time-Domain System, *Ulaş Sunar, Salman Farshchi, David J. Hall; Univ. of California at San Diego, USA.* We utilized full-field time domain system to simultaneously image two fluorophores, and discriminated them via their fluorescence lifetime contrast. Lifetime contrast allowed the individual fluorophore pharmacokinetics to be measured in different organs.

BSuE82

Design Considerations for a Combined MicroCT and Fluorescence Diffuse Optical Tomography System, *Dax Kepshire[1], Niculae Mincu[2], Michael Hutchins[2], Frederic Leblond[2], Brian W. Pogue[1], Mario Khayat[2]; [1]Thayer School of Engineering, USA, [2]Advanced Res. Technologies, ART Inc., Canada.* An imaging system combining X-ray microCT and fluorescence diffuse optical tomography is being developed for small animal functional imaging. The methodology for selecting the optimal source-detector geometry and subsequent system design are presented.

BSuE83

DOT Guided Quantitative Fluorescence Molecular Tomography with a Fiber-Free Multi-Angle Non-Contact Transmission System, *Yiyong Tan, Huabei Jiang; J. Crayton Pruitt Family Dept. of Biomedical Engineering, Univ. of Florida, USA.* Diffuse optical tomography (DOT) guided quantitative fluorescence molecular tomography (FMT) is implemented by a non-contact, multi-angle transmission system based on finite element algorithms. This DOT guided FMT approach is evaluated using extensive phantom experiments.

BSuE84

Three-Dimensional Bioluminescence Tomography Assisted by Diffuse Optical Tomography, *Qizhi Zhang, Lu Yin, Yiyong Tan, Zhen Yuan, Huabei Jiang; Universoty of Florida, USA.* We present experimental evidence that the quantitative accuracy of bioluminescence tomography (BLT) can be significantly improved by incorporating prior spatial distribution of optical properties of heterogeneous media obtained from diffuse optical tomography (DOT).

BSuE85

Transport Theory-Based Multi-Spectral Imaging of Tissue Chromophores Concentrations, *Hyun Keol Kim, James Masciotti, Andreas Hielscher; Columbia Univ., USA.* We introduce a transport-theory multi-spectral inverse method for direct recovery of the chromphores concentrations inside tissues. Numerical and experimental results show that the direct method produces more accurate results than the conventional approach.

BSuE86

Near Infrared Fluorescent Imaging of Tumor Boundaries Using Tissue Transglutaminase Substrates, *Chia-Pin Pan[1], Khalid Amin[1], Yihui Shi[1], Jeanne P. Haushalter[1], Charles S. Greenberg[2], Zishan Haroon[1], Gregory W. Faris[1]; [1]SRI Intl., USA, [2]Duke Univ. Medical Ctr., USA.* A novel strategy is developed to optically image tumor boundaries by cross-linking near infrared fluorescent-labeled tissue transglutaminase substrates into tumor boundary tissue.

BSuE87

Sensitivity Analysis of Fluorescence Signals for Diffuse Optical Imaging of Small Animals, *Matthieu Boffety[1,2], Anne Sentenac[3], Marc Allain[3], Marc Massonneau[2], Rémi Carminati[1]; [1]Lab EM2C - Ecole Centrale Paris, France, [2]Quidd SAS, France, [3]Inst. Fresnel, Univ. Aix-Marseille, France.* We study the sensitivity of a fluorescence diffuse optical tomography system to the fluorophores depth in a brain-skull geometry, using an advanced photon transport equation and a statistical analysis accounting for a noise model.

BSuE88

Time-Resolved Scanning Molecular Imaging System for Small Animals, *Marco Brambilla, Lorenzo Spinelli, Alessandro Torricelli, Antonio Pifferi, Rinaldo Cubeddu; Politecnico di Milano, Italy.* We present a compact system for small animals fluorescence imaging capable of producing projective images of the fluorophore distribution into the sample with 4mm spatial resolution and 200fmol sensitivity, independently from inclusion position.

BSuE89

A Method for Improving the Spatial Resolution of Images Acquired with a Flat Microlens-Coupled Detector, *Daniel Unholtz, Ralf B. Schulz, Wolfhard Semmler, Jörg Peter; German Cancer Res. Ctr., Germany.* An iterative subtraction method that improves a recently developed mapping algorithm is presented. This approach allows high-resolution image calculation from acquired sensor data of a very flat optical detector assembly based on a microlens array.

BSuE90

A New Water-Soluble Near-Neutral Ratiometric Fluorescent pH Indicator, *Sheng Yao[1], Katherine J. Schafer-Hales[2], Kevin D. Belfield[1]; [1]Univ. of Central Florida-CREOL, USA, [2]Emory Univ. School of Medicine, USA.* We report a new near-neutral pH indicator whose pKa of ~7.0 was determined by both absorption and fluorescence methods. It has a distinctive isoemissive point, good dispersion in cell cytosol, and low cytotoxicity.

BSuE91

Fluorene-Based Two-Photon Fluorescent Probes for Specific Biomolecule Labeling and Oligopeptide Conjugation, *Alma R. Morales[1], Katherine J. Schafer-Hales[2], Kevin D. Belfield[1]; [1]Univ. of Central Florida, USA, [2]Winship Cancer Inst., Emory Univ. School of Medicine, USA.* Two-photon absorbing amine-reactive fluorenyl-based probes were synthesized for biomolecule labeling and oligopeptide conjugation. Conventional and two-photon fluorescence microscopy imaging of H1299 and HeLa cells, incubated with novel efficient two-photon absorbing fluorescent probes, is demonstrated.

BSuE92

Fluorescent Images of *in situ* Mouse Ischemic Colons, *Mahsa Ranji, Shoko Nioka, Britton Chance; Univ. of Pennsylvania, USA.* The redox ratio known as NADH/(Fp+NADH), gives a measure of steady-state tissue metabolism. Fluorescent redox images of the healthy and dead mouse colons showed a significant reduction of redox ratio due to sever ischemia.

St. Petersburg Ballroom
3:30 p.m.–4:00 p.m.
Coffee Break

BSuF • Plenary I: Workshop on Contrast for *in vivo* Imaging

Grand Bay Ballroom North and South
4:00 p.m.–6:30 p.m.
BSuF • Plenary I: Workshop on Contrast for *in vivo* Imaging
Elizabeth M. Hillman; Columbia Univ., USA, Presider

BSuF1 • 4:00 p.m. Invited

Applications and Directions in Fluorescence Guided Surgical Interventions, *Stephen J. Lomnes; GE Global Res., USA.* A key applications space for advanced optical imaging and sensing technologies and molecular imaging agents is in aiding surgical and interventional procedures. Challenges and opportunities in the clinical translation of these technologies are discussed.

BSuF2 • 4:30 p.m. **Plenary**

Optical Molecular Imaging to Aid in Cancer Screening: Challenges of Clinical Translation, *Rebecca Richards-Kortum[1], David Javier[1], Sharmila Ananda[2], Ann Gillenwater[2]; [1]Rice Univ., USA, [2]MD Anderson Cancer Ctr., USA.* We review progress toward clinical application of optical molecular imaging for detection of precancer. We discuss: biomarker selection, contrast agent development, development of high resolution optical imaging systems, and regulatory approval for pilot clinical studies.

BSuF3 • 5:00 p.m. **Plenary**

Optical Imaging of Breast Cancer from an Industrial Perspective, *Martin B. van der Mark[1], Leon Bakker[1], Michiel van Beek[1], Claas Bontus[2], Bernhard Brendel[2], Rick Harbers[1], Thomas Koehler[2], Anais Leproux[1], Tim Nielsen[2], Marjolein van der Voort[1], Falk Uhleman[2], Andrea Wiethoff[3], Ronny Ziegler[2], Andy Ziegler[2], Kai Licha[4], Lueder Fels[4], Martin Pessel[4], Stephanie van de Ven[5], Sjoerd Elias[5], Willem Mali[5], Peter Luijten[5]; [1]Philips Res. Europe-Eindhoven, Netherlands, [2]Philips Res. Europe-Hamburg, Germany, [3]Philips Medical Systems-Best, Netherlands, [4]Bayer-Schering Pharma, Germany, [5]Univ. Medical Ctr. Utrecht, Netherlands.* This paper discusses our diffuse optical tomography system, the proof-of-principle results obtained in phantoms studies, our initial experience in patients and the impact on the breast cancer care cycle.

BSuF4 • 5:30 p.m. **Plenary**

Clinical Molecular Imaging in the Gastrointestinal Tract, *Thomas D. Wang; Univ. of Michigan, USA.* Fluorescent-labeled peptides are being developed as molecular probes to target pre-cancerous tissue *in vivo* for imaging with novel methods of wide area endoscopy and confocal microscopy as a guide for biopsy in the gastrointestinal tract.

NOTES

•Monday, March 17, 2008•

Conference Registration
7:00 a.m.–6:00 p.m.
Registration Open

BMA • Plenary II: Strategies for Functional Imaging and Diagnostics

Grand Bay Ballroom North and South
7:30 a.m.–10:00 a.m.
BMA • Plenary II: Strategies for Functional Imaging and Diagnostics
Joseph P. Culver; Washington Univ. in St. Louis, USA, Presider

BMA1 • 7:30 a.m. Tutorial
Photoacoustic Microscopy and Computed Tomography, *Lihong V. Wang; Washington Univ. in St. Louis, USA.* A pulsed laser produces a rapid small temperature rise in biological tissue, which leads to emission of ultrasonic waves due to thermoelastic expansion. The short-wavelength ultrasonic waves are then detected to form high-resolution tomographic images.

BMA2 • 8:15 a.m. Invited
High Resolution Photoacoustic Imaging for Characterizing Vascular Anatomy and Function, *Paul C. Beard; Univ. College London, UK.* A novel high resolution optical ultrasound imaging system has been developed and used to obtain 3-D images of the superficial vascular anatomy of the mouse brain, skin and implanted tumours and demonstrate the quantitative spectroscopic capability of the technique.

BMA3 • 8:45 a.m. Invited
Activatable Fluorescence Probes for the Cancer-Cell Specific Molecular Imaging of Cancer, *Hisataka Kobayashi; Natl. Cancer Inst., NIH, USA.* Activatable fluorescence probes dramatically improve the target-to-background signal ratios compared with conventional probes. By applying such activatable probes to cancer-specific cell-surface markers it should be possible to improve the sensitivity and specificity of cancer imaging.

BMA4 • 9:15 a.m. Invited
Optical Biomarkers in Breast Cancer, *Nirmala Ramanujam; Dept. of Biomedical Engineering, Duke Univ., USA.* This work focuses on the identification of optical biomarkers in solid tumors in the breast and early neoplastic transformations in stratified squamous epithelial tissues. Biomarkers can potentially provide early cancer identification and guide treatment decisions.

St. Petersburg Ballroom
10:00 a.m.–10:30 a.m.
Coffee Break

St. Petersburg Ballroom
10:00 a.m.–4:00 p.m.
Exhibits Open

BMB • OCT and Ophthalmic Applications

Grand Bay Ballroom North
10:30 a.m.–12:30 p.m.
BMB • OCT and Ophthalmic Applications
Wolfgang Drexler; Cardiff Univ., UK, Presider

BMB1 • 10:30 a.m. Tutorial
Fourier Domain OCT and its Applications, *Joseph Izatt; Dept. of Biomedical Engineering, Duke Univ., USA.* Abstract not available.

BMB2 • 11:15 a.m. Invited
Ophthalmic Applications of Birefringence and Flow Contrast Optical Coherence Tomography, *Yoshiaki Yasuno; Univ. of Tsukuba, Japan.* Further contrast mechanisms of ophthalmic optical coherence tomography (OCT) are summarized. The contrast mechanisms include scattering optical coherence angiography (S-OCA), Doppler OCA (D-OCA), and polarization sensitive OCT (PS-OCT).

BMB3 • 11:45 a.m.
Toward *in vivo* Imaging of Photoreceptor Morphology and Function, *Boris Hermann[1], Cris Torti[1], Enrique J. Fernández[2], Peter Ahnelt[3], Boris Povazay[1], Bernd Hofer[1], Angelika Unterhuber[1], Alison Binns[1], Tom Margrain[1], Wolfgang Drexler[1]; [1]School of Optometry and Vision Inst., Cardiff Univ., UK, [2]Lab de Optica, Univ. de Murcia, Spain, [3]Dept. of Physiology, Medical Univ. of Vienna, Austria.* The integration of adaptive optics and an achromatizing lens into an ultra-high resolution OCT system enables three-dimensional imaging of photoreceptor morphology. Optophysiology might lead to the extraction of depth-resolved information about retinal function.

BMB4 • 12:00 p.m.
Ultra High-Resolution Optical Coherence Tomography for Non-Contact Ocular Imaging of Small Animals, *Marco Ruggeri, Hassan Wehbe, Shuliang Jiao, Jianhua Wang, Maria Elena Jockovich, Philip J. Rosenfeld, James C. Major, Craig McKeown, Carmen A. Puliafito; Bascom Palmer Eye Inst., USA.* An ultra-high resolution spectral domain OCT system was built for non-contact imaging of retina and anterior segment of small animals. Short imaging time and high imaging quality make the system promising for high throughput applications.

BMB5 • 12:15 p.m.

High Speed, Spectrometer Based Optical Coherence Tomography at 1050 nm for Isotropic 3-D OCT Imaging and Visualization of Retinal and Choroidal Vasculature, *Boris Považay, Boris Hermann, Vedran Kajić, Bernd Hofer, Wolfgang Drexler; Cardiff Univ., UK.* Spectrometer based optical coherence tomography at 1050nm with >70nm of spectral bandwidth, acquiring 48k depth scans per second for deeper penetration and isotropic visualisation of the full three dimensional choroidal vasculature is demonstrated *in vivo*.

BMC • Reconstruction Methods for Diffuse Optical Tomography

Grand Bay Ballroom South

10:30 a.m.–12:30 p.m.

BMC • Reconstruction Methods for Diffuse Optical Tomography

Andreas Hielscher; Columbia Univ., USA, Presider

BMC1 • 10:30 a.m.

Improved Sensitivity by Applying Spectral Unmixing Prior to Fluorescent Tomography, *Heng Xu, Chaincy Kuo, Brad Rice; Caliper Life Sciences, USA.* Spectral unmixing technique was applied to the fluorescent tomography data acquired at multiple wavelengths to reduce the unwanted fluorophore signals and significantly improved the sensitivity and localization of the target fluorophore.

BMC2 • 10:45 a.m.

Multispectral Fluorescence Enhanced Diffuse Optical Tomography Evaluated with Weight Matrix Free Algorithm, *Pontus Svenmarker[1], Johan Axelsson[1], Martin Schweiger[2], Athanasios Zacharopoulos[2], Simon R. Arridge[2], Stefan Andersson-Engels[1]; [1]Dept. of Physics, Lund Univ., Sweden, [2]Dept. of Computer Science, Univ. College London, UK.* We present a novel multispectral scheme for fluorescence enhanced diffuse optical tomography. Reconstructions are performed using a weight matrix free algorithm. Initial multispectral reconstructions are shown.

BMC3 • 11:00 a.m.

Inferring Intra-Myocardial Electrical Wave Orientation from Epi-Fluorescence Recordings in Cardiac Tissue: Sensitivity to the Photon Transport Model, *Olivier Bernus[1], Christian W. Zemlin[2], Arvydas Matiukas[2], Arkady M. Pertsov[2], Christopher J. Hyatt[2]; [1]Univ. of Leeds, UK, [2]SUNY Upstate Medical Univ., USA.* The subsurface electrical wave orientation in cardiac tissue is inferred from epi-fluorescence measurements. It is calculated using coupled electrophysiological and photon transport models. We compare Monte Carlo and diffusion based models, showing only minor differences.

BMC4 • 11:15 a.m.

Image Reconstruction in Spectrally Resolved 3-D Bioluminescence Tomography Using the Adjoint Theorem, *Hamid Dehghani[1], Scott C. Davis[2], Brian W. Pogue[2]; [1]Univ. of Exeter, UK, [2]Dartmouth College, USA.* Spectrally-resolved BioLuminescence Tomography is used to image Luciferase activity within a 3-D model. The Adjoint theorem for 3-D image reconstruction is presented and validated using experimental data with a complete computation time of 5 minutes.

BMC5 • 11:30 a.m.

Optical Tomography with Large Data Sets and Analytic Reconstruction Formulas, *Soren D. Konecky, George Y. Panasyuk, Kijoon Lee, Vadim A. Markel, Arjun G. Yodh, John C. Schotland; Univ. of Pennsylvania, USA.* We use diffuse optical tomography to reconstruct images of complex phantoms with subcentimeter features. A noncontact scanner collects large data sets of over 10^8 measurements. Images are reconstructed using a fast analytic inversion formula.

BMC6 • 11:45 a.m.

Enhanced NIR Spectral Reconstruction with Ti:Sapphire Laser Based FD System, *Jia Wang, Shudong Jiang, Brian W. Pogue, Keith D. Paulsen; Dartmouth College, USA.* A Ti:Sapphire laser based frequency-domain NIR tomography system was created with custom heterodyne detection. Gelatin phantom imaging with varying numbers of wavelengths showed superior recovery of hemoglobin concentration with increasing wavelengths included.

BMC7 • 12:00 p.m.

Feasibility of 3-D Frequency-Domain Fluorescence Lifetime Imaging Based on Laminar Optical Tomography, *Baohong Yuan[1], Elizabeth M. C. Hillman[2]; [1]Catholic Univ. of America, USA, [2]Columbia Univ., USA.* Feasibility of a 3-dimensional fluorescence lifetime imaging within small tissue volumes with high spatial resolution is discussed. A high resolution in lifetime can also be obtained if high accuracy of phase measurement can be achieved.

BMC8 • 12:15 p.m.

Bioluminescence Tomography with SP_3 Equations, *Alexander D. Klose[1], Bradley J. Beattie[2]; [1]Columbia Univ., USA, [2]Memorial Sloan Kettering Cancer Ctr., USA.* We have developed an image reconstruction algorithm for bioluminescent sources based on the SP_N approximation. Tritium gas powered light sources were reconstructed in a small animal and image reconstructions were compared to co-registered CT images.

12:30 p.m.–1:30 p.m.

Lunch Break

BMD • BIOMED Poster Session II

Foyer
1:30 p.m.–3:30 p.m.
BMD • BIOMED Poster Session II

BMD1
NIRS-Based Quantitative Measurement of Autoregulatory Effects on Microvascular Hemoglobin Oxygenation: Applications to Assessment of Traumatic Brain Injury, *Randall L. Barbour[1,2], Gerald T. Voelbel[3], Jean Lengenfelder[3], Glenn Wylie[3], Yaling Pei[2], Harry L. Graber[1,2], John DeLuca[3]; [1]SUNY Downstate Medical Ctr., USA, [2]NIRx Medical Technologies, LLC., USA, [3]Kessler Medical Rehabilitation Res. and Education Ctr., USA.* We have developed a method for dividing the hemoglobin signal into six discrete categories that correspond to different states of vascular autoregulation. Here we use it to reveal physiologically meaningful differences among three subject groups.

BMD2
Validation of Optical Measurements of Cerebral Blood Flow and Volume with SPION and ASL fMRI, *Stefan A. Carp, Young R. Kim, Guangping Dai, David A. Boas, Maria Angela Franceschini; Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital, USA.* We attempt to validate optical measurements of cerebral blood volume and blood flow in a rat model during a hypercapnic challenge using functional MRI. Initial results show good correlation between optical measurements and MR results.

BMD3
Investigating Neurovascular Coupling in Rat Brain with Optical Imaging and Physiological Modeling, *Rickson C. Mesquita[1], Meryem A. Yucel[2], Ata Akin[2], Anna Devor[3,4], Theodore J. Huppert[5], David A. Boas[4]; [1]State Univ. of Campinas, Brazil, [2]Bogazici Univ., Turkey, [3]Univ. of California at San Diego, USA, [4]Massachusetts General Hospital, USA, [5]Univ. of Pittsburgh, USA.* Using parametric stimulation applied to somat-sensory cortex in rats, we were able to predict oxygenation changes measured with optical spectroscopy from neuronal activity by two different and independent approaches.

BMD4
System Identification of Prefrontal Cortex in the Presence of Cognitive Tasks, *Sergül Aydöre[1], Kıvanç Mıhçak[2], Ata Akın[3]; [1]Electrical and Electronic Engineering Dept., Boğaziçi Univ., Turkey, [2]Electrical and Electronic Engineering Dept., Bogaziçi Univ., Turkey, [3]Inst. of Biomedical Engineering, Boğaziçi Univ., Turkey.* This paper explains the connectivity between regions of prefrontal cortex by using statistical and algebraic methods and shows the differences between healthy and schizophrenic people, which may lead to the explanation for their concentration difficulties.

BMD5
Fast Optical Signal Not Detected in Awake Behaving Monkeys, *Harsha Radhakrishnan, Helen Deng, Leeland Ekstrom, Wim Vanduffel, Maria Angela Franceschini; Athinoula A. Martinos Ctr. for Biomedical Imaging, USA.* In awake monkeys during visual stimulation, we were able to measure hemodynamic responses and visual evoked potentials with optimal SNR, but failed to detect any fast optical signal. The usefulness of this signal is questioned.

BMD6
ARX Model Approach to Data Acquired from Healthy and Migraine Subjects, *Esin Karahan[1], Ata Akın[1], Hayrünnisa Bolay[2]; [1]Inst. of Biomedical Engineering, Boğaziçi Univ., Turkey, [2]Dept. of Neurology, Gazi Univ., Turkey.* This study investigates the brain hemodynamic responses of migraine and healthy subjects to breathholding task with ARX model. Analysis has shown that the amplitude of peak response of migraineurs is five folds smaller ($p<0.05$).

BMD7
Intrinsic Optical Imaging of the Rat Lumbar Spinal Cord, *Nicolas Brieu[1], Eric Beaumont[2], Frédéric Lesage[1]; [1]Ecole Polytechnique, Canada, [2]Univ. de Montréal, Canada.* The neuronal activity in the spinal cord of the rat was studied with intrinsic optical imaging. Hemodynamic responses and activation areas were reproducibly identified by using both bloc and continuous stimulation and associated processing.

BMD8
Simultaneous Acquisition of Time-Domain fNIRS and fMRI during Brain Cortex Activity, *Davide Contini[1], Alessandro Torricelli[1], Antonio Pifferi[1], Lorenzo Spinelli[1], Rinaldo Cubeddu[1], Luca Nocetti[2], Carlo A. Porro[3], Patrizia Baraldi[3]; [1]IIT, ULTRAS-INFM-CNR and IFN-CNR, Dept. di Fisica, Politecnico di Milano, Italy, [2]Azienda Ospedaliera-Univ. di Modena, Italy, [3]Dept. di Scienze Biomediche, Univ. di Modena e Reggio Emilia, Italy.* A time-domain fNIRS system was developed for simultaneous acquisition with fMRI. Preliminary results indicate the potentiality of the system. To our knowledge this is the first time-domain fNIRS and fMRI study on human brain.

BMD9

Depth Selectivity in Time-Domain Optical Brain Imaging Based on Time Windows and Moments of Time-of-Flight Distributions, *Heidrun Wabnitz[1], Adam Liebert[2], Davide Contini[3], Lorenzo Spinelli[3], Alessandro Torricelli[3]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Inst. of Biocybernetics and Biomedical Engineering, Poland, [3]IIT, ULTRAS-INFM-CNR, IFN-CNR, Dept. di Fisica, Politecnico di Milano, Italy.* Different approaches to discriminate between cerebral and extracerebral absorption changes are compared by means of diffusion and Monte-Carlo simulations and applied to functional stimulation experiments. The influence of instrument response and signal-to-noise ratio are discussed.

BMD10

Generalized Linear Models to Interpret Time Domain NIRS: Effect of a Prolonged Stimulation on Cerebral Hemodynamics, *Michele Butti[1], Giuseppe Baselli[1], Anna M. Bianchi[1], Matteo Caffini[2], Davide Contini[2], Lorenzo Spinelli[2], Alessandro Torricelli[2], Sergio Cerutti[1], Rinaldo Cubeddu[2]; [1]Politecnico di Milano, Dept. di Bioingegneria, IIT Unit, Italy, [2]IIT, ULTRAS-INFM-CNR and IFN-CNR, Politecnico di Milano Dept. di Fisica, Italy.* A Generalised Linear Model (GLM) was used to interpret time domain NIRS data during a Go-NoGo task to identify cerebral areas activated during a sustained attention protocol in a control group.

BMD11

Self-Adaptive Method to Uncouple Cortex-Related Brain Activation from Superficial Effects, *Antonio Pifferi, Lorenzo Spinelli, Davide Contini, Alessandro Torricelli, Rinaldo Cubeddu; IIT, ULTRAS-INFM-CNR and IFN-CNR, Dept. di Fisica, Politecnico di Milano, Italy.* A method for separating upper from lower layer changes in time-resolved functional brain imaging is presented, and applied to the brain monitoring of a finger tapping exercise, permitting to uncouple superficial from deeper activation.

BMD12

Depth-Resolved Imaging of Stimulus Evoked Fast Intrinsic Optical Signals Associated with Retinal Activation, *Xincheng Yao, Youbo Zhao, Chris Gorga; Univ. of Alabama at Birmingham, USA.* A near infrared video microscopy was constructed to do depth-resolved imaging from photoreceptor and inner layers of isolated retina. Dynamic functional images disclosed transient intrinsic optical changes associated with activities of photoreceptors and postsynaptic neurons.

BMD13

Nonlinearity of Hemodynamic Response in Motor Cortex Measured by Near Infrared Spectroscopy, *Vikrant Sharma[1,2], Gopinath Kaundinya[3], Renuka Parlapalli[1], Richard Briggs[3], Hanli Liu[1]; [1]Univ. of Texas at Arlington, USA, [2]Baylor Res. Inst., USA, [3]Univ. of Texas Southwestern Medical Ctr. at Dallas, USA.* Nonlinearity of hemodynamic response is used to decouple neuronal activity by modeling neural adaptation. This study is to investigate the nonlinearity in oxy-hemoglobin and deoxy-hemoglobin concentrations obtained using near infrared spectroscopy by varying stimulus durations.

BMD14

Real-Time Assessment of Mental Workload with Near-Infrared Spectroscopy: Potential for Human-Computer Interaction, *Sergio Fantini, Angelo Sassaroli, Yunjie Tong, Leanne H. Hirshfield, Audrey Girouard, Erin Treacy Solovey, Robert J. K. Jacob; Tufts Univ., USA.* We used machine learning techniques to analyze functional near-infrared spectroscopy (fNIRS) data from the brain of human subjects to classify different levels of mental workload. Preliminary results show potential for fNIRS in human-computer interaction research.

BMD15

Statistical Data Analysis in Functional Near Infrared Spectroscopy of the Brain in a Low Signal to Noise Ratio Regime, *Angelo Sassaroli, Yunjie Tong, Christian Benes, Sergio Fantini; Tufts Univ., USA.* We present some shortcomings of the standard t-test when it is applied to multiple comparisons. We propose an algorithm (Dubey/Armitage-Parmar) that represents a better compromise between statistical errors of type I and type II.

BMD16

High-Speed Optical Recordings of Excitability Changes in Neuronal Tissue, *Martin Muschol; Univ. of South Florida, USA.* Using optical recordings of electrical activity, we have investigated whether stimulation patterns affects the excitability of neurohypophysial axons. We find that different stimulation pattern significantly alter axonal excitability which, in turn, underlies neurohypophysial hormone release.

BMD17

A Multimodal Non-Invasive, *in vivo* Technique for Monitoring Vascular Status of Tumors, *Vishal Saxena; Univ. of Southern California & Appwave, USA.* The brain tumor vascularization is studied by nearinfrared spectroscopy technique for measuring hemoglobin dynamics and, the findings are correlated with magnetic resonance imaging and conventional histopathological procedures to capitalize on the strengths of each method.

BMD18

NIR Imaging of Labeled Human Neural Tissue: Computational Feasibility Studies, *Sergei I. Turovets[1], Don M. Tucker[2]; [1]NeuroInformatics Ctr., Univ. of Oregon, USA, [2]Electrical Geodesics, Inc, USA.* Simulations are done to explore feasibility of fDOT for imaging the human brain lesions. A FD layered slab model for intracranial tumors is developed and the capacity of NIR fluorescent signals for detection is predicted.

BMD19

Joint Attention Studies Using Diffuse Optical Imaging, *Nitin Yadav, Banghe Zhu, Anuradha Godavarty; Florida Intl. Univ., USA.* Optical imaging was performed on healthy adults to study the responses of the brain to social interactive tasks. Differences in activation in the pre-frontal brain regions was observed in response to joint attention based paradigms.

BMD20

fNIR Data Classification Using Wavelet Transforms and Neural Networks for Attention Monitoring, *Alireza Akhbardeh, Meltem Izzetoglu, Scott Bunce, Kambiz Pourrezaei, Banu Onaral; Drexel Univ., School of Biomedical Engineering, USA.* This study investigates the potential of wavelet transforms and two different neural classifiers on the classification of fNIR data for automated attention monitoring. It showed that fast and accurate classification of targets/non-targets is reachable.

BMD21

Neurovascular Coupling in the Human Visual Cortex Studied by Diffusing-Wave Spectroscopy (DWS) and Electroencephalography, *Markus Ninck[1], Leonie Koban[1], Jun Li[1], Franck Jaillon[1,2], Gregor Dietsche[1], Thomas R. Elbert[1], Johanna Kissler[1], Thomas Gisler[1]; [1]Univ. Konstanz, Germany, [2]Natl. Univ. of Singapore, Singapore.* We use diffusing-wave spectroscopy (DWS) and electroencephalography (EEG) to detect visual activity in humans elicited by steady-state flickering.

BMD22

A Simultaneous NIRS-EEG Study of Seizure in the Mouse Brain, *Seungduk Lee[1], Minah Lee[2], Dalkwon Koh[1], Beop-Min Kim[1], Jee Hyun Choi[2]; [1]Dept. of Biomedical Engineering, Yonsei Univ., Republic of Korea, [2]Korea Inst. of Science and Technology, Republic of Korea.* We measured hemodynamic responses of seizure in the mouse brain using frequency-domain near infrared spectroscopy and electroencephalogram. Our results show that the cerebral oxygenation and hemodynamics in the mouse brain can be stably monitored.

BMD23

Linear Image Reconstruction for a Diffuse Optical Mammography System in a Non-Compressed Geometry Using Scattering Fluid, *Tim Nielsen, Bernhard Brendel, Ronny Ziegler, Falk Uhlemann, Claas Bontus, Thomas Koehler; Philips Res. Europe, Germany.* We present a linear reconstruction scheme for diffuse optical mammography. We show that the reconstruction has to be initialized properly if there is a mismatch between the optical properties of scattering fluid and breast tissue.

BMD24

A Multi-Modality Image Reconstruction Platform for Diffuse Optical Tomography, *Qianqian Fang[1], Stefan A. Carp[1], Juliette Selb[1], Richard Moore[1], Daniel B. Kopans[1], Eric L. Miller[2], Dana H. Brooks[3], David A. Boas[1]; [1]Massachusetts General Hospital, USA, [2]Tufts Univ., USA, [3]Northeastern Univ., USA.* We present a software platform for image reconstruction and data analysis for diffuse optical tomography. The structure, algorithm and functionalities of the platform are reported together with the sample results produced by the platform.

BMD25

Continuous Wave and Time-Resolved Fluorescence Diffuse Optical Tomography: Comparison for Different Lifetimes and Optical Properties, *Nicolas Ducros[1], Anabela da Silva[1], Jean-Marc Dinten[1], Françoise Peyrin[2]; [1]CEA-Léti-Minatec, France, [2]Ctr. de Recherche et d'Applications en Traitement de l'Image et du Signal (CREATIS), Inst. Natl. des Sciences Appliquées de Lyon, France.* This paper aims at determining fluorescence lifetimes and optical properties leading to reconstruction benefices when employing the time-resolved method rather than the continuous wave method.

BMD26

Fluorescence Diffuse Optical Tomography of Heterogeneous Complex Shape Objects, *Lionel F. Hervé, Anne Koenig, Anabela Da Silva, Jérôme Boutet, Michel Berger, Jean-Marc Dinten, Philippe Peltié, Philippe Rizo; Micro Technologies for Biology and Healthcare Div., CEA, Léti-Minatec, France.* External shape management is challenging for fluorescence tomography. We implement the finite differences method with arbitrary boundaries and present validations on a phantom and on a mouse with a fluorescent tube inserted inside the lungs.

BMD27

Depth Sensitivity Analysis of High-Density Imaging Arrays for Mapping Brain Function with Diffuse Optical Tomography, *Hamid Dehghani[1], Brian R. White[2], Benjamin W. Zeff[2], Joseph P. Culver[2]; [1]Univ. of Exeter, UK, [2]Washington Univ., USA.* Developing diffuse optical tomography methods for neuroimaging of humans is challenging due geometry and light level constraints. Analysis of multi-distant high-density imaging arrays show feasibility of imaging up to 20-mm depth within the adult brain.

BMD28

A Fast Diffuse Optical Fluorescent Tomography Algorithm Reducing the Impact of Small-Animal Surface Boundaries, *Simon Fortier, Frederic Leblond, Nicolas Robitaille; ART Inc., Canada.* We present a fast algorithm finding light transport solutions in volumes with curved surfaces. We show that mishandling surface boundaries in small-animal fluorescence imaging can severely limit the quality of tomography images.

BMD29

A Location-Adaptive, Frequency-Specific Cancellation Algorithm to Improve Optical Brain Functional Imaging, *Fenghua Tian, Suresh Prajapati, Hanli Liu; Dept. of Bioengineering, Univ. of Texas at Arlington, USA.* The signal to noise ratio of brain imaging is poor because of the spontaneous noises. An algorithm to cancel two most pronounced noises related to the arterial pulsation and the blood pressure variation was developed.

BMD30

Compensation of Emission Light Waveguiding in Fluorescence Molecular Tomography, *Pouyan Mohajerani[1], Joshua Kempner[2], Wael Yared[2]; [1]Georgia Tech, USA, [2]VisEn Medical, Inc., USA.* We present a method for identification and compensation of image regions that evidence waveguiding of emission light in fluorescence molecular tomography. Two *in vivo* case studies are conducted and demonstrate significant improvements in reconstructions.

BMD31

Localization of Fluorescent Objects in the Presence of Heterogeneous Background in Fluorescent Tomography, *Pouyan Mohajerani, Ali A. Eftekhar, Ali Adibi; Georgia Tech, USA.* We propose a method for object localization in fluorescent tomography (FT) in the presence of highly heterogeneous background. Simulation results demonstrate effective localization of target objects for highly heterogeneous background distributions.

BMD32

Time-Domain Spatial Localization of Fluorescent Inclusions in Thick Scattering Media with Early Photons, *Vincent Robichaud, Yves Bérubé-Lauzière; Univ. de Sherbrooke, Canada.* We present a 2-step time-of-flight approach to localize in 3-D, with 1mm precision, small fluorescent inclusions in thick scattering media using arrival times of early fluoresced snake photons.

BMD33

Full Time-Resolved Fluorescence Diffuse Optical Tomography Using Total Light Approach, *Andhi Marjono[1], Akira Yano[1], Shinpei Okawa[1], Yukio Yamada[1], Feng Gao[2]; [1]Univ. of Electro-Communications, Japan, [2]Tianjin Univ., China.* Time-domain fluorescence diffuse optical tomography (FDOT) is developed by using a combination of full time-resolved scheme and total light approach for image reconstruction. The goal of this study is reconstructing embedded fluorophore concentrations in tissues.

BMD34

Optimal Source-Modulation Frequencies for Small-Geometry Frequency-Domain Optical Tomography, *Hyun Keol Kim[1], Uwe J. Netz[2], J. Beuthan[2], Andreas Hielscher[1]; [1]Columbia Univ., USA, [2]Charité-Univ.-Medizin Berlin, Germany.* To find optimal frequencies, we present numerical and phantom studies on small-geometry frequency-domain optical tomography, and found that best results were achieved in the 600-800MHz frequency range.

BMD35

CT Imaging of Biological Tissue Using Backscattered Light, *Takeshi Namita, Yuji Kato, Koichi Shimizu; Graduate School of Information Science and Technology, Hokkaido Univ., Japan.* For cross-sectional imaging of an animal body, the technique using backscattered light and repetitive inverse solution was developed. The effectiveness of the new technique was verified in simulation and the experiment using biological tissue.

BMD36

Wavelength Optimization in Spectral Near Infrared Tomography, *Matthew E. Eames[1], Brian W. Pogue[2], Hamid Dehghani[1]; [1]Univ. of Exeter, UK, [2]Dartmouth College, USA.* A method is developed to show that instead of using data from the entire spectrum, only selected spectral bands are required to improve image reconstruction accuracy in spectral diffuse optical tomography.

BMD37

Suppresion of Skin Perfusion on NIR Diffuse Optical Topography by Depth Selective Method, *Mamiko Fujii, Akira Kawanaka, Kiyoshi Nakayama; Faculty of Sience and Technology, Sohia Univ., Japan.* We propose an image reconstruction method that suppresses undesirable effects of skin circulation for NIR diffuse optical topography by a filtering algorithm. Proposed method selectively extracts target signals at deeper region from contaminated observation data.

BMD38

Inverse Solution Regularized with the Edge-Preserving Constrain for NIR DOT, *Min-Cheng Pan[1], Liang-Yu Chen[2], Min-Chun Pan[2], Chien-Hung Chen[2]; [1]Tungnan Univ., Taiwan, [2]Natl. Central Univ., Taiwan.* To remedy the low spatial resolution of diffuse optical tomography, an iterative solution to the optimization problem is developed using the Tikhonov regularization with the edge-preserving constraint as a prior knowledge into the objective function.

BMD39

CW and Time Domain Methods to Prepare Accurately Calibrated Liquid Diffusive Phantoms at NIR Wavelengths, *Lorenzo Spinelli[1], Fabrizio Martelli[2], Andrea Farina[1], Antonio Pifferi[1], Alessandro Torricelli[1], Rinaldo Cubeddu[1], Giovanni Zaccanti[2]; [1]Inst. for Photonics and Nanotechnologies, Consiglio Nazionale delle Ricerche, Politecnico di Milano, Italy, [2]Dept. di Fisica, Univ. degli Studi di Firenze, Italy.* Two procedures for CW and time-resolved instrumentations are described to calibrate at NIR wavelengths the reduced scattering coefficient of a diffusive medium and the absorption coefficient of an absorber with standard errors smaller than 2%.

BMD40

Frequency Domain Optical Tomography Instrument with High Modulation Frequencies for Imaging Small Geometries, *James M. Masciotti, Gesa L. Franke, Hyun K. Kim, Andreas H. Hielscher; Columbia Univ., USA.* We present a frequency domain optical tomography instrument for imaging small geometries. The instrument employs modulation frequencies up to 1 GHz which allows yields better separation of absorption and scattering and more accurate reconstructions.

BMD41

Calibration Techniques for Small Animal Bimodality X-CT and Fluorescence Diffuse Optical Tomography, *Anabela Da Silva, Mathieu Debourdeau, Thomas Bordy, Jean-Marc Dinten, Philippe Peltié, Philippe Rizo; CEA-Léti-Minatec, France.* A small animal tomographer designed for the dual acquisitions of fluorescence optical and X-rays signals is presented. Dedicated geometrical and optical calibration techniques have been developed and are exposed.

BMD42

Spectral Imaging Instrument for Optical Mammography, *Ning Liu, Yang Yu, Angelo Sassaroli, Sergio Fantini; Dept. of Biomedical Engineering, Tufts Univ., USA.* We present a spectral imaging system for 2-D projection mammography that acquires broadband spectra (600-1,000nm) with a tandem scan of illumination/detection fibers. Scanning speed: 3.5cm/s; temporal sampling: 57ms; spatial sampling: 2mm×2mm.

BMD43

A Multitute of Laser Sources for Pulsed and Continuous Excitation in Diffuse Optical Tomography, *Kristian Lauritsen[1], Dietmar Klemme[1], Martin Langkopf[1], Michael Wahl[1], Axel Hagen[2], Oliver Steinkellner[2], Dirk Grosenick[2], Rainer Macdonald[2], Rainer Erdmann[1]; [1]PicoQuant GmbH, Germany, [2]Physikalisch-Technische Bundesanstalt, Germany.* We report latest results developing high power pulsed lasers for time resolved / cw intensity DOT. These lasers were used for fluorescence imaging on phantoms for optical mammography with contrast agents in reflectance and transmission.

BMD44

Estimates of Fluorescence Lifetime of Targets Deeply Embedded in Turbid Medium, a Step to a Functional Imaging of Tissue Abnormalities, *Victor V. Chernomordik, Moinuddin Hassan, Jason Riley, Amir H. Gandjbakhche; Natl. Inst. of Child Health and Human Development, USA.* A novel method for estimating lifetime of deeply embedded fluorophores, based on scaling relations for photon migration is presented. It is experimentally substantiated for targets embedded in turbid medium, using our lifetime fluorescence imaging system.

BMD45

Recording of Artifact-Free Reflection Data with a Laser and Fluorescence Scanning Mammograph for Improved Axial Resolution, *Oliver Steinkellner[1], Axel Hagen[1], Christian Stadelhoff[1], Dirk Grosenick[1], Rainer Macdonald[1], Herbert Rinneberg[1], Ronny Ziegler[2], Tim Nielsen[2]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Philips Res. Europe, Germany.* We developed a method to record artifact-free diffuse reflectance in a parallel plate scanning fluorescence mammograph and used reflection data together with transmission data for reconstruction based fluorescence imaging at improved axial resolution.

BMD46
Monitoring of Contrast Agent Inflow into Human Brain by Multichannel Time-Resolved Diffuse Reflectometry, *Michal Kacprzak[1], Adam Liebert[1], Joanna Maczewska[2], Piotr Sawosz[1], Leszek Krolicki[2], Roman Maniewski[1]; [1]Inst. of Biocybernetics and Biomedical Engineering PAS, Poland, [2]Dept. of Nuclear Medicine, Medical Univ. of Warsaw, Poland.* Time-resolved optical imager allowing for recording of distributions of times of flight of photons for 32 source-detector pairs is presented. It was applied in *in-vivo* experiments during bolus of optical contrast agent.

BMD47
Imaging of Optically Turbid Medium with Fluorescence Inclusions by Multichannel Time-Resolved Measurements, *Michal Kacprzak, Adam Liebert, Piotr Sawosz, Roman Maniewski; Inst. of Biocybernetics and Biomedical Engineering, Polish Acad. of Sciences, Poland.* We present construction of a multichannel time-resolved measurement system and results of its application in imaging of fluorescence excited in an inclusion filled with ICG and located in optically turbid medium.

BMD48
Three-Dimensional Fluorescence Tomography Studies Using a Novel Hand-Held Probe Based Optical Imager, *Jiajia Ge, Banghe Zhu, Anuradha Godavarty; Florida Intl. Univ., USA.* A novel hand-held probe based optical imager is developed and used to demonstrate the feasibility of three-dimensional (3-D) tomography on slab phantoms. Fluorescence target localization in 3-D is also demonstrated without tomographic analysis.

BMD49
A Hand-Held Probe-Based Optical Imager with Self Co-Registration Facilities, *Steven Regalado, Banghe Zhu, Jiajia Ge, Anuradha Godavarty; Florida Intl. Univ., USA.* A novel hand-held probe-based optical imager with self co-registration facilities is developed towards breast cancer diagnosis. Initial experimental studies on slab tissue phantoms have demonstrated the feasibility of co-registered measurements towards future tomography studies.

BMD50
Comparison of Spatial Resolution and Temporal Response between Two Continuous-Wave Diffuse Optical Imagers, *Renuka Parlapalli[1], Fenghua Tian[1], Vikrant Sharma[2], Suresh Prajapati[1], Hanli Liu[1]; [1]Univ. of Texas at Arlington, USA, [2]Baylor Res. Inst., USA.* We present a comprehensive comparison of spatial resolutions and temporal responses between two continuous-wave diffuse optical imaging systems. This study shows a large difference in spatial resolution, while their temporal responses are comparable.

BMD51
Advantages Found for 10 fs Pulses in Multiphoton Microscopy, *Peng Xi, Yair Andegeko, Lindsay R. Weisel, Vadim V. Lozovoy, Marcos Dantus; Michigan State Univ., USA.* After compensation of high-order chromatic dispersion 10 fs pulses are found to produce much greater signal, less photobleaching, and allow deeper penetration in two-photon microscopy.

BMD52
A Shack-Hartmann Wavefront Sensor Based Adaptive Optics System for Multiphoton Microscopy, *Jae Won Cha, Peter T. C. So; MIT, USA.* The imaging depth of two-photon microscopy is limited by aberration resulted from inhomogeneous refractive-index distribution in a specimen. With adaptive optics, the resolution and signal level can be preserved at greater depth.

BMD53
Three-Dimensional Lithographic Microfabrication Based on Multiphoton-Induced Wide Field Illumination, *Daekeun Kim, Peter T. C. So; MIT, USA.* 3-D multiphoton laser writing microfabrication has good resolution but has relatively low throughput. We suggest 3-D multiphoton-induced wide field illumination lithography, and it can be a viable high throughput system for patterning tissue engineering substrates.

BMD54
Two-Photon Imaging for the Non-Invasive Assessment of Electric Field Effects on Osteogenic Stem Cell Differentiation, *Marie C. Hronik-Tupaj[1], William Rice[1], Mark Cronin-Golomb[1], Gordana Vunjak-Novakovic[2], David Kaplan[1], Irene Georgakoudi[1]; [1]Tufts Univ., USA, [2]Columbia Univ., USA.* We present the use of two-photon excited fluorescence and second harmonic generation, to monitor electric field effects on osteogenic differentiation of human mesenchymal stem cells in terms of cellular morphology, biochemical composition and collagen deposition.

BMD55
Two-Photon Microscopy with Adaptive Illumination Power, *Kengyeh K. Chu, Daryl Lim, Jerome Mertz; Boston Univ., USA.* We have introduced a feedback loop into a two-photon microscope to hold emitted fluorescence to a constant, enhancing effective dynamic range and increasing sensitivity at darker portions of an image without significantly changing overall exposure.

BMD56

Analysis of a Two-PMT System for Simultaneous Back- and Forward-Fluorescence Detection in Multiphoton Microscopy, *Ricardo Toledo-Crow, Songhai Shi, Yongbiao Li; Memorial Sloan-Kettering Cancer Ctr., USA.* A two-PMT system is analyzed as an opportunity to improve the S/N ratio in a multiphoton microscope. Conditions under which this arrangement is optimal and sub-optimal are presented and discussed with representative data.

BMD57

Far Field Reflection Microscopy Based on Optical Diffraction Tomography, *Filip Drsek[1], Guillaume Maire[1], Hugues Giovannini[1], Kamal Belkebir[1], Patrick Chaumet[1], Anne Talneau[2], Anne Sentenac[1]; [1]Inst. Fresnel, France, [2]Lab de Photonique et de Nanostructures, France.* Optical diffraction tomography in a reflection scheme is well adapted to the study of high index contrast samples. Using diffraction models that involve multiple scattering, we compare our experimental data to the modeling predictions.

BMD58

Cell Biology Explored with Digital Holographic Microscopy, *Christian Depeursinge[1], Pascal Jourdain[1], Benjamin Rappaz[1], Pierre Magistretti[1], Tristan Colomb[2], Pierre Marquet[2]; [1]Ecole Polytechnique Fédérale de Lausanne, Switzerland, [2]Ctr. de Neurosciences Psychiatriques, Switzerland.* DHM (Digital Holographic Microscopy) sheds new light on mechanisms affecting cell structure and dynamics including organelles, vesicles, nucleus, membranes. Overview of results is given for different cell types and tissues.

BMD59

Surface Topography of Cellular Membrane on Nanometer Scale Using White-Light Quantitative Phase Microscope, *Toyohiko Yamauchi, Hidenao Iwai, Mitsuharu Miwa, Yutaka Yamashita; Hamamatsu Photonics K. K., Japan.* We developed a Linnik-type interference microscope with a low-coherent light source and obtained a full-field topographic image of a cellular membrane on a nanometer scale without using staining dye or a reflection-enhancement agent.

BMD60

Femtosecond Cellular Transfection Using a Non-Diffracting Light Beam, *Xanthi Tsampoula[1], Veneranda Garcés-Chávez[1], Muriel Comrie[2], David James Stevenson[1], Ben Agate[1], Tom Brown[1], Frank Gunn-Moore[2], Kishan Dholakia[1]; [1]School of Physics and Astronomy, Univ. of St. Andrews, UK, [2]School of Biology, Univ. of St. Andrews, UK.* Foreign DNA introduction inside the living cell has been demonstrated using a Bessel beam. This obviates the need to locate precisely the cell membrane permitting two-photon photoporation along a line leading to successful transfection.

BMD61

Measuring the Spatio-Temporal Field of Focusing Ultra Short Pulses, *Pamela R. Bowlan, Pablo Gabolde, Rick Trebino; School of Physics, Georgia Tech, USA.* We present a techniques for measuring the spatio-temporal intensity and phase, $E(x,y,z,t)$, of an ultra short pulse at or near the focus with high spatial and spectral resolution.

BMD62

A Localized Surface Plasmon Microscope by the Use of a Zeroth-Order Bessel Beam with the Optimized Polarization in the Illumination System, *Kouyou Watanabe, Goro Terakado, Hiroshi Kano; Muroran Inst. of Technology, Japan.* We propose a localized surface plasmon microscope with a zeroth-order Bessel beam illumination. The microscope visualizes the refractive index distribution on the metal from the reflected intensity. The optimization of the polarization is also discussed.

BMD63

Improved Imaging Property of the Scanning Total Internal Reflection Fluorescence Microscope by the Use of Optimally Polarized Illumination, *Goro Terakado, Kouyou Watanabe, Hiroshi Kano; Muroran Inst. of Technology, Japan.* We report on an improvement of an imaging property in the two-photon excited total internal reflection fluorescence microscopy. The developed microscope, which employs optimally polarized illumination, provides a point spread function with a single peak.

BMD64

Effects of Pupil Functions on Tightly Focused Radially Polarized Beams in Microscopy, *Elijah Y. S. Yew, Colin J. R. Sheppard; Div. of BioEngineering, Natl. Univ. of Singapore, Singapore.* We examine the effects of tightly focusing a radially polarized beam with uniform, Gaussian or Bessel-Gauss pupil functions. FWHM is smallest for a uniform amplitude profile while the Bessel-Gauss beam results in the largest FWHM.

BMD65

Sensitivity Enhancement for Total Internal Reflection Fluorescence Imaging Using Dielectric Thin Films, *Kyujung Kim, Eun-Jin Cho, Yong-Min Huh, Donghyun Kim; Yonsei Univ., Republic of Korea.* Evanescent field enhancement was investigated experimentally based on dielectric thin films in TIRF microscopy. Field intensity enhancement measured by microbeads and live-cell imaging relative to that of a control without dielectric films was polarization dependent.

BMD66

Phase Subtraction Cell Counting Method and Dry Mass Determination for Assessment of Viability of Mouse Embryos, *William C. Warger II, Judith A. Newmark, Carol M. Warner, Charles A. DiMarzio; Northeastern Univ., USA.* The phase subtraction cell counting method has produced accurate, non-toxic cell counts in live mouse embryos beyond the eight-cell stage. Here we describe the combination of the cell count and dry mass to assess viability.

BMD67

Modeling DIC Microscope Images of Thick Objects Using a Product-of-Convolutions Approach, *Heidy Sierra, Charles DiMarzio, Dana Brooks; Northeastern Univ., USA.* A three-dimensional forward model which attempts to capture phase delays has been developed to simulate microscope images from thick heterogeneous transparent objects. Intensity images were calculated successfully predicting the appearance of Difference Interference Contrast images.

BMD68

Multimodal Intravital Microscopy of Oxygen Transport in Tumor Microvasculature, *Casey M. deDeugd, Mamta Wankhede, Brian S. Sorg; Univ. of Florida, USA.* Key oxygen transport parameters in tumor microvessels were quantified using a novel combination of intravital microscopy techniques. Results indicated a strong relationship between red blood cell flux and hemoglobin saturation in tumor microvessels.

BMD69

Optical Temperature Measurement in Aqueous Nanodroplets for PCR, *Hanyoup Kim, Sanhita Dixit, Chia-Pin Pan, Gregory W. Faris; Molecular Physics Lab, SRI Intl., USA.* We are investigating temperature measurements of nanoliter droplets to support polymerase chain reaction (PCR) assays. A fluorescence quenching method appears most promising for this application.

BMD70

Optimizing Fluorescence Collection in Multiphoton Microscopy, *Joseph P. Zinter, Michael J. Levene; Yale Univ., USA.* Efficient fluorescence collection is critically important when maximizing imaging depth in multiphoton microscopy. Here we present an optimized, large-aperture fluorescence collection system for use with Hamamatsu GaAsP photomultiplier tubes.

BMD71

Evaluation of Cultured Corneal Epithelial Cells and Epithelial Thickness by Full-Field Optical Coherence Tomography, *Masahiro Akiba[1], Akira Kubota[2], Charles Reisman[1], Yasufumi Fukuma[1], Kohji Nishida[2], Kinpui Chan[1]; [1]TOPCON Advanced Biomedical Imaging Lab, USA, [2]Tohoku Univ. Graduate School of Medicine, Japan.* The growth process of cultured corneal epithelial cells has been evaluated by full-field optical coherence tomography. Three different layers of the epithelium were discriminated and the thickness of corneal epithelium was quantitatively measured.

BMD72

Contrast Enhancement in Imaging the Tears and Contact Lenses with Optical Coherence Tomography, *Shuliang Jiao, Jianhua Wang, Yunxin Jiao, Carmen A. Puliafito; Bascom Palmer Eye Inst., Univ. of Miami Miller School of Medicine, USA.* Optical scattering biocompatible medium (Intralipid in the current experiment) was proposed and tested as contrast agent for optical coherence tomography in the study of tear dynamics and tear exchange in contact lens wearers.

BMD73

Quasi-Simultaneous OCT/SLO Imaging, *Irina Trifanov[1], Michael Hughes[1], Richard Rosen[2], Adrian Podoleanu[1]; [1]Univ. of Kent, UK, [2]New York Eye and Ear Infirmary, USA.* Quasi-simultaneous OCT and SLO images are produced without the need to split the signal from the retina. A chopper synchronized with the transverse scanner periodically blocks-off the reference beam in the OCT.

BMD74

Dynamic Imaging of Small Arteries and Veins of Human Fingers by Optical Coherence Tomography, *Mitsuo Kuwabara, Toshie Fuji, Masato Ohmi, Masamitsu Haruna; Graduate School of Medicine, Osaka Univ., Japan. In vivo* dynamic OCT imaging of small arteries and veins of human fingers are demonstrated. We can observe pulsation of the artery in synchronization with heartbeat, leading to a screening of aging of blood vessels.

BMD75

Calibration of Blood Flow Measurement with Spectral Domain Optical Coherence Tomography, *Hassan M. Wehbe[1], Marco Ruggeri[1], Shuliang Jiao[1], Giovanni Gregori[1], Carmen A. Puliafito[1], Weizhao Zhao[2]; [1]Bascom Palmer Eye Inst., USA, [2]Dept. of Biomedical Engineering, Univ. of Miami, USA.* We developed a technique that automatically measures retinal blood flow using spectral domain optical coherence tomography (SD-OCT). In this paper we present methods we used to calibrate the measurements.

BMD76

Contrast Enhancement in Optical Coherence Tomography (OCT), *Enock Jonathan, Jan S. Dam; CSIR, Natl. Laser Ctr., South Africa.* We demonstrate experimentally human saliva as an inexpensive and easy-to-use contrast-enhancing medium in OCT imaging. After treatment with fresh human saliva, *in-vivo* human fingertip, palm and nail-fold region images displayed more contrast and feature visibility.

BMD77

Automated Processing and Classification of Cervical Images Using Optical Coherence Tomography, *Wei Kang[1], Xin Qi[1], Margarita Kareta[2], Jerome Belinson[3], Andrew Rollins[1]; [1]Case Western Reserve Univ., USA, [2]Imalux Corp., USA, [3]Cleveland Clinic Foundation, USA.* We developed image processing techniques for OCT imaging of the uterine cervix and proposed two features for classification of normal/CIN1 and CIN2/CIN3 images. The sensitivity and specificity of the algorithm was 90.9% and 91.7%, respectively.

BMD78

Fourier Domain OCT at 840 nm Utilizing a Linear *k* Spectrometer, *Zhilin Hu, Andrew M. Rollins; Case Western Reserve Univ., USA.* This work describes a novel Fourier domain OCT equipped with linear wave number spectrometer at 840 nm. The linear *k* spectrometer eliminates the computing time of the interpolation and improves the fall-off of FDOCT image.

BMD79

1/f Noise in Spectrometer-Based Optical Coherence Tomography, *Emily J. McDowell[1], Marinko V. Sarunic[2], Changhuei Yang[1]; [1]Caltech, USA, [2]Simon Fraser Univ., Canada.* We document and analyze the effect of 1/f noise on the detection sensitivity of spectrometer-based optical coherence tomography systems, finding that such noise sources lead to a degradation in SNR for increasing integration times.

BMD80

Strained Quantum Well InGaAs/GaAlAs/GaAs SLDs and SOAs for HR OCT at 840 and 1060 nm Bands, *Vladimir Shidlovski, E. V. Andreeva, Yu. O. Kostin, P. I. Lapin, A. A. Lobintsov, M. V. Shramenko, S. D. Yakubovich; Superlum, Ireland.* SLDs and SOAs for HR OCT basing on strained InGaAs/AlGaAs/GaAs QWs at 850 and 1060 nm with ASE/gain bandwidths of 40-50 nm and output power ex SM fiber of up to 50mW are reported.

BMD81

Multiplexed Low-Coherence Interferometry Instrument for Measuring Microbicide Gel Thickness Distribution, *Tyler Drake, Francisco Robles, Adam Wax; Duke Univ., USA.* We present a multiplexed low coherence interferometry (LCI) system for *in-vivo* human vaginal imaging of microbicidal gel distribution. *In-vitro* testing demonstrated high accuracy and linearity of LCI in measuring gel coating thickness up to 500μm.

BMD82

Quasi-Single Shot Axial-Lateral Parallel Time Domain Optical Coherence Tomography Using an InGaAs Camera, *Yuuki Watanabe, Manabu Sato; Graduate School of Science and Engineering, Yamagata Univ., Japan.* We developed axial-lateral parallel time-domain optical coherence from a single interference image. We obtained OCT images of a moving human finger *in vivo* by subtracting a DC image based on averaged interference images.

BMD83

Low-Cost Solution for Artifact Free Images in Fourier-Domain Optical Coherence Tomography, *Sébastien Vergnole, Guy Lamouche, Marc L. Dufour; Natl. Res. Counci -Industrial Materials Inst., Canada.* We present an efficient and low cost artifact removal setup that relies on a piezoelectric fiber stretcher to generate a transverse modulation. Performing a Fourier processing in the transverse direction leads to artifact free images.

BMD84

Displacement Estimation in Optical Coherence Tomography Imagery Based on Speckle Tracking, *Gijs van Soest[1], Hervé Flesch[1], Anton F. W. van der Steen[1,2]; [1]Erasmus MC, Netherlands, [2]Interuniversity Cardiology Inst. of the Netherlands, Netherlands.* We present a method for analysis of displacement in OCT data. We show that tissue motion can be tracked with high accuracy based on M-mode speckle imaging. Materials with different stiffness can be identified.

BMD85

Real-Time Video-Rate Harmonically Detected Fourier Domain Optical Coherence Tomography, *Andrei B. Vakhtin, Kristen A. Peterson, Daniel J. Kane; Southwest Sciences, Inc., USA.* Real-time video-rate complex-conjugate-resolved subsurface imaging is demonstrated using harmonically detected Fourier domain OCT at 795 nm. Work toward implementing the method at 1300 nm in both broadband and swept-source configurations is presented.

BMD86

Swept Source Optical Coherence Tomography with Nonuniform Frequency Domain Sampling, *Sherif S. Sherif, Costel Flueraru, Youxin Mao, Shoude Change; Inst. for Microstructural Sciences, Canadian Natl. Res. Council, Canada.* Swept Source Optical Coherence Tomography requires complex hardware and/or numerical interpolation to obtain an image using the *discrete Fourier transform (DFT).* We describe a simpler and more accurate inversion method based on the *nonuniform DFT*.

BMD87

Degradation of Axial Resolution in Optical Coherence Tomography due to Scattering and Absorption in Skin Tissue, *Dirk H. P. Schneiderheinze, Timothy R. Hillman, David D. Sampson; Univ. of Western Australia, Australia.* We examine the effects of scattering and absorption in skin tissue upon the axial resolution of ultrahigh-resolution optical coherence tomography. By modeling the frequency dependence of the optical properties, we quantify the depth-dependent axial resolution.

BMD88

Real-Time Imaging of Radiofrequency Cardiac Ablation Using Optical Coherence Tomography, *Christine P. Fleming[1], Hui Wang[1], Guy Amit[2], Kara J. Quan[2], Andrew M. Rollins[1]; [1]Case Western Reserve Univ., USA, [2]MetroHealth Medical Ctr., USA.* Catheter ablation using radiofrequency (RF) energy is a clinical procedure to destroy abnormal conduction pathways, and cure arrhythmias. We present real-time imaging of lesion formation during *in vitro* application of RF energy on the endocardium.

BMD89

Functional Assessment of Cutaneous Wound Healing Using Spectral-Domain Optical Coherence Tomography, *Michael J. Cobb, Yicong Wu, Addie Warsen, Daniel J. MacDonald, Xingde Li; Univ. of Washington, USA.* We show that spectral-domain optical coherence tomography can monitor blood flow in and around the wound bed during the cutaneous wound healing process in a mouse model.

BMD90

Supercontinuum Based Ultrahigh Resolution Fourier Domain Optical Coherence Tomography for *in vivo* Dermatology, *Stefan Kray, Felix Spöler, Michael Först, Heinrich Kurz; Inst. of Semiconductor Electronics, RWTH Aachen Univ., Germany.* A Fourier domain optical coherence tomography system is demonstrated, employing a commercial supercontinuum light source for the 1300nm wavelength region. Ultrahigh axial resolution of <4.4µm, imaging depths of >1mm and 100dB sensitivity are achieved.

BMD91

Paper Withdrawn

BMD92

Optical Coherence Tomography Techniques in Dental Implant Investigations, *Iulian Ionita; Univ. of Bucharest, Romania.* FD-OCT with Swept Source was used to obtain 3-D image of the peri-implant tissue (soft and hard) in the case of mandible fixed screw. 1350 nm centered source give better images than 850 nm source.

St. Petersburg Ballroom
3:30 p.m.–4:00 p.m.
Coffee Break

BME • *In vivo* Imaging for Neuroscience

Grand Bay Ballroom North
4:00 p.m.–6:00 p.m.
BME • *In vivo* Imaging for Neuroscience
Jens Steinbrink; Charité Univ. Medicine, Germany, Presider

BME1 • 4:00 p.m. **Tutorial**

When the Brain Turns Red or Pale: Introduction to Non-Invasive Optical Brain Imaging, *Jens Steinbrink, Hellmuth Obrig; Charité Univ. Medical Ctr., Germany.* This tutorial introduces non-invasive optical brain imaging to the newcomers in the field. Based on a comparison to the well established absorption spectroscopy in a cuvette, the lecture motivates the most recent technological challenges.

BME2 • 4:45 p.m. **Invited**

Multidimensional Functional Optical Imaging of the Brain, *Elizabeth M. Hillman[1], Brenda Chen[1], Sean A. Burgess[1], Andrew J. Radosevich[1], Matthew B. Bouchard[1], Amir K. Iranmahboob[1], Aniruddha Das[2], Bruno Cauli[3]; [1]Columbia Univ., USA, [2]Ctr. for Neurobiology and Behavior, Columbia Presbyterian Medical Ctr., USA, [3]Univ. Pierre et Marie Curie, France..* Optical brain imaging in rodents allows investigation of normal physiology and the effects of disease. Multi-scale imaging and delineation of multiple sources of contrast can reveal contributions of individual cells and processes to ensemble activity.

BME3 • 5:15 p.m.

Phase-Encoded Retinotopic Mapping in Humans with DOT, *Brian R. White[1], Benjamin W. Zeff[2], Bradley L. Schlaggar[2], Hamid Dehghani[3], Joseph P. Culver[2]; [1]Dept. of Physics and School of Medicine, Washington Univ. in St. Louis, USA, [2]Dept. of Radiology, Washington Univ. in St. Louis, USA, [3]School of Physics, Univ. of Exeter, UK.* We have developed a high-density neuroimaging DOT system with improved depth discrimination and lateral resolution. The advantages are demonstrated through cortical maps of phase-encoded traveling waves in the full visual field of adult humans.

BME4 • 5:30 p.m.
Haemodynamic Response Measured by NIRS to Physiological Intermittent Cerebral Activation during Quiet Sleep in Healthy and Sick Premature Neonates, *Nadege Roche-Labarbe[1,2], Guy Kongolo[3], Reinhard Grebe[1], Fabrice Wallois[1,2]; [1]GRAMFC, Faculte de Medecine Amiens, France, [2]GRAMFC, Neuropediatric Functional Explorations Unit, North Hospital, France, [3]Pediatric Intensive Care Unit, North Hospital, France.* Simultaneous NIRS and EEG recordings in premature neonates, six healthy and four presenting neurological distress (29 to 35 weeks GA) showed bursts of neuronal activity during quiet sleep are associated with a stereotyped haemodynamic response.

BME5 • 5:45 p.m.
Evoked Optical Response under Wake, Sleep and Anesthetized States, *Jennifer L. Schei, Amanda J. Foust, Manuel J. Rojas, Jinna A. Navas, David M. Rector; Washington State Univ., USA.* Concurrent electrical and optical measurements of auditory cortex responses exhibits state dependent hemodynamic activity. When compared to wake, quiet sleep elicits large, late optical signals, REM signals are large, while Isoflurane signals are phase shifted.

BMF • Advances in Microscopy

Grand Bay Ballroom South
4:00 p.m.–6:00 p.m.
BMF • Advances in Microscopy
Tony Wilson; Univ. of Oxford, UK, Presider

BMF1 • 4:00 p.m. **Invited**
Contrasts and Resolution in Light Sheet Based Microscopy (SPIM, DSLM, LSFM), *Ernst Stelzer; European Molecular Biology Lab, Germany.* Abstract not available.

BMF2 • 4:30 p.m.
Optical Design for Spatial-Spectral Volume Holographic Imaging System, *Paul J. Gelsinger[1], Yuan Lo[1], George Barbastathis[2], Raymond Kostuk[3], Jennifer K. Barton[4]; [1]College of Optical Sciences, Univ. of Arizona, USA, [2]Dept. of Mechanical Engineering, MIT, USA, [3]Dept. of Electrical and Computer Engineering, Univ. of Arizona, USA, [4]Dept. of Biomedical Engineering, Univ. of Arizona, USA.* We present a design for a holographic imaging system that acquires spatial and spectral information about a volume object. Our design provides a solution to the field of view issues related to volume holographic imaging.

BMF3 • 4:45 p.m.
Pushing the Limits of Dynamic Speckle Illumination Microscopy, *Daryl Lim, Cathie Ventalon, Jerome Mertz; Boston Univ., USA.* Dynamic speckle illumination (DSI) microscopy is a widefield fluorescence imaging technique that provides depth discrimination even in scattering media. We discuss theoretical and practical results geared towards the optimization of this relatively new technique.

BMF4 • 5:00 p.m.
Fourier Analysis and Synthesis Tomography: High-Resolution Long-Range Volume Imaging of Cells and Tissue, *Daniel Feldkhun, Kelvin Wagner; Univ. of Colorado at Boulder, USA.* We present a light-efficient imaging technique that measures the sample's fluorescent or coherent spatial spectrum using projected dynamic interference patterns, a fast single-pixel detector, and large low-precision optics, effectively decoupling depth-of-field and working-distance from resolution.

BMF5 • 5:15 p.m.
Microscope on a Chip— A Complete On-Chip High-Resolution Optofluidic Microscope, *Xiquan Cui[1], Xin Heng[1], Weiwei Zhong[1], Paul W. Sternberg[1], Demetri Psaltis[2,1], Changhuei Yang[1]; [1]Caltech, USA, [2]Ecole Polytechnique Federale de Lausanne, Switzerland.* We report the first complete on-chip high-resolution (~0.9μm) optofluidic microscope. It's smaller than a U.S. quarter and yet can achieve resolution comparable to a conventional microscope with 20× objective.

BMF6 • 5:30 p.m.
Background Reduction with Two-Color Two-Beam Multiphoton Excitation, *Demirhan Kobat, Guanghao Zhu, Chris Xu; Cornell Univ., USA.* By comparing axial excitation profiles, we present experimental proof which demonstrates that two-color two-beam multiphoton excitation offers a better signal to background ratio than conventional single beam multiphoton excitation.

BMF7 • 5:45 p.m.
Microscopic Imaging of Oxygen by Two-Photon-Excited Phosphorescence, *Olga S. Finikova[1], Artem Y. Lebedev[1], Alexei Aprelev[2], Thomas Troxler[1], Feng Gao[1], Carmen Garnacho[1], Silvia Muro[1], Robin M. Hochstrasser[1], Sergei A. Vinogradov[1]; [1]Univ. of Pennsylvania, USA, [2]Drexel Univ., USA.* Microscopic oxygen distributions in heterogeneous phantoms and cells were visualized by means of two-photon laser scanning microscopy, using phosphorescent probes with controllable quenching parameters and enhanced two-photon absorption cross-sections.

St. Petersburg Ballroom
6:30 p.m.–8:00 p.m.
Conference Reception

•Tuesday, March 18, 2008•

Conference Registration
7:00 a.m.–6:00 p.m.
Registration Open

BTuA • Plenary III: Imaging and Diagnostics in Tissue

Grand Bay Ballroom North and South
7:30 a.m.–10:00 a.m.
BTuA • Plenary III: Imaging and Diagnostics in Tissue
Irene Georgakoudi; Tufts Univ., USA, Presider

BTuA1 • 7:30 a.m. **Tutorial**

High Throughput Tissue Imaging and Bioinformatics, *Peter T. C. So; MIT, USA.* Image informatics has been shown to be an important new paradigm in understanding cell biology. We extend this approach to study tissue level physiology and pathology based on high throughput two-photon microscopy.

BTuA2 • 8:15 a.m. **Invited**

Dual-Color Superresolution Imaging Using Genetically Expressed Probes, *Hari Shroff[1], Catherine G. Galbraith[2], James A. Galbraith[3], Helen White[1], Jennifer Gillette[4], Scott Olenych[5], Michael W. Davidson[5], Eric Betzig[1]; [1]Howard Hughes Medical Inst., Janelia Farm Res. Campus, USA, [2]Natl. Inst. of Dental and Craniofacial Res., NIH, USA, [3]Natl. Inst. of Neurological Disorders and Stroke, NIH, USA, [4]Natl. Inst. of Child Health and Human Development, NIH, USA, [5]Natl. High Magnetic Field Lab and Dept. of Biological Science, Florida State Univ., USA.* We report dual-color superresolution imaging using endogenously expressed fluorescent proteins. An imaging resolution of 20-30 nm facilitates study of the ultrastructural relationship between proteins present in adhesion complexes at the surfaces of whole, fixed cells.

BTuA3 • 8:45 a.m. **Invited**

The Role of Light Scattering Spectroscopy in Spectral Diagnosis of Disease, *Michael S. Feld[1], Condon Lau[1], Obrad Scepanovic[1], Sasha McGee[1], Jelena Mirkovic[1], Chung-Chieh Yu[1], Steve Fulghum[2], James Tunnell[3], Irene Georgakoudi[4], Kate Bechtel[1]; [1]MIT Spectroscopy Lab, USA, [2]Newton Labs Inc., USA, [3]Univ. of Texas at Austin, USA, [4]Tufts Univ., USA.* Light scattering spectroscopy (LSS), which contributes to diffuse tissue reflectance, provides important diagnostic information. However, the presence of blood vessels provide an alternate interpretation. A revised view of the role of LSS will be presented.

BTuA4 • 9:15 a.m. **Invited**

The Glass Brain: Visualization of Neuronal Networks in the Whole Mouse Brain by Ultramicroscopy, *Hans-Ulrich Dodt, N. Jährling, K. Becker; Vienna Univ. of Technology, Austria.* Visualization of neuronal networks in the whole mouse brain is possible by ultramicroscopy using a special method to make tissue optically transparent. This method also allows the three-dimensional visualization of drosophilae and whole mouse embryos.

St. Petersburg Ballroom
10:00 a.m.–10:30 a.m.
Coffee Break

St. Petersburg Ballroom
10:00 a.m.–4:00 p.m.
Exhibits Open

BTuB • Methods in Microendoscopy

Grand Bay Ballroom North
10:30 a.m.–12:30 p.m.
BTuB • Methods in Microendoscopy
Xingde Li; Univ. of Washington, USA, Presider

BTuB1 • 10:30 a.m. **Tutorial**

Seeing inside the Body with Microendoscopy and Endoscopic Microscopy, *Gary Tearney; Wellman Ctr. for Photomedicine, Massachusetts General Hospital, USA.* In this paper, we report the use of advanced optical fiber devices and single-mode light sources for ultraminiature 3-D endoscopy and large area, comprehensive microscopy of the coronary arteries and gastrointestinal tract of human patients.

BTuB2 • 11:15 a.m. **Invited**

Interferometric Spectrally Encoded Endoscopy, *Dvir Yelin[1], Brett E. Bouma[2], John J. Rosowski[3], Michael E. Ravicz[3], Guillermo J. Tearney[2]; [1]Technion, Israel, [2]Wellman Ctr. for Photomedicine, USA, [3]Massachusetts Eye and Ear Infirmary, USA.* Using low coherence interferometry, spectrally encoded endoscopy (SEE) is capable of volumetric subsurface reflectance and Doppler imaging. The technique is demonstrated by imaging a variety of samples through miniature fiber optic endoscopic probes.

BTuB3 • 11:45 a.m.
Fluorescence Confocal Mosaicing Microscopy of Basal Cell Carcinomas to Potentially Guide Mohs Surgery, *Daniel S. Gareau, Billy Huang, Yongbiao Li, Iana Aranda, Kishwer Nehal, Milind Rajadhyaksha; Memorial Sloan-Kettering Cancer Ctr., USA.* Fluorescence confocal mosaicing detects basal cell carcinomas in 10-20 mm-large Mohs surgical skin excisions within 5-9 minutes, compared to 20-45 minutes for frozen histology. Confocal mosaicing microscopy may enable rapid pathology-at-the-bedside to guide Mohs surgery.

BTuB4 • 12:00 p.m.
High-Resolution Imaging within Tissue by Fiber Microendoscopy, *Timothy J. Muldoon[1], Dawn L. Nida[1], Mark C. Pierce[1], Ann Gillenwater[2], Rebecca Richards-Kortum[1]; [1]Rice Univ., USA, [2]Univ. of Texas M.D. Anderson Cancer Ctr., USA.* A simple and robust fiber bundle microendoscope can be used for high-resolution contact imaging within living tissue. Combining this technique with molecular imaging strategies enables monitoring of biological systems over time at the subcellular level.

BTuB5 • 12:15 p.m.
Scanning Fiberoptic Endomicroscope System for Nonlinear Optical Imaging of Tissue, *Yicong Wu, Yuxin Leng, Xiaoli Li, Daniel J. MacDonald, Michael J. Cobb, Xingde Li; Dept. of Bioengineering, Univ. of Washington, USA.* A scanning fiber-optic miniature endomicroscope system was developed for tissue nonlinear optical imaging. Real-time two-photon fluorescence and SHG imaging of rat tail tendon and skin/hair was demonstrated for the first time with the fiber-optic endomicroscope.

BTuC • Light for Therapeutics and Diagnostics

Grand Bay Ballroom South
10:30 a.m.–12:30 p.m.
BTuC • Light for Therapeutics and Diagnostics
Lothar Lilge; Ontario Cancer Inst., Canada, Presider

BTuC1 • 10:30 a.m.
Novel Polymers for Intraocular Lenses Enabling Photo-Triggered Drug Delivery, *Hee-Cheol Kim, Jens Träger, Daniel Kehrlößer, Julia Liese, Norbert Hampp; Philipps-Univ. Marburg, Germany.* Posterior capsule opacification (PCO) is a common complication of cataract surgery. To address this problem we have developed drug delivery polymers allowing repeated drug release in a non-invasive and controlled manner.

BTuC2 • 10:45 a.m.
Optical Pharmacokinetics Measurement of Photosensitising Drug Concentrations for Photodynamic Therapy, *Martin Austwick[1], Josephine Woodhams[1], Charles A. Mosse[1], Caroline Elliot-Laize[1], Vadzim Chalau[1], Alexander J. MacRobert[1], Irving J. Bigio[2], Stephen Bown[1]; [1]Natl. Medical Laser Ctr., UK, [2]Dept. of Biomedical Engineering, Boston Univ., USA.* Measuring the concentration of a photosensitising drug non-invasively could provide substantial benefits for photodynamic therapy (PDT). AlS_2Pc tissue levels were assessed from the OP spectra and correlated well with chemical extraction.

BTuC3 • 11:00 a.m.
Longitudinal Monitoring of 4T1-Tumor Physiology *in vivo* with Doxorubicin Treatment via Diffuse Optical Spectroscopy, *Karthik Vishwanath, Hong Yuan, Laura Moore, Janelle Bender, Mark Dewhirst, Nimmi Ramanujam; Duke Univ., USA.* A diffuse optical spectrometer was used to monitor 4T1 breast carcinoma tumors implanted in mice. Animals treated with doxorubicin showed relative increased oxygen saturation and decreased blood volume vs. controls, over a 10 day period.

BTuC4 • 11:15 a.m.
A Singlet Molecular Oxygen Imaging Sensor for Photodynamic Therapy, *S. Lee[1], D. H. Vu[1], M. F. Hinds[1], S. J. Davis[1], J. A. O'Hara[2], B. W. Pogue[2]; [1]Physical Sciences Inc., USA, [2]Dartmouth College, USA.* Singlet oxygen is believed to be the species destroying cancerous cells during PDT. An optically-based imaging device for monitoring singlet oxygen production in a tumor was developed and tested *in vivo*.

BTuC5 • 11:30 a.m.
Single-Cell Partial Wave Spectroscopic Microscopy, *Hariharan Subramanian[1], Prabhakar Pradhan[1], Dhananjay Kunte[2], Nicholas Deep[1], Hemant K. Roy[2], Vadim Backman[1]; [1]Northwestern Univ., USA, [2]Evanston Northwestern Healthcare, USA.* Partial-wave spectroscopic microscopy (PWS) provides unprecedented insights into the nano-architecture of living biological cells. We demonstrate the capability of PWS to diagnose pre-cancerous changes in histologically normal cells far earlier than any existing detection technique.

BTuC6 • 11:45 a.m.
Quantifying the Field Effect of Carcinogenesis with Low-Coherence Enhanced Backscattering Spectroscopy (LEBS), *Vladimir Turzhitsky[1], Young L. Kim[1], Prabhakar Pradhan[1], Hemant K. Roy[2], Randall E. Brand[2], Jay L. Hoogheem[1], Michael J. Jung[1], Mohammed Jameel[2], Nahla Hasabou[2], Vadim Backman[1]; [1]Northwestern Univ., USA, [2]Evanston-Northwestern Healthcare, USA.* We have evaluated LEBS as a tool for detecting the field effect of carcinogenesis in 219 rectal biopsy patients and 86 duodenal biopsy patients and present several LEBS parameters that are potentially diagnostic.

BTuC7 • 12:00 p.m.
An Intraoperative Ratiometric Fluorescence System for *in vivo* Imaging, *Eduardo H. Moriyama, Antony Kim, Arjen Bogaards, Lothar Lilge, Brian C. Wilson; Ontario Cancer Inst., Canada.* We have developed a fluorescence imaging system based on the ratiometric correction method designed for *in vivo* detection of Protoporphyrin IX (PpIX) fluorescence and demonstrated its potential use for detection and visualization of brain tumors.

BTuC8 • 12:15 p.m.
Design and Verification of an Endoscopic Pre-Cancer Detection System Based on Angle-Resolved Low Coherence Interferometry (a/LCI), *Yizheng Zhu, Neil G. Terry, William J. Brown, Adam Wax; Dept. of Biomedical Engineering, Duke Univ., USA.* This paper presents the design and implementation of a portable endoscopic a/LCI system for clinical pre-cancer detection through accurate sizing of cell nuclei. System performance is evaluated in *ex vivo* measurements.

12:30 p.m.–1:30 p.m.
Lunch Break

BTuD • Optical Cancer Diagnostics

Grand Bay Ballroom North
1:30 p.m.–3:30 p.m.
BTuD • Optical Cancer Diagnostics
Urs Utzinger; Univ. of Arizona, USA, Presider

BTuD1 • 1:30 p.m.
Multispectral and Hyperspectral *in vivo* Imaging of the Oral Cavity for Neoplastic Tissue Detection, *Darren M. Roblyer[1], Cristina Kurachi[2], Adel El-Naggar[2], Michelle D. Williams[2], Ann Gillenwater[2], Rebecca Richards-Kortum[1]; [1]Rice Univ., USA, [2]Univ. of Texas MD Anderson Cancer Ctr., USA.* We present results from a pilot clinical trial of 25 patients using narrowband reflectance, polarized reflectance, and fluorescence multispectral as well as fluorescence hyperspectral optical microscopy to aid in the identification of neoplastic oral lesions.

BTuD2 • 1:45 p.m.
Spectroscopic Evaluation of Oral Tissue: The Impact of Anatomy, *Sasha McGee[1], Jelena Mirkovic[1], Vartan Mardirossian[2], Alphi Elackattu[2], Gregory Grillone[2], Zimmern Wang[2], Sadru Kabani[3], George Gallagher[3], Robert Pistey[4], Luis Galindo[1], Chung-Chieh Yu[1], Condon Lau[1], Ramachandra Dasari[1], Michael Feld[1]; [1]MIT, USA, [2]Dept. of Otolaryngology, Head and Neck Surgery, Boston Univ. School of Medicine, USA, [3]Oral and Maxillofacial Pathology, Boston Univ. Goldman School of Dental Medicine, USA, [4]Dept. of Anatomic Pathology, Boston Medical Ctr., USA.* We have collected 800 *in vivo* reflectance and fluorescence spectra from the oral cavity of 82 healthy volunteers. We show that spectroscopy can characterize normal anatomical variation by providing parameters that reflect tissue physical properties.

BTuD3 • 2:00 p.m.
Developing Optical Biomarkers to Characterize the Progression of Barrett's Esophagus to Pre-Cancer, *Nadhi Thekkek[1], Bertha Valle[1], Dipen Maru[2], Sharmila Anandasabapathy[2], Rebecca Richards-Kortum[1]; [1]Rice Univ., USA, [2]Univ. of Texas M. D. Anderson Cancer Ctr., USA.* Esophageal pre-cancer biomarkers can be optically detected in tissue using confocal microscopy and specific stains. Developing and characterizing these optical biomarkers *ex vivo* is necessary to be able to detect them *in vivo*.

BTuD4 • 2:15 p.m.
Hyperoxic/Hypercapnic Gas Inhalation as a Route to Increase Contrast from Tumor Tissue in Near-Infrared Imaging of Breast Tissue, *Sanhita Dixit[1], Hanyoup Kim[1], Brendan Visser[1], Christopher Comstock[2], Gregory Faris[1]; [1]SRI Intl., USA, [2]Dept. of Radiology, Univ. of California at San Diego, USA.* We explore inhalation protocols to implement hyperoxic/hypercapnic gas inspiration in a clinical setting. These inspired gases could yield sufficient contrast from abnormal tumor vasculature in breast tissue using differential optical imaging in the near infrared.

BTuD5 • 2:30 p.m.
Tumor Angiogenesis of Carcinoma *in situ*, Early-Stage Invasive and Larger Breast Cancers Imaged by Optical Tomography with Ultrasound Localization, *Quing Zhu[1], Chen Xu[1], Mark Kane[2], Yasaman Ardeshirpour[1], Laura Mariano[1], Nancy Baccaro[2], Malini Iyers[2], Poornima Hegde[2], Susan Tannenbaum[2], Scott Kurtzman[2], Peter Deckers[2]; [1]Univ. of Connecticut, USA, [2]Univ. of Connecticut Health Ctr., USA.* We present a spectrum of breast-tumor angiogenesis distributions from DCIS, early-stage-invasive cancers to advanced cancers. The complexity of the angiogenesis distributions suggests that intrinsic vascular contrast has a significant clinical role in distinguishing early-stage-invasive cancers.

BTuD6 • 2:45 p.m.

Early Cancer Diagnosis Using Quantitative Spectroscopic Imaging: A Feasibility Study, *Condon Lau[1], Jelena Mirkovic[1], Chung-Chieh Yu[1], Geoffrey O'Donoghue[1], Kamran Badizadegan[1], Sasha McGee[1], Alphi Elackattu[2], Elizabeth Stier[2], Gregory Grillone[2], Antonio de las Morenas[2], Ramachandra Dasari[1], Michael Feld[1]; [1]MIT, USA, [2]Boston Medical Ctr., USA.* We have extended quantitative spectroscopy from a single pixel, contact probe to a wide area, non-contact imaging system. Quantitative Spectroscopic Imaging is used to distinguish high grade from low grade dysplasia and non-dysplastic tissue.

BTuD7 • 3:00 p.m.

Accuracy of *in vivo* Light Scattering for Detection of HSIL and Cancers of the Cervix, *Judith R. Mourant[1], Therese J. Bocklage[2], Tamara M. Powers[1], Alan Waxman[2], Meggan M. Zsemlye[2], Maxine H. Dorin[2], Heather M. Greene[1], Harriet O. Smith[2]; [1]Los Alamos Natl. Lab, USA, [2]Univ. of New Mexico, USA.* *In vivo* light scattering data have been analyzed for 151 patients. Physiological parameters correlate with light scattering. Sensitivities in the 80's and specificities in the 60's were obtained for a disease threshold of HSIL+.

BTuD8 • 3:15 p.m.

***In vivo* Fluorescence Imaging to Target HER2 Receptor,** *Moinuddin Hassan, Sang Bong Lee, Jason Riley, Victor Chernomordik, Jacek Capala, Amir H. Gandjbakhche; NIH, USA.* The goal of our study is to develop a non-invasive optical method for monitoring of HER2 receptor *in-vivo* and HER2-specific delivery of therapeutic agents to individualize treatment of HER2-positive cancers (breast cancer).

BTuE • Functional Neural Imaging

Grand Bay Ballroom South

1:30 p.m.–3:30 p.m.

BTuE • Functional Neural Imaging

David Boas; Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital, USA, Presider

BTuE1 • 1:30 p.m.

Effect of GABA on Somatosensory Evoked Potentials and Hemodynamic Evoked Responses, *Harsha Radhakrishnan, Weicheng Wu, Stefan Carp, David A. Boas, Maria A. Franceschini; Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital, USA.* To investigate the neurovascular coupling, we performed simultaneous diffuse optical imaging and EEG measurements in rats while modulating the neuronal activity by topical infusion of GABA on the brain surface.

BTuE2 • 1:45 p.m.

Analysis of Optical Signals Associated with the Electrical Stimulation of Peripheral Nerves, *Debbie K. Chen[1], Yunjie Tong[1], Angelo Sassaroli[1], Jeffrey M. Martin[2], Peter R. Bergethon[2], Sergio Fantini[1]; [1]Tufts Univ., USA, [2]Boston Univ., USA.* We report the possible origins of optical responses to electrical stimulation of the median nerve in human subjects. The optical signals are ~0.2% in amplitude, and peak ~100 ms after the 0.1 ms stimulus.

BTuE3 • 2:00 p.m.

Detection of Ca^{2+}-Dependent Neuronal Activity Simultanously with Dynamic Changes in Cerebral Blood Flow, Blood Volume and Oxygenation in Somatosensory Cortex of the Live Rat Brain, *Congwu Du[1,2], Zhongchi Luo[1,3], Mei Yu[1], Helene Benveniste[1,2]; [1]Brookhaven Natl. Lab, USA, [2]Dept. of Anesthesiology, SUNY at Stony Brook, USA, [3]Dept. of Biomedical Engineering, SUNY at Stony Brook, USA.* We present our first *in vivo* results of simultaneous detection of intracellular calcium transients along with cerebral blood flow, blood volume and tissue oxygenation in rat somatosensory cortex during activation induced by electrical forepaw stimulation.

BTuE4 • 2:15 p.m.

Can Functional Near-Infrared Spectroscopic (fNIRS)Imaging Detect Deception? *Fenghua Tian[1], Rhonda Dobbs[2], Alejandro Del Carmen[2], Frank A. Kozel[3], Hanli Liu[1]; [1]Dept. of Bioengineering, Univ. of Texas at Arlington, USA, [2]Dept. of Criminology and Criminal Justice, Univ. of Texas at Arlington, USA, [3]Dept. of Psychiatry, the Univ. of Texas Southwestern Medical Ctr. at Dallas, USA.* We report two studies on the capability of fNIRS brain imaging to detect deception. We demonstrate that fNIRS has potential to be a new approach to detect deception that has important applications for homeland society.

BTuE5 • 2:30 p.m.

Optical Stimulation of the Central Nervous System *in vitro*, *Jonathan M. Cayce[1], Chris Kao[2], Jonathan D. Malphurus[1], Peter Konrad[1,2], Duco Jansen[1,2], Anita Mahadevan-Jansen[1,2]; [1]Dept. of Biomedical Engineering, Vanderbilt Univ., USA, [2]Dept. of Neurosurgery, Vanderbilt Univ., USA.* Optical stimulation in the central nervous system could potentially provide less invasive techniques for procedures involving stimulation of neurons in Neurosurgery. Optical stimulation of the thalamocortical brain slice model indicated a frequency and wavelength dependence.

BTuE6 • 2:45 p.m.
Complete Optical Neurophysiology: Toward Optical Stimulation and Recording of Neural Tissue, *Fred A. Wininger, Jennifer L. Schei, David M. Rector; Washington State Univ., USA.* Optical methods to stimulate and record neural activity provide artifact free and noncontact neurophysiological procedures. Focused mid-infrared light alters membrane potential and activates individual neural processes; simultaneous intrinsic scattered light changes report neural activity patterns.

BTuE7 • 3:00 p.m.
Non-invasive Optical Detection of Functionally-Stimulated Neural Activity in the *limulus* Compound Eye, *B. Hyle Park[1], Chris L. Passaglia[2], Johannes F. de Boer[1]; [1]Wellman Ctr. for Photomedicine, Massachusetts General Hospital, Harvard Medical School, USA, [2]Boston Univ., USA.* Recent studies have indicated the potential of phase-sensitive interferometry to non-invasively detect transient structural changes that accompany action potential propagation. We present a demonstration of optical detection of functionally-stimulated activity in the limulus compound eye.

BTuE8 • 3:15 p.m.
***In vivo* Real Time Combined Diffuse Reflectance-OCT Monitoring of Vasoconstriction and Vasodilation,** *Alexandre Douplik[1,2], D. Morofke[1], S. Chiu[1], V. Bouchelev[1], L. Mao[1], V. Yang[1], A. Vitkin[1]; [1]Xillix Ltd., Canada, [2]Graduate School in Advanced Optical Technology, Univ. Erlangen-Nürnberg, Germany.* A combined Diffuse Reflectance Spectroscopy–Optical Coherence Tomography approach was conducted on externalized intact rat gut *in vivo* during both vasoconstriction and vasodilatation. A reproducible correlation was found between the derived metrics.

St. Petersburg Ballroom
3:30 p.m.–4:00 p.m.
Coffee Break

BTuF • BIOMED Poster Session III

Foyer
4:00 p.m.–6:00 p.m.
BTuF • BIOMED Poster Session III

BTuF1
Novel Polymers for Intraocular Lenses Enabling Photo-Induced Tuning of Focal Length, *Jens Träger, Martin Schraub, Hee-Cheol Kim, Norbert Hampp; Philipps-Univ. Marburg, Germany.* We have developed polymers where we can non-invasively induce a change in refractive index which is great enough to be interesting for the concept of *in vivo* tunable IOL's by employing a photoinduced cycloaddition reaction.

BTuF2
Erbium:YAG Laser Emulsification of Grade 4+ Porcine and Human Cataracts Using a Germanium Oxide Fiber Probe, *Nicholas J. Scott[1], Susan R. Trammell[1], Nathaniel M. Fried[1], Priscila Wittmann[2], Ashley K. Behrens[2], Alexei Tchapyjnikov[3], Ken Levin[3], Danh Tran[3]; [1]Univ. of North Carolina at Charlotte, USA, [2]Wilmer Eye Inst., Johns Hopkins Hospital, USA, [3]Infrared Fiber Systems, USA.* Previous studies reported difficulty emulsifying hard cataracts with Erbium:YAG laser. This preliminary ex vivo tissue study demonstrates successful Er:YAG laser emulsification of Grade 4+ cataracts using a germanium oxide / sapphire optical fiber delivery system.

BTuF3
Sampling Fluorescent Drug in Tissue with a Depth Dependent Sensitive Fiber Probe or Interstitial Sampling, *Brian W. Pogue, Kristen Lurie, Chao Sheng, Tim Monahan, Dax Kepshire; Dartmouth College, USA.* Fluorescence fiber probes were designed to sample tissue layers or along an implanted fiber track. Pancreas tumor measurements show the high heterogeneity present, and quantify the minimum number of measurements for accurate dosimetry in PDT.

BTuF4
Medium-Power Tissue Ablation Using 1940 nm Thulium Fiber Laser, *Vladimir Lemberg, Dmitry D. Rozhetskin, Chris Jadczak; Lumenis Inc., USA.* Ablation rate was measured for the laser power output ranging from 2 to 9 W delivered through 50 and 200 μm fibers to three different types of tissue. The slopes of interpolation curves were estimated.

BTuF5
Controllable Injury of the Dermal Collagen in CO2 Microablative Method, *Vladimir Lemberg[1], Haim Epshtein[2]; [1]Lumenis, Inc., USA, [2]Lumenis Ltd., Israel.* The feasibility of producing controllable injury to dermal collagen by using a novel CO2 laser based microablation method was studied. An *ex vivo* dose response histological study was performed as well as preliminary clinical testing.

BTuF6
Comparison of the Mie Theory and T-Matrix Methods for Estimating the Size of Cell Nuclei, *Michael G. Giacomelli, Kevin J. Chalut; Duke Univ., USA.* We investigate the accuracy of inverse light scattering cell nuclei size predictions derived from Mie theory with the T-matrix method over a range of aspherical nuclei relevant to cancer detection and monitoring.

BTuF7

Modeling Advances for Measuring Spheroidal Geometries Using Angle-Resolved Low Coherence Interferometry, *Cyrus Amoozegar, Michael G. Giacomelli, Kevin J. Chalut, Adam Wax; Duke Univ., USA.* The relative efficacy of a modified Mie theory model and a T-matrix method model in determining the geometry of spheroidal scatterers is determined through comparison of scattering distributions of optical phantoms to these two models.

BTuF8

Real-Time Blood Monitoring via Coherent Raman Spectroscopy, *Arthur Dogariu[1], Alexander Goltsov[1], Marlan O. Scully[1,2]; [1]Princeton Univ., USA, [2]Texas A&M Univ., USA.* We demonstrate a real-time method of blood analysis. Using a novel coherent Raman technique we record the vibrational spectrum from picoliters of whole blood in milliseconds. This method will allow real-time, *in vivo*, blood monitoring.

BTuF9

Non-Invasive Characterization of Mineralized Silk Films Using Light Scattering, *Sharad Gupta, Martin Hunter, David L. Kaplan, Irene Georgakoudi; Tufts Univ., USA.* Light scattering spectroscopy is used as a non-invasive technique to characterize mineralization of silk films. Acquired scattering data is analyzed to provide information about the overall content as well as the organization of mineral deposits.

BTuF10

An Endoscope Compatible Low-Coherence Enhanced Backscattering Spectroscopy Probe for Cancer Screening, *Jeremy D. Rogers[1], Vladimir M. Turzhitsky[2], Nikhil N. Mutyal[2], Andrew Gomes[2], Alexey Kromin[2], Vadim Backman[2]; [1]Northwestern Univ., USA, [2]Optical Sciences Ctr., USA.* Low-coherence Enhanced Backscattering Spectroscopy (LEBS), an angular resolved spectroscopic technique developed by our group, has been shown to detect early forms of cancer. Here, we implement the technique in an endoscope compatible probe.

BTuF11

Quantifying Microarchitectural and Light Scattering Differences between Tumorigenic and Non-Tumorigenic Cell Models of Tissue: Analysis with Unified Mie and Fractal Model, *Min Xu; Dept. of Physics, Fairfield Univ., USA.* Microarchitectural differences between tumorigenic and non-tumorigenic cell models of tissue are quantified by unified Mie and fractal analysis of polarized light scattering spectroscopy. Differentiation based on their resulting different light scattering characteristics is discussed.

BTuF12

Concentric Sphere Mie Theory Model: Applications to Nanoshell Spectra Prediction and Design of Anti-Reflection Coatings for Optical Traps, *Ying Hu[1], Timo A. Nieminen[2], Lissett R. Bickford[1], Rebekah A. Drezek[1]; [1]Rice Univ., USA, [2]Ctr. for Biophotonics and Laser Science, School of Physical Sciences, Univ. of Queensland, Australia.* We develop a Lorenz-Mie solution for multilayer concentric spheres and present two separate studies on evaluating nanoshell spectra and anti-reflection coatings for improved optical trapping.

BTuF13

Simulations of Light Scattering from B-Cells with Inhomogeneous Nuclei Using a Improved FDTD Program, *R. Scott Brock[1], Xin-Hua Hu[1], Douglas A. Weidner[1], Judith R. Mourant[2], Jun Q. Lu[1]; [1]East Carolina Univ., USA, [2]Los Alamos Natl. Lab, USA.* We have significantly improved the accuracy and efficiency of a previously developed parallel FDTD program by including correction for numerical dispersion. The updated program is used to investigate the effect of inhomogeneous nuclei in B-cells.

BTuF14

Analysis of Particle Size Distributions from Spectral Reflectance Measurements on Small Tissue Volumes, *Roberto Reif[1], Yakov Gitin[2], Eladio Rodriguez-Díaz[1], Chris Atkinson[2], Ousama A'Amar[1], Satish K. Singh[2], Irving J. Bigio[1]; [1]Boston Univ., USA, [2]Boston Medical Ctr., USA.* Mie theory has been used to describe the reduced scattering coefficient from a model that extracts optical properties from a reflectance spectrum. Preliminary results are presented from normal and inflamed colon mucosa.

BTuF15

High-Throughput, Multiplex Aperture-Coded Raman Spectrometer for Biomedical Diagnostics, *Christy A. Fernandez[1], S. Lim[1], Bobby D. Guenther[1], David J. Brady[1], Scott T. McCain[2]; [1]Duke Univ., USA, [2]Blue Angel Optics, USA.* Over the past couple of years, we have developed an aperture coded Raman spectrometer whose performance is optimized for extended, incoherent sources. We describe results conveying the potential for *in vivo* biomedical diagnostics.

BTuF16

Comparison of Tumor and Healthy Tissues Using Raman Spectroscopy, *Aisha Hilliard[1], Paula Magee[1], Jafar G. Naeini[1], Tim Kute[2], Arthur Dogariu[3]; [1]Winston-Salem State Univ., USA, [2]Wake Forest Univ., USA, [3]Princeton Univ., USA.* Raman-scattering measurements of tumor and healthy tissues are reported. The ratio of peak-intensity at 860cm^{-1} and 1300cm^{-1} increases from 0.37±0.01 (healthy tissue) to 0.51±0.01 (malignant tissue), consistent with pathological criterion of nucleus-to-cytoplasm ratio increase for infiltrating carcinoma.

BTuF17

Measurement of Skin Texture through Polarization Imaging, *Paulo R. Bargo, Nikiforos Kollias; Johnson & Johnson Consumer Products Co., USA.* Polarization imaging was used to determine skin texture/roughness. The imaging setup used wide illumination angles and co-polarized imaging to enhance surface texture. The system was used to evaluate skin texture as a function of age.

BTuF18

Depth-Sensitive Spectroscopic Measurements of Patients with Oral Mucosal Lesions, *Richard A. Schwarz[1], Wen Gao[1], Crystal E. Weber[1], Rebecca Richards-Kortum[1], Ann M. Gillenwater[2]; [1]Rice Univ., USA, [2]Univ. of Texas M.D. Anderson Cancer Ctr., USA.* Spectroscopic measurements of 58 patients with oral mucosal lesions are presented and compared with histopathology. The performance of a depth-sensitive fiber optic probe that enables preferential interrogation of epithelial and stromal regions is evaluated.

BTuF19

Early Detection of Rheumatoid Arthritis in Humans by Fluorescence Imaging, *Bernd Ebert[1], Jörn Berger[1], Jan Voigt[1], Rainer Macdonald[1], Thomas Fischer[2], Kay-Geert Hermann[2], Kai Licha[3], Michael Schirner[3]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Dept. of Radiology, Charite Campus Mitte, Medizinische Fakultät der Humboldt Univ. zu Berlin, Germany, [3]migenion GmbH, Germany.* The agent indo-cyanine green has been investigated for early detection of rheumatoid arthritis using fluorescence imaging. Different distributions of fluorescence intensity are found for healthy and inflamed finger joints after injection of an ICG bolus.

BTuF20

***In vivo* Reperfusion Dynamics of Autofluorescence during Prolonged Renal Warm Ischemia for Early Prediction of Tissue Function and Ability to Recover,** *Rajesh N. Raman[1], Christopher D. Pivetti[2], Dennis L. Matthews[1], Christoph Troppmann[2], Stavros G. Demos[3,4]; [1]Univ. of California at Davis, Dept. of Applied Sciences, USA, [2]Univ. of California at Davis Medical Ctr., Dept. of Surgery, USA, [3]Lawrence Livermore Natl. Lab, USA, [4]Univ. of California at Davis Medical Ctr., Dept. of Urology, USA.* Autofluorescence dynamics of kidneys *in situ* in response to different durations of prolonged ischemia is characterized in rats using a relaxation model. Relaxation times increased with injury time and are compared to post-operative survival outcome.

BTuF21

Statistical Analysis of Spatial Extent of Hemoglobin-Concentration Change in Exposed Cortex Measured by Multi-Spectral Imaging, *Koichiro Sakaguchi[1], Shunsuke Furukawa[1], Eiji Okada[1], Takushige Katsura[2], Kyoko Yamazaki[2], Hideo Kawaguchi[2], Atsushi Maki[2]; [1]Dept. of Electronics and Electrical Engineering, Keio Univ., Japan, [2]Advanced Res. Lab, Hitachi Ltd., Japan.* The spatial extents of the concentration changes in hemoglobin caused by brain activation are investigated by an ANOVA-test. The wavelength dependence of the optical path length affects the spatial extents of the hemoglobin concentrations.

BTuF22

Factors Influencing the Accuracy of Determining Tissue Physiology Quantitatively Using Optical Spectroscopy, *Janelle E. Bender, Laura K. Moore, Karthik Vishwanath, Nirmala Ramanujam; Duke Univ., USA.* The accuracy of quantifying optical properties using optical spectroscopy and a Monte Carlo model of light transport was assessed. We show accurate extractions from single and multi-absorber phantoms, independent of probe and instrument.

BTuF23

Lookup Table-Based Inverse Model for Determining Tissue Optical Properties, *Narasimhan Rajaram, James W. Tunnell; Dept. of Biomedical Engineering, The Univ. of Texas at Austin, USA.* We present a lookup table based-inverse model for determining tissue optical properties from steady-state diffuse reflectance spectra that is valid for fiber-based probe geometries with close source-detector separations and tissues with low albedos.

BTuF24

Probe Contact Pressure Effects on *in vivo* Diffuse Reflectance and Fluorescence Spectroscopy, *Yalin Ti, Wei-Chiang Lin; Florida Intl. Univ., USA.* The effects of probe contact pressure on *in vivo* diffuse reflectance and fluorescence spectroscopy was investigated. Spectral alterations induced by contact probe pressure and the minimal pressure required to induce such effects are reported here.

BTuF25

Diffuse Optical Reflectance Image in Skeletal Muscle, *Gang Yao, Janaka Ranasinghesagara; Univ. of Missouri-Columbia, USA.* We studied the diffuse reflectance images in skeletal muscles. Our results suggested that sarcomere structures played important roles in modulating light propagation in whole muscle and were responsible for the unique reflectance patterns observed.

BTuF26

Noninvasive Determination of Optical Parameters from One Reflectance Image and Extension to Depth-Resolving, *Cheng Chen, Jun Q. Lu, Kenneth M. Jacobs, Xin H. Hu; East Carolina Univ., USA.* The problem of determining optical parameters from one reflectance image has been solved for homogeneous tissue phantoms within the radiative transfer theory. We further extend this method for depth-resolving in heterogeneous phantoms of pigmented lesions.

BTuF27

Imaging of Laser-Excited Autofluorescence Fading Rates: Novel Technique for Tissue Surface Structure Studies, *Janis Spigulis, Alexey Lihachev, Renars Erts; Univ. of Latvia, Latvia.* Experimental methodology for imaging of laser-excited tissue autofluorescence fading rates has been developed and clinically tested. Details of the equipment and image processing are described, along with measurement results confirming feasibility of the novel technology.

BTuF28

Optimal Filters for Recovery of Object Model Parameters from Optical Images, *Iain Styles; Univ. of Birmingham, UK.* We describe a procedure for selecting optimal filters that can be used in conjunction with an appropriate model to obtain parameters describing the composition of an object from optical images.

BTuF29

Optical Properties of Rat Heads Measured by the Diffuse Reflectance Method over 1 Micrometer, *Goro Nishimura, Mamoru Tamura; Hokkaido Univ., Japan.* Time-of-flight measurements over 1 micrometer wavelength using a Streak camera system monitor the optical parameters of rat heads. With respect to the hemodynamic change, the temporal response function was essentially not affected.

BTuF30

Electrical and Metabolic Imaging of Cardiac Ischemia, *Matthew B. Bouchard[1], Sean A. Burgess[1], Philip Moussazadeh[1], Andrew J. Radosevich[1], Joseph P. Wuskell[2], Leslie M. Loew[2], Arkady Pertsov[3], Elizabeth M. C. Hillman[1]; [1]Lab for Functional Optical Imaging, Dept. of Biomedical Engineering, Columbia Univ., USA, [2]Univ. of Connecticut Health Ctr., Richard D. Berlin Ctr. for Cell Analysis and Modeling, USA, [3]Dept. of Pharmacology, State Univ. of New York, Upstate Medical Univ., USA.* A high-speed CCD camera-based imaging system employing frequency modulated multi-spectral illumination sources is under development to image intrinsic and exogenous fluorophores. The system will be used to investigate electrical and metabolic function during cardiac ischemia.

BTuF31

Quantitative Imaging of Platelet Aggregation in a Microchannel Using an Interfacial Collision Reactor, *Taisuke Hirono[1,2], Shinpei Okawa[1], Yukio Yamada[1]; [1]Univ. of Electro-Communications, Japan, [2]Kowa Co., Ltd., Japan.* We have developed an interfacial collision reactor which enables biochemical reaction between solid biological cells and liquid reagent in a laminar micro flow. Applying this technique, quantitative imaging of platelet aggregation was succeeded and assessed.

BTuF32

Development of a New Sensitive and Rapid Detection Method of Specific DNA Sequences, *Amos Danielli[1], Ady Arie[1], Noga Porat[2], Marcelo Erlich[1]; [1]Tel-Aviv Univ., Israel, [2]Univ. of Illinois, USA.* Sensitive detection of DNA sequences is experimentally demonstrated by attaching magnetic beads to fluorescent-labeled DNA probes and applying alternating magnetic field gradient. This enables elimination of the scattering noise from the solution by synchronous detection.

BTuF33

Transient Fluorescence Spectroscopy Applied to Lifetime Studies of DPA-Tb as Related to Bacterial Spores, *Anali Makoui, Dennis K. Killinger; Univ. of South Florida, USA.* The fluorescence lifetimes of the individual emission lines of the DPA-Tb complex have been measured in different solvents using a new technique, Transient Fluorescence Spectroscopy (TFS).

BTuF34

Integrated Raman and Angular-Scatter Microscopy (IRAM), *Andrew J. Berger, Zachary J. Smith; Inst. of Optics, Univ. of Rochester, USA.* Raman spectroscopy studies a target chemically, while angularly-resolved elastic light scattering probes morphology. We have combined these modalities on a microscopic platform. The optical system and data from beads and immune cells are discussed.

BTuF35

Monitoring Hemodynamic Changes in Preterm Infants Using Optical Spectroscopies and Doppler Ultrasound, *Erin M. Buckley, Meeri N. Kim, Turgut Durduran, Guoqiang Yu, Regine Choe, Chao Zhou, Susan Shultz, Chandra M. Sehgal, Daniel J. Licht, Peter H. Arger, Hallam H. Hurt, Noah M. Cook, Arjun G. Yodh; Univ. of Pennsylvania, USA.* Diffuse correlation and optical spectroscopies are used to monitor cerebral blood flow and oxygenation in premature infants during changes in angular head-of-bed position. Subsequent transcranial Doppler ultrasound measurements corroborate our findings.

BTuF36

Combined NIRS and EEG Studies and the Development of a Novel Reconstruction Software for Optical Tomography, *Tommi E. Noponen[1], Tiina Näsi[2], Petri Hiltunen[2], Jaakko Virtanen[2], Kalle Kotilahti[2], Lauri Lipiäinen[2], Pekka Meriläinen[2]; [1]Turku PET Ctr., Turku Univ. Central Hospital, Finland, [2]Lab of Biomedical Engineering, Helsinki Univ. of Technology, Finland.* This paper summarizes some of the latest progress in near-infrared spectroscopy (NIRS) and optical tomography research at Helsinki University of Technology and briefly describes the main results of three works carried out recently.

BTuF37

Two-Photon Luminescence Imaging Using Gold Nanorods as Bright Contrast Agents, *Nicholas J. Durr[1], Benjamin A. Holfeld[1], Timothy Larson[1], Danielle K. Smith[1], Brian A, Korgel[1], Konstantin Sokolov[1,2], Adela Ben-Yakar[1]; [1]Univ. of Texas at Austin, USA, [2]Univ. of Texas M.D. Anderson Cancer Ctr., USA.* Gold nanorods were used as molecularly targeted contrast agents for two-photon luminescence imaging of cancer cells 160 microns inside a tissue phantom. Nanorod labeled cells exhibit three orders of magnitude brighter signal than unlabeled cells.

BTuF38

Single- and Two-Photon Excited Autofluorescence of Epithelial Tissue, *Wei Zheng, Dong Li, Yicong Wu, Jianan Y. Qu; Hong Kong Univ. of Science and Technology, China.* Single- and two-photon excited fluorescence spectra were measured at the same location in tissue. The results revealed that TPF and SPF signals are different and TPF signal provides more accurate information on tissue morphology.

BTuF39

Dynamic Imaging of Collagen Remodeling during Angiogenesis, *Nathaniel D. Kirkpatrick[1], Stylianous Andreou[2], James Hoying[3], Urs Utzinger[1,2]; [1]Dept. of Biomedical Engineering, Univ. of Arizona, USA, [2]Dept. of Electrical and Computer Engineering, Univ. of Arizona, USA, [3]Cardiovascular Innovation Inst., Univ. of Louisville, USA.* Based on analysis of SHG from fibrillar collagen and 2PEF as well as coherent transmitted light from vascular cells, angiogenic sprouts and growing neovessels actively and differentially remodel existing collagen fibrils.

BTuF40

***In vivo* Assessment of Microvascular Blood Content in the Rectal Mucosa Using Polarization-Gated Spectroscopy: Applications for Colon Cancer Screening,** *Andrew J. Gomes[1], Young Kim[2], Vladimir Turzhitsky[1], Jeremy Rogers[1], Vadim Backman[1]; [1]Northwestern Univ., USA, [2]Purdue Univ., USA.* Our group has developed a polarization-gated spectroscopy probe capable of interrogation of the colonic microvascular blood content. A human pilot study demonstrated that the rectal blood content is elevated in the presence of colonic neoplasia.

BTuF41

Optical Characterization of Myocardial Infarction: An *in vivo* Study, *Yalin Ti, Wei-Chiang Lin; Florida Intl. Univ., USA.* The effects of myocardial infarction on *in vivo* diffuse reflectance and fluorescence characteristics of myocardial tissue were investigated. Spectral alterations induced by infarct development in myocardial tissue are reported.

BTuF42

Lesion Thickness Assessment Using a Fiber Optic Probe, *Bevin Lin[1], Dennis L. Matthews[1,2], Shiva Sharareh[3], Stavros G. Demos[1,2]; [1]Ctr. for Biophotonics, Univ. of California at Davis, USA, [2]Lawrence Livermore Natl. Lab, USA, [3]Biosense Webster Inc., USA.* Dual fiber spectroscopy explores NIR light scattering to assess cardiac tissue lesion formation during RF tissue ablation. This feasibility study demonstrates optical spectroscopy potential to address conditions that remain poorly controlled in current clinical practice.

BTuF43

Optical Reflectance Spectroscopy for Detection of Renal Cell Carcinoma Using Model-Driven Analysis, *Aditya V. Mathker[1], Dheerendra Kashyap[1], Disha L. Peswani[1], Karim Bensalah[2], Wareef Kabbani[2], Altug Tuncel[2], Jeffrey Cadeddu[2], Hanli Liu[1]; [1]Univ. of Texas at Arlington, USA, [2]Univ. of Texas Southwestern Medical Ctr. at Dallas, USA.* We have developed an effective new methodology using short-separation, optical reflectance spectroscopy to differentiate between normal tissue and renal cell carcinoma and also between benign and malignant carcinoma using reflectance model-driven analysis.

BTuF44

Feasibility of Detecting Prostate Adenocarcinoma Using Optical Reflectance Spectroscopy, *Disha L. Peswani[1], Aditya Mathker[1], Dheerendra Kashyap[1], Karim Bensalah[2], Altug Tuncel[2], Wareef Kabbani[2], Jung Hun Oh[1], Jeffrey Cadeddu[2], Jean Gao[1], Hanli Liu[1]; [1]Univ. of Texas at Arlington, USA, [2]Univ. of Texas Southwestern Medical Ctr. at Dallas, USA.* We introduce a novel application of optical reflectance spectroscopy to detect positive surgical margins for prostate adenocarcinoma during laparoscopic prostatectomy to monitor hemodynamic and light scattering changes.

BTuF45

Monte Carlo Model of Stricture Formation in Esophageal Photodynamic Therapy, *Norris W. Preyer[1], Linda R. Jones[1], Daryl Reynolds[1], Herbert C. Wolfsen[2], Michael B. Wallace[2]; [1]College of Charleston, USA, [2]Div. of Gastroenterology and Hepatology, Mayo Clinic, USA.* A Monte Carlo simulation was developed for esophageal PDT. It was tested on a photosensitized pig esophagus model and compared to a published account of stricture formation in pigs. The simulation correctly predicted the damage.

BTuF46

Raman Spectroscopy: Potential for Detecting Tissue Coagulation during Laser Therapy, *Matthew Rodrigues[1], Robert Weersink[1,2], William Whelan[1,3]; [1]Ryerson Univ., Canada, [2]Ontario Cancer Inst., Photonics Res. Ontario, Princess Margaret Hospital,, Canada, [3]Univ. of Prince Edward Island, Canada.* Raman spectra of bovine muscle and albumen phantoms were acquired before and after laser heating. Results demonstrate that Raman spectroscopy is sensitive to changes occurring in tissues during heating, indicating potential for monitoring thermal therapies.

BTuF47

Colposcopy Based on 3-D Imaging and Motion Tracking, *Tao T. Wu, Jianan Y. Qu; Dept. of Electronic and Computer Engineering, Hong Kong Univ. of Science and Technology, China.* A colposcopic optical imaging system is built to measure the 3-D surface topology of cervix and track the motion of patient. The imaging system can potentially improve the accuracy of colposcopic diagnosis of cervical cancer.

BTuF48

Compact Polarization Camera with Liquid-Crystal Retarder for Patterning of Biological Textures, *Alexander P. Sviridov[1,2], Zachary Ulissi[2], Victor Chernomordik[2], Moinnudin Hassan[2], Albert C. Boccara[3], Amir Gandjbakhche[2]; [1]Inst. for Laser and Information Technologies of Rusian Acad. of Sciences, Russian Federation, [2]Natl. Inst. of Health, USA, [3]Ecole Superinieure de Physique et de Chimie Industrielle de Paris (ESPCI), France.* The designed camera allows illumination with polarized light and consequently capturing two orthogonally polarized images using liquid crystal retarder and polarizer. Real time mapping of polarization degree and correlation coefficient were built into image processing.

BTuF49

Intraoperative Delineation of Nonmelanoma Skin Cancers: An *in vivo* Pilot Trial, *Anna N. Yaroslavsky[1], Munir Al-Arashi[1], Elena Salomatina[2], Andrew Nelson[1], Victor A. Neel[1]; [1]Harvard Medical School, USA, [2]Massachusetts General Hospital, USA.* This pilot clinical trial in the Mohs surgery environment demonstrates that multi-spectral polarization reflectance and fluorescence imaging enables intraoperative guidance of nonmelanoma skin cancer treatments.

BTuF50

A Marker of Accumulation of Elastin Cross-Links in Facial Skin Based on Blue Fluorescence Imaging, *Gabriela Oana Cula, Paulo R. Bargo, Sheng-Hao Tseng, Nikiforos Kollias; Johnson and Johnson, USA.* Blue-excited fluorescence imaging is used to study solar elastosis. We find that blue fluorescence increases with age. This trend correlates well with the accumulation of elastotic material in skin due to natural aging and photoaging.

BTuF51

A Novel Confocal System to Provide High Precision Non-Contact Measurements of Optical Media Applied to the Human Eye, *Austen Hearn[1], Robin Taylor[1], Richard Holley[1], Tony Wilson[2]; [1]Lein Applied Diagnostics Ltd., UK, [2]Dept. of Engineering Science, Univ. of Oxford, UK.* There are few affordable devices for the non-contact measurement of corneal thickness. This paper introduces a low cost instrument capable of measuring the position of interfaces within the human eye with micron level precision.

BTuF52

Characterization of a Multiphoton Endomicroscope, *Heejin Choi, Shih-Chi Chen, Martin L. Culpepper, Peter T.C. So; MIT, USA.* A multiphoton endomicroscope features a double clad photonic crystal fiber for light delivery and collection. Two thermally driven actuators and fiber resonator in its distal end provide three axis raster scanning.

BTuF53

A Novel High-Throughput Scanning Microscope for Label-Free Detection of Protein and Small-Molecule Chemical Microarrays, *Y. Y. Fei, Xiangdong Zhu, J. P. Landry, Y. S. Sun, X. B. Wang, J. T. Luo, K. S. Lam; Univ. of California at Davis, USA.* We describe a novel scanning optical microscope that enables high-throughput label-free detection of end-points and kinetics of multiple biomolecular reactions on microarrays with more than 10,000 protein or small-molecule targets.

BTuF54

Morphological Feature Quantification of Colonic Crypt Pattern Using Microscope Integrated OCT Scanner, *Xin Qi, Yinsheng Pan, Zhilin Hu, Wei Kang, Michael V. Sivak, Andrew M. Rollins; Case Western Reserve Univ., USA.* There is a close correlation between colonic crypt morphological patterns and histopathological diagnosis. We have conducted an *in vitro* colonic tissue study to quantify the morphological features of crypts using our microscope-integrated OCT scanner.

BTuF55

A Miniature Optical Device for Noninvasive, Fast Characterization of Tumor Pathology, *Justin Y. Lo[1], Bing Yu[1], Gregory M. Palmer[1], Thomas F. Kuech[2], Nirmala Ramanujam[1]; [1]Duke Univ., USA, [2]Univ. of Wisconsin at Madison, USA.* An optical spectroscopy system for cancer diagnostics is miniaturized. The performance of the device is validated with phantom studies. Absorption and scattering coefficients are extracted with high accuracy with an inverse Monte Carlo model.

BTuF56

FPGA-Based Electronics for Confocal Line-Scanners with Linear Detector Arrays, *Sanjeewa Abeytunge, Ricardo Toledo-Crow, Milind Rajadhyaksha; Memorial Sloan-Kettering Cancer Ctr., USA.* Linear detector arrays are conveniently driven by FPGA-based electronics and enable simple line-scanning confocal microscope configurations. Their responsivity and signal-to-noise ratio for reflectance line-scanning is comparable to that of standard APD detectors for point-scanning.

BTuF57

Fluorescence Endomicroscopy with Out-of-Focus Background Rejection, *Nenad Bozinovic, Cathie Ventalon, Timothy Ford, Jerome Mertz; Boston Univ., USA.* We present a novel fluorescence endomicroscope that provides out-of-focus background rejection. Our technique is based on structured and speckled laser illumination.

BTuF58

Integrated Surface Acquisition for Hand-Held Probes, *Thomas Wendler[1], Irène Faure de Pebeyre[1,2], Tobias Lasser[1], Nassir Navab[1]; [1]Computer Aided Medical Procedures (CAMP), TUM, Germany, [2]École Supérieure d'Electricité, France.* Tracked hand-held probes were recently introduced in intra-operative functional imaging, where a priori information on the surface is often helpful. An integrated system for simultaneous acquisition of surface and functional information is described and evaluated.

BTuF59

Optically Controlled Droplet Adhesion and Coalescence: A New and Versatile Microfluidic Technique, *Sanhita Dixit, Gregory Faris; SRI Intl., USA.* We report on a new technique to control nanoliter aqueous droplet adhesion and coalescence. The thermal Marangoni effect is used to drive droplet motion. Surface-active molecules are used to form adhering boundaries between drops.

BTuF60

Assessment of Second Harmonic Properties of Tumor Collagen: Determining the Structural Relationship between Reactive Stroma and Healthy Stroma, *Xiaoxing Han[1], Ryan M. Burke[2], Edward B. Brown[2]; [1]Inst. of Optics, Univ. of Rochester, USA, [2]Dept. of Biomedical Engineering, Univ. of Rochester, USA.* We utilize the polarization and directionality of second harmonic generation to determine structural relationships between fibrillar collagen in mouse mammary tumor models and the healthy mammary fat pad.

BTuF61

***In vivo* Second-Harmonic-Generation Imaging of Dermal Collagen Fiber Using a Mode-Locked Cr:Forsterite Laser,** *Takeshi Yasui, Yu Takahashi, Tsutomu Araki; Osaka Univ., Japan.* We applied a mode-locked Cr:Forsterite laser with a center wavelength of 1250 nm for second-harmonic-generation (SHG) imaging to increase a probing depth, and demonstrated optical-sectioning SHG imaging of dermal collagen fiber.

BTuF62

Femtolaser Precision Photodestruction of Collagen Fibers, *Vladimir A. Hovhannisyan, Wen Lo, Chen Yuan Dong; Dept. of Physics, Natl. Taiwan Univ., Taiwan.* Non-ablative, non-thermal destruction of collagen fiber by femtosecond Ti:Sa laser was revealed. Irreversible increase in twophoton-autofluorescence and decrease in SHG intensities were recorded using multiphoton imaging. Controllable photomodification of collagen fibers in biotissues was demonstrated.

BTuF63

High-Speed *en face* Scanning Optical Coherence Microscopy, *Linbo Liu, Nanguang Chen, Colin Sheppard; Natl. Univ. of Singapore, Singapore.* A high-speed, high-efficiency, high-duty-cycle, path-length maintaining and linear beam scanner is proposed for en face scanning optical coherence microscopy, which provides a line rate up to 3 kHz, ±1.8º scanning range and 90% duty cycle.

BTuF64

Blood Vessel 3-D Imaging Using Electronically Controlled Optics Lens-Based Confocal Microscopy, *Mumtaz Sheikh, Nabeel A. Riza; College of Optics, CREOL, Univ. of Central Florida, USA.* A commercial confocal microscope WITec AlphaSNOM is modified by including a sample path electronically controlled lens to achieve no-moving parts axial scanning microscopy. Shown are three dimensional imaging results of a blood vessel.

BTuF65

Confocal Fluorescence Imaging to Detect the Drug-Induced Abnormality of Intracellular Ca^{2+} in Rat Brain, *Rubin Pan[1], Jiong Chen[2], Anat Biegon[3], Jasbeer Dhawan[3], Yingtian Pan[2], Congwu Du[3,4]; [1]Education Program of Brookhaven Natl. Lab, USA, [2]Dept. of Biomedical Engineering, SUNY at Stony Brook, USA, [3]Medical Dept., Brookhaven Natl. Lab, USA, [4]Dept. of Anesthesiology, SUNY at Stony Brook, USA.* We have demonstrated a microscopic method of measuring intracellular calcium ($[Ca^{2+}]_i$) in the brain using the fluorescence calcium indicator Rhod2 to characterize cocaine-induced abnormality of the brain $[Ca^{2+}]_i$ with cellular morphological visualization.

BTuF66

Engineering of a Line-Scanning Confocal Microscope toward Imaging Epithelial Tissues, *Daniel S. Gareau, Sanjee Abeytunge, Milind Rajadhyaksha; Memorial Sloan-Kettering Cancer Ctr., USA.* A confocal reflectance line-scanning microscope provides optical sectioning of 1.4 µm and shows promise to image nuclear and cellular detail in human tissues. Line-scanning may be a simpler alternative to point-scanning for imaging epithelial tissues.

BTuF67

Fluorescence Tomography with the Frequency Domain Equation of Radiative Transfer, *Alexander D. Klose, Hyun K. Kim, Andreas H. Hielscher; Columbia Univ., USA.* We have developed an image reconstruction algorithm for fluorescence tomography based on the frequency domain equation of radiative transfer. Transport properties of tissue become significant when strong light absorption is encountered in small animal tissue.

NOTES

•Wednesday, March 19, 2008•

Conference Registration
7:00 a.m.–6:00 p.m.
Registration Open

BWA • Plenary IV: Molecular Imaging and Therapeutics

Grand Bay Ballroom North and South
7:30 a.m.–10:00 a.m.
BWA • Plenary IV: Molecular Imaging and Therapeutics
Rebekah Drezek; Rice Univ., USA, Presider

BWA1 • 7:30 a.m. **Tutorial**
Optical Technologies for Early GI Cancer Detection: Many Ways to Skin a Cat? *Brian C. Wilson; Univ. of Toronto, Canada***,** The detection of early cancer in the colon and esophagus are critical to successful treatment. Many endoscopic imaging and spectroscopic techniques have been investigated, with varying results. The challenges have driven many biophotonic advances.

BWA2 • 8:15 a.m. **Invited**
Fluorescence Imaging and Spectroscopy for Oral Cancer Detection, *Ann M. Gillenwater; Univ. of Texas MD Anderson Cancer Ctr., USA.* We present results demonstrating how depth-resolved fluorescence and reflectance spectroscopy can non-invasively and objectively discriminate between normal and neoplastic oral mucosa with improved sensitivity and specificity, and describe their implications for improved oral cancer screening.

BWA3 • 8:45 a.m. **Invited**
Multifunctional QDs for Molecular Imaging and siRNA Delivery, *Xiaohu Gao; Univ. of Washington, USA.* In this talk, I present a recent development of multifunctional quantum dots for ultrasensitive detections, molecular imaging and traceable drug delivery.

BWA4 • 9:15 a.m. **Invited**
Effects of Low Intensity Laser Light on Wound Healing in the Rat, *Ethne L. Nussbaum, Tony Mazzulli, Kenneth P. H. Pritzker, Facundo Las Heras, Lothar Lilge; Univ. of Toronto, Canada.* Biomodulation of bacteria is a potential effect of exposing wounds to laser light, dependent upon wavelength and radiant exposure. Significant reduction in normal flora or increased presence of pathogenic bacteria in wounds can delay healing.

St. Petersburg Ballroom
10:00 a.m.–10:30 a.m.
Coffee Break

St. Petersburg Ballroom
10:00 a.m.–4:00 p.m.
Exhibits Open

BWB • Optical Therapeutics

Grand Bay Ballroom North
10:30 a.m.–12:30 p.m.
BWB • Optical Therapeutics
Seonkyung Lee; Physical Sciences Inc., USA, Presider

BWB1 • 10:30 a.m. **Tutorial**
Developing Conformal Therapy Treatment Planning for Photodynamic Therapy, *Lothar Lilge[1,2], Augusto Rendon[1,2]; [1]Ontario Cancer Inst., Canada, [2]Univ. of Toronto, Canada.* Photodynamic Therapy undergoes currently a renaissance as treatment modality for solid tumors, which is due to novel photosensitizers absorbing beyond 700nm and the application of treatment planning concepts from ionizing radiation therapy.

BWB2 • 11:15 a.m. **Invited**
To Be Announced, *Jean-Claude Kieffer; INRS Énergie, Matériaux et Télécommunications, Canada.* Abstract not available.

BWB3 • 11:45 a.m.
Multi-Modality Optical Imaging of Vascular Responses to Photodynamic Therapy in Mouse Window Chamber Model, *Mamta Khurana[1], Hazel A. Collins[2], Eduardo H. Moriyama[1], Adrian Mariampillai[1], Harry L. Anderson[2], Brian C. Wilson[1]; [1]Ontario Cancer Inst., Univ. of Toronto, Canada, [2]Univ. of Oxford, UK.* We demonstrate multi-modal optical imaging in a window-chamber vascular model to investigate the response to photodynamic therapy using novel photosensitizers with high 2-photon cross-section, and show that (micro)vessel closure is feasible at clinically-realistic doses.

BWB4 • 12:00 p.m.
Use of Magnetic Fields to Probe and Alter Photodynamic Processes in Photosensitizers, *Ozzy Mermut[1], Jean-Pierre Bouchard[1], Jean-Francois Cormier[1], Patrice Desroches[1], Michel Fortin[1], Pascal Gallant[1], Sébastien Leclair[1], Isabelle Noiseux[1], Marcia L. Vernon[1], Kevin R. Diamond[2,3], Michael S. Patterson[2,3]; [1]INO (Natl. Optics Inst.), Canada, [2]Juravinski Cancer Ctr., Canada, [3]McMaster Univ., Canada.* Spin states of Type 1 photosensitizer radicals are perturbed using weak magnetic fields (<200mT) to affect their luminescence, measured using time-domain photon counting. Magneto-photosensitization effects on photodynamic pathways in liposome cell phantoms are examined.

BWB5 • 12:15 p.m.
Three-Dimensional Mapping of Photosensitizer Distribution for Interstitial Photodynamic Therapy Dosimetry, *Johan Axelsson[1], Ann Johansson[1], Johannes Swartling[2], Stefan Andersson-Engels[1]; [1]Dept. of Physics, Lund Univ., Sweden, [2]SpectraCure AB, Sweden.* A reconstruction scheme is adopted for retrieval of photosensitizer concentration in human prostate. The scheme utilizes interstitially positioned optical fibers. Results, based on modeled data, indicate potential for homogeneous and heterogeneous photosensitizer distribution reconstruction.

BWC • Techniques for Functional Neural Imaging

Grand Bay Ballroom South
10:30 a.m.–12:30 p.m.
BWC • Techniques for Functional Neural Imaging
David Rector; Washington State Univ., USA, Presider

BWC1 • 10:30 a.m.
Multiphoton Fluorescence Lifetime Imaging of NADH in Epileptic Rat Brain Tissue Reveals Metabolic Abnormalities, *Thomas H. Chia, Anne Williamson, Michael J. Levene; Yale Univ., USA.* Abnormal neuronal-astrocytic metabolic coupling is hypothesized in temporal lobe epilepsy. FLIM of hippocampus from rodent epilepsy models demonstrates abnormalities in the distribution of bound and unbound NADH in response to stimulation, indicating underlying metabolic pathology.

BWC2 • 10:45 a.m.
Combining Laser Doppler Speckle Contrast Imaging and Optical Coherence Tomography for Quantitative Imaging of Cortical Blood Flow in Rat Brain, *Zhongchi Luo[1,2], Zhenguo Wang[1], Zhijia Yuan[1], Congwu Du[2,3], Yingtian Pan[1]; [1]Dept. of Biomedical Engineering, Stony Brook Univ., USA, [2]Medical Dept., Brookhaven Natl. Lab, USA, [3]Dept. of Anesthesiology, Stony Brook Univ., USA.* We quantify the relative flow mapping of laser Doppler speckle contrast imaging with frequency-domain optical coherence Doppler tomography by calibrating co-registered cerebral arteriolar/arterial blood flow changes such as induced by cocaine challenge.

BWC3 • 11:00 a.m.
The Effect of Methylphenidate on Brain Hemodynamics of Attention-Deficit/Hyperactivity Disorder Measured by Functional Near Infrared Spectroscopy, *Nermin Topaloğlu[1], Ercan Kara[1], Esin Karahan[1], Sinem Burcu Erdoğan[1], Sinem Serap[1], Özgür Öner[2], Bedriye Öncü[3], Kerim Münir[4], Koray Çiftçi[1], Ata Akin[1]; [1]Inst. of Biomedical Engineering, Bogazici Univ., Turkey, [2]Dept. of Child Psychiatry, SB Diskapi Children's Hospital, Turkey, [3]Dept. of Psychiatry, Ankara Univ. School of Medicine, Turkey, [4]Dept. of Psychiatry, Children's Hospital Boston, Harvard Medical School, USA.* Fifteen ADHD adults were evaluated with fNIRS during Stroop task. The aim was to examine methylphenidate-induced hemodynamic changes during cognitive activity. It is found that methylphenidate decreased oxyhemoglobin levels. The reason may be vasoconstriction.

BWC4 • 11:15 a.m.
Simultaneous Imaging of Cerebral Blood Flow and Partial Pressure of Oxygen During Cortical Spreading Depression, *Sava Sakadžić[1], Shuai Yuan[1], Ergin Dilekoz[2,3], Svetlana Ruvinskaya[1], Mark H. Shalinsky[1], Sergei A. Vinogradov[4], Cenk Ayata[2,3], David A. Boas[1]; [1]Photon Migration Lab, Martinos Ctr. for Biomedical Imaging, Dept. of Radiology, Massachusetts General Hospital, Harvard Medical School, USA, [2]Stroke and Neurovascular Regulation Lab, Dept. of Radiology, Massachusetts General Hospital, Harvard Medical School, USA, [3]Stroke Service and Neuroscience Intensive Care Unit, Dept. of Neurology, Massachusetts General Hospital, Harvard Medical School, USA, [4]Dept. of Biochemistry and Biophysics, Univ. of Pennsylvania, USA.* We develop a novel imaging technique that provides real-time two-dimensional maps of partial pressure of oxygen and cerebral blood flow in rats and mice by combining phosphorescence lifetime imaging with laser speckle contrast imaging.

BWC5 • 11:30 a.m.
Study of Neurovascular Coupling via Simultaneous MEG DOI Acquisition, *Wanmei Ou[1], Ilkka Nissila[2], Harsha Radhakrishnan[2], David A. Boas[2], Matti S. Hämäläinen[2], Maria Angela Franceschini[2]; [1]MIT, USA, [2]Athinoula A. Martinos Ctr. for Biomedical Imaging, Massachusetts General Hospital, USA.* Our simultaneous magnetoencephalography and diffuse optical imaging measurements in five subjects during median nerve stimulation show a good correlation of the hemodynamic evoked response with MEG deflection N20 and Peak 3, but not with P35.

BWC6 • 11:45 a.m.
Time-Resolved Functional Near-Infrared Spectroscopy at Null Source-Detector Separation, *Antonio Pifferi[1], Alessandro Torricelli[1], Lorenzo Spinelli[1], Davide Contini[1], Rinaldo Cubeddu[1], Fabrizio Martelli[2], Giovanni Zaccanti[2], Alberto Tosi[3], Alberto Dalla Mora[3], Franco Zappa[3], Sergio Cova[3]; [1]Dept. Fisica, Inst. Italiano di Tecnologia, Politecnico di Milano, Italy, [2]Dept. Fisica, Univ. degli Studi di Firenze, Italy, [3]Dept. Elettronica e Informazione, Politecnico di Milano, Italy.* We demonstrate the feasibility of time-resolved diffuse reflectance at a small source-detector separation using a time-gated single-photon avalanche diode both with measurements on heterogeneous phantoms and with *in vivo* detection of a task-related brain activation.

BWC7 • 12:00 p.m.
Correlation between Optical Coherence Tomography (OCT) and Optical Intrinsic Signal Imaging (OISI) during Functional Brain Activation, *Yu Chen[1], Aaron D. Aguirre[1,2], Lana Ruvinskaya[3], Anna Devor[3], David A. Boas[3,2], James G. Fujimoto[1]; [1]MIT, USA, [2]Harvard-MIT Health Sciences and Technology, USA, [3]Massachusetts General Hospital, USA.* Simultaneous OCT and OISI were performed on rat somatosensory cortex during forepaw stimulation. The depth-integrated OCT signal correlates well with OISI signal, while OCT resolves layer-specific dynamics in functional activation patterns indicating retrograde vessel dilation.

BWC8 • 12:15 p.m.
Quantitative Measurement of Hemodynamics during Early Cardiovascular Development Using Spectral Doppler Velocimetry, *Anjul M. Davis[1], Florence Rothenberg[2], Neal Shepherd[1], Joseph Izatt[1]; [1]Duke Univ., USA, [2]Univ. of Cincinnati College of Medicine, USA.* The study of hemodynamic effects on embryonic cardiovascular development has been limited by technology. Here we present an extension to Doppler OCT which may provide insight in the relationship between blood flow and heart development.

12:30 p.m.–1:30 p.m.
Lunch Break

BWD • Methods for Spectroscopy and Microscopy

Grand Bay Ballroom North
1:30 p.m.–3:30 p.m.
BWD • Methods for Spectroscopy and Microscopy
Jerome Mertz; Boston Univ., USA, Presider

BWD1 • 1:30 p.m. **Invited**
Multimodality Nonlinear Optical Imaging, *Ji-Xin Cheng; Purdue Univ., USA.* Coherent anti-Stokes Raman scattering, sum-frequency generation and two-photon excitation fluorescence microscopy are combined on the same platform for multimodality imaging of complex biological systems such as the central nervous system and atherosclerotic lesions.

BWD2 • 2:00 p.m.
High Speed, Optically Sectioned Fluorescence Lifetime Imaging Utilizing Time-Gated Nipkow Disk or Multifocal Multiphoton Time Correlated Single Photon Counting Microscopy, *Clifford Talbot[1], James McGinty[1], Ewan McGhee[1], David Grant[2], Sunil Kumar[2], Gordon Kennedy[1], Ian Munro[1], Patrick Courtney[3], W. Zhang[4], Tom Bunney[4], Tony Magee[5], Dan Davis[6], Matilda Katan[4], Chris Dunsby[1], Mark Neil[1], Paul French[1]; [1]Dept. of Physics, Imperial College London, UK, [2]Chemical Biology Ctr., Imperial College London, UK, [3]Perkin Elmer Inc., UK, [4]Cancer Res. UK Ctr. for Cell and Molecular Biology, Chester Beatty Labs, Inst. of Cancer Res., UK, [5]Dept. of Biomedical Sciences, Imperial College London, UK, [6]Div. of Cell and Molecular Biology, Imperial College London, UK.* We report two optically sectioned fluorescence lifetime systems that exhibit better signal to noise per unit time than conventional time correlated single photon counting systems. Both systems are applied to biologically relevant samples.

BWD3 • 2:15 p.m.
Quantitative Spectroscopic Imaging for Early Cancer Diagnosis, *Chung-Chieh Yu[1], Jelena Mirkovic[1], Condon Lau[1], Geoffrey O'Donoghue[1], Sasha A. McGee[1], Alphi Elackattu[2], Grillone A. Grillone[2], Zhi Wang[2], Elizabeth A. Stier[2], Ramachandra R. Dasari[1], Kamran Badizadegan[1,3], Michael S. Feld[1]; [1]MIT, USA, [2]Boston Univ. Medical Ctr., USA, [3]Massachusetts General Hospital, USA.* We have developed a quantitative spectroscopic imaging (QSI) system for detecting early cancer. Its effectiveness is demonstrated with *ex vivo* human colonic mucosa. In addition, clinical data is acquired from the ventral tongue.

BWD4 • 2:30 p.m.
Optical Coherence Tomography versus High-Frequency Ultrasound for Diagnosis and Staging of Bladder Cancer, *Zhijia Yuan, Zhenguo Wang, Jingxuan Liu, Yingtian Pan; SUNY at Stony Brook, USA.* We present experimental results to examine the utility and potential limitations of 1.3μm spectrum-domain optical coherence tomography and high-frequency ultrasound for diagnosis and staging of cancers induced in rat bladders following AY-27 cells induction.

BWD5 • 2:45 p.m.
3-D Image-Guided Raman Characterization in a Phantom Study, *Subhadra Srinivasan[1], Matthew V. Schulmerich[2], Brian W. Pogue[1], Michael D. Morris[2]; [1]Thayer School of Engineering, Dartmouth College, USA, [2]Univ. of Michigan, USA.* We demonstrate model-based image reconstruction of Raman measurements obtained experimentally. Results show that Raman characterization with accurate localization is possible with anatomical priors. This method has been extended to Raman imaging of dog tibia *in vivo*.

BWD6 • 3:00 p.m.
Development of Combined Raman Spectroscopy— Optical Coherence Tomography (RS-OCT), *Chetan A. Patil[1], Nienke Bosschaart[2], Jeffry S. Nyman[3], Dirk J. Faber[4], Ton G. van Leeuwen[2], Anita Mahadevan-Jansen[1]; [1]Vanderbilt Univ., USA, [2]Univ. of Twente, Netherlands, [3]Vanderbilt Univ. Medical Ctr., USA, [4]Academic Medical Ctr., Univ. of Amsterdam, Netherlands.* We report the development of a combined RS-OCT system able to perform precision guided RS of features within OCT. The device's potential is demonstrated on breast and bone samples, and *in vivo* skin lesions.

BWD7 • 3:15 p.m.
Quantitative Coherent Anti-Stokes Raman Scattering (CARS) Microscopy of Skin Optical Clearing Dynamics, *Maxwell Zimmerley[1], Bernard Choi[2], Eric O. Potma[2]; [1]Dept. of Chemistry, Univ. of California at Irvine, USA, [2]Beckman Laser Inst., Univ. of California at Irvine, USA.* CARS microscopy is used to quantitatively investigate the process of skin optical clearing. Using glycerol and dimethyl-sulfoxide as the clearing agents, we find that tissue scattering is a highly nonlinear function of agent concentration.

BWE • Molecular Imaging Using Fluorescence

Grand Bay Ballroom South
1:30 p.m.–3:30 p.m.
BWE • Molecular Imaging Using Fluorescence
Vasilis Ntziachristos; GSF-Natl. Res. Ctr. for Environment and Health, Germany, Presider

BWE1 • 1:30 p.m.
Dynamic Molecular Imaging: Anatomical Co-Registration and Dynamic Contrast Enhancement, *Elizabeth M. Hillman[1], Matthew B. Bouchard[1], Sean A. Burgess[1], Kirk Gossage[2], James R. Mansfield[2], Richard M. Levenson[2]; [1]Columbia Univ., USA, [2]Cambridge Res. and Instrumentation (CRi), USA.* A new approach to acquiring and analyzing small animal molecular imaging data is presented. By imaging the *in-vivo* dynamics of a dye or targeted probe, improved contrast and all-optical anatomical co-registration can be achieved.

BWE2 • 1:45 p.m.
Fluorescence Lifetime Tomography for Whole Body Small Animal Imaging, *Ralph E. Nothdurft, Sachin Patwardhan, Walter Akers, Samuel Achilefu, Joseph P. Culver; Washington Univ. in St. Louis, USA.* Fluorescent lifetime provides a rich approach to quantitative molecular in vivo imaging. Here we report *in vivo* FLT-tomography using full spatial sampling for 3-D localization, and time-resolved (up to >1 GHz) analysis of lifetime contrasts.

BWE3 • 2:00 p.m.
***In vivo* FMT and Oxymetry Measurements for Combined Imaging of Tumor Physiology and Function,** *Rosy Favicchio[1], Giannis Zacharakis[2], Anikitos Garofalakis[2], Clio Mamalaki[1], Sifis Papamatheakis[1], Jorge Ripoll[2]; [1]Inst. of Molecular Biology and Biotechnology, FORTH, Greece, [2]Inst. of Electronic Structure and Laser, FORTH, Greece.* We describe a modified setup for combined *in vivo* FMT and 3-D rendering of oxygen distribution used to measure change in hypoxic burden during tumour growth whilst simultaneously probing for fluorescence activity.

BWE4 • 2:15 p.m.
Multi-Spectral Imaging of Tissue-Specific Fluorescence Tomography Data, *Giannis Zacharakis[1], Stylianos Psycharakis[1], Anikitos Garofalakis[1], Heiko Meyer[1], Rosy Favicchio[2], Clio Mamalaki[2], Jorge Ripoll[1]; [1]Foundation for Res. and Technology Hellas (FORTH), Inst. of Electronic Structure and Laser (IESL), Greece, [2]Foundation for Res. and Technology Hellas (FORTH), Inst. of Molecular Biology and Biotechnology (IMBB), Greece.* We present a study that combines multi-spectral approaches with the fluorescence molecular tomography for imaging fluorophores with overlapping signatures and for removing autofluorescence signals, for improved contrast, detection limits and quantification accuracy.

BWE5 • 2:30 p.m.
Quantification of Point-Like Fluorescent Sources in Small Animals, *Daria C. Comsa[1,2], Thomas J. Farrell[1,2], Michael S. Patterson[1,2]; [1]Juravinski Cancer Ctr., Canada, [2]McMaster Univ., Canada.* We propose a technique for the *in vivo* determination of depth and strength of fluorescent point-like sources, with particular application to the study of bone metastases in small animals. Measurements in tissue-simulating media are reported.

BWE6 • 2:45 p.m.
Time-Domain Fluorescence Lifetime Tomography, *James McGinty[1], Khadija B. Tahir[1], Vadim Y. Soloviev[2], Romain Laine[1], Alex Sardini[1], Clifford B. Talbot[1], Christopher Dunsby[1], Ian Munro[1], Daniel S. Elson[1], Jo V. Hajnal[1], Mark A. A. Neil[1], Simon R. Arridge[2], Paul M. W. French[1]; [1]Imperial College London, UK, [2]Univ. College London, UK.* We present a platform for fluorescence lifetime tomography utilising tuneable supercontinuum excitation and wide-field time-gated technology. Applied to optical projection and diffuse fluorescence tomography, we demonstrate 3-D time-resolved fluorescence reconstruction in transparent and scattering phantoms.

BWE7 • 3:00 p.m.
MRI-Coupled Fluorescence Tomography of Murine Glioma Metabolic Activity, *Scott C. Davis[1], Summer L. Gibbs-Strauss[1], Hamid Dehghani[2], Brian W. Pogue[3], Keith D. Paulsen[1]; [1]Dartmouth College, USA, [2]Univ. of Exeter, UK, [3]Dartmouth College, USA.* Protoporphyrin IX fluorescence activity in mouse model gliomas is imaged in nude mice using an MRI-coupled spectroscopy scanner. Segmented MR images acquired simultaneously with fluorescence spectra are used to guide fluorescence yield reconstruction.

BWE8 • 3:15 p.m.
Separation of Target Fluorescence Signal from *in vivo* Autofluorescence Background Based on Their Temporal Signatures, *Guobin Ma, Bruno Guerrero, Anader Benyamin-Seeyar, Mario Khayat; ART Advanced Res. Technologies, Inc., Canada.* A novel method is presented to separate target fluorescence signal from autofluorescence background *in vivo* using their temporal features based on *a priori* knowledge. The method is tested for GFP labeled tumors in mouse brain.

St. Petersburg Ballroom
3:30 p.m.–4:00 p.m.
Coffee Break

BWF • Optical Coherence Tomography: Novel Techniques and Functional Imaging

Grand Bay Ballroom North
4:00 p.m.–6:00 p.m.
BWF • Optical Coherence Tomography: Novel Techniques and Functional Imaging
Adrian Podoleanu; Univ. of Kent at Canterbury, UK, Presider

BWF1 • 4:00 p.m.
Spectral Optical Coherence Tomography Using Scanning Optical Frequency Comb Generator, *Tomasz Bajraszewski, Maciej Wojtkowski, Maciej Szkulmowski, Wojciech Fojt, Andrzej Kowalczyk; Nicolaus Copernicus Univ., Poland.* New concept of Spectral OCT method using optical frequency comb is demonstrated. This technique overcomes some limitations of Fourier-domain OCT techniques. High resolution cross-sectional images of biological samples obtained with the presented technique are shown.

BWF2 • 4:15 p.m.
Fourier Domain Low Coherence Transillumination Computed Tomography, *Andrew S. Thomas, Bradley A. Bower, Yuankai K. Tao, Joseph A. Izatt; Duke Univ., USA.* We introduce an extension of Fourier Domain OCT to computed tomographic imaging in thick highly scattering tissues.

BWF3 • 4:30 p.m.
Coherence Length Improvement by Quasi-Phase Continuous Tuning in Wavelength Swept Laser Source for OCT, *Changho Chong, Takuya Suzuki, Atsushi Morosawa, Tooru Sakai; Santec Corp., Japan.* The quasi-phase continuous tuning technique is proposed to improve the coherent build-up of gain, resulting in narrower instantaneous linewidth, thus longer coherence length. We demonstrated the improvement by a factor of two at 20kHz rate.

BWF4 • 4:45 p.m.
***In vivo* Three-Dimensional Fourier Domain Optical Coherence Tomography of Subpleural Alveoli Combined with Intra Vital Microscopy in the Mouse Model,** *Sven Meissner[1], Michael Mertens[2], Alexander Krüger[1], Arata Tabuchi[2], Wolfgang Kuebler[2], Edmund Koch[1]; [1]Univ. of Technology Dresden, Germany, [2]Charité Berlin, Germany.* Simultaneous Fourier domain optical coherence tomography and dark-field intravital microscopy were used for *in vivo* imaging of alveolar dynamics in the ventilated mouse. Quantification of the images revealed an alveolar expansion with increased end-inspiratory-pressure.

BWF5 • 5:00 p.m.
Photothermal Optical Coherence Tomography for Molecular Contrast Imaging, *Melissa C. Skala, Stella Marinakos, Ashutosh Chilkoti, Joseph A. Izatt; Duke Univ., USA.* Photothermal optical coherence tomography with laser-heated gold nanorods as the photothermal source is proposed as a novel molecular imaging technique. A description of the technique and validation experiments are reported.

BWF6 • 5:15 p.m.
A Cardiac Study on Zebrafish Using a Dual Beam Doppler OCT System, *Mircea Mujat, Nicusor V. Iftimia, D. X. Hammer, R. D. Ferguson, D. Vu, A. Ferrante; Physical Sciences Inc., USA.* We present a high-throughput fiber optics-based Doppler SDOCT system that measures heart rate and blood velocity, and generates a flow map of the major blood vessels on zebrafish for cardiac studies.

BWF7 • 5:30 p.m.
Simplified Single Channel High-Speed Polarization Sensitive Retinal SDOCT, *Mingtao Zhao, Joseph A. Izatt; Duke Univ., USA.* Polarization sensitive OCT (PSOCT) provides additional contrast for retinal imaging. We have constructed and tested a compact, single channel and single camera, high-speed (17,000 A-scans/sec) polarization sensitive SDOCT (PS-SDOCT) system for retinal imaging.

BWF8 • 5:45 p.m.
Three-Dimensional Endoscopic Optical Coherence Tomography (OCT) using Fourier Domain Mode Locked (FDML) Lasers, *Yu Chen[1], Desmond C. Adler[1], Robert Huber[2], Chao Zhou[1], Joseph M. Schmitt[3], James Connolly[4], James G. Fujimoto[1]; [1]MIT, USA, [2]Ludwig-Maximilians-Univ. München, Germany, [3]LightLab Imaging, Inc., USA, [4]Beth Israel Deaconess Medical Ctr., USA.* We have developed an endoscopic OCT system based on an FDML laser. *In vivo* three-dimensional imaging at 100 kHz with 9 × 7 μm (transverse by axial) resolution is demonstrated in the rabbit gastrointestinal tract.

BWG • Instrumentation and Techniques for Tissue Imaging

Grand Bay Ballroom South
4:00 p.m.–6:00 p.m.
BWG • Instrumentation and Techniques for Tissue Imaging
Lihong Wang; Washington Univ. in St. Louis, USA, Presider

BWG1 • 4:00 p.m.
A Fast 512-Channel System for Real-Time Photoacoustic Imaging of Small Animals, *Anastasios Maurudis[1], John Gamelin[1], Andres Aguirre[1], Nathan White[1], Michael Khalil[1], Raj Shah[1], Diego Castillo[1], Fei Huang[1], Raumil Shah[1], Lihong V. Wang[2], Quing Zhu[1]; [1]Univ. of Connecticut, USA, [2]Washington Univ. in St. Louis, USA.* A fast 512-channel tomographic photoacoustic system for small animal imaging using a curved ultrasound array has been developed. For the first time, real-time tomographic imaging for functional photoacoustic studies is possible. Initial characterization/imaging is presented.

BWG2 • 4:15 p.m.
A New Wireless Multichannel Near Infrared Imaging System, *Thomas L. Muehlemann, Martin Wolf, Daniel V. Haensse; Univ. Hospital Zurich, Switzerland.* Near-infrared imaging (NIRI) quantifies hemoglobin in tissue. To optimize the comfort, reduce the weight of the sensor and provide free movement, we miniaturized NIRI and designed a wireless sensor.

BWG3 • 4:30 p.m.
High Speed Processing of Frequency Domain Images, *David Watt, Kameron Harmon, Abneesh Srivastava, Gregory W. Faris; SRI Intl., USA.* We are developing a system to process high frame rate frequency domain images using field programmable gate arrays. This has applications in diffuse optical imaging or fluorescence lifetime imaging.

BWG4 • 4:45 p.m.
Development of a Trans-Rectal Optical Tomography Probe for Concurrent Sagittal Imaging with Trans-Rectal Ultrasound, *Zhen Jiang, Guan Xu, Amal Elgawadi, Daqing Piao; Oklahoma State Univ., USA.* A first-of-its-kind trans-rectal near-infrared optical tomography probe for non-invasive sagittal imaging of prostate has been developed. This trans-rectal NIR probe is designed to attach to a commercial biplane trans-rectal ultrasound for concurrent NIT/US imaging.

BWG5 • 5:00 p.m.
High-Resolution Virtual Optical-Sectioning Imaging and Tomography for 3-D Modeling of Biomedical Specimens, *Joris J. J. Dirckx, Jan A. N. Buytaert; Univ. of Antwerp, Belgium.* HROPFOS is an optical tomography technique capable of imaging bony structures as well as soft tissue in high resolution (2 μm), by means of optical-sectioning of cleared and fluorescent specimens.

BWG6 • 5:15 p.m.
Deep Optical Sectioning in Turbid Media with Dual-Axes Confocal Microscopy: Toward *in vivo* Optical Biopsy, *Jonathan T. C. Liu[1], Michael J. Mandella[1], James M. Crawford[2], Christopher H. Contag[1], Thomas D. Wang[3], Gordon S. Kino[1]; [1]Stanford Univ., USA, [2]Univ. of Florida, USA, [3]Univ. of Michigan, USA.* Toward developing dual-axes confocal microscopy for gastrointestinal disease detection, we quantitatively investigate the optical-sectioning ability of this technology through reflectance experiments in a tissue phantom, and also obtain deep fluorescence image sections of tissue specimens.

BWG7 • 5:30 p.m.
Hyperspectral *in vivo* Two-Photon Microscopy of Intrinsic Fluorophores, *Andrew J. Radosevich, Matthew B. Bouchard, Sean A. Burgess, Roman Stolper, Brenda Chen, Elizabeth M. C. Hillman; Dept. of Biomedical Engineering, Columbia Univ., USA.* *In-vivo* two-photon imaging of intrinsic fluorescence allows metabolic function to be evaluated on a cellular level. A method of validating, identifying and separating the fluorophores present in an *in vivo* two-photon image is described.

BWG8 • 5:45 p.m.
3-D Fluorescence Imaging in Turbid Media by Using Time Gated Data Acquisition, *Vadim Soloviev[1], Simon Arridge[1], Cosimo D'Andrea[2], Marco Brambilla[2], Gianluca Valentini[2], Rinaldo Cubeddu[2], Ralf Schulz[3]; [1]Dept. of Computer Science, Univ. College London, UK, [2]CNR-INFM and CNR-IFN, Dept. di Fisica, Politecnico di Milano, Italy, [3]Inst. for Molecular and Biological Imaging (IMBI) GSF, Germany.* We demonstrate the feasibility of fluorescence imaging experimentally on the basis of a time gating technique completely in the time domain by using a small number of time steps.

Grand Bay Ballroom North
6:00 p.m.–6:10 p.m.
BIOMED Closing Remarks

NOTES

Key to Authors and Presiders

(**Bold** denotes Presider or Presenting Author)

A

A'Amar, Ousama–BTuF14
Aasa, Ando–JMA6
Abdi, Rabah A.–BSuB5
Abeytunge, Sanjeewa–**BTuF56**, BTuF66
Abshire, James B.–JMA19, **LMA4**, LMC5
Achilefu, Samuel–BWE2
Acosta, Victor M.–JMA44
Adányi, Nóra–JMA26
Adibi, Ali–BMD31
Adler, Desmond C.–BWF8
Agate, Ben–BMD60
Aguirre, Andres–BWG1
Aguirre, Aaron D.–BWC7
Ahn, Steven–DTuB1
Ahnelt, Peter–BMB3
Akers, Walter–BWE2
Akhbardeh, Alireza–**BMD20**
Akiba, Masahiro–**BMD71**
Akin, Ata–BMD3, BMD4, BMD6, BSuE62, BSuE63, BSuE64, BSuE78, BWC3
Al Abdi, Rabah–BSuE19
Al-Arashi, Munir–BTuF49
Aldén, Marcus–LWC3, LWC5
Alerstam, Erik–**BSuE67**
Allain, Marc–BSuE87
Allan, Graham–LMA4, LMC5
Allen, Mark–LMA1, LMB5
Amin, Khalid–BSuE27, BSuE86
Amit, Guy–BMD88
Amoozegar, Cyrus–**BTuF7**
Ananda, Sharmila–BSuF2
Anandasabapathy, Sharmila–BTuD3
Andegeko, Yair–BMD51
Anderson, Harry L.–BWB3
Andersson-Engels, Stefan–BMC2, BSuE67, BWB5, LTuC4
Andreeva, E. V.–BMD80
Andreou, Stylianous–BTuF39
Andronica, Randall–BSuE19
Ansari, Rehman–BSuE19
Aprelev, Alexei–BMF7
Apreleva, Sofia V.–**BSuE24**
Araki, Tsutomu–BTuF61
Aranda, Iana–BTuB3
Ardeshirpour, Yasaman–**BSuE21**, BTuD5
Arger, Peter H.–BTuF35
Argue, Leanne–LThA1
Arie, Ady–BTuF32
Ariese, Freek–LTuB5
Armstrong, Karla M.–LTuA3
Armstrong, Victoria–BSuE15
Arridge, Simon R.–BMC2, BSuE13, BSuE14, BWE6, BWG8
Ash III, William M.–DTuB6
Asobe, Masaki–**JMA21**
Asundi, Anand–DMC2, DWB5
Atkinson, Chris–BTuF14
Auner, Gregory W.–BSuE11
Austwick, Martin–**BSuB8**, **BTuC2**
Axelsson, Johan–BMC2, **BWB5**
Axner, Ove–LTuA5
Ayata, Cenk–BWC4
Aydöre, Sergül–**BMD4**

B

Baccaro, Nancy–BTuD5
Backman, Vadim–BTuC5, BTuC6, BTuF10, BTuF40
Badizadegan, Kamran–BTuD6, BWD3
Baek, Byung Joon–DTuC1
Baek, Hyeon-Man–BSuE69
Bajraszewski, Tomasz–**BWF1**
Baker, Jr., James R.–BSuE4
Bakhirkin, Yury A.–**LMB4**
Bakker, Leon–BSuF3
Bambha, Ray P.–LMC3, LThB4
Ban, Han Y.–**BSuE18**
Banerjee, Partha P.–**DWA**, **DWB1**
Baraldi, Patrizia–BMD8
Barbastathis, George–BMF2, **DTuA**, DWB6
Barbour, Ethan A.–LWC2
Barbour, Randall L.–**BMD1**, BSuB5, BSuE19, BSuE57, BSuE61
Bargo, Paulo R.–**BTuF17**, BTuF50
Barton, Jennifer K.–BMF2, DWB6
Baselli, Giuseppe–BMD10
Bassi, Andrea–BSuE75
Bastiaans, G.–LTuC1
Bauer, Christoph–JMA29, **LThB3**
Beard, Paul C.–**BMA2**
Beattie, Bradley J.–BMC8
Beaumont, Eric–BMD7
Bechtel, Kate–BTuA3
Becker, K.–BTuA4
Behrens, Ashley K.–BTuF2
Beigang, René–**LThA**
Belfield, Kevin D.–**BSuE90**, **BSuE91**
Belinson, Jerome–BMD77
Belkebir, Kamal–BMD57
Ben-Yakar, Adela–**BTuF37**
Bender, Janelle–BTuC3, **BTuF22**
Benes, Christian–BMD15
Bensalah, Karim–BTuF43, BTuF44
Benveniste, Helene–BTuE3
Benyamin-Seeyar, Anader–BWE8
Berger, Andrew J.–**BTuF34**
Berger, Jörn–BTuF19
Berger, Michel–BMD26
Bergethon, Peter R.–BTuE2
Bernus, Olivier–**BMC3**
Berrocal, E.–LTuC3
Bérubé-Lauzière, Yves–**BMD32**
Betzig, Eric–BTuA2
Beuthan, J.–BMD34, BSuD6, SuE59
Bewley, William–JMA40
Bhuiyan, Aizaz H.–LMC4
Bianchi, Anna M.–BMD10
Bickford, Lissett R.–**BSuE7**, BTuF12
Biegon, Anat–BTuF65
Bigio, Irving–BSuB8, BTuC2, BTuF14
Bigour, Damien–JMA43
Bilyy, Rostyslav–**BSuE9**
Bingham, Philip R.–DTuC4
Binns, Alison–BMB3
Birgul, Özlem–BSuE69
Bisson, Scott E.–LThA2
Blackmore, Kristina–BSuE70, **BSuE71**
Blandón, Astrid–DMB5
Blasi, Anna–**BSuE79**
Boas, David–BMD2, BMD24, BMD3, BSuB2, BSuB7, BSuD4, BSuD8, BSuE20, BSuE72, BSuE73, **BTuE,** BTuE1, BWC4, BWC5, BWC7
Bobboh-Ebo, Eudes-Evrard–DMC4
Boccara, Albert C.–BTuF48
Bocklage, Therese J.–BTuD7
Böehm, Benjamin–LWB2
Boffety, Matthieu–**BSuE87**
Bogaards, Arjen–BTuC7
Bohling, Christian–LThC3
Boisselle, Matthew–JMA33
Bolay, Hayrünnisa–BMD6
Bontus, Claas–BMD23, BSuF3
Bood, Joakim–LWC5
Bordy, Thomas–BMD41
Bosschaart, Nienke–BWD6
Bouchard, Jean-Pierre–BWB4
Bouchard, Matthew B.–BME2, BSuD7, **BTuF30**, BWE1, BWG7
Bouchelev, V.–BTuE8
Bouchier, Francis A.–LThB4
Boulous, Fouad I.–BSuB6
Bouma, Brett E.–BTuB2
Boutet, Jérôme–BMD26
Bower, Bradley A.–BWF2
Bowlan, Pamela R.–**BMD61**
Bown, Stephen–BSuB8, BTuC2
Boxx, Isaac–LWB2
Bozinovic, Nenad–**BTuF57**
Brady, David J.–BTuF15
Brambilla, Marco–**BSuE88**, BWG8
Brand, Randall E.–BTuC6
Brendel, Bernhard–BMD23, **BSuE43**, BSuE44, BSuF3
Brieu, Nicolas–**BMD7**
Briggs, Richard–BMD13
Brock, R. S.–BTuF13
Brooks, Dana–BMD24, BMD67, BSuB2, BSuE20, BSuE26
Brooks, Traci–BSuE1
Brown, Edward B.–BTuF60
Brown, L. R.–LTuB4
Brown, Tom–BMD60
Brown, William J.–BTuC8
Brübach, Jan–LWB5
Bruno, John D.–LMB4
Buckley, Erin M.–BSuD5, **BTuF35**
Budker, Dmitry–JMA44
Bunce, Scott–BMD20
Bunney, Tom–BWD2
Bunting, Charles F.–BSuE31
Bur, Andres M.–BSuB5
Burgess, Sean A.–BME2, **BSuD7**, BTuF30, BWE1, BWG7
Burke, Ryan M.–BTuF60
Busch, David R.–**BSuE16**
Busch, Theresa M.–BSuD2
Butti, Michele–**BMD10**
Buytaert, Jan A. N.–**BWG5**, **JMA11**

C

Cadeddu, Jeffrey–BSuE80, BTuF43, BTuF44
Caffini, Matteo–BMD10
Canedy, Chadwick L.–JMA40
Cao, Zhengyi–BSuE4
Capala, Jacek–BTuD8
Carl, Daniel–**DMC7**
Carmen, Alejandro D.–BTuE4
Carminati, Rémi–BSuE87
Carp, Stefan–**BMD2**, BMD24, BSuB2, **BSuB7**, BSuE20, BTuE1
Carpenter, Colin–**BSuB4,** BSuE36
Casanova, Herley–DTuC7

Castañeda, Roman–DMB5, DTuB2, DTuC6
Castillo, Diego–BWG1
Cauli, Bruno–BME2
Cayce, Jonathan M.–**BTuE5**
Centurion, Martin–DMA5
Cerussi, Albert E.–BSuE69
Cerutti, Sergio–BMD10
Cha, Jae Won–**BMD52**
Chai, Ning–LWA3
Chalau, Vadzim–BTuC2
Chalut, Kevin–BTuF6, BTuF7, JMA7
Chan, Kinpui–BMD71
Chance, Britton–BSuB1, BSuE55, BSuE92
Chang, Chi-Ching–DTuB4
Chang, Joseph–BSuE7
Chang, Yu-Chung–**BSuE4**
Change, Shoude–BMD86
Charrière, Florian–DTuB5, DTuC2
Chatterjee, M. R.–DWB1
Chaumet, Patrick–BMD57
Chee, Oi Choo–**DWB5**
Chen, Brenda–BME2, BWG7
Chen, Cheng–**BTuF26**
Chen, Chien-Hung–BMD38, BSuE54
Chen, Debbie K.–**BTuE2**
Chen, Gu-Liang–DTuB4
Chen, J.–LTuC1
Chen, Jiong–BTuF65
Chen, Liang-Yu–**BMD38**, BSuE54
Chen, Nanguang–**BTuF63**
Chen, Shih-Chi–BTuF52
Chen, Weidong–**JMA36**, **JMA43**
Chen, Y. Q.–LTuC1
Chen, Yaqin–**BSuE50**
Chen, Ying-Ling–JMA22
Chen, Yu–**BWC7**, **BWF8**
Chen, Zhongping–DMC6
Cheng, Chau-Jern–**DTuB3**
Cheng, Ji-Xin–**BWD1**
Chernomordik, Victor–**BMD44,** BTuD8, BTuF48
Chia, Thomas H.–**BWC1**
Chicken, Wayne–BSuB8
Chilkoti, Ashutosh–BWF5
Chiu, S.–BTuE8
Cho, Eun-Jin–BMD65
Cho, Hyun-Jun–JMA9
Choe, Regine–**BSuB1**, BSuD3, BSuE16, BSuE18, BSuE55, BTuF35
Choi, Bernard–BWD7
Choi, Heejin–**BTuF52**
Choi, Hyun-Jun–**JMA10**
Choi, Jee Hyun–**BMD22**, **BSuE2**
Choi, Young-Geun–JMA10
Chong, Changho–**BWF3**
Chow, Tzu-Hao–BSuE8
Christesen, Steven–**LThA1**
Chu, Kengyeh K.–**BMD55**
Chu, Michael K.–**BSuE42**
Chung, So Hyun–**BSuE69**
Çiftçi, Koray–BWC3
Clark, Benjamin–BSuB8
Cobb, Michael J.–**BMD89**, BTuB5
Collins, Hazel A.–BWB3
Colomb, Tristan–BMD58, **DMA4**, **DTuB5**, DTuC2, DTuC3
Comelli, Daniela–BSuE66, BSuE75, LTuC5
Comrie, Muriel–BMD60
Comsa, Daria C.–**BWE5**
Comstock, Christopher–BTuD4
Connolly, James–BWF8
Contag, Christopher H.–BWG6
Contini, Davide–BMD10, BMD11, **BMD8**, BMD9, **BSuE58**, BWC6
Cook, Noah M.–BTuF35
Cooper, Chris–BSuE76, BSuE77
Corlu, Alper–BSuB1
Cormier, Jean-Francois–BWB4
Correia, Teresa M. M.–**BSuE49**
Corsini, Eric–JMA44
Courtney, Patrick–BWD2
Cousin, Julien–JMA36, JMA43
Cova, Sergio–BWC6
Crawford, James M.–BWG6
Crocker, Robert W.–**LThA2**
Cronin-Golomb, Mark–BMD54
Crow, Matthew J.–**BSuE6**
Cubeddu, Rinaldo–BMD10, BMD11, BMD39, BMD8, BSuB3, BSuE58, BSuE75, BSuE88, BWC6, BWG8, LTuC5
Cucchiara, Brett L–BSuD3
Cui, Xiquan–**BMF5**
Cula, Gabriela Oana–**BTuF50**
Culpepper, Martin L.–BTuF52
Culver, Joseph P.–**BMA**, BMD27, BME3, BWE2
Curl, Robert F.–LMB3
Czerniecki, Brian J.–BSuB1

D

D'Andrea, Cosimo–BWG8, **LTuC5**
da Silva, Anabela–BMD25, BMD26, **BMD41**, BSuE47
Dackman, Matthew–JMA22
Dai, Guangping–BMD2
Dalla Mora, Alberto–BWC6
Dallas, William J.–**DWA3**
Dam, Jan S.–BMD76
Danielli, Amos–**BTuF32**
Dansson, Mark A.–JMA33
Dantus, Marcos–BMD51, LThB2
Das, Aniruddha–BME2
Dasari, Ramachandra–BTuD2, BTuD6, BWD3
Davidson, David F.–JMA28
Davidson, Michael W.–BTuA2
Davis, Anjul M.–**BWC8**
Davis, Cabell–**DMB1**
Davis, Dan–BWD2
Davis, Scott C.–BMC4, **BWE7**
Davis, S. J.–BTuC4
de Boer, Johannes F.–BTuE7
de las Morenas, Antonio–BTuD6
Debourdeau, Mathieu–BMD41
Deckers, Peter–BTuD5
deDeugd, Casey M.–**BMD68**
Deep, Nicholas–BTuC5
Dehghani, Hamid–**BMC4**, **BMD27**, BMD36, BME3, BSuB4, **BSuE30**, BSuE31, BSuE35, BSuE42, BWE7
Delano, Matthew–BSuE10
DeLuca, John–BMD1
DeLucia, F. C.–LThC1
DeMichele, Angela–BSuB1
Demos, Stavros G.–BTuF20, BTuF42
Deng, Helen–BMD5
Depeursinge, Christian–**BMD58**, DMA4, DTuB5, DTuC2, **DTuC3**
Desroches, Patrice–BWB4
Desse, Jean-Michel–DMC4, DMC5
Detre, John A.–BSuD3, BSuD5
Devor, Anna–BMD3, BWC7
Dewhirst, Mark–BTuC3
Dhawan, Jasbeer–BTuF65
Dholakia, Kishan–BMD60
Diamond, Kevin R.–BWB4
Diamond, Solomon G.–BSuD4, BSuD8
Dick, Samantha N.–**BSuE70**
Dietsche, Gregor–BMD21
Dilekoz, Ergin–BWC4
DiMarzio, Charles–BMD66, BMD67
Dinten, Jean-Marc–BMD25, BMD26, BMD41, BSuE47
Diop, Mamadou–**BSuE60**
Dirckx, Joris J. J.–BWG5, JMA11
Dixit, Sanhita–BMD69, **BSuE27**, **BTuD4,** **BTuF59**
Dobbs, Rhonda–BTuE4
Dodt, Hans-Ulrich–**BTuA4**
Dogariu, Arthur–**BTuF16**, **BTuF8**
Dong, Chen Yuan–BTuF62
Dorin, Maxine H.–BTuD7
Dorshow, Richard B.–BSuA5
Dottery, Edwin L.–LThC4
Doty, Jim–LMB3
Douek, Michael–BSuE13, BSuE14
Douplik, Alexandre–**BTuE8**
Drake, Tyler–**BMD81**
Dreizler, Andreas–**LWB2**, LWB5, **LWC**
Drexler, Wolfgang–**BMB**, BMB3, BMB5
Drezek, Rebekah–**BWA**, BSuE7, BTuF12
Drsek, Filip–BMD57
Du, Congwu–**BTuE3**, **BTuF65**, BWC2
Duan, Zhihui–DMA1
Ducros, Nicolas–**BMD25**
Duduran, Turgut–BSuE56
Dufour, Marc L.–BMD83
Dumitrescu, Cosmin–JMA23
Dunsby, Christopher–BWD2, BWE6
Durduran, Turgut–BSuB1, BSuD2, **BSuD3**, BSuD5, BSuE16, BSuE55, BTuF35
Durr, Nicholas J.–BTuF37

E

Eames, Matthew E.–**BMD36**, BSuE30, **BSuE35**
Eberhard, Dietmar–DWB7
Ebert, Bernd–**BTuF19**
Ebert, Volker–**LMA2**, **LMB**, LMB1
Edlow, Brian L.–BSuD3, BSuD5
Eftekhar, Ali A.–BMD31
Ehn, Andreas–LWC5
Einarsdóttír, Margrét–BSuE67
Ekstrom, Leeland–BMD5
El-Naggar, Adel–BTuD1
Elackattu, Alphi–BTuD2, BTuD6, BWD3
Elbert, Thomas R.–BMD21
Elgawadi, Amal–BWG4
Elias, Sjoerd–BSuF3
Elliot-Laize, Caroline–BTuC2
Elliott, Jonathan–BSuE60
Elson, Daniel S.–BWE6
Elwell, Clare E.–BSuE76, BSuE77, BSuE79
Emge, Darren–LThA1
Enfield, Louise C.–**BSuE13**, BSuE14, BSuE15
Epshtein, Haim–BTuF5
Ercan, Ayse E.–BSuE78
Erdmann, Rainer–**BMD43**

Erdoğan, Sinem B.–BSuE62, **BSuE64**, BWC3
Erlich, Marcelo–BTuF32
Erts, Renars–BTuF27
Eseller, Kemal Efe–**JMA38**
Everdell, Nick L.–BSuE13
Eversole, Jay–LThA4, **LThB**

F
Faber, Dirk J.–BWD6
Fajardo, Claudia M.–**LWB4**
Falzon, Mary–BSuB8
Fan, Xudong–LThA3
Fang, Qianqian–**BMD24**, **BSuB2**, BSuB7
Fantini, Sergio–**BMD14**, BMD15, BMD42, BTuE2
Farina, Andrea–BMD39, BSuE66, LTuC5
Faris, Gregory–BMD69, **BSuC**, BSuE1, BSuE27, BSuE86, BTuD4, BTuF59, **BWG3**
Farooq, Aamir–LWC2
Farrell, Thomas J.–BWE5
Farrow, Roger L.–LMC3, LTuA3
Farshchi, Salman–BSuE81
Faure de Pebeyre, Irène–BTuF58
Favicchio, Rosy–**BWE3**, BWE4
Fei, Y. Y.–BTuF53
Feld, Michael–**BTuA3**, BTuD2, BTuD6, BWD3
Feldkhun, Daniel–**BMF4**
Fels, Lueder–BSuF3
Ferguson, R. D.–BWF6
Fernandez, Christy A.–**BTuF15**
Fernández, Enrique J.–BMB3
Ferrante, A.–BWF6
Ferrante, Simona–BSuE58
Ferrigno, Giancarlo–BSuE58
Fertein, Eric–JMA36
Fève, Jean-Philippe–LTuA3
Finikova, Olga S.–BMF7
Fink, Manfred–**LTuB3**
Finlay, Jarod C.–BSuD2
Fischer, Marc–LTuA1
Fischer, Thomas–BTuF19
Fleming, Christine P.–**BMD88**
Flesch, Hervé–BMD84
Flexman, Molly L.–BSuB5
Flueraru, Costel–BMD86
Fojt, Wojciech–BWF1
Folestad, Staffan–LTuC4
Foltynowicz, Aleksandra–**LTuA5**
Fong, Christopher J.–BSuB5
Ford, Timothy–BTuF57
Först, Michael–BMD90
Försth, Mikael–LWC3
Fortier, Simon–BMD28
Fortin, Michel–BWB4
Fourmentin, Marc–JMA36
Foust, Amanda J.–BME5
Fox-Lloyd, Sarah–BSuE79
Franceschini, Maria Angela–BMD2, BMD5, BSuD1, BSuD4, BSuE72, BTuE1, BWC5
Frangos, Suzanne–BSuD5
Frank, Jonathan H.–LWB3
Frank, Matthew–DMB3
Franke, Gesa L.–BMD40
Frassati, Anne–**BSuE47**
Fratz, Markus–DMC7, **DWB7**
French, Paul–BWD2, BWE6
French, P. J.–BSuE66
Freskos, John N.–BSuA5
Fried, Alan–LTuA2
Fried, Nathaniel M.–**BTuF2**
Fu, Kun–BSuE7
Fuji, Toshie–BMD74
Fujii, Mamiko–**BMD37**
Fujii, Tomohiko–JMA12
Fujimoto, James G.–BWC7, BWF8
Fukuma, Yasufumi–BMD71
Fulghum, Steve–BTuA3
Fung, Jerome–DTuB1
Furukawa, Shunsuke–BTuF21

G
Gabolde, Pablo–BMD61, DTuC5
Gagnon, Louis–**BSuE73**
Galbraith, Catherine G.–BTuA2
Galbraith, James A.–BTuA2
Galindo, Luis–BTuD2
Gallagher, George–BTuD2
Gallant, Pascal–BWB4
Gamelin, John–BSuE25, BWG1
Gandjbakhche, Amir–BMD44, BTuD8, BTuF48
Gao, Feng–BMD33, BMF7
Gao, Jean–BTuF44
Gao, Wen–BTuF18
Gao, Xiaohu–**BWA3**
Garcés-Chávez, Veneranda–BMD60
Garcia, Javier–DMA6
Garcia-Sucerquia, Jorge–DTuC7
Gardner, Charles–LThB1
Gareau, Daniel S.–**BTuB3**, **BTuF66**
Garnacho, Carmen–BMF7
Garofalakis, Anikitos–BWE3, BWE4
Ge, Jiajia–**BMD48**, BMD49
Gelsinger, Paul J.–**BMF2**, DWB6
Georgakoudi, Irene–BMD54, **BTuA**, BTuA3, BTuF9
Georges, Didier–BSuE47
Gessenhardt, Christopher–LWB1
Giacomelli, Michael–**BTuF6**, BTuF7, JMA7
Gibbs, Ashley D.–BSuE27
Gibbs-Strauss, Summer L.–BWE7
Gibson, Adam P.–BSuE13, **BSuE14**, BSuE15, BSuE49
Giel, Dominik M.–DMC7, DWB7
Gillenwater, Ann–BSuF2, BTuB4, BTuD1, BTuF18, **BWA2**
Gillette, Jennifer–BTuA2
Gimzewski, James K.–DMB3
Giovannini, Hugues–BMD57
Girouard, Audrey–BMD14
Gisler, Thomas–**BMD21**
Gitin, Yakov–BTuF14
Giusto, Arianna–BSuB3
Godavarty, Anuradha–BMD19, BMD48, BMD49, BSuE74
Goldberg, Lew–LTuA3
Goltsov, Alexander–BTuF8
Gomes, Andrew–BTuF10, **BTuF40**
Gonzalez Trujillo, Jorge Carlos–**BSuE53**
Gooijer, Cees–LTuB5
Gord, James–JMA41, **LTuC**, LTuC2, LWA1, LWA2, LWA3, **LWA4**
Gorga, Chris–BMD12
Gossage, Kirk–BWE1
Gottfried, J. L.–LThC1
Graaff, Reindert–**BSuE52**
Graber, Harry L.–BMD1, BSuE57, **BSuE61**
Grady, M. Sean–BSuD5
Gramer, Markus–BSuE76
Grant, David–BWD2
Grant, P. Ellen–BSuD1, BSuE72
Grebe, Reinhard–BME4
Greenberg, Charles S.–BSuE86
Greenberg, Joel H.–BSuD3, BSuD5
Greenblatt, Ellen M.–BSuE70
Greene, Heather M.–BTuD7
Gregori, Giovanni–BMD75
Grillone, Gregory–BTuD2, BTuD6, BWD3
Grobmyer, Stephen R.–BSuE10
Grosenick, Dirk–BMD43, BMD45
Gu, Min–**DMB6**, **DTuB**
Gu, Xuejun–**BSuE39**, **BSuE40**
Guenther, Bobby D.–BTuF15
Guerrero, Bruno–BWE8
Guicheteau, Jason–LThA1
Gulsen, Gultekin–BSuE69
Gunn-Moore, Frank–BMD60
Gupta, Sharad–**BTuF9**

H
Hadway, Jennifer–BSuE68
Haensse, Daniel V.–BWG2
Hagen, Axel–BMD43, BMD45
Hahn, Joonku–**DWB3**, DWB4
Hahn, Stephen M.–BSuD2
Hajnal, Jo V.–BWE6
Hall, David J.–**BSuE81**
Hämäläinen, Matti S.–BWC5
Hammer, D. X.–BWF6
Hampp, Norbert–BTuC1, BTuF1
Han, P. Y.–LTuC1
Han, Sen–DMB3
Han, Xiaoxing–**BTuF60**
Handa, Hitesh–BSuE11
Hanson, Ronald K.–JMA28, LWC2
Harbers, Rick–BSuF3
Harmon, Kameron–BWG3
Haroon, Zishan–BSuE27, BSuE86
Harris, D. A.–LThB2
Haruna, Masamitsu–BMD74
Hasabou, Nahla–BTuC6
Hassan, El B.–JMA32
Hassan, Moinuddin–BMD44, **BTuD8**, BTuF48
Haushalter, Jeanne P.–BSuE86
Haylett, Daniel R.–JMA28
Headrick, Jeffrey M.–**LThB4**
Hearn, Austen–**BTuF51**
Hebden, Jeremy C.–BSuE13, BSuE14, BSuE15, BSuE49
Hegde, Poornima–BTuD5
Heitmann, Uwe–LTuB2
Henderson, Angus J.–**LMC2**
Heng, Xin–BMF5
Hennelly, Bryan M.–DTuA5
Henry, Scott M.–BSuA4
Herken, Hasan–BSuE63
Hermann, Boris–**BMB3**, BMB5
Hermann, Kay-Geert–BTuF19
Herrera, Jorge A.–DTuC6
Hervé, Lionel F.–**BMD26**
Hielscher, Andreas–**BMC**, BMD34, BMD40, BSuB5, **BSuC1**, BSuD6, BSuE39, BSuE40, BSuE59, BSuE85, BTuF67
Higbie, James M.–JMA44
Hilliard, Aisha–BTuF16

Hillman, Elizabeth M.–BMC7, **BME2**, BSuD7, BSuE34, **BSuF**, BTuF30, **BWE1**, BWG7
Hillman, Timothy R.–BMD87
Hiltunen, Petri–BTuF36
Hincapie, Diego A.–**DTuC7**
Hinds, M. F.–BTuC4
Hirono, Taisuke–**BTuF31**
Hirshfield, Leanne H.–BMD14
Hochstrasser, Robin M.–BMF7
Hodges, Joseph T.–**LTuB4**
Hoenders, Bernhard J.–BSuE52
Hofer, Bernd–BMB3, BMB5
Hoffman, Allan S.–BSuA4
Hoffman, Paul–LMC2
Höfler, Heinrich–DMC7
Hoge, Rick D.–BSuE73
Hohmann, Konrad–LThC3
Hokoma, Leslie A.–JMA28
Holfeld, Benjamin A.–BTuF37
Holl, Gerhard–LThC3
Holley, Richard–BTuF51
Hoogheem, Jay L.–BTuC6
Hoops, Alexandra A.–**LMC3**, LTuA3
Hornkohl, James O.–JMA27, JMA45
Hovde, Chris–**JMA40**, **JMA44**
Hovhannisyan, Vladimir A.–**BTuF62**
Hoying, James–BTuF39
Hronik-Tupaj, Marie C.–**BMD54**
Hsiang, David–BSuE69
Hsieh, Wang-Ta–**DTuB4**
Hsu, Paul–LWA4
Hu, Xin-Hua– BSuE51, BTuF13, BTuF26
Hu, Ying–BSuE7, **BTuF12**
Hu, Zhilin–**BMD78**, BTuF54
Huang, Billy–BTuB3
Huang, Fei–BWG1
Huang, Minming–BSuE21
Huber, Robert–BWF8
Hughes, Michael–BMD73
Huh, Yong-Min–BMD65
Hui Koh, Peck–BSuE79
Huijing, Peter A.–BSuE64
Hunter, Martin–BTuF9
Huppert, Theodore J.–BMD3, **BSuD8**
Hurt, Hallam H.–BTuF35
Hutchins, Michael–BSuE82
Hwang, Dong-Choon–JMA1
Hyatt, Christopher J.–BMC3
Hyde, Damon E.–**BSuE26**

I
Iftimia, Nicusor V.–BWF6
Ingram, Leonard–JMA32
Ionita, Iulian–**BMD92**
Iranmahboob, Amir K.–BME2, **BSuE34**
Iwai, Hidenao–BMD59
Iwakuma, Nobutaka–BSuE10
Iyers, Malini–BTuD5
Izatt, Joseph–**BMB1**, BWC8, BWF2, BWF5, BWF7
Izzetoglu, Meltem–BMD20

J
Jabbour, Rabih–LThA1
Jacob, Robert J. K.–BMD14
Jacobs, Kenneth M.–BTuF26
Jacobson, Wells–LThA4
Jadczak, Chris–BTuF4
Jährling, N.–BTuA4
Jaillon, Franck–BMD21
Jameel, Mohammed–BTuC6
Jansen, Duco–BTuE5
Javier, David–BSuF2
Jeffries, Jay B.–**JMA28**, **LWC2**
Jelzow, Alexander–BSuC4
Jeong, HyeonSeop–JMA4
Jiang, Huabei–BSuE10, BSuE28, BSuE29, BSuE51, BSuE83, BSuE84
Jiang, Naibo–LTuA4
Jiang, Shudong–BMC6, BSuB4, **BSuC3**, **BSuE17**
Jiang, Zhen–**BWG4**
Jiao, Shuliang–BMB4, **BMD72**, BMD75
Jiao, Yunxin–BMD72
Jockovich, Maria E.–BMB4
Johansson, Ann–BWB5
Johansson, Jonas–LTuC4
Jonathan, Enock–**BMD76**
Jones, Linda R.–BTuF45
Jones, S. G.–JMA40
Joshi, Sachin–JMA23
Jourdain, Pascal–BMD58
Jung, Jae-Hyun–**DTuA2**, JMA16, JMA2
Jung, Michael J.–BTuC6

K
Kabani, Sadru–BTuD2
Kabbani, Wareef–BTuF43, BTuF44
Kacprzak, Michal–**BMD46**, **BMD47**
Kah, James C. Yong.–**BSuE8**
Kajić, Vedran–BMB5
Kaldvee, Billy–**LWC5**
Kane, Daniel J.–BMD85
Kane, Mark–BTuD5
Kang, Hoonjong–**DWA4**
Kang, Jin-Mo–**JMA15**
Kang, Wei–**BMD77**, BTuF54
Kano, Hiroshi–BMD62, BMD63
Kao, Chris–BTuE5
Kaplan, David–BMD54, BTuF9
Kara, Ercan–BWC3
Karahan, Esin–**BMD6**, BWC3
Kareta, Margarita–BMD77
Kashyap, Dheerendra–**BSuE80**, BTuF43, BTuF44
Kasner, Scott E.–BSuD3
Kassi, Samir–JMA43
Katan, Matilda–BWD2
Kato, Yuji–BMD35
Katsura, Takushige–BTuF21
Katz, Barak–**JMA13**
Kaundinya, Gopinath–BMD13
Kawa, S. R.–JMA19, LMA4
Kawaguchi, Hiroshi–**BSuE38**
Kawaguchi, Hideo–BTuF21
Kawanaka, Akira–BMD37
Kaz, David–DTuB1
Keenliside, Lynn–BSuE60
Kehrlößer, Daniel–BTuC1
Keller, David–LThA4
Keller, Matthew D.–**BSuB6**
Kelley, Jude A.–LThB4
Kelley, Mark C.–BSuB6
Kempner, Joshua–BMD30
Kennedy, Gordon–BWD2
Kepshire, Dax–**BSuE82**, BTuF3
Kerstel, Erik–**LMB2**
Keshtgar, Mohammed–BSuB8, BSuE13
Khalil, Michael–BWG1
Kham, Keetaek–DWA2, DWA5
Khan, Nadeem–BSuC3
Khayat, Mario–BSuE82, BWE8
Khmaladze, Alexander–**DMB5**
Khosroshahi, Mohammad E.–**BSuE12**
Khurana, Mamta–**BWB3**
Kieffer, Jean-Claude–**BWB2**
Kienle, Alwin–**BSuE48**, BSuE66, LTuC5
Kilger, Alex–BSuE55
Killinger, Dennis K.–BTuF33, JMA24, JMA34, **LMC**, LThA5, LThB5, LThC4
Kim, Antony–BTuC7
Kim, Beop-Min–BMD22
Kim, Chang-Keun–**JMA1**
Kim, Chul S.–JMA40
Kim, Daekeun–**BMD53**
Kim, Daesuk–**DTuC1**
Kim, Donghyun–BMD65
Kim, Dong-Wook–DWA2, DWA6, JMA10, JMA9
Kim, Eun-Soo–JMA1, JMA14
Kim, Hanyoup–**BMD69**, BTuD4
Kim, Hee-Cheol–**BTuC1**, BTuF1
Kim, Hwa-Sung–JMA10
Kim, Hwi–JMA3
Kim, Hyun K.– **BMD34,** BMD40, **BSuE85,** BTuF67
Kim, Joohwan–DTuA2, JMA15, JMA16, JMA2
Kim, Kyujung–**BMD65**
Kim, Meeri N.–BSuD3, **BSuD5**, BTuF35
Kim, Mijin–JMA40
Kim, Myung–DMB2, DMB5, DTuB2, **DTuB6**, **DWB**, DWB2
Kim, Nam–**DTuA6**, **JMA4**
Kim, Seung-Cheol–JMA1, JMA14
Kim, Sungjee–BSuE2
Kim, Young–BTuF40
Kim, Young L.–BTuC6
Kim, Young R.–BMD2
Kim, Youngmin–DTuA2, **JMA2**
Kim, Yunhee–JMA2
Kinnius, Paul J.–LWA1, LWA2
Kino, Gordon S.–BWG6
Kirimli, Ceyhun E.–**BSuE62**
Kirkpatrick, Nathaniel D.–BTuF39
Kissel, Thilo–**LWB5**
Kissler, Johanna–BMD21
Kittler, Christof–LWB2
Klemme, Dietmar–BMD43
Klibanov, Michael V.–**BSuE33**
Klifa, Catherine–BSuE69
Kliner, Dahv A. V.–LMC3, **LTuA3**
Klingbeil, Adam E.–LWC2
Klose, Alexander D.–**BMC8**, BSuE42, BSuE59, **BTuF67**
Klose, Christian D.–**BSuE59**
Koban, Leonie–BMD21
Kobat, Demirhan–**BMF6**
Kobayashi, Hisataka–**BMA3**
Koch, Edmund–BWF4
Kocjan, Gabrijela–BSuB8
Koehler, Thomas–BMD23, BSuF3
Koenig, Anne–BMD26
Koeth, Johannes–LTuA1
Koh, Dalkwon–BMD22
Kohl-Bareis, Matthias–BSuE76
Kojima, Jun–**JMA42**
Kollias, Nikiforos–BTuF17, BTuF50
Konecky, Soren D.–**BMC5**, BSuB1, BSuE18, BSuE55
Kongolo, Guy–BME4

Konrad, Peter–BTuE5
Kopans, Daniel–BMD24, BSuB2, BSuB7
Koplow, Jeffrey P.–LTuA3
Korgel, Brian A.–BTuF37
Kosterev, Anatoliy A.–**LMA5**, LMB4
Kostin, Yu. O.–BMD80
Kostuk, Raymond–BMF2, DWB6
Kotilahti, Kalle–BTuF36
Kotlyar, Alina–BSuE4
Kotz, Kenneth T.–BSuE27
Kowalczyk, Andrzej–BWF1
Kozel, Frank A.–BTuE4
Krainak, Michael A.–JMA19, LMA4, LMC5
Kray, Stefan–**BMD90**
Kreuzer, Jurgen–DTuC7
Krolicki, Leszek–BMD46
Kromin, Alexey–BTuF10
Krüger, Alexander–BWF4
Kubota, Akira–BMD71
Kuebler, Wolfgang–BWF4
Kuech, Thomas F.–BTuF55
Kühn, Jonas–**DTuC2**, DTuC3
Kukhtarev, N. V.–DWB1
Kulatilaka, Waruna D.–**LWB3**
Kulp, Thomas J.–LThA2, LTuA3
Kumar, Sunil–BWD2
Kumaravel, M.–BSuE22
Kunte, Dhananjay–BTuC5
Kuo, Chaincy–BMC1, **BSuE46**
Kuo, Ming-Kuei–DTuB4
Kurachi, Cristina–BTuD1
Kurtzman, Scott–BTuD5
Kurz, Heinrich–BMD90
Kute, Tim–BTuF16
Kuwabara, Mitsuo–BMD74

L
Laine, Romain–BWE6
Lam, K. S.–BTuF53
Lamouche, Guy–**BMD83**
Landry, J. P.–BTuF53
Langkopf, Martin–BMD43
Lapin, P. I.–BMD80
Lappas, Petros–JMA28
Larson, Timothy–BTuF37
Las Heras, Facundo–BWA4
Lasser, Tobias–**BTuF58**
Lau, Condon–BTuA3, BTuD2, **BTuD6**, BWD3
Lauer, Christian–LMA2
Laughney, Ashley M.–BSuE17
Laurendeau, Normand M.–LWA3
Lauritsen, Kristian–BMD43
Lebedev, Artem Y.–BMF7
Leblond, Frederic–**BMD28**, BSuE82
Lech, Gwen–BSuE56
Leclair, Sébastien–BWB4
Ledbetter, Micah P.–JMA44
Lee, Byoungho–DTuA2, DWB3, DWB4, JMA15, JMA16, JMA2, JMA3
Lee, Byung-Gook–JMA8
Lee, Keong-Jin–JMA1
Lee, Kijoon–BMC5, BSuB1, BSuE18
Lee, Minah–BMD22
Lee, Nam S.–**BSuA5**
Lee, S.–**BTuC4**
Lee, Sang Bong–BTuD8
Lee, Seungduk–BMD22
Lee, Seung-Hyun–**DWA2,** DWA5, **DWA6**
Lee, Seonkyung–**BWB**
Lee, Ting-Yim–BSuE60, BSuE68
Legge, Michael–LTuA1
Leipertz, Alfred–LWA5
Lemberg, Vladimir–BTuF4, **BTuF5**
Lempert, Walter R.–**LTuA4**
Leng, Yuxin–BTuB5
Lengenfelder, Jean–BMD1
Leproux, Anais–BSuF3
Lesage, Frédéric–BMD7, BSuE73
Leung, Terence S.–BSuE76, **BSuE77**
Levene, Michael J.–BMD70, BWC1
Levenson, Richard M.–BWE1
Levin, Ken–BTuF2
Levine, Josh–BSuD5
Levkovets, Inna–JMA26
Lewicki, Rafal–LMB3
Lewis, James W. L.–JMA22
Li, Bo–LWC3
Li, Dong–BTuF38
Li, Haowen–**LThB2**
Li, Hyung-Chul O.–DWA2, **DWA5**
Li, Jun–BMD21
Li, Xiaoli–BTuB5
Li, Xingde–BMD89, **BSuA4**, **BTuB**, BTuB5
Li, Yang–**BSuB5**
Li, Yongbiao–BMD56, BTuB3
Li, Zhongshan–**LWC3**
Licha, Kai–BSuF3, BTuF19
Licht, Daniel J.–BTuF35
Liebert, Adam–BMD46, BMD47, BMD9
Liese, Julia–BTuC1
Lihachev, Alexey–BTuF27
Lilge, Lothar–BSuE70, BSuE71, **BTuC**, BTuC7, BWA4, **BWB1**
Lim, Daryl–BMD55, **BMF3**
Lim, S.–BTuF15
Lim, Yongjun–DWB3, **DWB4**
Lin, Bevin–**BTuF42**
Lin, Wei-Chiang–BTuF24, **BTuF41**
Lin, Yu-Chih–DTuB3
Linne, M.–JMA33, LTuC3
Lipiäinen, Lauri–BTuF36
Liu, Hanli–BMD13, BMD29, BMD50, BSuE33, BSuE80, BTuE4, BTuF43, BTuF44
Liu, Jingxuan–BWD4
Liu, Jonathan T. C.–**BWG6**
Liu, Linbo–BTuF63
Liu, Ning–**BMD42**
Liu, Shih-Ki–**BSuE55**
Lo, Justin Y.–**BTuF55**
Lo, Wen–BTuF62
Lo, Yuan–BMF2
Lobintsov, A. A.–BMD80
Loew, Leslie M.–BTuF30
Lomnes, Stephen J.–**BSuF1**
Lozovoy, Vadim V.–BMD51, LThB2
Lu, Jun Q.–**BTuF13**, BTuF26
Lucht, Robert P.–JMA41, **LMC4**, LWA1, **LWA2**, **LWA3**
Luijten, Peter–BSuF3
Lunazzi, Jose J.–DTuA4
Luo, J. T.–BTuF53
Luo, Yuan–**DWB6**
Luo, Zhongchi–BTuE3, **BWC2**
Lurie, Kristen–BTuF3

M
Mıhçak, Kıvanç–BMD4
Ma, Guobin–**BWE8**
Ma, Lin–**JMA17**
Ma, Weiguang–LTuA5
Macdonald, Rainer–BMD43, BMD45, BSuC4, BTuF19
MacDonald, Daniel J.–BMD89, BTuB5
MacRobert, Alexander J.–BTuC2
Maczewska, Joanna–BMD46
Magalhães, Daniel S. F.–**DTuA4**
Magee, Paula–BTuF16
Magee, Tony–BWD2
Magistretti, Pierre–BMD58, DTuB5
Mahadevan-Jansen, Anita–BSuB6, BTuE5, BWD6
Mahoney-Wilensky, Eileen–BSuD5
Maire, Guillaume–BMD57
Major, James C.–BMB4
Majoros, Istvan J.–BSuE4
Majumder, Shovan K.–BSuB6
Maki, Atsushi–BTuF21
Makoui, Anali–**BTuF33**, **LThA5**
Mali, Willem–BSuF3
Malkowicz, S. Bruce–BSuD2
Malphurus, Jonathan D.–BTuE5
Mamalaki, Clio–BWE3, BWE4
Mandella, Michael J.–BWG6
Maniewski, Roman–BMD46, BMD47
Mann, Christopher J.–**DTuC4**
Manoharan, Vinothan N.–**DTuB1**
Mansfield, James R.–BWE1
Mao, Guangzhao–BSuE11
Mao, Jianping–JMA19, LMA4
Mao, L.–BTuE8
Mao, Youxin–BMD86
Mardirossian, Vartan–BTuD2
Margalit, Ofer–DMA6
Margallo-Balbás, Eduardo–BSuE66
Margrain, Tom–BMB3
Mariampillai, Adrian–BWB3
Mariano, Laura–BTuD5
Marinakos, Stella–BWF5
Marjono, Andhi–**BMD33**
Markel, Vadim A.–BMC5, **BSuE45**
Marquet, Pierre–BMD58, DTuB5, DTuC3
Martelli, Fabrizio–BMD39, BSuE37, BWC6
Martin, Jeffrey M.–BTuE2
Maru, Dipen–BTuD3
Marzan, Tim A.–BSuA5
Masciotti, James–**BMD40**, BSuE85
Maslowski, Piotr–LTuB4
Massonneau, Marc–BSuE87
Mathker, Aditya–**BTuF43**, BTuF44
Matiukas, Arvydas–BMC3, BSuC5
Matthew, Howard W.–BSuE11
Matthews, Dennis L.–BTuF20, BTuF42
Maurudis, Anastasios–**BWG1**
Mayor, Shane D.–JMA20
Mayorga-Cruz, D.–JMA25
Mazzulli, Tony–BWA4
McCain, Scott T.–BTuF15
McDowell, Emily J.–**BMD79**, **BSuE32**
McElhinney, Conor P.–**DTuA5**
McEnnis, Caroline–LThC2
McGee, Sasha–BTuA3, **BTuD2**, BTuD6, BWD3
McGhee, Ewan–BWD2
McGinn, Joseph–LThA4
McGinty, James–BWD2, **BWE6**
McGorty, Ryan–DTuB1
McKeown, Craig–BMB4
McNeil, Jason–BSuE10
Meier, Wolfgang–LWB2
Meissner, Sven–**BWF4**

Mendez Gamboa, Jose Angel–BSuE53
Meriläinen, Pekka–BTuF36
Mermut, Ozzy–**BWB4**
Merritt, Sean I.–BSuE69
Mertens, Michael–BWF4
Mertz, Jerome–BMD55, BMF3, BTuF57, **BWD**
Mesquita, Rickson C.–**BMD3**
Meszoely, Ingrid M.–BSuB6
Meyer, Heiko–BWE4
Meyer, Jerry R.–JMA40
Meyer, Terrence–**LTuC2**, **LWB**
Mhaisalkar, Subodh G.–BSuE8
Michels, Rene–BSuE48
Michelsen, Hope A.–**JMA33**
Miles, Richard B.–**LWC4**
Miller, Charles E.–LTuB4
Miller, Eric–BMD24, BSuB2, BSuE20, BSuE26
Miller, J. Houston–**LTuB**
Min, Sung-Wook–**JMA3**
Mincu, Niculae–BSuE82
Mirkovic, Jelena–BTuA3, BTuD2, BTuD6, BWD3
Mishina, Tomoyuki–**DMC1**
Mitina, Natalia–BSuE9
Mitrea, Bogdan G.–**BSuC5**
Miwa, Mitsuharu–BMD59
Miyamoto, Yoko–DMA1
Miziolek, Andrzej–**LThC1**
Mohajerani, Pouyan–**BMD30**, **BMD31**
Mohler, Emile R.–BSuE56
Molteni, Franco–BSuE58
Monahan, Tim–BTuF3
Montfort, Frédéric–DMA4
Moore, Laura–BTuC3, BTuF22
Moore, Richard–BMD24, BSuB2, BSuB7
Moore, Sean W.–LTuA3
Morales, Alma R.–BSuE91
Mordmüller, Mario–JMA29
Moriyama, Eduardo H.–**BTuC7**, BWB3
Morley, Bruce–JMA20
Morofke, D.–BTuE8
Morosawa, Atsushi–BWF3
Morris, Michael D.–BWD5
Morris, Norma–**BSuE15**
Mortelmans, Kristien E.–JMA28
Mosse, Charles A.–BSuB8, BTuC2
Moulton, Peter F.–**LMC1**
Mounier, Denis–DMC4
Mourant, Judith R.–**BTuD7**, BTuF13
Moussazadeh, Philip–BTuF30
Muehlemann, Thomas L.–**BWG2**
Muehlschlegel, Susanne–BSuD4
Mujat, Mircea–**BWF6**
Muldoon, Timothy J.–**BTuB4**
Mulhall, Philip A.–LMB5
Münir, Kerim–BWC3
Munro, Ian–BWD2, BWE6
Munson, C. A.–LThC1
Muro, Silvia–BMF7
Muschol, Martin–**BMD16**
Musgrove, Cameron–BSuE31
Mutyal, Nikhil N.–BTuF10

N
Naeini, Jafar G.–BTuF16
Naik, Sameer V.–LMC4, LWA3
Nakayama, Kiyoshi–BMD37
Namita, Takeshi–**BMD35**
Näsi, Tiina–BTuF36
Naughton, Thomas J.–DTuA5
Navab, Nassir–BTuF58
Navas, Jinna A.–BME5
Neel, Victor A.–BTuF49
Nehal, Kishwer–BTuB3
Nehmetallah, G.–DWB1
Neil, Mark–BWD2,BWE6
Nelson, Andrew–BTuF49
Nelson, Matthew P.–LThB1
Nemes, László–JMA27, JMA45
Netz, Uwe–BMD34, **BSuD6**, BSuE59
Neumann, William L.–BSuA5
Nevsehirli, Deniz–BSuE78
Newaz, Golam M.–BSuE11
Newmark, Judith A.–BMD66
Nguyen, Quang-Viet–JMA42
Nguyen, Thu H.–BSuE74
Ni, Ping–DMC2
Nida, Dawn L.–BTuB4
Nielsen, Tim–**BMD23**, BMD45, BSuE43, BSuE44, BSuF3
Nieminen, Timo A.–BTuF12
Ninck, Markus–BMD21
Nioka, Shoko–BSuE92
Nishida, Kohji–BMD71
Nishida, Yoshiki–JMA21
Nishimura, Goro–**BTuF29**
Nissila, Ilkka–BWC5
Nocetti, Luca–BMD8
Noiseux, Isabelle–BWB4
Noponen, Tommi E.–**BTuF36**
Norris, Theodore B.–BSuE4
Nothdurft, Ralph E.–**BWE2**
Ntziachristos, Vasilis–BSuE26, **BWE**
Numata, Kenji–LMC5
Nussbaum, Ethne L.–**BWA4**
Nwanguma, Onyeoziri R.–**BSuE57**
Nyman, Jeffry S.–BWD6

O
O'Donoghue, Geoffrey–BTuD6, BWD3
O'Hara, J. A.–BTuC4
Obrig, Hellmuth–BME1, BSuC4
Oh, Daniel B.–JMA40, **LMA**
Oh, Jung Hun–BTuF44
Ohmi, Masato–**BMD74**
Okada, Eiji–BSuE38, BTuF21
Okano, Fumio–**DTuA1**
Okawa, Shinpei–BMD33, **BSuE41**, BTuF31
Okui, Makoto–DMC1
Okumura, M.–LTuB4
Olcmen, Semih–JMA23
Olenych, Scott–BTuA2
Olivo, Malini C.–BSuE8
Onaral, Banu–BMD20
Öncü, Bedriye–BWC3
Öner, Özgür–BWC3
Onural, Levent–**DWA1**
Orduna, Juan M.–BSuE27
Orlandi, Marco–LTuC5
Ou, Wanmei–**BWC5**

P
Pache, Christophe–DTuC2
Pal, Avishekh–**LThB5**, LThC4
Palanco, Santiago–**JMA30**, **LThC5**
Palmer, Gregory M.–BTuF55
Palyvoda, Olena–BSuE11
Pan, Chia-Pin–BMD69, **BSuE1**, **BSuE86**
Pan, Min-Cheng–BMD38, BSuE54
Pan, Min-Chun–BMD38, **BSuE54**
Pan, Rubin–BTuF65
Pan, Yingtian–BTuF65, BWC2, BWD4
Pan, Yinsheng–BTuF54
Panasyuk, George Y.–BMC5
Pandian, P. S.–**BSuE22**
Pantong, Natee–BSuE33
Papamatheakis, Sifis–BWE3
Parameswaran, Krishnan–LMA1, LMB5
Parigger, Christian G.–**JMA22**, **JMA27**, **JMA35**, **JMA45**
Park, B. Hyle–**BTuE7**
Park, Gilbae–**JMA16**
Park, Jae-Hyeung–**DTuA3, JMA4**
Parlapalli, Renuka–BMD13, **BMD50**
Passaglia, Chris L.–BTuE7
Patil, Chetan A.–**BWD6**
Patnaik, Anil K.–**JMA41**
Patterson, Brian D.–LWB3
Patterson, Michael S.–BWB4, BWE5
Patwardhan, Sachin–BWE2
Paulsen, Keith D.–BMC6, BSuB4, BSuE17, BSuE36, BWE7
Pava, Diego–DMA3
Pavani, Sri Rama Prasanna–**DMA2**
Pavillon, Nicolas–DTuC3
Pearl, Roy–DMA6
Pease, Tamara–LTuB3
Pedrocchi, Alessandra–BSuE58
Pei, Yaling–BMD1, BSuE61
Peltié, Philippe–BMD26, BMD41
Perez Cortes, Mario–BSuE53
Pertsov, Arkady–BMC3, BSuC5, BTuF30
Pessel, Martin–BSuF3
Peswani, Disha–BSuE80, BTuF43, **BTuF44**
Peter, Jörg–BSuE50, BSuE89
Peterson, Kristen A.–BMD85
Peyrin, Françoise–BMD25
Pfeifer, Kent B.–LThB4
Piao, Daqing–BSuE30, BSuE31, BWG4
Picart, Pascal–**DMC4**, **DMC5**
Pierce, Mark C.–BTuB4
Piestun, Rafael–DMA2
Pifferi, Antonio–**BMD11**, BMD39, BMD8, BSuB3, BSuE37, BSuE66, BSuE75, BSuE88, **BWC6**, LTuC5
Pike, Pavlina J.–JMA35
Piksarv, Peeter–**JMA6**
Pistey, Robert–BTuD2
Pivetti, Christopher D.–BTuF20
Pletcher, Timothy–LThA4
Plutov, Denis–**JMA24**
Podoleanu, Adrian–**BMD73**, **BWF**
Pogue, B. W.–BMC4, BMC6, BMD36, BSuB4, BSuC3, BSuE17, BSuE35, BSuE36, BSuE82, BTuC4, **BTuF3**, BWD5, BWE7
Pohlkötter, Andreas–JMA29, LThB3
Ponder, Steven L.–BSuE74
Poon, Ting-Chung–JMA3
Porat, Noga–BTuF32
Porro, Carlo A.–BMD8
Porter, Jason M.–JMA28
Potcoava, Mariana C.–**DMB2**
Potma, Eric O.–**BWD7**
Pourrezaei, Kambiz–BMD20
Považay, Boris–BMB3, **BMB5**
Powers, Tamara M.–BTuD7
Pradhan, Prabhakar–BTuC5, BTuC6
Praharaj, S. C.–DWB1
Prajapati, Suresh–BMD29, BMD50
Preyer, Norris W.–**BTuF45**

Pritchard, Caroline–BSuE77
Pritzker, Kenneth P. H.–BWA4
Pruss, Christof–LWB1
Psaltis, Demetri–BMF5, DMA5
Psycharakis, Stylianos–BWE4
Pu, Ye–**DMA5**
Puliafito, Carmen A.–BMB4, BMD72, BMD75
Pun, Suzie H.–BSuA4
Purev, Sukhbat–**JMA14**
Putt, Mary E.–BSuD3
Puzinauskas, Paul–JMA23

Q
Qi, Xin–BMD77, **BTuF54**
Qu, Jianan Y.–**BTuF38**, **BTuF47**
Quan, Kara J.–BMD88
Quon, Harry–BSuE55

R
Radhakrishnan, Harsha–**BMD5**, **BTuE1**, BWC5
Radosevich, Andrew J.–BME2, BTuF30, **BWG7**
Rafferty, Elizabeth–BSuB7
Rajadhyaksha, Milind–BTuB3, BTuF56, BTuF66
Rajaram, Narasimhan–**BTuF23**
Raman, Rajesh N.–**BTuF20**
Ramanujam, Nirmala–**BMA4**, **BSuB**, BTuC3, BTuF22, BTuF55
Ranasinghesagara, Janaka–BTuF25
Ranji, Mahsa–**BSuE92**
Rappaz, Benjamin–BMD58, DTuB5
Ratner, Désirée–BSuD7
Ravicz, Michael E.–BTuB2
Rector, David–BME5, **BTuE6**, **BWC**
Reed, Jason–DMB3
Regalado, Steven–**BMD49**, BSuE74
Reichardt, Thomas A.–LMC3, LThA2, LThB4, LTuA3
Reichle, René–LWB1
Reif, Roberto–**BTuF14**
Reisman, Charles–BMD71
Reivelt, Kaido–JMA6
Rendon, Augusto–BWB1
Reneker, Joseph W.–LMC4
Restrepo, Cesar–DTuC7
Restrepo, John F.–**DTuC6**
Restrepo-Martínez, Alejandro–DMB5, **DTuB2**
Reynolds, Daryl–BTuF45
Rhodes, William T.–**DMA3**
Rice, Brad–BMC1,BSuE46
Rice, William–BMD54
Richards-Kortum, Rebecca–**BSuD**, **BSuF2**, BTuB4, BTuD1, BTuD3, BTuF18
Richardson, Daniel R.–LMC4
Richardson, Martin–JMA30, LThC5
Richter, Dirk–**LTuA2**
Riedel, Wolfgang J.–DWB7
Riley, Jason–BMD44, BTuD8
Rinehart, Matthew T.–**JMA7**
Rinneberg, Herbert–BMD45, BSuE44
Ripoll, Jorge–BWE3, BWE4
Riris, Haris–LMA4, LMC5
Risby, Terence H.–LMB4, LMB5
Riza, Nabeel A.–BTuF64
Rizo, Philippe–BMD26, BMD41
Robichaud, David J.–LTuB4
Robichaud, Vincent–BMD32
Robitaille, Nicolas–BMD28
Robles, Francisco–BMD81
Roblyer, Darren M.–**BTuD1**
Roche-Labarbe, Nadege–**BME4**, BSuD1
Rodrigues, Matthew–**BTuF46**
Rodriguez, Victoria B.–BSuA4
Rodriguez-Díaz, Eladio–BTuF14
Rogers, Jeremy–**BTuF10**, BTuF40
Rojas, Manuel J.–BME5
Rollins, Andrew–BMD77, BMD78, BMD88, BTuF54
Romanini, Daniele–JMA43
Romanowski, Marek–BSuA3
Rose, Jeremy–LThC4
Rosen, David I.–LMB5
Rosen, Joseph–DMA1, DMC3, JMA13
Rosen, Mark–BSuB1, BSuE16
Rosen, Richard–BMD73
Rosenfeld, Philip J.–BMB4
Rosowski, John J.–BTuB2
Rothenberg, Florence–BWC8
Rothman, Laurence S.–**LMA3**
Roy, Hemant K.–BTuC5, BTuC6
Roy, Sukesh–JMA41, LTuC2, **LWA1**, LWA2, LWA3, LWA4
Rozhetskin, Dmitry D.–**BTuF4**
Ruggeri, Marco–**BMB4**, BMD75
Ruth, Albert A.–LTuB2
Ruvinskaya, Svetlana–BWC4, BWC7
Ryerson, Thomas B.–LTuA2
Rylett, R. J.–BSuE68

S
Sainsbury, Richard–BSuE13
Sakadžić, Sava–**BWC4**
Sakaguchi, Koichiro–**BTuF21**
Sakai, Tooru–BWF3
Salakhutdinov, Ildar–**BSuE11**
Salomatina, Elena–BTuF49
Sampson, David D.–BMD87
Sanders, Scott T.–**LWC1**
Sardini, Alex–BWE6
Sarmiento-Martinez, Oscar–**JMA25**
Sarunic, Marinko V.–BMD79
Sassaroli, Angelo–BMD14, **BMD15**, BMD42, BSuE37, BTuE2
Sato, Manabu–BMD82
Sawosz, Piotr–BMD46, BMD47
Saxena, Vishal–**BMD17**, **BSuE65**
Sayli, Omer–BSuE78
Scepanovic, Obrad–BTuA3
Schade, Wolfgang–JMA29, LThB3, **LThC**, LThC3
Schaefer, Z.–LTuC2
Schäfer, Jan–BSuE48
Schafer-Hales, Katherine J.–BSuE90, BSuE91
Scheel, Alexander–BSuE59
Schei, Jennifer L.–**BME5**, BTuE6
Schilt, Stephane–LMA5
Schippers, Wolfgang–**LThC3**
Schirner, Michael–BTuF19
Schlaggar, Bradley L.–BME3
Schmidt, Florian M.–LTuA5
Schmidt, J.–LTuC2
Schmidt, Titania A. R.–JMA40
Schmit, Joanna–**DMB3**
Schmitt, Joseph M.–BWF8
Schmitt, Randal L.–LMC3
Schmitz, Christoph H.–**BSuE19**
Schnall, Mitchell D.–BSuB1, BSuE16
Schneiderheinze, Dirk H. P.–**BMD87**
Schossig, Tobias–JMA29
Schotland, John C.–BMC5, BSuE45
Schrader, Paul E.–LTuA3
Schraub, Martin–BTuF1
Schulkin, B.–LTuC1
Schulmerich, Matthew V.–BWD5
Schultz, Paul–LTuA3
Schulz, Christof–**LWB1**
Schulz, Paul–LMC3
Schulz, Ralf–BSuE26, BSuE50, BSuE89, BWG8
Schwamm, Lee H.–BSuD4
Schwarz, Richard A.–**BTuF18**
Schweiger, Martin–BMC2, BSuE14
Schweitzer, Robert–LThB1
Scott, Nicholas J.–BTuF2
Scully, Marlan O.–BTuF8
Sedarsky, David–**LTuC3**
Seeger, Thomas–**LWA5**
Sehgal, Chandra M.–BTuF35
Selb, Juliette–BMD24, BSuB2, BSuB7, BSuD1, **BSuD4**, BSuE73, **BSuE72**
Semmler, Wolfhard–BSuE50, BSuE89
Sentenac, Anne–**BMD57**, BSuE87
Seo, Junho–DWA5
Seo, Young-Ho–JMA10, **JMA9**
Serap, Sinem–**BSuE63**, BWC3
Settersten, Thomas–**LWA**, LWB3
Seufert, Jochen–LTuA1
Shah, Qaisar–BSuD3
Shah, Raj–BWG1
Shah, Raumil–BWG1
Shaked, Natan T.–**DMC3**, JMA13
Shalinsky, Mark H.–BWC4
Shan, Hua–BSuE33
Sharareh, Shiva–BTuF42
Sharikova, Anna V.–**JMA34**
Sharma, Anita–BSuE13, BSuE15
Sharma, Ashwini Kumar–LThB3
Sharma, Parvesh–BSuE10
Sharma, Vikrant–**BMD13**, BMD50
Sheikh, Mumtaz–**BTuF64**
Sheng, Chao–BTuF3
Shepherd, Neal–BWC8
Sheppard, Colin–BMD64, BSuE8, BTuF63
Sherif, Sherif S.–**BMD86**
Shi, Songhai–BMD56
Shi, Yihui–BSuE86
Shidlovski, Vladimir–**BMD80**
Shieh, Jeng J.–BSuA5
Shimada, Sotaro–BSuE79
Shimizu, Koichi–BMD35
Shin, Dong-Hak–**JMA5**, **JMA8**
Shneider, Mikhail–LWC4
Shramenko, M. V.–BMD80
Shroff, Hari–**BTuA2**
Shultz, Susan–BTuF35
Sick, Volker–LWB4
Sierra, Heidy–**BMD67**
Sigman, Michael–LThB5
Sim, Eddy–DWB5
Singh, Jagdish P.–JMA32, JMA38
Singh, Megha–BSuE22
Singh, Satish K.–BTuF14
Singh, Vijay Raj–DWB5
Sivak, Michael V.–BTuF54
Sivaprakasam, Vasanthi–**LThA4**
Skala, Melissa C.–**BWF5**
Smith, Danielle K.–BTuF37

Smith, Harriet O.–BTuD7
Smith, Martin–BSuE77
Smith, Zachary J.–BTuF34
So, Peter T. C.–BMD52, BMD53, **BTuA1**, BTuF52
Sokolov, Konstantin V.–**BSuA**, **BSuA1**, BTuF37
Solovey, Erin Treacy –BMD14
Soloviev, Vadim–BWE6, **BWG8**
Somasundaram, Santosh–BSuB8
Sommers, Ricky L.–LTuA3
Sonnenfroh, David M.–**LMA1**
Sorg, Brian S.–BMD68
Spicer, James B.–**LThC2**
Spigulis, Janis–**BTuF27**
Spinelli, Lorenzo–BMD10, BMD11, **BMD39**, BMD8, BMD9, BSuB3, **BSuE37**, BSuE58, BSuE88, BWC6
Splinter, Robert–JMA35
Spöler, Felix–BMD90
Spuler, Scott M.–**JMA20**
Srinivasan, Kalyan–JMA38
Srinivasan, Subhadra–BSuB4, **BSuE36**, **BWD5**
Srivastava, Abneesh–BSuE1, BWG3
St. Lawrence, Keith–BSuE60, BSuE68
Stadelhoff, Christian–BMD45
Stafford, Ryan–LMC2
Stayton, Patrick S.–BSuA4
Steele, Philip–JMA32
Steinbrink, Jens–**BME, BME1**, BSuC4
Steinkellner, Oliver–BMD43, **BMD45**
Stelzer, Ernst–**BMF1**
Stephen, Mark–**JMA19**, LMA4
Sternberg, Paul W.–BMF5
Stevenson, David J.–BMD60
Stier, Elizabeth–BTuD6, BWD3
Stoika, Rostyslav–BSuE9
Stolper, Roman–BWG7
Strohmeier, Dirk–DMC7
Styles, Iain–**BTuF28**
Su, Jianzhong–BSuE33
Subramanian, Hariharan–**BTuC5**
Sueiras, Vivian–BSuE74
Sumer, Suna–BSuE62
Sun, Xiaoli–JMA19, LMA4, LMC5
Sun, Y. S.–BTuF53
Sun, Zhiwei–LWC3
Sunar, Ulaş–BSuE55, BSuE81
Surova, Andrea–**BSuD1**
Suter, Jonathan D.–LThA3
Suzuki, Kenneth M.–JMA40
Suzuki, Takuya–BWF3
Svanberg, Katarina–BSuE67
Svenmarker, Pontus–**BMC2**
Svensson, Tomas–BSuE67, **LTuC4**
Sviridov, Alexander P.–**BTuF48**
Swartling, Johannes–BWB5
Swartz, Harold M.–BSuC3
Szèkács, Andras–**JMA26**
Szendro, István–JMA26
Szkulmowski, Maciej–BWF1

T
Tabuchi, Arata–BWF4
Tachiki, Mark L.–DMB4
Tachtsidis, Ilias–**BSuE76**, BSuE77
Tadanaga, Osamu–JMA21
Tahir, Bilal–BSuE76
Tahir, Khadija B.–BWE6
Tahriri, Mohammadreza–BSuE12
Takahashi, Yu–BTuF61
Takeda, Mitsuo–**DMA1**, **DTuC**
Talbot, Clifford–**BWD2**, BWE6
Talneau, Anne–BMD57
Tamura, Mamoru–BTuF29
Tan, Chun-Wei–JMA8
Tan, Yiyong–**BSuE83**, BSuE84
Tankam, Patrice–DMC5
Tannenbaum, Susan–BTuD5
Tao, Lei–LTuB1
Tao, Yuankai K.–BWF2
Taroni, Paola–**BSuB3**, **BSuE66**, **BSuE75**, LTuC5
Taylor, Robin–BTuF51
Tchapyjnikov, Alexei–BTuF2
Tchou, Julia C.–BSuB1
Tearney, Gary–**BTuB1**
Tearney, Guillermo J.–BTuB2
Teitell, Michael A.–DMB3
Terakado, Goro–BMD62, **BMD63**
Terry, Neil G.–BTuC8
Thekkek, Nadhi–**BTuD3**
Thomas, Andrew S.–**BWF2**
Thomas, Thommey P.–BSuE4
Ti, Yalin–**BTuF24**, BTuF41
Tian, Fenghua–**BMD29**, BMD50, **BTuE4**
Tichauer, Kenneth–BSuE60, **BSuE68**
Tisdall, Martin–BSuE77
Tittel, Frank K.–LMA5, LMB3, LMB4, **LTuA**
Tobin, Kenneth W.–DTuC4
Toledo-Crow, Ricardo–**BMD56**, BTuF56
Tomyn, Andriy–BSuE9
Tong, Yunjie–BMD14, BMD15, BTuE2
Topaloğlu, Nermin–BSuE62, **BWC3**
Torricelli, Alessandro–BMD10, BMD11, BMD39, BMD8, BMD9, BSuB3, BSuE37, BSuE58, BSuE88, BWC6
Torti, Cris–BMB3
Tosi, Alberto–BWC6
Träger, Jens–BTuC1, **BTuF1**
Trainer, Michael K.–LTuA2
Trammell, Susan R.–BTuF2
Tran, Danh–BTuF2
Treado, Patrick J.–**LThB1**
Trebino, Rick–BMD61, **DTuC5**
Trifanov, Irina–BMD73
Tripathi, Ashish–LThA1
Tripathi, Markandey M.–**JMA32**
Troke, Joshua J.–DMB3
Tromberg, Bruce–**BSuC2**, BSuE69
Troppmann, Christoph–BTuF20
Troutman, Timothy–**BSuA3**
Troxler, Thomas–BMF7
Tsampoula, Xanthi–**BMD60**
Tseng, Sheng-Hao–BTuF50
Tu, Han-Yen–DTuB3
Tucker, Don M.–BMD18
Tucker, John–LThA4
Tuncel, Altug–BTuF43, BTuF44
Tunnell, James–BTuA3, BTuF23
Turkoglu, Ahu N.–**BSuE78**
Turovets, Sergei I.–**BMD18**
Turzhitsky, Vladimir–**BTuC6**, BTuF10, BTuF40

U
Ubachs, Wim–LTuB5
Uhlemann, Falk–BMD23, BSuF3
Ulissi, Zachary–BTuF48
Umeki, Takeshi–JMA21
Unholtz, Daniel–**BSuE89**
Unterhuber, Angelika–BMB3
Uruchurtu-Chavarín, J.–JMA25
Utzinger, Urs–**BTuD**, **BTuF39**

V
Vakhtin, Andrei B.–**BMD85**
Valentini, Gianluca–BWG8, LTuC5
Valle, Bertha–BTuD3
Valluru, Rahul–BSuE57
van Beek, Michiel–BSuF3
van de Ven, Stephanie–BSuF3
van der Mark, Martin B.–**BSuF3**
van der Sneppen, Lineke–**LTuB5**
van der Steen, Anton F. W.–BMD84
van der Voort, Marjolein–BSuF3
van Leeuwen, Ton G.–BWD6
van Ruijven, Leo J.–BSuE66
van Soest, Gijs–**BMD84**
VandeVord, Pamela J.–BSuE11
Vanduffel, Wim–BMD5
Varghese, Philip L.–LTuB3
Varma, Ravi M.–**LTuB2**
Venables, Dean–LTuB2
Ventalon, Cathie–BMF3, BTuF57
Vergnole, Sébastien–BMD83
Vernon, Marcia L.–BWB4
Vexberg, Emanuel–DMA6
Vidolova, Eleonora Z.–**BSuE20**
Vinogradov, Sergei A.–**BMF7**, BSuE24, BWC4
Virtanen, Jaakko–BTuF36
Vishwanath, Karthik–**BTuC3**, BTuF22
Visser, Brendan–BTuD4
Vitkin, A.–BTuE8
Voelbel, Gerald T.–BMD1
Voigt, Jan–BTuF19
Vu, D.–BWF6, BTuC4
Vunjak-Novakovic, Gordana–BMD54
Vurgaftman, Igor–JMA40

W
Wabnitz, Heidrun–**BMD9**, **BSuC4**
Wagner, Kelvin–BMF4
Wagner, Steven–LMA2, LMB1
Wahl, Michael–BMD43
Walega, James G.–LTuA2
Wallace, Michael B.–BTuF45
Wallois, Fabrice–BME4
Wan, Rachel C. Y.–BSuE8
Wang, Hui–BMD88
Wang, Jia–**BMC6**
Wang, Jianhua–BMB4, BMD72
Wang, Lihong–**BMA1**, **BWG**, BWG1
Wang, Qiang–BSuE28, BSuE29
Wang, Thomas D.–**BSuF4**, BWG6
Wang, Wei–DMA1
Wang, X. B.–BTuF53
Wang, Zhenguo–BWC2
Wang, Zhi–BWD3
Wang, Zimmern–BTuD2
Wang, Zhenguo–BWD4
Wankhede, Mamta–BMD68
Warger, II, William C.–**BMD66**
Warnasooriya, Nilanthi–**DWB2**
Warner, Carol M.–BMD66
Warren, Elizabeth–BSuD1
Warrender, J.–LTuC1
Warsen, Addie–BMD89
Watanabe, Kouyou–**BMD62**, BMD63

Watanabe, Yuuki–**BMD82**
Waterbury, Robert D.–**LThC4**
Watt, David–BWG3
Wax, Adam–BMD81, **BSuA2**, BSuE6, BTuC8, BTuF7, JMA7
Waxman, Alan–BTuD7
Weber, Crystal E.–BTuF18
Weber, Dieter–LMA2
Weersink, Robert–BTuF46
Wehbe, Hassan–BMB4, **BMD75**
Weibring, Petter–LTuA2
Weidman, Matthew–LThC5
Weidner, Douglas A.–BTuF13
Weikl, Markus C.–LWA5
Weisel, Lindsay R.–BMD51
Wellner, Marcel–BSuC5
Wendler, Thomas–BTuF58
Wentworth, Rachel–LThB1
Werner, Ralph–LTuA1
Whelan, William–BTuF46
White, Brian R.–BMD27, **BME3**
White, Helen–BTuA2
White, Ian M.–LThA3
White, Nathan–BWG1
Wi, Sung-Min–DWA2
Wiethoff, Andrea–BSuF3
Willer, Ulrike–**JMA29**, LThB3
Williams, Benjamin B.–BSuC3
Williams, Michelle D.–BTuD1
Williamson, Anne–BWC1
Wilson, Brian C.–BTuC7, **BWA1**, BWB3
Wilson, Emily–LMA4
Wilson, Tony–**BMF**, BTuF51
Wininger, Fred A.–BTuE6
Wittmann, Priscila–BTuF2
Wojtkowski, Maciej–BWF1
Wolf, Martin–BWG2
Wolfsen, Herbert C.–BTuF45
Won, Nayoun–BSuE2
Wong, Daisy Y. L.–BSuE68
Woodhams, Josephine–BTuC2
Wooley, Karen L.–BSuA5
Wrzesinski, Paul J.–LThB2
Wu, Changfeng–BSuE10
Wu, Tao T.–BTuF47
Wu, Weicheng–BTuE1
Wu, Yicong–BMD89, **BTuB5**, BTuF38
Wunderle, Karl–**LMB1**
Wuskell, Joseph P.–BTuF30
Wylie, Glenn–BMD1
Wysocki, Gerard–**LMB3**, LMB4

X
Xi, Peng–**BMD51**
Xing, Xiaoman–BSuD2, **BSuE56**
Xu, Bingwei–LThB2
Xu, Chen–**BSuE23**, BTuD5
Xu, Chris–BMF6
Xu, Guan–**BSuE31**, BWG4
Xu, Heng–**BMC1**
Xu, Min–**BTuF11**
Xu, Yong–BSuE61

Y
Yadav, Nitin–**BMD19**
Yakubovich, S. D.–BMD80
Yalavarthy, Phaneendra K.–BSuE35
Yalin, Azer P.–**JMA23**, **LTuB1**
Yamada, Yukio–BMD33, BSuE41, BTuF31
Yamaguchi, Ichirou–**DMA**
Yamaguchi, Takeshi–DWA4, **JMA12**
Yamamoto, Naoji–LTuB1
Yamashita, Yutaka–BMD59
Yamauchi, Toyohiko–**BMD59**
Yamazaki, Kyoko–BTuF21
Yan, Hao–DWB5
Yanagawa, Tsutomi–JMA21
Yang, Changhuei–BMD79, BMF5, BSuE32
Yang, V.–BTuE8
Yano, Akira–BMD33
Yao, Gang–**BTuF25**
Yao, Sheng–BSuE90
Yao, Xincheng–**BMD12**
Yaqoob, Zahid–BSuE32
Yared, Wael–BMD30
Yaroslavsky, Anna N.–**BTuF49**
Yasui, Takeshi–**BTuF61**
Yasuno, Yoshiaki–**BMB2**
Yatagai, Toyohiko–**DMB4**
Yau, Hon-Fai–DTuB4
Ye, Jing Yong–BSuE4
Yelin, Dvir–**BTuB2**
Yew, Elijah Y. S.–**BMD64**
Yin, Lu–**BSuE29**, BSuE84
Yodh, Arjun–BMC5, BSuB1, BSuD2, BSuD3, BSuD5, BSuE16, BSuE18, BSuE55, BSuE56, BTuF35
Yoo, Hoon–JMA5, JMA8
Yoo, Ji-Sang–DWA2, DWA6, JMA10
Yoshikawa, Hiroshi–**DMC**, DWA4, JMA12
Youn, Jeongkyu–BSuE2
Yu, Anthony W.–**LMC5**
Yu, Bing–BTuF55
Yu, Chung-Chieh–BTuA3, BTuD2, BTuD6, **BWD3**
Yu, Guoqiang–**BSuD2**, BSuD3, BSuD5, BSuE16, BSuE56, BTuF35
Yu, Lingfeng–**DMC6**
Yu, Mei–BTuE3
Yu, Tse-Kuan–BSuE7
Yu, Yang–BMD42
Yu, Yingjie–DMC2
Yuan, Baohong–**BMC7**, BSuD7, **BSuE25**
Yuan, Hong–BTuC3
Yuan, Shuai–BWC4
Yuan, Zhen–**BSuE28**, **BSuE51**, BSuE84
Yuan, Zhijia–BWC2, **BWD4**
Yucel, Meryem A.–BMD3
Yucesoy, Can A.–BSuE64
Yueh, Fang-Yu–JMA32, JMA38

Z
Zaccanti, Giovanni–BMD39, BSuE37, BWC6
Zacharakis, Giannis–BWE3, **BWE4**
Zacharopoulos, Athanasios–BMC2
Zaichenko, Alexander–BSuE9
Zaidi, Sohail–LWC4
Zalevsky, Zeev–**DMA6**, **DMB**
Zappa, Franco–BWC6
Zeff, Benjamin W.–BMD27, BME3
Zelikova, Olga–BSuE9
Zeller, Wolfgang–**LTuA1**
Zemlin, Christian W.–BMC3
Zhang, Qizhi–**BSuE10**, **BSuE84**
Zhang, W.–BWD2
Zhang, Xi Cheng–**LTuC1**
Zhang, Zhijiang–DMC2
Zhang, Zhili–LWC4
Zhao, Chao–BSuE16
Zhao, H. W.–LTuC1
Zhao, Mingtao–**BWF7**
Zhao, Weizhao–BMD75
Zhao, Youbo–BMD12
Zheng, Wei–BTuF38
Zhong, Weiwei–BMF5
Zhou, Chao–BSuB1, BSuD2, BSuD3, BSuD5, BSuE56, BTuF35, BWF8
Zhou, Wenjing–**DMC2**
Zhu, Banghe–BMD19, BMD48, BMD49, **BSuE74**
Zhu, Guanghao–BMF6
Zhu, Hongying–**LThA3**
Zhu, Quing–BSuE21, BSuE23, BSuE25, **BTuD5**, BWG1
Zhu, Timothy–BSuD2
Zhu, Xiangdong–**BTuF53**
Zhu, Yizheng–**BTuC8**
Ziegler, Andy–BSuE44, BSuF3
Ziegler, Ronny–BMD23, BMD45, **BSuE44**, BSuF3
Zimmerley, Maxwell–BWD7
Zimmermann, Frank–LWB1
Zinter, Joseph P.–**BMD70**
Zoia, Luca–LTuC5
Zondlo, Mark A.–JMA40
Zsemlye, Meggan M.–BTuD7

Biomedical Optics (BIOMED) Postdeadline Paper Abstracts

•Sunday, March 16, 2008•

BSuE • BIOMED Poster Session I

Foyer
1:30 p.m.–3:30 p.m.
BSuE • BIOMED Poster Session I

PDPBSuE1
Monitoring of Acute Wound Healing, *Elisabeth S. Papazoglou, Michael S. Weingarten, Leonid Zubkov, Michael Neidrauer, Linda Zhu, Kambiz Pourrezaei; School of Biomedical Engineering, Drexel Univ., USA.* Optical properties of wounds in hairless rats were assessed using DPDW methodology. An increase in absorption and scattering coefficients and a decrease in blood saturation was observed in wounds compared to control sites.

PDPBSuE2
Heterodyne Polarization Coherent Anti-Stokes Raman Scattering (HP-CARS) Microscopy for High Contrast Bioimaging, *Fake Lu, Wei Zheng, Zhiwei Huang; Natl. Univ. of Singapore, Singapore.* We report a heterodyne-detected polarization coherent anti-Stokes Raman scattering (HP-CARS) microscopy for high sensitive and high contrast biomolecular vibration imaging.

•Monday, March 17, 2008•

BMD • BIOMED Poster Session II

Foyer
1:30 p.m.–3:30 p.m.
BMD • BIOMED Poster Session II

PDPBMD1
Inverse Solution Regularized with the Edge-Preserving Constraint for NIR DOT, *Min-Cheng Pan[1], Liang-Yu Chen[2], Min-Chun Pan[2], Chien-Hung Chen[2]; [1]Tungnan Univ., Taiwan, [2]Natl. Central Univ., Taiwan.* To remedy the low spatial resolution of diffuse optical tomography, an iterative solution to the optimization problem is developed using Tikhonov regularization with the edge-preserving constraint as a prior knowledge into the objective function.

•Tuesday, March 18, 2008•

BTuF • BIOMED Poster Session III

Foyer
4:00 p.m.–6:00 p.m.
BTuF • BIOMED Poster Session III

PDPBTuF1
A 3-D Image-Based Guidance System for Handheld Optical Imaging Devices, *Fred S. Azar[1], Albert Cerussi[2], Benoit De Roquemaurel[1], Elizabeth Flannery[2], Bruce J. Tromberg[2]; [1]Siemens Corporate Res. Inc., USA, [2]Univ. of California at Irvine, USA.* We present a novel 3-D visualization and guidance system for handheld optical imaging devices. The system enables more accurate longitudinal studies, 3-D reconstruction of optical handheld measurements and joint analysis with other imaging modalities.

PDPBTuF2
Tissue Turbidity Suppression by Optical Phase Conjugation, *Zahid Yaqoob, Emily McDowell, Changhuei Yang; Caltech, USA.* Light scattering in tissue may appear random but it is causal and deterministic in nature. We report on our findings into the use of optical phase conjugation (TS-OPC) for tissue turbidity suppression.

PDPBTuF3
Optical Tomographic Imaging of Hemodynamic Effects in Arthritic Joints, *Andreas H. Hielscher, Joseph M. Lasker, Chris J. Fong, Edward Dwyer; Columbia Univ., USA.* We performed dynamic imaging studies on healthy volunteers and patients diagnosed with rheumatoid arthritis (RA) in proximal-interphalangeal finger joints. We observed pronounced differences between the hemodynamic effect occurring in healthy volunteers and patients with RA.

PDPBTuF4
Large Depth-of-Field Lensfree Imaging and Characterization of Cells over an Ultra-Wide Field-of-View, *Ting-Wei Su[1], Sungkyu Seo[1], Anthony Erlinger[1], Aydogan Ozcan[1,2]; [1]Electrical Engineering Dept., Univ. of California at Los Angeles, USA, [2]Biomedical Engineering IDP, Univ. of California at Los Angeles, USA.* A high-throughput on-chip imaging-platform that can rapidly characterize >100,000 cells within a depth-of-field of >1mm, and over a field-of-view of ~10cm^2 is introduced. This imaging-system can monitor multiple object-planes without any lenses or mechanical scanning.

PDPBTuF5
Measurement of Optical Disorder Strength due to the Nanoscale Refractive Index Fluctuations of Tissues/Cells: Inverse Participation Ratio (IPR) Analysis of Transmission Electron Microscopy (TEM) Images, *Prabhakar Pradhan[1], Vladimir Turzhitsky[1], Alexander Heifetz[1], Dhwanil Damania[1], Hariharan Subramanian[1], Hemant K. Roy[2], Vadim Backman[1]; [1]Northwestern Univ., USA, [2]Evanston-Northwestern Healthcare, USA.* An IPR imaging technique is developed for the first time to analyze TEM images of cells/tissues by projecting them to optical lattices and quantifying their short-range nanoscale refractive-index fluctuations/correlations. Applications for pre-cancer detections are discussed.

PDPBTuF6
Diffuse Optical Spectroscopic Imaging Applications in Human Muscle, *Jason Ruth, Sophie Chung, Albert Cerussi, Bruce Tromberg; Beckman Laser Inst., Univ. of California at Irvine, USA.* Diffuse optical spectroscopic imaging measures absolute concentrations of DeoHb and HbO_2, water, bulk lipid. Broadband spectra allows deep tissue temperature measurement, and sensitivity to myoglobin. Clinically translatable tests demonstrate applications to human muscle.

PDPBTuF7
***In vivo* Assessment of Chronic Diabetic Wounds with DPDW Methodology,** *Elisabeth S. Papazoglou, Michael S. Weingarten, Leonid Zubkov, Michael Neidrauer, Kambiz Pourrezaei; School of Biomedical Engineering, Drexel Univ., USA.* Optical properties of diabetic wounds in human subjects were assessed over several weeks using DPDW methodology. Preliminary results indicate that differences in optical properties can be seen between wounds with different healing behaviors.

PDPBTuF8
Imaging of Cystic Breast Lesions by Spectral Diffuse Optical Tomography, *Anaïs Leproux[1], Marjolein van der Voort[1], Martin van der Mark[1], Leon Bakker[1], Tim Nielsen[2], Bernhard Brendel[2], Falk Uhlemann[2], Andrea Wiethoff[3], Stephanie van den Ven[4], Peter Luijten[4], Willem Mali[4]; [1]Philips Res., Netherlands, [2]Philips Res., Germany, [3]Philips Medical Systems, Netherlands, [4]Univ. Medical Ctr. Utrecht, Netherlands.* In this study, cystic breast lesions were imaged by spectral diffuse optical tomography. Spectroscopic analysis of the lesions elucidated their high water content and low total hemoglobin content.

PDPBTuF9
Why Acquiring Excitation Data Improves the Quality of Reconstructed Fluorescence Images for Highly Heterogeneous Diffusive Media, *Frederic Leblond[1], Niculae Mincu[2], Nicolas Robitaille[2], Simon Fortier[2], Mario Khayat[2], Brian W. Pogue[1]; [1]Thayer School of Engineering, Dartmouth College, USA, [2]Advanced Res. Technologies Inc., Canada.* Diffuse optical fluorescence tomography often relies on the assumption that samples are homogeneous. This degrades the correspondence between tomography data sets and model predictions. We provide evidence that data normalization significantly improve on this situation.

PDPBTuF10
Comparison of the Fluorescent Protein Performance in Deep-Tissue Small-Animal Imaging Applications, *Nikolaos Deliolanis[1,2], Thomas Wurdinger[1,3], Bakhos A. Tannous[1,3], Khalid Shah[1], Vasilis Ntziachristos[4], Ralph Weissleder[1,2]; [1]Ctr. for Molecular Imaging Res., Massachusetts General Hospital and Harvard Medical School, USA, [2]Ctr. for Systems Biology, Massachusetts General Hospital and Harvard Medical School, USA, [3]Molecular Neurogenetics Unit, Massachusetts General Hospital and Harvard Medical School, USA, [4]Inst. for Biological and Medical Imaging, Technical Univ. of Munich and Helmholtz Ctr. Munich, Germany.* The performance of various fluorescent proteins for *in-vivo* deep tissue molecular imaging applications is presented. Experimental results and theoretical model prediction show the superiority of the red-shifted fluorescent proteins.

PDPBTuG • BIOMED Postdeadline Session

Grand Ballroom North and South
6:00 p.m.–7:00 p.m.
PDPBTuG • BIOMED Postdeadline Session
Presider to Be Announced

PDPBTuG1 • 6:00 p.m.
Biological Studies Using High-Throughput 3-D Tissue Cytometry Based on Two-Photon Microscopy, *HyukSang Kwon, Peter T. C. So; MIT, USA.* High throughput 3-D tissue cytometry based on two-photon microscopy has been applied to investigate the muscle architecture of whole mouse tongue and study cardiovascular diseases using mouse heart.

PDPBTuG2 • 6:10 p.m.
***In vivo* Optical Coherence Tomography of Mouse Skin Wound Healing,** *Zhijia Yuan, Julia Zakehaleva, Hugang Ren, Weiliam Chen, Yingtian Pan; SUNY Stony Brook, USA.* We examined the utility of OCT for *in vivo* imaging of skin healing using murine transcutaneous wound model. OCT identifications as validated by corresponding histology demonstrate its potential for noninvasive, high-resolution monitoring of wound healing.

PDPBTuG3 • 6:20 p.m.
Investigation of the Motor Cortex Function in Children with Cerebral Palsy Using Functional Near-Infrared Spectroscopic Imaging, *Fenghua Tian[1], Mauricio R. Delgado[2,3], Nancy J. Clegg[2], Mario I. Romero-Ortega[2], Hanli Liu[1]; [1]Dept. of Bioengineering, Univ. of Texas at Arlington, USA, [2]Dept. of Neurology, Texas Scottish Rite Hospital, USA, [3]Dept. of Neurology, Univ. of Texas Southwestern Medical Ctr., USA.* This study investigates the ability and reliability of functional near-infrared spectroscopic (fNIRS) imaging to detect motor cortical activity during upper extremity movement in normal children and children with cerebral palsy.

PDPBTuG4 • 6:30 p.m.
Spectral-Encoding Design to Parallelize Sources in Near Infrared Tomography during Magnetic Resonance Imaging of the Breast, *Zhiqiu Li, Colin Carpenter, Venkataramanan Krishnaswamy, Scott C. Davis, Shudong Jiang, Keith D. Paulsen, Brian W. Pogue; Dartmouth College, USA.* A NIR diffuse tomography system with spectrally-encoded sources allows simultaneous detection of all data. It can provide images of high-contrast, fast changes in tissue optical properties to be overlayed on the magnetic resonance breast scan.

PDPBTuG5 • 6:40 p.m.
Bessel Beam Based Spectral Domain High Resolution OCT with a 0.6mm Effective Diameter Axicon Providing Extended Focusing Range, *Kye-Sung Lee, Jannick Rolland; CREOL and Florida Photonics Ctr. of Excellence, College of Optics and Photonics, Univ. of Central Florida, USA.* We report on the measured sensitivities of Bessel beam and Gaussian beam based SDOCTs and show invariant SNR and resolution images with a 0.6mm effective diameter axicon across a 4mm depth of focus.

NOTES

Key to Authors
(**Bold** Denotes Presenting Author)

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