ECBO

European Conferences On Biomedical Optics

12-16 June 2005

Collocated with:

Laser 2005 World of Photonics Congress and CLEO/Europe - EQEC 2005

ICM -- International Conference Center
Neue Messe
Munich, Germany

Sponsored by:

Co-sponsored by:

European Physical Society

IEEE/Lasers and Electro-Optics Society

Wissenschaftliche Gesellschaft Lasertechnik e.V.

European Optical Society

Deutsche Gesellschaft fü Lasermedizin e.V.

World Photonics Congress

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General Chairs
Guy Delacretaz , *Swiss Federal Inst. of Technology , Switzerland*
James Fujimoto , *MIT , USA*

Program Chairs
David Boas , *Harvard Medical School , USA*
Stefan Andersson-Engels , *Lund Inst. of Technology , Sweden*

About ECBO

Important Dates

Conference Dates: 12-16 June 2005

In 2005, ECBO will be collocated with the CLEO/Europe - EQEC 2005 conference, sponsored by EPS, IEEE/LEOS and OSA and organized by EPS. In order to better serve participants active in biomedical optics, it has been arranged that the biomedical optics content of ECBO and CLEO/Europe - EQEC will be a joint activity. CLEO/Europe - EQEC will take the lead for emerging concepts in biophotonics (CLEO/Europe topic CL: "Biophotonics" (CL)) and ECBO will take the lead on all other areas of biomedical optics, including a Joint Symposium with CLEO/Europe-EQEC on Novel Optical Instrumentations for Biomedical Applications Thus, papers concerning biophotonics should be submitted to CLEO/Europe and all other papers concerning biomedical optics should be submitted to ECBO 2005. Attendees of ECBO will be able to attend all CLEO/Europe - EQEC sessions.

The use of optical technologies and lasers for minimally invasive diagnostic and therapeutic applications has recently emerged as major research field. The European Conferences on Biomedical Optics (ECBO) bring together scientists, engineers, and clinical researchers from a variety of disciplines who are engaged in the applications of optical sciences and photonics technologies to problems in biomedical science.

Conferences

On This Page:

- Molecular Imaging
- Optical Coherence Tomography and Coherence Techniques
- Diagnostic Optical Spectroscopy
- Photon Migration
- Confocal, Multiphoton, and Nonlinear Microscopic Imaging
- Novel Optical Instrumentation for Biomedical Applications
- Photodynamic Therapy
- Therapeutic Laser Applications and Minimally Invasive Laser Treatment

Molecular Imaging

Conference Chair: **Kai Licha**, *Schering AG, Germany*

Program Committee: **Samuel Achilefu**, *Washington Univ., USA*; **Ulrich Dirnagl**, *Humboldt Univ., Germany*; **Eyk Schellenberger**, *Humboldt Univ., Germany*; **Clemens W.G.M. Lowik**, *Leiden Univ., The Netherlands*; **Bernd Ebert**, *Physikalisch-Technische Bundesanstalt, Germany*

Novel concepts of molecular imaging based on optical technologies are being rapidly introduced these recent years. The design and application of both extrinsic fluorescent probes and intrinsic reporter proteins has allowed basic researchers and physicians to gain insight into fundamental molecular processes at the molecular, cellular, tissue and organ level. Likewise, novel biooptical technologies allowed a hand-in-hand evolution of integrated methods for the evaluation of molecular pathways and the translation of drug discovery processes into clinical benefit. This conference addresses research on novel emerging approaches in chemistry, biotechnology, biology and pharmacology contributing, but not limited to the following topics:

- Novel instrumentation and algorithms for molecular imaging
- Approaches for multi-modality imaging including MRI, X-ray, ultrasound and radiodiagnostic techniques
- Chemistry of fluorescent dyes and molecular probes for animal and human imaging
- Probe design of smart and activatable agents
- Nanostructured and particulate probes, e. g. quantum dots
- Molecular targeting of disease

- Monitoring of physiological processes at molecular and cellular level
- Angiogenesis, oncogenesis, inflammation
- Imaging in drug discovery, proteomics and screening
- Novel genetically introduced reporters and proteins for fluorescence and biolumiscence imaging
- Clinical applications of molecular imaging

Optical Coherence Tomography and Coherence Techniques

Conference Chair: **Wolfgang Drexler**, *Medical Univ. of Vienna, Austria*

Program Committee: Peter E. Andersen *Risø Natl. Lab., Denmark*; **Stephen A. Boppart**, *Univ. of Illinois at Urbana-Champaign, USA*; **James G. Fujimoto**, *MIT, USA*; **Ton G. van Leeuwen**, *Univ. of Amsterdam, The Netherlands*; **Constantinos Pitris**, *Univ. of Cyprus, Cyprus*; **Adrian Podoleanu**, *Univ. of Kent at Canterbury, UK*; **René P. Salathe**, *Swiss Federal Inst. of Technology, Switzerland*; **Joseph M. Schmitt**, *LightLab Imaging, Inc., USA*; **Natalia M. Shakhova**, *Univ. Nizhny Novgorod, Russia*

Optical coherence tomography (OCT) and optical methods based on coherent light interactions with tissue are emerging medical diagnostic imaging techniques which can perform cross sectional, three-dimensional, functional, real time visualization of biological microstructure *in situ*. This conference provides an interdisciplinary forum for topics in research and development on a physical and theoretical basis of coherent imaging including novel low-coherence interferometry and tomography techniques, extension techniques of OCT such as polarization-sensitive, flow-coherence interferometry and tomography, phase contrast OCT, spectroscopic OCT and others. In addition, this conference will also focus on the development of new light sources for coherent imaging new detection schemes as well as scanning mechanisms and delivery systems. Applications of coherent optical techniques for morphological as well as functional assessment in different living tissues and phantoms in various medical fields are also covered. Contributed papers are solicited, but not limited to, the following areas:

- Biomedical optics
- Minimally invasive optical diagnostic techniques
- Optical coherence tomography technology, systems, theory, signal post processing
- Frequency domain OCT
- Clinical applications of OCT
- Spectroscopic and functional OCT, contrast enhancement techniques for OCT
- Doppler and polarization sensitive OCT

- Optical coherent techniques for tissue spectroscopy and imaging
- Fourier optics in tissue imaging
- Coherent light microscopy
- Speckle technologies for imaging
- Novel light sources for OCT
- Adaptive coherent optical systems

Diagnostic Optical Spectroscopy

Conference Chair: **Mary-Ann Mycek**, *Univ. of Michigan, USA*

Program Committee: **Maryann Fitzmaurice**, *Case Western Univ., USA*; **James Scheiman**, *Univ. of Michigan, USA*; **Dietrich Schweitzer**, *Friedrich Schiller Univ. Jena, Germany*; **George Wagnieres**, *EPFL-ENAC/ISTE-LPAS, Switzerland*

The developments of principles and technologies based on optical spectroscopy and imaging for minimally invasive diagnostic applications have recently emerged as a major research field. Moreover, the number of related industrial developments has increased significantly, resulting in numerous biological/medical/clinical/dental applications.

This situation is due to the strong clinical need for the early detection and localization of pathologies, combined with the development and improvement of medical endoscopes, light sources, optical fibers, spectrometers and optical markers, as well as quantitative computational approaches.

One aim of this conference is to draw together scientists, engineers, clinical researchers and medical doctors from a variety of disciplines with an emphasis on applications that are pioneering in this field.

Contributed papers are solicited concerning, but not limited to, the following areas involving diagnostic optical spectroscopy and imaging based on the use of:

- Fluorescence-autofluorescence and exogenous selective agents
- Light scattering and absorption
- Raman scattering
- Monte Carlo and other computational techniques
- Tissue optical properties
- Nanoprobes: optically-active materials
- Fluorescent biosensors
- Pre-clinical and clinical investigations
- Endoscopic fluorescence imaging
- Quantitative tissue optical spectroscopy

Photon Migration

Conference Chair: **Rinaldo Cubeddu**, *Politecnico of Milan, Italy*

Program Committee: **Sigrid Avrillier**, *Lab. de Physique des Lasers Univ. PARIS XIII, France*; **Herbert Rinneberg**, *PTB Berlin, Germany*; **Marco Ferrari**, *Univ. dell'Aquila, Italy*; **Robert Sterenborg**, *Erasmus Univ. Medical Ctr., The Netherlands*; **Simon Arridge**; *UCL London, UK*

The study of photon migration through high scattering media provides new tools for exploring the structural and functional properties of tissues that are not easily accessed by alternative methods. The optical properties of tissues can be evaluated in a non-invasive way over a broad wavelength range allowing an estimate of both the normal and pathological tissue composition. The development and advancement of instrumentation and methods has led to new scientific applications ranging from the study of cerebral physiology to cancer patho-physiology. Clinical applications being explored include breast cancer imaging and diagnosis, stroke detection, brain and muscle oxygenation monitoring and the diagnosis of peripheral vascular disease and arthritis

Further improvements in these application areas and others rely on continued advancement in instrumentation, in the theory of photon migration through random media, in data analysis and in image reconstruction algorithms.

This conference provides an interdisciplinary forum for engineers, physicists, mathematicians, and biomedical scientists and physicians to report on recent results, improvements, and new approaches and applications for using diffused light to characterize the structural and functional properties of tissue.

Contributed papers are solicited concerning, but not limited to, the following areas:

- Diffuse optical tomography, topography and imaging
- Diffuse optical spectroscopy
- Diffusing wave spectroscopy and correlation spectroscopy
- Advances and optimization in instrumentation
- Image reconstruction algorithms
- Diffuse fluorescence imaging, molecular markers
- Phantom studies
- Animal studies
- Clinical applications
- Physiological studies using photon migration
- Multi-modality imaging with MRI, ultrasound, or X-Ray

- Brain imaging of cerebral activation
- Clinical brain imaging of stroke, hemorrhage, oxygenation, etc.
- Breast imaging and spectroscopy
- Muscle physiology
- Tissue oxymetry
- Bone physiology and spectroscopy

Confocal, Multiphoton and Nonlinear Microscopic Imaging

Conference Chair: **Tony Wilson**, *Univ. of Oxford, UK*

Program Committee: **Eithne McCabe**, *Trinity College, Ireland*; **Stefan Hell**, *Max-Planck-Inst fur Biophysik Chemie, Germany*; **Alberto Diaspro**, *University of Genoa, Italy*; **Ernst H. Stelzer**, *EMBL Heidelberg, Germany*; **Boris Vojnovic**, *Gray Cancer Institute, UK*

This conference will explore the rapidly developing field of multidimensional microscopy, including confocal microscopy and other novel imaging modalities. Consideration will be given to the characteristics of the overall system design, as well as to the topics of image formation, image recording, deconvolution in two, three or more dimensions, and digital methods of producing and displaying the resulting reconstruction. Recent innovations in multidimensional microscopy have had a large impact in the biological and medical fields. It is hoped that the broad range of relevant topics being presented at this conference will serve to encourage interaction among instrumentation engineers, computer image analysts and researchers in the various fields of biomedical and life science application. Papers are invited in all areas of development and application of confocal and novel optical microscopies including, but not limited to, the following and related areas:

- High resolution optical imaging on the nanometer scale
- Multi-modal spectroscopic analysis in microscopy
- Single molecular microscopy and microanalysis
- Micro-optics and MEMS based optical systems for biomedical diagnosis
- Novel image contrast enhancement approaches such as SER and other near-field surface effects
- Fluorescence correlation spectroscopy, single and multiphoton microscopy
- FRET-FLIM modalities
- Second and third harmonic generation microscopies
- Biomedical instrumentation
- Fast image acquisition
- Time-resolved image acquisition systems

Novel Optical Instrumentation for Biomedical Applications Joint with CLEO/Europe

Conference Chair: **Christian Depeursinge**, *EPFL, Switzerland*

Program Committee: **Brahim Lounis**, *Bordeaux I Univ, France*; **Georg Maret**, *Univ. of Konstanz, Germany*; **Ernst H. Stelzer**, *EMBL Heidelberg, Germany*; **Benoit Forget**, *ESPCI, France*, **Alexander Oraevsky**, *Fairwway Medical Technologies, USA*

In addition to large, well recognized avenues of biomedical optics for imaging and diagnostics, a number of "exotic" and highly promising methods are being explored. These new techniques often take advantage of the cross-fertilization of two fields (e.g. optics and acoustics) for signal generation or processing (optics and MRI or optics and echography). Moreover a number of new ideas are being investigated based on new methodology, physical basis, instrumental developments and data analysis. This conference is intended to be a highly interdisciplinary forum of discussion for instrument designers, sensor builders, experimentalists and applied and fundamental physicists. Topics for contributions are thus broadly open and include:

- Photoacoustic/optoacoustic imaging and diagnostics
- Photothermal imaging and diagnostics
- Acoustooptic imaging
- Speckle based techniques
- Holography and micro-holography
- Nanoprobes for imaging and diagnostics
- MRI/optical image fusion
- Ultrasound/optical image fusion
- New approaches for photon discrimination in turbid media
- Near-field imaging in two-dimensions and three-dimensions
- Novel endoscopic technologies

Photodynamic Therapy

Conference Chair: **Hubert van den Bergh** , *EPFL, Switzerland*

Program Committee: **Herbert Stepp**, *Univ. of Munich, Germany*; **Stanley Brown**, *Leeds, United Kingdom*; **Heyke Diddens**, *Univ. of Lubeck, Germany*; **Giulio Jori**, *Univ. of Padova, Italy*; **Tabaya Hassan**; *Massachusetts General Hospital, USA*

This conference will cover the field of photodynamic therapy and the use of exogenous agents as optical reporters. In addition to photodynamic therapy, there has been a recent growth in the development of molecular imaging techniques that enable functional imaging in proteomics and genomics. The conference will consider a broad range of topics from the photochemistry and

photobiology exogenous agents to their investigation *in vivo* and in clinical studies. Contributed papers are solicited concerning, but not limited to, the following areas:

- Tissue-targeting or tumor-seeking agents
- Molecular imaging
- New optical reporters for functional imaging
- Biological mechanisms in PDT
- Light delivery modalities/light sources/dosimetry
- Pre-clinical studies and experimental work
- Clinical evaluation of the techniques

Therapeutic Laser Applications and Minimally Invasive Laser Treatment

Conference Chair: **Alfred Vogel**, *Medical Laser Ctr. Lübeck, Germany*

Program Committee: **Heyke Diddens**, *Medical Laser Ctr. Lübeck, Germany*;
Martin Frenz, *Univ. Bern, Switzerland*; **Holger Lubatschowski**, *Laserzentrum Hannover eV, Germany*; **Dieter Manstein**, *Wellman Ctr. of Photomedicine, USA*; **Michael Mrochen**, *ETH Zürich, Switzerland*; **Guenther Paltauf**, *Karl-Franzens-Univ. Graz, Austria*; **Rudolf Steiner**, *Univ. Ulm, Germany*; **Ronald Sroka**, *Ludwig Maximilians-Univ. München, Germany*; **Zhenxi Zhang** , *Xi'an Jiaotong Univ., China*

Medical laser application is a broad area for research and development to improve therapeutic procedures or to open new fields for the medical use of lasers. New types of lasers are emerging with a different profile of laser-tissue interactions (ultra short pulsed lasers, fiber lasers, diode lasers, diode pumped solid state lasers), which can be used to improve selectivity and specificity of laser radiation. This includes thermal reactions on a "macro"-scale, e.g. skin smoothing without ablation, and also on a "nano"-scale for nano-surgery within cells as well as short-pulsed laser applications to treat soft and hard tissue.

The understanding of biological reactions triggered by laser radiation, using targeting molecules, natural absorbing sites, or nanoparticles continuously improves and might be used for non-invasive laser effects. Theoretical considerations and modeling of laser light perfusion in tissue with consequent energy transfer and tissue interactions have been improved to build up a solid basis for therapy planning. This conference will provide an interdisciplinary forum for scientists, engineers and research-oriented medical specialists to discuss the progress in all these topics and also the actual medical needs where hopefully the laser can play an important role.

Contributed papers are solicited concerning, but not limited to, the following topics:

- Photo-biological and photo-chemical reactions
- Photo-thermal and photo-mechanical tissue reactions
- Modeling of laser-tissue interactions
- Cellular micro- and nano-effects of laser radiation
- Laser-induced microdissection and catapulting of cells
- Tissue ablation and cutting with short and ultra-short laser pulses
- Hard tissue ablation
- Antimicrobial PDT
- Cellular mechanisms of low power laser therapy
- Minimally invasive laser surgery
- Progress in therapeutic laser applications

Plenary Speaker

- SuP1, **Molecular Imaging: From Mouse to Man**, *C. Bremer; Dept. of Clinical Radiology, UKM, Germany*

Tutorial Speaker

- WD1, **Multiphoton Tomography and Nanoprocessing of Biological Targets with Near-Infrared Femtosecond Laser Pulses**, *Karsten Koenig; Fraunhofer Inst. of Biomedical Technology (IBMT), Germany*

Invited Speakers

- SuA1, **Molecular Imaging of Rheumatoid Arthritis**, *Andreas Wunder; Univ. of Regensburg, Germany*
- SuA2, **Molecular Imaging of Apoptosis**, *Eyk Schellenberger; Humboldt Univ., Germany*
- SuB4, **Theory Concerning the Ablation of Corneal Tissue with Large-Area, 193-nm Excimer Laser Beams**, *Charles R. Munnerlyn, Mark E. Arnoldussen, Audrey L. Munnerlyn, Benjamin A. Logan; VISX, Inc., USA*
- SuC1, **Fluorescence Lifetime Based Tomography for Turbid Media**, *Anand T. Kumar, Brian J. Bacskai, Jesse Skoch, David A. Boas, Andrew K. Dunn; Massachusetts General Hospital, USA*
- MB1, **Selective Permeabilization of Cells by Laser Irradiated Gold Nano Particles**, *Gereon K. Huettmann[1], Marco Bever[1], Ramtin Rahmanzadeh[2], Johannes Geerdes[2], Cuiping Yao[3,4], Elmar Endl[5]; [1]Inst. of Biomedical Optics, Univ. of Luebeck, Germany, [2]Res. Ctr. Borstel, Germany, [3]Key Lab of Biomedical Information Engineering of Ministry of Education, Xi'an Jitotong Univ., China, [4]Inst. of Biomedical Engineering, School of Life Science and Technology, Xi'an Jitotong Univ., China, [5]Inst. of Molecular Medicine and Experimental Immunology, Univ. Bonn, Germany*
- MB7, **Femtosecond Laser Manipulation of Subcellular Organelles in Living Cells**, *Wataru Watanabe, Timoko Shimada, Kazuyoshi Itoh, Sachihiro Matsunaga, Kiichi Fukui; Osaka Univ., Japan*
- MB8, **Nerve Regeneration Following Femtosecond Laser Nano-Axotomy**, *Mehmet F. Yanik[1], Hulusi Cinar[2], Hediye Nese Cinar[2], Andrew D. Chisholm[2], Yishi Jin[2,3], Adela Ben-Yakar[4]; [1]Stanford Univ., USA, [2]Univ. of*

California at Santa Cruz, USA, [3]Howard Hughes Medical Inst., USA, [4]Univ. of Texas at Austin, USA

- MG1, **3-D High-Resolution Optical Imaging of Cortical Activation: Vascular Compartment Separation Using Spatio-Temporal Constraints and Priors**, *Elizabeth M. Hillman, Anna Devor, Andrew K. Dunn, David A. Boas; Massachusetts General Hospital, USA*
- TuA1, **Pre-Treatment Dosimetry for Interstitial Photodynamic Therapy**, *Ann Johansson, Jonas Hjelm, Andreas Eriksson, Stefan Andersson-Engels; Lund Inst. of Technology, Sweden*
- TuC1, **Spectroscopy: Development of Clinical Applications for Breast Cancer Diagnosis**, *Maryann Fitzmaurice[1], Nancy Wang[1], Nina Klein[1], Robert Shenk[1], Joanne Woletz[2], David Hickes[2], Joseph P. Crowe[2], Abigail S. Haka[3], Zoya Volynskaya[3], Jason T. Motz[3], Joseph A. Gardecki[3], Jonathon Nazemi[3], Ramachandra R. Dasari[3], Michael S. Feld[3]; [1]Univ. Hospitals of Cleveland and Case Western Reserve Univ., USA, [2]Cleveland Clinic Foundation, USA, [3]MIT, USA*
- TuF1, **ALA-PpIX Fluorescence and MR Spectroscopy in Connection with Stereotactic Biopsy of Human Glioblastomas**, *Stefan Andersson-Engels1, Sara Pålsson1, Erik-Olof Backlund2, Patrik Sturnegk2, Peter Lundberg2, Örjan Smedby2, Katarina Svanberg3, Ola Eriksson2, Karin Wårdell2; 1Lund Inst. of Technology, Sweden, 2Linköping Univ. Hospital, Sweden, 3Lund Univ. Hospital, Sweden*
- WA1, **A Spatial-Temporal Comparison of fMRI and NIRS Hemodynamic Responses to Motor Stimuli in Adult Humans**, *Theodore J. Huppert, Rick D. Hoge, Maria A. Franceschini, David A. Boas; Massachusetts General Hospital, USA*
- WB1, **In vivo Detection of Pre-Cancerous Changes in Barrett's Esophagus Using Elastic Scattering Spectroscopy (ESS)**, *Benjamin R. Clark1, Kristie Johnson1, Gary D. Mackenzie[1], Marco R. Novelli[1], Chelliah R. Selvasekar[1], Sally M. Thorpe[1], Irving J. Bigio[2], Steven G. Brown[1], Laurence B. Lovat[1]; [1]Natl. Medical Laser Ctr., Univ. College London, United Kingdom, [2]Dept. of Biomedical Engineering, Boston Univ., USA*
- WE1, **Monitoring of Radiation Therapy Response of Head and Neck Tumors by Non-Invasive Optical Blood Flow Measurements**, , *Ulas Sunar, H. Quon, J. Zhang, J. Du, T. Durduran, C. Zhou, G. Yu, A. Kilger, R. Lustig, L. Loevner, S. Nioka, A. G. Yodh, B. Chance; Univ. of Pennsylvania, USA*

- ThB1, **Computer Aided Visualizations of 3-Dimensional Light Distributions in Tissues for Quantitative Optical Diagnostics**, *Karthik Vishwanath, Mary-Ann Mycek; Univ. of Michigan, USA*
- ThE1, **Comparison of Time-Resolved Autofluorescence in the Eye-Ground of Healthy Subjects and Patients Suffering from Age-Related Maculer Degeneration**, *Dietrich Schweitzer, Frank Schweitzer, Martin Hammer, Stefan Schenke, Sandra Richter; Experimental Ophthalmology, Univ. of Jena, Germany*

ECBO Agenda of Sessions

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- Sunday, June 12, 2005
- Monday, June 13, 2005
- Tuesday, June 14, 2005
- Wednesday, June 15, 2005
- Thursday, June 16, 2005

Sunday, June 12, 2005

Time	Event/Location
1:30 PM - 2:30 PM	**SuP**, ECBO Plenary *Room 5*
2:30 PM - 4:00 PM	**SuA**, In vivo Applications and Targeted Probes *Room 5*
4:30 PM - 6:30 PM	**SuB**, Ophthalmic Laser Applications *Room 3*
4:30 PM - 6:30 PM	**SuC**, New Technologies *Room 5*
4:30 PM - 6:00 PM	**SuD**, Imaging Tools I: Hybrid Methods *Room 11*

Monday, June 13, 2005

Time	Event/Location
10:30 AM - 12:30 PM	**MA**, Retinal Imaging and Ophthalmic Applications *Room 5*
1:30 PM - 4:00 PM	**MB**, Cell Surgery and Cellular Effects *Room 3*
1:30 PM - 4:00 PM	**MC**, New Light Sources, Technologies, and Signal Postprocessing *Room 5*
1:30 PM - 4:15 PM	**MD**, Imaging Tools II: Microscopy *Room 11*

4:30 PM - 6:00 PM	**ME**, Tissue Surgery *Room 3*
4:30 PM - 6:00 PM	**MF**, Polarization Sensitive OCT *Room 5*
4:30 PM - 6:00 PM	**MG**, Imaging Tools III *Room 11*

Tuesday, June 14, 2005

Time	Event/Location
8:30 AM - 10:00 AM	**TuA**, Applications, Dosimetry, Preclinical *Room 3*
8:30 AM - 10:00 AM	**TuB**, Clinical and Biomedical Applications *Room 5*
8:30 AM - 10:00 AM	**TuC**, Raman Spectroscopy for Clinical Diagnostics *Room 11*
11:30 AM - 12:30 PM	**TuD**, Clinical Diagnosis and Therapy *Room 3*
11:30 AM - 12:30 PM	**TuE**, Tissue Optics and Contrast Agents *Room 5*
2:00 PM - 3:30 PM	**TuF**, Optical Spectroscopy: In vivo Human Studies *Room 3*
2:00 PM - 3:30 PM	**TuG**, New Developments in Technology *Room 5*
4:00 PM - 5:30 PM	**TuH**, Poster Session *Foyer ICM*

Wednesday, June 15, 2005

Time	Event/Location
8:30 AM - 10:00 AM	**WA**, Functional Optical Imaging of the Brain I *Room 3*
8:30 AM - 10:00 AM	**WB**, Tissue Diagnostics by Optical Absorption and Scattering *Room 5*
8:30 AM - 10:00 AM	**WC**, Methods and Instruments I *Room 11*
11:30 AM - 12:30 PM	**WD**, ECBO Tutorial *Room 5*

2:00 PM - 4:00 PM	**WE**, Functional Characterization and Monitoring of Malignant and Normal Tissues *Room 3*
2:00 PM - 4:00 PM	**WF**, Confocal, Multiphoton and Biomedical Applications *Room 5*
2:00 PM - 4:00 PM	**WG**, Methods and Instruments II *Room 11*
4:30 PM - 6:15 PM	**WH**, Functional Optical Imaging of the Brain II *Room 3*
4:30 PM - 6:00 PM	**WI**, Optical Biosensing Methods and Assays *Room 5*

Thursday, June 16, 2005

Time	Event/Location
8:30 AM - 10:00 AM	**ThA**, Diffuse Spectroscopy and Fluorescence Tomography *Room 3*
8:30 AM - 10:00 AM	**ThB**, Modeling for Quantitative Tissue Spectroscopy and Imaging *Room 5*
8:30 AM - 10:00 AM	**ThC**, New Instrument and Imaging Methods *Room 11*
10:30 AM - 12:30 PM	**ThD**, Photon Migration Theory *Room 3*
10:30 AM - 12:30 PM	**ThE**, Static and Dynamic Biological Fluorescence Sensing *Room 5*
10:30 AM - 12:30 PM	**ThF**, Fluorescence, FLIM and Nonlinear Microscopy *Room 11*

ROOM 5

1:30 p.m.–2:30 p.m.
SuP • ECBO Plenary

SuP1 • 1:30 p.m.
Molecular Imaging: From Mouse to Man, *Christoph Bremer; Dept. of Clinical Radiology, UKM, Germany.* Different approaches—including MRI, optical imaging and scintigraphic techniques—are currently explored to detect the markers of disease *in vivo*. A brief overview of currently available imaging and tracer technology is given. Moreover, examples for translational approaches of molecular imaging techniques are presented to highlight potential clinical applications

2:30 p.m.–4:00 p.m.
SuA • *In vivo* Applications and Targeted Probes
Kai Licha; Schering AG, Germany, Presider

SuA1 • 2:30 p.m. Invited
Molecular Imaging of Rheumatoid Arthritis, *Andreas Wunder; Univ. of Regensburg, Germany.* The presentation provides an overview of current molecular imaging approaches in rheumatoid arthritis, with special emphasis on optical imaging as a tool to non-invasively visualize biological processes including apoptosis and enzyme activity underlying joint destruction.

SuA2 • 3:00 p.m. Invited
Molecular Imaging of Apoptosis, *Eyk Schellenberger; Humboldt Univ., Germany.* Apoptosis is a crucial mechanism in living organisms with many implications in medicine. Here we summarize developments in fluorescent probes for imaging apoptosis and their use in imaging the response to chemotherapy.

SuA3 • 3:30 p.m.
Fluorescence Imaging of Angiogenesis Using Antibody-Cyanine Dye Conjugates Targeting ED-B-Fibronectin, *Kai Licha[1], Christin Perlitz[1], Peter Hauff[1], Frank-Detlef Scholle[1], Annett Rexin[2], Arne Scholz[2], Michael Schirner[1]; [1]Schering AG, Germany, [2]Charité Virchow, Humboldt Univ., Germany.* We report on the design of fluorescent dye conjugates with engineered antibodies for the optical imaging of angiogenesis. The conjugates target the extracellular matrix protein ED-B-fibronectin and lead to high target-specific contrasts in animal models.

SuA4 • 3:45 p.m.
Contrast Agent Enhanced Fluorescence Imaging of Breast Cancer in a Transgenic Mouse Model, *Bernd Ebert[1], Jan Voigt[1], Rainer Macdonald[1], Jens Jakob[2], Uschi Klamm[2], Wolfgang Kemmner[2], Wolfgang Haensch[2], Peter M. Schlag[2], Kurt T. Moesta[2], Kai Licha[3], Christin Perlitz[3], Peter Hauff[3], Michael Schirner[3]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Chirurgie und Chirurgische Onkologie, Charité-Univ. Medizin Berlin, Campus-Buch, Medizinische Fakultät der Humboldt-Univ. zu Berlin, Germany, [3]Schering AG, Res. Labs, Germany.* Optical molecular imaging following intravenous administration of a specific contrast agent has been investigated for detection of tumors in a transgenic mouse model, verifying mammary gland neoplasia with high sensitivity.

4:00 p.m.–4:30 p.m.
Coffee Break

NOTES

ROOM 3

4:30 p.m.–6:30 p.m.
SuB • Ophthalmic Laser Applications
Michael Mrochen; ETH Zurich, Switzerland, Presider

SuB1 • 4:30 p.m.
Creating Fs-Laser Induced Cuts inside Lens Tissue with Respect to Presbyopia Treatment, *Tammo Ripken[1], Cerstin Zilz[1], Wolfgang Ertmer[1], Holger Lubatschowski[1], Georg Gerten[2], Uwe Oberheide[2]; [1]Laser Zentrum Hannover e.V., Germany, [2]Laserforum Koeln e.V., Germany.* We will present our latest results of increasing lens deformation ability by creating microcuts inside lens tissue with NIR ultrashort laser pulses. An improvement in lens tissue cutting precision will also be exhibited.

SuB2 • 4:45 p.m.
FEM-Simulation of the Human Lens during Accommodation, *Patrick Breitenfeld, T. Ripken, H. Lubatschowski; Laser Zentrum Hannover e. V., Germany.* A finite-element-method model with ANSYS 8.0 of the human lens during accommodation will be presented. It analyses a possible method for the treatment of presbyopia by fs-laser induced microcuts.

SuB3 • 5:00 p.m.
Computer Investigations of the Thermal Processes and New Options for CW Laser Thermal Keratoplasty, *Viktor K. Pustovalov[1,2], Benedikt Jean[2], Thomas Bende[2]; [1]Belarussian Inst. of System Analysis, Belarus, [2]Div. Experimental Ophthalmic Surgery, Tuebingen Univ. Eye Hospital, Germany.* The results of investigations demonstrate that various geometrical patterns of heating in the corneal stroma and new options for CW laser thermal keratoplasty are possible using converging beam of laser radiation with the appropriate parameters.

SuB4 • 5:15 p.m. Invited
Theory Concerning the Ablation of Corneal Tissue with Large-Area, 193-nm Excimer Laser Beams, *Charles R. Munnerlyn, Mark E. Arnoldussen, Audrey L. Munnerlyn, Benjamin A. Logan; VISX, Inc., USA.* A theory is presented which shows ablation profiles are dependent upon fluence levels and distance from ablation boundaries. This theory requires energy from broken bonds to propagate transversely, thereby influencing recombination within the ablation area.

ROOM 5

4:30 p.m.–6:30 p.m.
SuC • New Technologies
Bernd Ebert; Phys.-Techn. Bundesanstalt, Germany, Presider

SuC1 • 4:30 p.m. Invited
Fluorescence Lifetime Based Tomography for Turbid Media, *Anand T. Kumar, Brian J. Bacskai, Jesse Skoch, David A. Boas, Andrew K. Dunn; Massachusetts General Hospital, USA.* We describe a novel method to reconstruct lifetime sensitive fluorescent targets from turbid media. This method is shown to be superior to conventional fluorescence molecular tomography techniques in spatially localizing fluorophores with distinct *in vivo* lifetimes.

SuC2 • 5:00 p.m.
Fluorescence Spectroscopy in Tissue Phantoms for Improved Depth Resolution in Molecular Imaging, *Jenny Svensson[1], Stefan Andersson-Engels[1], Anikitos Garofalakis[2], Heiko Meyer[2], Jorge Ripoll[2]; [1]Atomic Physics Dept., Lund Inst. of Technology, Sweden, [2]Inst. of Electronic Structure & Laser - FORTH, Greece.* We have been able to determine the depth of a fluorescent object in a tissue phantom, by forming a ratio at two different fluorescence wavelengths, for which the phantom has different absorption.

SuC3 • 5:15 p.m.
Measurement of Intracellular Oxygen Levels Using Fluorescence Lifetime Imaging Microscopy (FLIM), *Dhruv Sud, Wei Zhong, Mary-Ann Mycek; Univ. of Michigan, USA.* We developed a controlled-environment FLIM system towards intracellular oxygen sensing, with a resolution of approximately 8 μM, covering the entire physiologic range (0-300 μM). We measured oxygen levels in normal and cancerous living cells.

SuC4 • 5:30 p.m.
TIR Fluorescence Screening of Cell Membranes, *Thomas Bruns[1], Herbert Schneckenburger[1,2], Michael Wagner[1], Reinhard Sailer[2], Wolfgang S. L. Strauss[2]; [1]Hochschule Aalen, Inst. für Angewandte Forschung, Germany, [2]Inst. für Lasertechnologien in der Medizin und Messtechnik an der Univ. Ulm, Germany.* A novel setup for selective fluorescence screening of surfaces from vital biological samples (cell membranes), based on multiple total internal reflection (TIR) of a laser beam on the surface of a multi-well plate, is described.

ROOM 11

4:30 p.m.–6:00 p.m.
SuD • Imaging Tools I: Hybrid Methods
Benoît C. Forget; Univ. Pierre et Marie Curie, France, Presider

SuD1 • 4:30 p.m.
Pulsed Acousto-Optic Imaging with Holographic Speckle Detection, *Pedro Santos[1], Michael Atlan[1], Benoît C. Forget[1], François Ramaz[1], Claude Boccara[1], Michel Gross[2]; [1]Univ Pierre et Marie Curie, France, [2]ENS - LKB, France.* We present a new detection acousto-optic scheme for tomography, in which pulse-wave configuration allows excellent axial resolution and field reconstructed from digitally recorded holograms allows a more detailled analysis of the scatering in thick samples.

SuD2 • 4:45 p.m.
Thermoacoustic Tomography Using Optical Line Detection, *Guenther Paltauf[1], Peter Burgholzer[2], Markus Haltmeier[3], Otmar Scherzer[3]; [1]Karl-Franzens-Univ. Graz, Austria, [2]Upper Austrian Res., Austria, [3]Univ. Innsbruck, Austria.* A method for thermoacoustic tomography is presented that uses a line detector for ultrasonic waves. The line is laser beam that is part of a Mach-Zehnder interferometer. Data acquisition and image reconstruction procedures are described.

SuD3 • 5:00 p.m.
Thermoacoustic Tomography Using Integrating Detectors, *Peter Burgholzer[1], C. Hofer[1], G. Paltauf[2], M. Haltmeier[3], O. Scherzer[3]; [1]Upper Austrian Res., Austria, [2]Karl-Franzens-Univ. Graz, Austria, [3]Univ. Innsbruck, Austria.* Thermoacoustic (optoacoustic, photoacoustic) tomography is an emerging technology for imaging semitransparent objects, like soft biological tissue. A novel measurement setup using integrating detectors is proposed and demonstrated by reconstructing the cross section of a grape.

SuD4 • 5:15 p.m.
Apparatus for Endoscopical, Laser-Based Determination of Ciliary Beat Frequency, *Nebojša S. Bogdanović[1], Jaroslav Rička[1], Martin Frenz[1], Beat Krattiger[2]; [1]Inst. for Applied Physics, Switzerland, [2]Storz Endoscop Productions GmbH, Switzerland.* There is a considerable interest in minimal invasive *in vivo* detection of ciliary beat frequency (CBF) in medicine. We have shown that CBF can be measured by the technique of video-endoscopic dynamic speckle interferometry.

SuD5 • 5:30 p.m.
Development of Three Dimensional Endoscope by Compound Optics, *Kenji Yamada[1], Toshiro Asano[1], Jun Tanida[2], Rui Shougenji[2], Toshiaki Nagakura[3]; [1]Hiroshima Inst. of Technology, Japan, [2]Osaka Univ., Japan, [3]Osaka Electro-Communication Univ., Japan.* The three dimensional endoscope by compound optics is presented. The system consists of a micro-lens array, a signal separator and a photo-detector array.

ROOM 3

SuB5 • 5:45 p.m.
Selective Retina Therapy (SRT)—Results of the First Multicenter Clinical Trial, *Ralf Brinkmann[1], Dirk Theisen-Kunde[1], Jörg Neumann[1], Hanno Elsner[2], Erk Pörksen[2], Peter Hamilton[3], Johann Roider[2], Reginald Birngruber[1]; [1]Medical Laser Ctr. Lübeck, Germany, [2]Univ. Eye Clinic, Germany, [3]St. Thomas Hospital, UK.* Selective Retina Therapy (SRT) is a new minimally damaging laser treatment of retinal diseases associated with a degradation of the retinal pigment Epithelium (RPE) like age-related macular degeneration or macular oedema.

SuB6 • 6:00 p.m.
Real-Time Chorioretinal Temperature Determination during Transpupillary Thermotherapy (TTT) by Optoacoustics, *Jochen Kandulla[1], Hanno Elsner[2], Markus Hilmes[1], Carolin Hartert[1], Ralf Brinkmann[1]; [1]Inst. for Biomedical Optics, Univ. Lübeck, Germany, [2]Eye Clinic, Univ. Lübeck, Germany.* We developed a non-invasive optoacoustic technique to determine the chorioretinal temperature increase during TTT in real-time. The technique is proven on enucleated porcine eyes and in-vivo on rabbits and has a measurement accuracy of ±1°C.

SuB7 • 6:15 p.m.
Nucleation and Dynamics of Bubbles Forming Around Laser Heated Microabsorbers, *Jörg Neumann, Ralf Brinkmann; Inst. for Biomedical Optics, Univ. Lübeck, Germany.* Selective tissue damage on the cellular level can be achieved due to transient microbubbles around laser-heated intracellular pigments. We investigated bubble dynamics and nucleation mechanisms at microabsorbers in suspensions by flash-photography and time-resolved probe-laser transmission.

ROOM 5

SuC5 • 5:45 p.m.
***In vitro* Characterization of Gap Junctional Intercellular Communication by Gap-FRAP Technique,** *Muriel Abbaci[1], Jean-Rene Stines[1], Muriel Barberi-Heyob[1], Walter Blondel[1], Dominique Dumas[2], Francois Guillemin[1], Jacques Didelon[1]; [1]CRAN-UMR CNRS 7039, France, [2]LEMTA-UMR CNRS 7563 et Equipe IFR 111, France.* The gap-FRAP approach can be suggested to study modifications in functionality of gap junctions. Our results indicate that the degree of gap junctional intercellular communication could be estimated by this technique *in vitro*.

SuC6 • 6:00 p.m.
Interferometric Tracking of Two Particles with Dynamic Optical Traps, *Dirk Neumayer, Peter Kaiser, Ernst Stelzer, Alexander Rohrbach; EMBL Heidelberg, Germany.* By time-multiplexing (scanning) an optical trap, one can generate various optical potential landscapes along the scan direction. Interferometric position detection with 10 nm precision and at kHz rates, allows measuring the interaction of diffusing particles.

SuC7 • 6:15 p.m.
Cell Culture Biochips for High End Microscopy, *Ulf Raedler; ibidi GmbH, Germany.* ibidi is a nanobiotechnology company specialized on disposable cell culture biochips. ibidi's "Lab-on-a-Slide" technology is based on a perfusion micro-slide (µ-Slide) optimized for the optical analysis of cells in high resolution, fluorescence or 3-D techniques.

ROOM 11

SuD6 • 5:45 p.m.
Wavelength Multiplexed Spectral Interferometry for Endoscopic Topographic Imaging, *Luc Froehly[1], Adrian H. Bachmann[2], Christian Depeursinge[2], Theo Lasser[2], Florian Lang[3]; [1]FEMTO-St, France, [2]EPFL, Switzerland, [3]CHUV, Switzerland.* We present an imaging system for endoscopic topography. This system couples wavelength multiplexing and spectral interferometry what allows monomode fibre use as the imaging channel. Results and limits will be presented after the main principles.

NOTES

ROOM 5

10:30 a.m.–12:30 p.m.
MA • Retinal Imaging and Ophthalmic Applications
Wolfgang Drexler; Univ. of Vienna, Austria, Presider

MA1 • 10:30 a.m.
High Resolution Spectral Optical Coherence Tomography for Clinical Imaging of the Anterior Segment of the Eye, *Piotr Targowski[1], Anna Szkulmowska[1], Iwona Gorczyńska[1], Maciej Szkulmowski[1], Andrzej Kowalczyk[1], Bartlmiej J. Kałużny[2]; [1]Inst. of Physics, Nicolaus Copernicus Univ., Poland, [2]Collegium Medicum, Nicolaus Copernicus Univ., Poland.* High resolution images of pathological human cornea and eye lens *in vivo* are shown. Standard and high resolution images of cornea are compared. The assessment of contact lenses fitting with OCT is proposed.

MA2 • 10:45 a.m.
Optical Coherence Tomography of the Ex-PRESS™ Miniature Glaucoma Implant, *Daniel Martijn de Bruin[1], Frank D. Verbraak[1], Marco Sulak[1,2], Mirjam de Jong[1], Maurice C. Aalders[1], Dirk J. Faber[1], Ton G. van Leeuwen[3]; [1]AMC / UvA lasercentre, Netherlands, [2]Univ. of Ljubljana, Slovenia, [3]AMC / UvA Lasercentre, Netherlands.* Description of the use of Optical Coherence Tomography to localize the Ex-PRESS™ mini implant placed in the anterior segment of the eye. AS-OCT is providing answers about the success or failure of this device.

MA3 • 11:00 a.m.
***In vivo* Retinal Optical Coherence Tomography at 1030 nm with Enhanced Penetration into the Choroid,** *Angelika Unterhuber[1], Boris Povazay[1], Boris Hermann[1], Harald Sattmann[1], Stephan Michels[2], Stefan Sacu[2], Christian Ahlers[2], Christoph Scholda[2], Arturo Chavez-Pirson[3], Ursula Schmidt-Erfurth[2], Adolf F. Fercher[1], Wolfgang Drexler[1]; [1]Ctr. for Biomedical Engineering and Physics, Christian Doppler Lab, Medical Univ. Vienna, Austria, [2]Dept. of Ophthalmology, General Hospital of Vienna, Medical Univ. Vienna, Austria, [3]NP Photonics, UA Science & Technology Park, USA. In vivo* retinal OCT imaging with ~8μm axial resolution is demonstrated for the first time using a compact ASE light source at 1030nm enabling deeper penetration into the choroid, improving visualization of the RPE/choriocapillaris/choroid interface.

MA4 • 11:15 a.m.
Adaptive-Optics High-Resolution and High-Speed Retinal *in vivo* Fourier-Domain OCT, *Robert J. Zawadzki[1], Sophie Laut[1], John S. Werner[1], Steven M. Jones[2], Scott S. Olivier[2], Mingtao Zhao[3], Bradley Bower[3], Joseph Izatt[3]; [1]Univ. of California at Davis, USA, [2]Lawrence Livermore Natl. Lab, USA, [3]Duke Univ., USA.* We have combined a Fourier-domain optical coherence tomograph (OCT) with a closed-loop Adaptive Optics (AO) system. The AO-OCT instrument has been then used for *in vivo* retinal imaging.

MA5 • 11:30 a.m.
Standard Versus High Resolution Spectral Optical Coherence Tomography in Imaging of Retinal Pathologies, *Iwona Gorczynska[1], Anna Szkulmowska[1], Maciej Szkulmowski[1], Piotr Targowski[1], Andrzej Kowalczyk[1], Jakub J. Kaluzny[2], Maciej Wojtkowski[3], James G. Fujimoto[3]; [1]Inst. of Physics, Nicolaus Copernicus Univ., Poland, [2]Collegium Medicum, Nicolaus Copernicus Univ., Poland, [3]MIT, USA.* The results of comparison between three Spectral OCT instruments with different axial resolution and detecting spectrographs used for imaging of various retinal lesions are presented. Analysis of the optimal clinical Spectral OCT system is shown.

MA6 • 11:45 a.m.
Three-Dimensional Ultrahigh Resolution Optical Coherence Tomography of Retinal Pathologies, *Boris Hermann[1], Stephan Michels[2], Boris Povazay[1], Stefan Sacu[2], Christian Ahlers[2], Harald Sattmann[1], Christoph Scholda[2], Ursula Schmidt-Erfurth[3], Adolf F. Fercher[1], Rainer A. Leigeb[1], Wolfgang Drexler[1]; [1]Ctr. for Biomed. Engineering, Medical Univ. Vienna, Austria, [2]Dept. of Ophthalmology, Medical Univ. Vienna, Austria, [3]Dept. of Ophthalmology, Medical Univ.Vienna, Austria.* The clinical feasibility of three-dimensional ultrahigh resolution (3 μm) optical coherence tomography has been investigated to visualize macular pathologies in more than 140 eyes at video-rate with up to 50 tomograms (512x1024 pixels) per second.

MA7 • 12:00 p.m.
Ophthalmic Imaging Using High-Speed, Ultrahigh Resolution OCT with Spectral/Fourier Domain Detection, *Tony H. Ko[1], Maciej Wojtkowski[1], Vivek J. Srinivasan[1], Mariana Carvalho[1], James G. Fujimoto[1], Jay S. Duker[2], Andrzej Kowalczyk[3]; [1]Dept. of Electrical Engineering and Computer Science and Res. Lab of Electronics, MIT, USA, [2]New England Eye Ctr., Tufts-New England Medical Ctr., Tufts Univ. School of Medicine, USA, [3]Inst. of Physics, Nicholas Copernicus Univ., Poland.* OCT with spectral/Fourier detection enables high speed, ultrahigh resolution imaging with ~2 μm axial resolutions and ~24,000 axial scans/second. Imaging is performed in the ophthalmology clinic on a cross section of patients with retinal disease.

MA8 • 12:15 p.m.
Novel Near-IR Broad-Band Light Sources for Optical Coherence Tomography Based on Superluminescent Diodes, *Dmitry S. Mamedov[1], Sergei D. Yakubovich[1], Pavel I. Lapin[1], Maciej Wojtkowski[2], James G. Fujimoto[2]; [1]Superlum Diodes Ltd., Russian Federation, [2]MIT, USA.* Two novel high-brightness broadband light sources based on quantum-well superluminescent diodes for optical coherence tomography and other applications with record CW output power and spectral bandwidth are described.

12:30 p.m.–1:30 p.m.
Lunch

NOTES

ROOM 3

1:30 p.m.–4:15 p.m.
MB • Cell Surgery and Cellular Effects
Alfred Vogel; Inst. of Biomedical Optics, Univ. of Luebeck, Germany, Presider

MB1 • 1:30 p.m. Invited
Selective Permeabilization of Cells by Laser Irradiated Gold Nano Particles, *Gereon K. Huettmann[1], Marco Bever[1], Ramtin Rahmanzadeh[2], Johannes Geerdes[2], Cuiping Yao[3,4], Elmar Endl[5]; [1]Inst. of Biomedical Optics, Univ. of Luebeck, Germany, [2]Res. Ctr. Borstel, Germany, [3]Key Lab of Biomedical Information Engineering of Ministry of Education, Xi'an Jitotong Univ., China, [4]Inst. of Biomedical Engineering, School of Life Science and Technology, Xi'an Jitotong Univ., China, [5]Inst. of Molecular Medicine and Experimental Immunology, Univ. Bonn, Germany.* Permeabilization was studied in two lymphoma cells lines when gold nanoparticles bound to the cell membrane by antibodies were irradiated with pulsed lasers. Efficacies of more than 60% were attained with only 27% cell death.

MB2 • 2:00 p.m.
Gene Transfer by the Use of Laser-Induced Stress Wave: Cell Type Dependence of Transfection Efficiency, *Mitsuhiro Terakawa[1], Shunichi Sato[2], Hiroshi Ashida[2], Minoru Obara[1]; [1]Keio Univ., Japan, [2]Natl. Defense Medical College Res. Inst., Japan.* We demonstrated that gene can be transfected to various types of cells by use of laser-induced-stress waves. The effect of cellular heating was also investigated, showing the different characteristics between normal cells and malignant cells.

MB3 • 2:15 p.m.
Synergistic Antimicrobial Effects by Combining Photodynamic Therapy with an Antiseptic Drug, *Heyke Diddens, N. Arp; Inst. for Biomedical Optics, Univ. Lübeck, Germany.* For treatment of local infections, photodynamic therapy with toluidine blue was combined with the application of an antiseptic drug. This combination resulted in synergistic effects in killing pathogenic Staphylococcus aureus and the multiresistant strain MRSA.

ROOM 5

1:30 p.m.–4:00 p.m.
MC • New Light Sources, Technologies and Signal Postprocessing
Ton van Leeuwen; AMC, Netherlands, Presider (MC1-5)
Constantinos Pitris; Univ. of Cyprus, Cyprus, Presider (MC6-10)

MC1 • 1:30 p.m.
Wavelet Decomposition and Unresolvable Component Analysis of Optical Coherence Tomography Signals, *Panayiotis Ioannides, Charalambos Nicolaou, Costas Pitris; Univ. of Cyprus, Cyprus.* A novel technique for analyzing OCT signals is presented. The signal is separated in resolvable and diffuse components using wavelet decomposition and, subsequently, the characteristics of the diffuse part are evaluated with autoregressive analysis.

MC2 • 1:45 p.m.
Laterally Super-Resolving Optical Coherence Tomography by Intentional Defocus and Numerical Compensation, *Yoshiaki Yasuno, Junichiro Sugisaka, Yusuke Sando, Shuichi Makita, Takashi Endo, Masahide Itoh, Toyohiko Yatagai; Inst. of Applied Physics, Japan.* A method of lateral superresolution for Fourier-domain optical coherence tomography is presented. This method consists of intentional defocus and its numerical compensation using a spatial frequency- phase filter. Theoretical consideration and experimental demonstration are described.

MC3 • 2:00 p.m.
Analysis of Multiple Scattering Effects in Optical Doppler Tomography, *Lars Thrane[1], Harold T. Yura[2], Peter E. Andersen[1]; [1]Risoe Natl. Lab., Denmark, [2]The Aerospace Corp., USA.* We present results of a theoretical analysis of optical Doppler tomography where multiple scattering effects are included. This analysis explains previous measurements of depth-resolved retinal flow profiles where the influence of multiple scattering was observed.

MC4 • 2:15 p.m.
Effects of Multiple Scattering on Flow Velocity Profiles Measured Using DOCT, *Julian Moger, C. Peter Winlove, Stephen J. Matcher; Univ. of Exeter, UK.* The velocity profile of blood flowing in a glass capillary is measured using Doppler OCT. The flow profile distorts significantly when the optical depth of the capillary reaches about 2.5 scattering mean free paths.

ROOM 11

1:30 p.m.–4:00 p.m.
MD • Imaging Tools II: Microscopy
Christian Depeursinge; EPFL, Switzerland, Presider

MD1 • 1:30 p.m.
Sensing Cellular Function and Molecular Activity *in vivo* Using Fluorescence Lifetime Imaging Microscopy (FLIM), *Wei Zhong, Dhruv Sud, Mary-Ann Mycek; Univ. of Michigan, USA.* We present design features and applications of a novel UV-visible-NIR FLIM system with optical sectioning, high resolution (50ps), and large temporal dynamic range (750ps-1μs) to probe cellular metabolism and detect molecular interactions *in vivo*.

MD2 • 1:45 p.m.
Video Rate Fluorescence Lifetime Imaging and Fluorescence Lifetime Endoscopy, *James McGinty, Ian Munro, Neil P. Galletly, Jose Requejo-Isidro, Daniel S. Elson, Christopher Dunsby, Mark A. Neil, Gordon W. Stamp, Paul M. French; Imperial College London, UK.* We report real-time (video-rate) fluorescence lifetime imaging and its application to tissue autofluorescence and endoscopy, demonstrating FLIM of unstained ex vivo tissue at update rates of 5.5 Hz through a flexible endoscope.

MD3 • 2:00 p.m.
Time-Resolved Measurements Using Stroboscopic Excitation, *Daniel Matthews[1], Huw Summers[1], Kerenza Njoh[2], Rachel Errington[2], Paul Smith[2], Simon Ameer-Beg[3], Boris Vojnovic[3]; [1]School of Physics and Astronomy, Cardiff Univ., UK, [2]School of Pathology, Cardiff Univ., UK, [3]Advanced Technology Development Group, Gray Cancer Inst., UK.* We describe the development of a novel stroboscopic excitation technique for performing time-resolved fluorescence measurements on an optical biochip format, where the time-resolution is provided by the variable repetition rate of a self-pulsing laser.

MD4 • 2:15 p.m.
Motility of Live Cancer Cells Quantified by Fourier Phase Microscopy, *Gabriel Popescu[1], Kamran Badizadegan[2], Ramachandra R. Dasari[1], Michael S. Feld[1]; [1]MIT, USA, [2]Harvard Medical School, USA.* Using Fourier phase microscopy, the motility of epithelial cancer cells has been quantified. The mean squared displacement analysis suggest that the cell motion is superdiffusive for cells at various stages of their life cycle.

ROOM 3

MB4 • 2:30 p.m.
Catapulting of Microdissected Histologic Specimens with Focused and Defocused Laser Pulses, *Alfred Vogel[1], Kathrin Lorenz[1], Bernd Saegmueller[2], Karin Schuetze[2]; [1]Inst. of Biomedical Optics, Univ. Luebeck, Germany, [2]PALM Microlaser Technologies, Germany.* Laser-dissected specimens can be separated from histologic sections by catapulting with focused and defocused laser pulses. Tight focusing and strong defocusing produce minimum damage in the specimen; whereas weak defocusing is less advantageous.

MB5 • 2:45 p.m.
Microdissection, Catapulting and Microinjection of Biologic Specimens with Femtosecond Laser Pulses, *Verena M. Horneffer[1], Alfred Vogel[1,2], Bernd Sägmüller[2], Karin Schütze[2]; [1]Inst. for Biomedical Optics, Univ. Lübeck, Germany, [2]P.A.L.M. Microlaser Technologies, Germany.* We demonstrate the potential of amplified femtosecond laser pulses to improve microdissection of histological specimens and microinjection of cells as compared to state-of-the-art commercial instruments in which ns-pulses from a nitrogen laser are used.

MB6 • 3:00 p.m.
Sub-Cellular Nanosurgery in Live Cells Using Ultrashort Laser Pulses, *Iva Z. Maxwell[1], Sanjay Kumar[2], Alexander Heisterkamp[3], Donald Ingber[2], Eric Mazur[1]; [1]Harvard Univ., USA, [2]Harvard Medical School, USA, [3]Lazer Zentrum Hannover, Germany.* We performed sub-cellular ablation with resolution of 250nm by tightly focused femtosecond pulses and verified the ablated volume using electron microscopy. This ablation technique is successfully applied in live cells nanosurgery.

MB7 • 3:15 p.m. Invited
Femtosecond Laser Manipulation of Subcellular Organelles in Living Cells, *Wataru Watanabe, Timoko Shimada, Kazuyoshi Itoh, Sachihiro Matsunaga, Kiichi Fukui; Osaka Univ., Japan.* We present manipulation including inactivation and movement, of subcellular organelles in living cells by tightly focusing femtosecond laser pulses inside the cells. Photodisruption of organelles in living cells was experimentally confirmed by restaining of organelles.

ROOM 5

MC5 • 2:30 p.m.
Low Coherence Refractometry, *M. Bagherzadeh, A. Fercher, W. Drexler, M. Pircher, C. K. Hitzenberger; Medical Physics, Austria.* We use dispersion data to measure concentrations of pure solutions and mixtures. Spectral dispersion data are obtained from white-light interferograms. Such a technique can be used for depth-localized refractometry and as contrasting technique in OCT.

MC6 • 2:45 p.m.
Signal Processing Techniques for OCT Images of Human Tissue, *Christopher D. Russell[1], Caroline D. Sudworth[1], Neville Krasner[2], Mustapha Haqqani[2], Gordon R. Jones[3], Anthony Deakin[3]; [1]Medical Laser Inst., UK, [2]Univ. Hospital Aintree, UK, [3]Univ. of Liverpool, UK.* We present the application of chromatic analysis for signal processing of optical coherence tomography (OCT) images in human tissue. Reflecting surfaces are highlighted and background noise is reduced to improve image interpretation.

MC7 • 3:00 p.m.
Fast Scanning Transmissive Delay Line for Multi-Scan Optical Coherence Tomography, *Carla C. Rosa[1,2], John Rogers[3], Adrian Gh Podoleanu[4]; [1]INESC-Porto, Portugal, [2]Dep Fisica, Faculdade de Ciencias da Univ. do Porto, Portugal, [3]Ophthalmic Technology Inc., Canada, [4]Applied Optics Group, Univ. of Kent, UK.* A new transmissive grating-based scanning delay-line for optical coherence tomography is proposed, with dispersion compensation capability. Compared to other spectral delay-lines, our implementation has less loss due to a halved number of diffraction grating reflections.

MC8 • 3:15 p.m.
OCT System with Electro-Dynamic Shaker Driven by a Frequency-Modulated Waveform, *Frederic Boulvert, Sylvain Rivet; LSOL, France.* We have demonstrated the possibility to use a shaker in an Optical Coherence Tomography system with a frequency-modulated driving waveform in order to avoid nonlinearities of the shaker.

MC9 • 3:30 p.m.
Swept-Wavelength Source for Optical Coherence Tomography in the 1 μm Range, *Frederik D. Nielsen; Risoe Natl. Lab, Denmark.* We present a novel implementation of the lightwave synthesized frequency sweeper based on Ytterbium doped fibre amplifiers and a tunable optical filter. We demonstrate the use of the source for swept source optical coherence tomography.

ROOM 11

MD5 • 2:30 p.m.
Nanometer Fluctuations of Erythrocytes Imaged by Hilbert Phase Microscopy, *Gabriel Popescu[1], Takahiro Ikeda[2], Kamran Badizadegan[3], Ramachandra R. Dasari[1], Michael S. Feld[1]; [1]MIT, USA, [2]Hamamatsu Photonics, Japan, [3]Harvard Medical School, USA.* Using Hilbert phase microscopy, a technique recently developed in our laboratory, the nanometer level structure and dynamics associated with live red blood cells have been quantified on the 10 millisecond time scale.

MD6 • 2:45 p.m.
Digital Holographic Microscopy for Study Cellular Dynamics, *Pierre M. Marquet[1], Benjamin Rappaz[1], Pierre J. Magistretti[1], Etienne Cuche[2], Yves Emery[2], Tristan Colomb[3], Frédéric Montfort[3], Florian Charrière[3], Marian Anca[3], Christian Depeursinge[3]; [1]Univ. of Lausanne, Switzerland, [2]Lyncée Tec SA, Switzerland, [3]Ecole Polytechnique Fédérale de Lausanne, Inst. d'Imagerie et d'Optique Appliquée, Switzerland.* Based on an original numerical reconstruction algorithm (E. Cuche et al. Appl. Opt. 38, 6994 1999), we have developed a Digital Holographic Microscope (DHM), in a transmission mode, allowing to investigate cellular structures and dynamics.

MD7 • 3:00 p.m.
Digital Holographic Microscopy Applied to Pollen Cells Analysis and Recognition, *Florian Charrière[1], Christian D. Depeursinge[1], Pierre Marquet[2], Etienne Cuche[3], Markus Von Ehr[4]; [1]EPFL STI IOA LOA, Switzerland, [2]Inst. de Physiologie, Switzerland, [3]Lyncee Tec SA, Switzerland, [4]Fraunhofer IPM, Germany.* The ability of digital holographic microscopy (DHM) to provide both amplitude and phase images of a specimen makes it a convenient tool for cells analysis and recognition. Practical applications are demonstrated on pollen particles.

MD8 • 3:15 p.m.
Shot Noise Influence in Reconstructed Phase Images SNR in Digital Holographic Microscopy, *Florian Charriere[1], Christian D. Depeursinge[1], Pierre Marquet[2], Etienne Cuche[3]; [1]EPFL STI IOA LOA, Switzerland, [2]Inst. de Physiologie, Switzerland, [3]Lyncee Tec SA, Switzerland.* We present a study based on simulations describing how shot noise, an intrinsic part of the recording process with a digital camera, influences the quality of the reconstructed phase images under different beams intensities configurations.

MD9 • 3:30 p.m.
A Human Eye Model Based on Bimorph Flexible Mirror, *Alexey I. Belyakov[1], Renat R. Letfullin[2], Tatyana Yu. Cherezova[2], Alexis V. Kudryashov[3]; [1]Inst. on Laser and Information Technologies, Russian Federation, [2]Moscow State Univ., Physical Dept., Russian Federation, [3]Adopt Ltd., Russian Federation.* A model of human eye based on bimorph flexible mirror is introduced. We demonstrate experimental data of reproducing spatial-temporal statistics of aberrations of common human eye with our model with RMS error about 5%.

ROOM 3

MB8 • 3:45 p.m. Invited
Nerve Regeneration Following Femtosecond Laser Nano-Axotomy, *Mehmet F. Yanik[1], Hulusi Cinar[2], Hediye Nese Cinar[2], Andrew D. Chisholm[2], Yishi Jin[2,3], Adela Ben-Yakar[4]; [1]Stanford Univ., USA, [2]Univ. of California at Santa Cruz, USA, [3]Howard Hughes Medical Inst., USA, [4]Univ. of Texas at Austin, USA.* We demonstrate nanoscale surgery with femtosecond lasers in C. elegans, and for the first time, show nerve regeneration in such a tiny organism with morphological and behavioral studies. This technique opens up tremendous research potential.

4:00 p.m.–4:30 p.m.
Coffee Break

4:30 p.m.–6:00 p.m.
ME • Tissue Surgery
Ronald Sroka; Univ. of Munich, Germany, Presider

ME1 • 4:30 p.m.
Hemostasis of Dissected Vessels Using a cw 2µm-Laser-Scalpel, *Dirk Theisen-Kunde[1], Verena Ott[2], Ralf Brinkmann[1], Robert Keller[2]; [1]Inst. for Biomedical Optics, Univ. Lübeck, Germany, [2]Clinic for Surgery, Univ. Hospital Schleswig/Holstein, Lübeck, Germany.* A 2µm-laser-scalpel was used for dissection of arteries and veins in pigs. Closing rates for small vessels up to 1mm were 94% and 70% for medium sized vessels (1- 2.3 mm).

ME2 • 4:45 p.m.
Endoscopic Cystoventriculostomy and Ventriculo-Cysternostomy Using a 2.0 Micron Fiber Guided cw Laser in Children with Hydrocephalus, *Hans C. Ludwig[1], Thomas Kruschat[1], Torsten Knobloch[1], Kevin M. Rostasy[2], Heinrich O. Teichmann[3], Michael Buchfelder[4]; [1]Dept. Neurological Surgery, Georg-August-Univ., Germany, [2]Dept. Pediatric Neurology, Georg-August-Univ., Germany, [3]LISA Laser Products, Germany, [4]Dept. Neurological Surgery, Germany.* Preterm infants have a high incidence of post hemorrhagic or post infectious hydrocephalus associated with ventricular or arachnoic cysts. We have used a 2.0 micron cw-laser for laser assisted minimally invasive neuroendoscopy in complex hydrocephalus.

ME3 • 5:00 p.m.
Bone Tissue Ablation with CO_2 Lasers at Different Pulse Durations, *Mikhail Ivanenko[1], Said Afilal[1], Martin Werner[1], Peter Hering[1,2]; [1]Ctr. of Advanced European Studies and Res., Germany, [2]Inst. of Laser Medicine, Germany.* Systematic investigations on ablation of compact bone tissue with different CO_2 laser systems are presented. Main attention is paid to the influence of the laser wavelength and pulse duration on the efficiency of the ablation.

ROOM 5

MC10 • 3:45 p.m.
Broad-Band High-Brightness Light Sources Based on Semiconductor Optical Amplifier and Superluminescent Diode, *Viatcheslav V. Prokhorov, Dmitry S. Shvakov, Sergei D. Yakubovich; SuperlumDiodes Ltd., Russian Federation.* Using semiconductor optical amplifier at 1300 nm in MOPA system with superluminescent diode as a master oscillator a CW output power of 50 mw ex SM fiber and linewidth near 70 nm were obtained.

4:00 p.m.–4:30 p.m.
Coffee Break

4:30 p.m.–6:00 p.m.
MF • Polarization Sensitive OCT
Adrian Podoleanu; Univ. of Kent, UK, Presider

MF1 • 4:30 p.m.
Studies of Equine Articular Cartilage Using Polarization-Sensitive Optical Coherence Tomography, *Nadya Ugryumova, Stephen Matcher, C. Peter Winlove, Don P. Attenburrow; Univ. of Exeter, UK.* Variations in orientation of collagen fibers in equine articular cartilage were studied. Comparison of normal with ostearthritic tissue was made. Cartilage birefringence was measured to be less than $2*10^{-3}$.

MF2 • 4:45 p.m.
Depolarization Effects in Human Tissue Investigated with Transversal PS-OCT, *Michael Pircher, Erich Götzinger, Christoph K. Hitzenberger; Ctr. of Biomedical Engeneering and Physics, Medical Univ. of Vienna, Austria.* In this study we used a phase resolved polarization sensitive optical coherence tomography system to investigate depolarization effects of different human tissues. Skin, cornea, iris, and retina of healthy human volunteers were measured.

MF3 • 5:00 p.m.
Polarization Sensitive Spectral Domain Optical Coherence Tomography, *Erich Götzinger, Michael Pircher, Christoph K. Hitzenberger; Ctr. of Biomedical Engineering and Physics, Medical Univ. of Vienna, Austria.* We developed a polarization sensitive spectral domain optical coherence tomography (PS-SD-OCT) system. To demonstrate the performance of our system we measured the distribution of retardation of a highly birefringent plastic sample.

ROOM 11

MD10 • 3:45 p.m.
Human Retina Imaging: Anisoplanatism Considerations, *Alexander Dubinin[1], Tatyana Cherezova[1], Alexey Belyakov[2], Alexis Kudryashov[3]; [1]Moscow State Univ., Physical Dept., Russian Federation, [2]Inst. on Laser Information Technologies (ILIT), Russian Acad. of Sciences, Russian Federation, [3]Adopt Ltd., Russian Federation.* We report our results of investigation of anisoplanatism effect in human eye. Optimal beacon and wavefront corrector positions for maximum compensation for the eye's aberrations by ideal wavefront corrector are discussed.

4:00 p.m.–4:30 p.m.
Coffee Break

4:30 p.m.–6:00 p.m.
MG • Imaging Tools III
Elizabeth M. Hillman; Massachusetts General Hospital, USA, Presider

MG1 • 4:30 p.m. Invited
3-D High-Resolution Optical Imaging of Cortical Activation: Vascular Compartment Separation Using Spatio-Temporal Constraints and Priors, *Elizabeth M. Hillman, Anna Devor, Andrew K. Dunn, David A. Boas; Massachusetts General Hospital, USA.* Depth-resolved optical imaging of exposed rat cortex has allowed spatio-temporal separation of arterial, venous and capillary vascular compartments. Distinct features of functional hemodynamic mechanisms are revealed. Latest results, hardware and reconstruction methodologies will be described.

MG2 • 5:00 p.m.
Time Multiplexed Continuous Wave Brain Imager, *Danny K. Joseph, Jonathan Stott, Ted Huppert, David A. Boas; Martinos Ctr. for Biomedical Imaging, USA.* We describe a continuous wave system that combines frequency encoding with time-division multiplexing to increase the effective dynamic range. This allows overlapping measurements while maintaining a reasonable image temporal resolution for functional brain imaging.

ROOM 3

ME4 • 5:15 p.m.
The Use of Diode Laser in Treatment of Bone and Bone-Articular Panaris, *Alexander V. Lappa, Valery A. Privalov, Igor V. Krochek, Andrey N. Poltavsky, Andrey A. Antonov; Medical Physics Ctr. at Chelyabinsk State Univ. and Chelyabinsk State Medical Acad., Russian Federation.* Laser osteoperforation was applied in clinic to 91 patients with panaris in bone and bone-articular forms. The osteoperforation turned out to be greatly more efficient in comparison with conventional methods of panaris treatment.

ME5 • 5:30 p.m.
Medical Application of a High Power Diode Laser, *Dirk Mittnacht[1], Albert Linder[2], Hans-Jochen Foth[1]; [1]Dept. of Physics, Univ. of Kaiserslautern, Germany, [2]Lungenklinik Hemer, Germany.* To evaluate the application of high power diode lasers for medical treatment, the interaction of a beam of up to 450 W (λ = 808 and λ = 940 nm) on lung tissue was studied.

ME6 • 5:45 p.m.
Indocyanine Green-Laser Thermolysis of Acne Vulgaris, *Elina A. Genina[1], Alexey N. Bashkatov[1], Georgy V. Simonenko[1], Valery V. Tuchin[1], Ilya V. Yaroslavsky[2], Gregory B. Altshuler[2]; [1]Inst. of Optics and Biophotonics, Saratov State Univ., Russian Federation, [2]Palomar Medical Products, USA.* Near infrared diode laser high-intensity phototherapy at topical application of Indocyanine Green has been suggested for thermal treatment of acne vulgaris. At high power densities stained acne inflammatory elements were destructed without any adverse effects.

ROOM 5

MF4 • 5:15 p.m.
Feasibility of a Compact Fiberoptic Probe for Real Time Tracing of Subsurface Skin Birefringence, *Vitaly Tugbaev[1], Risto Myllyla[2], Alexander Mashchenko[1]; [1]Inst. of Physics, Belarus, [2]Univ. of Oulu, Finland.* A new concept is devised for real time cross-sectional tracing of optical birefringence in subsurface layers of human skin. The design is devoid of any movable functional elements. Either handheld or endoscopic diversities are feasible.

MF5 • 5:30 p.m.
2-D Distributions of Polarization Structure of Biological Tissues Coherent Images, *Oleg V. Angelsky, Alexander G. Ushenko, Yuriy A. Ushenko; Chernivtsi Natl. Univ., Ukraine.* The article outlines the results of polarization coordinate mapping and analysis of the statistics of first-fours orders of biological tissues polarizational azimuth and ellipticities values. .

MF6 • 5:45 p.m.
Complex Degree of Mutual Polarization of Biological Tissue Speckle-Images, *Oleg V. Angelsky, Alexander G. Ushenko, Yevheniya G. Ushenko; Chernivtsi Natl. Univ., Ukraine.* The article is devoted to investigation of statistics of the complex degree of mutual polarization of biological tissues speckle-images.

ROOM 11

MG3 • 5:15 p.m.
A Frequency Multiplexed Near Infrared Topography System—Initial Clinical Results on Infants, *Nicholas L. Everdell[1,2], Adam P. Gibson[1], Iain Tullis[1], Gilberto Branco[1], Tharshan Vaithianathan[1], Jeremy C. Hebden[1], David T. Delpy[1], Rebeccah Slater[1], Anne Cantarella[1], Leslie Tucker[2], Agnes Volein[2], Gergely Csibra[2]; [1]Univ. College London, UK, [2]Birkbeck College, UK.* We have developed a novel near infrared optical topography system that acquires images at a minimum of 10 frames per second. We will report on the clinical investigations that have been undertaken using the instrument.

MG4 • 5:30 p.m.
Measurements of Optical Properties of Pig Brain Tissue *in vitro* Using a Novel Compact Device, *Nazila Yavari[1,2], Stefan Andersson-Engels[1], Jan Sorensen Dam[3], Johan Antonsson[4], Karin Wardell[4]; [1]Lund Inst. of Technology, Sweden, [2]Dept. of Physics and Technology, Univ. of Bergen, Norway, [3]Bang & Olufsen Medicom, Denmark, [4]Dept. of Biomedical Engineering, Linköping Univ., Sweden.* We present the optical properties of pig brain tissue measured by a novel instrumentation for simultaneous absorption and scattering characterization. Results compare very well with data obtained with an integrating sphere for well-defined samples.

MG5 • 5:45 p.m.
Tissue Viability Imaging for Assessment of Microvascular Events, *Jim O'Doherty[1], Gert E. Nilsson[2], Joakim Henricson[3], Folke Sjöberg[3], Martin J. Leahy[1]; [1]Dept. of Physics, Univ. of Limerick, Ireland, [2]Dept. of Biomedical Engineering, Linköping Univ., Sweden, [3]Dept. of Medicine and Care, University Hospital, Sweden.* A method for Tissue Viability Imaging is presented, based on polarisation spectroscopy. A theory based on red blood cell (RBC) and tissue light absorption provides information about the amount of RBCs in the microvasculature.

NOTES

ROOM 3

8:30 a.m.–10:00 a.m.
TuA • Applications, Dosimetry, Preclinical
Tayyaba Hasan; Massachusetts General Hospital, USA, Presider

TuA1 • 8:30 a.m. Invited
Pre-Treatment Dosimetry for Interstitial Photodynamic Therapy, *Ann Johansson, Jonas Hjelm, Andreas Eriksson, Stefan Andersson-Engels; Lund Inst. of Technology, Sweden.* A genetic algorithm for optimal placement of optical fibres in arbitrary geometries for interstitial photodynamic therapy has been developed. Based on calculated fibre positions, the light distribution is simulated and the treatment time is calculated.

TuA2 • 9:00 a.m.
Characterization of the Modeled Fluence Distribution of Real Cylindrical Diffusers in the Intraluminal and Interstitial Settings, *Cesar A. Rendon[1], Daniel Côté[2], Leonid Vesselov[3], Lothar Lilge[1,4]; [1]Dept. of Medical Biophysics, Univ. of Toronto, Canada, [2]Wellman Ctr. for Photomedicine, USA, [3]Walsh Medical Devices Inc., Canada, [4]Ontario Cancer Inst., Univ. Health Network, Univ. of Toronto, Canada.* We present a methodology for standardizing measurements of cylindrical diffusers and a way to evaluate the impact that particular emission characteristics have on light dosimetry, using Monte Carlo modeling for interstitial and interstitial tissue geometries.

TuA3 • 9:15 a.m.
Photodynamic Therapy of Diseased Bone, *Stuart K. Bisland[1], Jeffery Siewerdsen[1], Albert Yee[2], Brian C. Wilson[1], Shane Burch[1]; [1]Ontario Cancer Inst., Univ. Health Network, Univ. of Toronto, Canada, [2]Sunnybrook Hospital, Div. of Orthopaedics, Canada.* Our preclinical studies confirm that photodynamic therapy can provide minimally invasive treatment of diseased bone, including primary or secondary cancers and microbial infections. This manuscript describes our experiments, results and imaging strategies for the clinic.

ROOM 5

8:30 a.m.–10:00 a.m.
TuB • Clinical and Biomedical Applications
Stephen A. Boppart; Beckman Inst., Univ. of Illinois at Urbana-Champaign, USA, Presider

TuB1 • 8:30 a.m.
Optical Coherence Imaging and Fluorescence Spectroscopy of a Novel Rat Model of Ovarian Cancer, *Jennifer K. Barton, Elizabeth Kanter, Ross Walker, Samuel Marion, Patricia Hoyer; Univ. of Arizona, USA.* Rats ovaries were exposed to 4-Vinylcyclohexene Dieposide and 2,4-Dimethylbenzoic Acid to induce menopause and surface epithelial cancers. *Ex vivo* imaging with optical coherence tomography/microscopy and laser induced fluorescence revealed neoplastic tissue and follicle loss.

TuB2 • 8:45 a.m.
Common-Path Fourier Domain Optical Coherence Tomography of Irradiated Human Skin and Ventilated Isolated Rabbit Lungs, *Alexander Popp[1], Martina Wendel[1], Lilla Knels[1], Peter Knuschke[1], Mirko Mehner[1], Thea Koch[1], Dennis Boller[2], Peter Koch[2], Edmund Koch[1]; [1]Medizinische Fakultät TU Dresden, Germany, [2]Medizinisches Laserzentrum Lübeck, Germany.* A common path Fourier domain optical coherence tomography system based on a superluminescence diode is used for medical imaging: human epidermis after exposure to ultraviolet light and alveolar mechanics of ventilated isolated rabbit lungs.

TuB3 • 9:00 a.m.
Ultrahigh Resolution Optical Coherence Tomography of Human Skin, *Sara Gasparoni[1], Boris Povazay[1], Boris Hermann[1], Angelika Unterhuber[1], Harald Kittler[2], Harald Sattmann[1], Florian Ròka[2], Michael Binder[2], Kostadinka Bizheva[1], Rainer Leitgeb[1], Hubert Pehamberger[2], Wolfgang Drexler[1]; [1]Ctr. for Biomedical Engineering and Physics, Christian Doppler Lab, Medical Univ. Vienna, Austria, [2]Dept. of Dermatology, Medical Univ. of Vienna, Austria.* Ultrahigh resolution OCT (UHR OCT) with sub-3 μm resolution was performed on normal and pathologic human skin biopsies using ultrabroad-bandwidth light sources centered at 800nm. Three-dimensional UHR OCT at video rate is demonstrated *in vivo*.

TuB4 • 9:15 a.m.
Imaging of Highly Scattering Tissue with Spectral-Domain OCT, *Gereon Huettmann[1], Denis Boller[1], Eva Lankenau[1,2], Edmund Koch[2,3], Hans-Joachim Böhringer[3], Jan Leppert[3], Ulrich Knopp[3], Alf Giese[3,4], Julia Welzel[4], Peter Koch[1]; [1]Inst. of Biomedical Optics, Germany, [2]Klinisches Sensoring und Monitoring, TU-Dresden, Germany, [3]Clinics for Neurosurgery, Univ. Luebeck, Germany, [4]Klinik für Dermatologie und Allergologie, Klinikum Augsburg, Germany.* A spectral-domain OCT specially designed for imaging with 4 μm leteral resolution in highly scattering tissue was designed and tested. The images of different tissues in-vivo and ex-vivo were compared to time-domain OCT images.

ROOM 11

8:30 a.m.–10:00 a.m.
TuC • Raman Spectroscopy for Clinical Diagnostics
Maryann Fitzmaurice; Univ. Hospitals of Cleveland and Case Western Reserve Univ., USA, Presider

TuC1 • 8:30 a.m. Invited
Raman Spectroscopy: Development of Clinical Applications for Breast Cancer Diagnosis, *Maryann Fitzmaurice[1], Nancy Wang[1], Nina Klein[1], Robert Shenk[1], Joanne Woletz[2], David Hickes[2], Joseph P. Crowe[2], Abigail S. Haka[3], Zoya Volynskaya[3], Jason T. Motz[3], Joseph A. Gardecki[3], Jonathon Nazemi[3], Ramachandra R. Dasari[3], Michael S. Feld[3]; [1]Univ. Hospitals of Cleveland and Case Western Reserve Univ., USA, [2]Cleveland Clinic Foundation, USA, [3]MIT, USA.* We report the development of techniques and instrumentation for clinical application of NIR Raman spectroscopy for breast cancer diagnosis. Potential clinical applications include optical biopsy at the time of mammography and intra-operative margin assessment.

TuC2 • 9:00 a.m.
Raman Spectroscopy Is Sensitive and Specific in the Detection of Lymph Node Metastases in Breast Cancer, *Jenny Smith, Catherine Kendall, Alastair M. Sammon, Jonathan Christie-Brown, Trupti Mandalia, Nicholas Stone; Biophotonics Res. Group, UK.* Laboratory Raman spectroscopy was performed on 59 lymph node sections from breast cancer patients, demonstrating 91% sensitivity and 93% specificity for the correct classification of positive node spectra in a model.

TuC3 • 9:15 a.m.
Near Infrared Raman Spectroscopy for Alzheimer's Disease Detection, *Caroline D. Sudworth[1], John K. Archer[1], David Mann[2]; [1]Medical Laser Inst., Lasers for Life, UK, [2]Greater Manchester Neurosciences Ctr., UK.* The use of near infrared Raman spectroscopy for the analysis of ex vivo brain tissues, combined with principle components statistical analysis, is presented in order that the early detection of Alzheimer's disease may be facilitated.

ROOM 3

TuA4 • 9:30 a.m.
The Susceptibility of Bacteria to Photodynamic Inactivation with Lanthanides Conjugates of Fotolon (chlorin e6), *Zuzanna Drulis-Kawa[1], Artur Bednarkiewicz[2], Wieslaw Strek[2], Janina Legiendziewicz[3], Rafal Wiglusz[3]; [1]Inst. of Genetics and Microbiology, Univ. of Wroclaw, Poland, [2]Inst. of Low Temperature and Structure Res., Poland, [3]Faculty of Chemistry, Univ. of Wroclaw, Poland.* We report the increased photodynamic inactivation efficiency of the Fotolon (chlorin e6) complexes with Lanthanides (Yb^{3+}, Eu^{3+} and Pr^{3+}) in comparison to pure Fotolon against bacteria with laser (90 J/cm^2) or light bulb (11 J/cm^2).

TuA5 • 9:45 a.m.
Antimicrobial Photodynamic Treatment of Gram-Negative Bacteria with a Cationic Phenothiazine Dye under Pulse Light Irradiation, *Satoko Kawauchi[1], Shunichi Sato[2], Masafumi Nagasawa[3], Nariyoshi Shinomiya[1], Daizo Saito[1], Hiroshi Ashida[2], Minoru Obara[3], Makoto Kikuchi[1]; [1]Natl. Defense Medical College, Japan, [2]Natl. Defense Medical College Res. Inst., Japan, [3]Keio Univ., Japan.* We investigated methylene blue-mediated photodynamic effect on Pseudomonas aeruginosa using 665-nm nanosecond pulsed light *in vitro*. The optimum excitation conditions were examined; a reduction of survival fraction up to 10^{-4} was obtained.

10:00 a.m.–10:30 a.m.
Coffee Break

11:30 a.m.–12:30 p.m.
TuD • Clinical Diagnosis and Therapy
Hubert van den Bergh; EPFL, Switzerland, Presider

TuD1 • 11:30 a.m.
Pathological Diagnosis of Bladder Cancer by Image Analysis of Hypericin Induced Fluorescence Cystoscopic Images, *James C. Kah[1], Malini C. Olivo[2], Colin J. Sheppard[1], Weber K. Lau[3]; [1]Natl. Univ. of Singapore, Singapore, [2]Natl. Cancer Ctr. Singapore, Singapore, [3]Singapore General Hospital, Singapore.* The potential of hypericin fluorescence in performing optical biopsy to grade bladder cancer using image analysis is investigated. Results suggest a correlation between fluorescence and cancer grade with a diagnostic algorithm in performing cancer grading.

ROOM 5

TuB5 • 9:30 a.m.
OCT Visualization of Acute Radiation Mucositis: Pilot Study, *Natalia Gladkova[1], Anna Masslennikova[1], Anna Terentieva[1], Yulia Fomina[1], Nina Khomutinnikova[1], Irina Balalaeva[1], Yulia Vyseltseva[1], Roman Larin[1], Natalia Kornoujhova[1], Andrei Shakhov[1], Natalia Shakhova[2], Grigory Gelikonov[2], Vladislav Kamensky[2], Felix I. Feldchtein[2,3]; [1]Nizhny Novgorod Medical Acad., Russian Federation, [2]Inst. of Applied Physics of Russian Acad. of Sciences, Russian Federation, [3]Imalux, USA.* We present pilot results in Optical Coherence Tomography visualization of normal mucosa radiation damage. OCT can see stages of radiation mucositis development, including hidden ones, before any clinical manifestations.

TuB6 • 9:45 a.m.
OCT as a Method of Tumor Monitoring in Clinical and Experimental Oncology, *Natalia M. Shakhova[1], Grigory V. Gelikonov[1], Valentin M. Gelikonov[1], Vladislav A. Kamensky[1], Ilya V. Turchin[1], Natalia D. Gladkova[2], Tatyana G. Sherbatuk[2], Elena V. Zagajnova[2], Marina V. Shirmanova[3]; [1]Inst. of Applied Physics RAS, Russian Federation, [2]Nizhny Novgorod Medical Acad., Russian Federation, [3]Nizhny Novgorod State Univ., Russian Federation.* We demonstrate OCT in management of patient's care in oncology. The results obtained in experimental conditions allow us to draw a preliminary conclusion that OCT is promising for monitoring of oncogenesis and new treatment approaches.

10:00 a.m.–10:30 a.m.
Coffee Break

11:30 a.m.–12:30 p.m.
TuE • Tissue Optics and Contrast Agents
Peter E. Andersen; Riso Natl. Lab, Denmark, Presider

TuE1 • 11:30 a.m.
Brain Tumor Identification by Use of Ultrahigh Resolution Optical Coherence Tomography and Tissue Optics Analysis, *Kostadinka K. Bizheva[1], Lars Thrane[2], Thomas Joergensen[2], Angelika Unterhuber[3], Matthias Preusser[4], Sara Gasparoni[3], Boris Hermann[3], Harald Sattmann[3], Boris Povazay[3], Herbert Budka[4], Peter Andersen[2], Wolfgang Drexler[3]; [1]Dept. of Physics, Univ. of Waterloo, Canada, [2]Risoe Natl. Lab, Denmark, [3]Dept. of Medical Physics, Medical Univ. of Vienna, Austria, [4]Inst. of Neurology, Medical Univ. of Vienna, Austria.* Novel theoretical model is used to complement UHROCT morphological imaging to identify various brain tumors based on their optical scattering properties. The model precision and patient-related statistical variation of the extracted optical properties are investigated.

ROOM 11

TuC4 • 9:30 a.m.
Near-Infrared Raman Spectroscopy for Colonic Cancer Diagnosis, *Zhiwei Huang[1], Wei Zheng[2], Sheppard Colin[1]; [1]Bioengineering Dept., Natl. Univ. of Singapore, Singapore, [2]Div. of Medical Sciences, Natl. Cancer Ctr. of Singapore, Singapore.* This study evaluated the diagnostic capability of near-infrared (NIR) Raman spectroscopy for identifying the malignant tumors from normal and benign tissues in the colon.

TuC5 • 9:45 a.m.
Classification of ENT Tissue Using Near-Infrared Raman Spectroscopy and Support Vector Machines, *Effendi Widjaja[1], Wei Zheng[2], Zhiwei Huang[3]; [1]Inst. of Chemical and Engineering Sciences, Singapore, [2]Natl. Cancer Ctr., Singapore, [3]Natl. Univ. of Singapore, Singapore.* A recent developed pattern recognition algorithm, Support Vector Machines (SVM), was employed to classify near-infrared Raman spectroscopy data collected from normal and cancerous ENT tissues. Both SVM and Linear Discriminant Analysis show comparable classification performance.

10:00 a.m.–10:30 a.m.
Coffee Break

ROOM 3

TuD2 • 11:45 a.m.
Fluorescence Guided Evaluation of Photodynamic Therapy as Acne Treatment, *Marica B. Ericson[1], Camilla Hörfelt[1], Elaine Cheng[2], Frida Larsson[2], Olle Larkö[1], Ann-Marie Wennberg[1]; [1]Sahlgrenska Univ. Hospital, Göteborg Univ., Sweden, [2]Chalmers Univ. of Technology, Sweden.* Patients with acne are treated with photodynamic therapy with and without aminolevulinic acid. Clinical evaluation and fluorescence imaging is used for assessment.

TuD3 • 12:00 p.m.
Methylene Blue Laser Therapy for the Treatment of Chronic Maxillary Sinusitis, *Alexey N. Bashkatov[1], Elina A. Genina[1], Valery V. Tuchin[1], Elena E. Chikina[2], Anatoly B. Knyazev[2], Oleg V. Mareev[2]; [1]Saratov State Univ., Russian Federation, [2]Saratov State Medical Univ., Russian Federation.* The clinical results of photodynamic therapy of chronic maxillary sinusitis have been demonstrated. Obtained results show that the photodynamic therapy is effective in comparison with conservative methods of treatment of the disease.

TuD4 • 12:15 p.m.
Five Years' Experience of Photodynamic Therapy with New Chlorin Photosensitizer, *Valery A. Privalov, Elena V. Kochneva, Alexander V. Lappa; Chelyabinsk State Univ. and Chelyabinsk State Medical Acad., Russian Federation.* Results of applications of photodynamic therapy with a new photosensitizer "Radachlorin", mainly consisting of sodium chlorine e6, to more than 100 patients with different malignant tumours are analysed. Optimal drug and light doses are estimated.

12:30 p.m.–2:00 p.m.
Lunch Break

2:00 p.m.–3:30 p.m.
TuF • Optical Spectroscopy: *In vivo* Human Studies
Stefan Andersson-Engels; Lund Inst. of Technology, Sweden, Presider

TuF1 • 2:00 p.m. Invited
ALA-PpIX Fluorescence and MR Spectroscopy in Connection with Stereotactic Biopsy of Human Glioblastomas, *Stefan Andersson-Engels[1], Sara Pålsson[1], Erik-Olof Backlund[2], Patrik Sturnegk[2], Peter Lundberg[2], Örjan Smedby[2], Katarina Svanberg[3], Ola Eriksson[2], Karin Wårdell[2]; [1]Lund Inst. of Technology, Sweden, [2]Linköping Univ. Hospital, Sweden, [3]Lund Univ. Hospital, Sweden.* Fluorescence spectroscopy, MR imaging and spectroscopy of normal brain and brain tumours was used during stereotactic biopsy in order to determine the possibilities to characterize the border between tumour and normal brain tissue.

ROOM 5

TuE2 • 11:45 a.m.
Hematocrit-Dependence of the Scattering Coefficient of Blood Determined by Optical Coherence Tomography, *Dirk J. Faber, Freek van der Meer, Maurice C. Aalders, Martijn de Bruin, Ton G. van Leeuwen; AMC Laser Ctr., Netherlands.* We measured the scattering coefficient and anisotropy of blood samples as a function of hematocrit using optical coherence tomography and a curve fitting procedure.

TuE3 • 12:00 p.m.
Quantitative Evaluation of Nanoshells as a Contrast Agent for Optical Coherence Tomography, *Anant Agrawal[1], Stanley Huang[1], Joshua Pfefer[1], Min-Ho Lee[2], Rebekah Drezek[2]; [1]Food and Drug Administration, USA, [2]Rice Univ., USA.* We have quantitatively assessed the effectiveness of nanoshells to enhance the quality of optical coherence tomography images. Depending on concentration, nanoshells increased image signal intensities by up to 13 decibels.

TuE4 • 12:15 p.m.
Apoptosis Induces Temporal Increase in Attenuation as Measured by Optical Coherence Tomography, *Freek J. van der Meer[1], Dirk J. Faber[1], Maurice C. Aalders[1], Jop Perree[1], Ton G. van Leeuwen[1,2]; [1]AMC, Netherlands, [2]Biophysical Engineering, Univ. of Twente, Netherlands.* We quantified the temporal incease in scattering in balloon dilatted ex vivo porcine arteries and in cell cultures after chemical induction of apoptosis. In the cell culture, necrosis was observed as an decrease in attenuation.

12:30 p.m.–2:00 p.m.
Lunch Break

2:00 p.m.–3:30 p.m.
TuG • New Developments in Technology
Jim Fujimoto; MIT, USA, Presider

TuG1 • 2:00 p.m.
Optical Coherence Tomography of Cell Dynamics in Three-Dimensional Engineered Tissues, *Stephen A. Boppart, Wei Tan, Han-Jo Ko, Claudio Vinegoni; Univ. of Illinois at Urbana, USA.* Optical coherence tomography (OCT) is used to nondestructively monitor cell dynamics and distributions in 3-D engineered tissues. Dynamic processes including cell migration, proliferation, apoptosis, necrosis, and mechanical restructuring are observed during engineered tissue development.

NOTES

ROOM 3

TuF2 • 2:30 p.m.
Noninvasive Diabetes Screening—Assessment of Advanced Glycation Endproduct Measurement Accuracy *in vivo*, *Marwood Ediger[1], Robert Johnson[1], Alan Ross[1], John Maynard[1], Cliona Fleming[2], John Baynes[3]; [1]VeraLight, USA, [2]InLight Solutions, USA, [3]Univ. of South Carolina, USA.* An *in vivo* study evaluated noninvasive spectroscopic quantification of advanced glycation endproducts in skin. Noninvasive measurement accuracy, the effectiveness of techniques for optical property compensation and the implications for noninvasive diabetes screening will be discussed.

TuF3 • 2:45 p.m.
Autofluorescence Detection of Tumors in the Human Lung—Comparison between *in vivo* and *in vitro* Measurements, *Dirk Hüttenberger[1], Tanja Gabrecht[2], G. Wagnieres[2], B. Weber[3], Albert Linder[4], Hans-Jochen Foth[1], Lutz Freitag[4]; [1]Dept. of Physics, Technische Univ. Kaiserslautern, Germany, [2]EPFL, Switzerland, [3]Richard Wolf GmbH, Germany, [4]Lungenklinik, Germany.* To detect bronchial carcinoma by autofluorescence we measured *in vivo* and *in vitro* the spectra of tumor and normal tissue by a fiber-optic-spectrometer. The main difference between tumor and bronchial tissue is the intensity at 505 nm.

TuF4 • 3:00 p.m.
Non-Invasive Measurement of Hypoxia-Related Parameters in Bronchial Epithelium by Use of Differential Path-Length Spectroscopy, *Arjen Amelink[1], Martin P. Bard[2], Joachim G. Aerts[2], Henricus J. Sterenborg[1]; [1]Ctr. for Optical Diagnostics and Therapy, Erasmus MC, Netherlands, [2]Sint Fransiscus Hospital, Netherlands.* We measured by use of DPS that bronchial tumors are characterized by a lower blood oxygen saturation and a higher blood content than normal mucosa. No differences were observed between normal and metaplastic/mild dysplastic mucosa.

ROOM 5

TuG2 • 2:15 p.m.
An Achromatized Endoscope for Ultrahigh-Resolution Optical Coherence Tomography, *Alexandre R. Tumlinson[1], Jennifer K. Barton[1], James McNally[1,2], Angelika Unterhuber[2], Boris Hermann[2], Harald Sattmann[2], Wolfgang Drexler[2]; [1]Univ. of Arizona, USA, [2]Medical Univ. of Vienna, Austria.* Achromatized optics maintain full 260nm bandwidth of a Titanium:sapphire laser while achieving a 4.4µm lateral spot. Visualized structures include: crypts in colonic mucosa, as well as muscular mucosa, submucosa, muscularis externa, and serosa layers.

TuG3 • 2:30 p.m.
Functional Ultrahigh Resolution Optical Coherence Comography for Non-Invasive, Spatially Resolved Probing of Retinal Physiology, *Kostadinka K. Bizheva[1], Renate Pflug[2], Boris Hermann[3], Boris Povazay[3], Sara Gasparoni[3], Harald Sattmann[3], Angelika Unterhuber[3], Elizabeth Anger[2], Herbert Reitsamer[2], Sergej Popov[4], John Tylor[4], Vladimir Gapontsev[5], Peter Ahnelt[2], Wolfgang Drexler[3]; [1]Dept. of Physics, Univ. of Waterloo, Canada, [2]Dept. of Physiology, Medical Univ. of Vienna, Austria, [3]Dept. of Medical Physics, Medical Univ. of Vienna, Austria, [4]Physics Dept., Imperial College, UK, [5]IPL Photonics Corp., USA.* Functional UHROCT was used for spatially localized optical probing of retinal physiology in excised living rabbit retinas. Optical response to single white flash stimulus observed in various retinal layers correlated well with electrical recordings (ERG).

TuG4 • 2:45 p.m.
Parallel Image Acquisition in Frequency Domain OCT, *Boris Povazay, Angelika Unterhuber, Boris Hermann, Harald Sattmann, Wolfgang Drexler; Ctr. of Biomedical Engineering and Physics, Medical Univ. of Vienna, Austria.* Novel three dimensional imaging techniques based on the Optical Coherence Tomography are investigated and compared to the novel, massively parallel time-encoded frequency domain OCT technique.

TuG5 • 3:00 p.m.
***In vivo* and *ex vivo* Imaging with Ultrahigh Resolution Full-Field OCT,** *Kate Grieve, Gael Moneron, Wilfrid Schwartz, Claude Boccara, Arnaud Dubois; ESPCI, France.* Imaging of *in vivo* and *ex vivo* biological samples using full-field optical coherence tomography is demonstrated. Three variations on the original full-field optical coherence tomography instrument are presented, and evaluated in terms of performance.

NOTES

ROOM 3

TuF5 • 3:15 p.m.
Reflectance Measurements of Skin Lesions—Noninvasive Method for Diagnostic Evaluation of Pigmented Neoplasia, *Ekaterina G. Borisova[1], Latchezar A. Avramov[1], Petranka Troyanova[2]; [1]Inst. of Electronics, Bulgaria, [2]Natl. Oncological Ctr., Bulgaria.* Reflectance spectra in the wavelength range 400 - 900 nm were obtained from malignant and benign skin lesions and characteristic differences between them were studied. Algorithm for differentiation and valuation of lesions condition was developed.

3:30 p.m.–4:00 p.m.
Coffee Break

ROOM 5

TuG6 • 3:15 p.m.
Fiber Optic Distance Sensor with Sub-nm Axial Resolution, *Edmund Koch[1], Alexander Popp[1], Dennis Boller[2], Hans-Frieder Schleiermacher[2], Peter Koch[2]; [1]Medizinische Fakultaet der TU-Dresden, Germany, [2]Medizinisches Laserzentrum Lübeck, Germany.* Based on the Fourier-domain-optical-coherence-tomography-principle we present a method to measure distances up to some millimeters with a resolution in the sub nm range. To achieve this resolution the phase of the spectral data is used.

3:30 p.m.–4:00 p.m.
Coffee Break

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4:00 p.m.–5:30 p.m.
TuH • Poster Session

TuH1
Imaging Articular Cartilage Using Second Harmonic Generation Microscopy, *Jessica C. Mansfield, C. Peter Winlove, Stephen Matcher; Univ. of Exeter, UK.* We use Second Harmonic Generation microscopy for characterising the collagen organisation of articular cartilage tissue. Images of post-mortem samples of normal healthy equine cartilage are compared with those of cartilage displaying osteoarthritic changes.

TuH2
Observation of Collagen Fiber Structure in Dermis Tissue by a Second-Harmonic-Generation Microscope, *Takeshi Yasui[1], Masahiro Ito[1], Kunihiko Sasaki[1], Tsutomu Araki[1], Toyonobu Yamashita[2], Naomi Kunizawa[2], Motoji Takahashi[2]; [1]Osaka Univ., Japan, [2]Shiseido Co. Ltd., Japan.* Second-harmonic-generation (SHG) microscope is applied to observe collagen fiber structure in porcine dermis and mouse tendon. Difference of collagen fiber structure among different samples is clearly visualized through high resolution and high contrast SHG images.

TuH3
Effect of Glucose on the Optical Properties of Arterial Blood Using Mie Theory Simulations, *Neil T. Clancy, Martin J. Leahy; Univ. of Limerick, Ireland.* The glucose concentration in arterial plasma has immediate effects on the optical properties of blood-bearing tissue. The influence of these effects on pulse oximetry is investigated using a numerical model based on Mie theory.

TuH4
Blood Skin Microcirculation over the Glucose Solution, *Alexander N. Korolevich[1], E. K. Naumenko[2], N. S. Dubina[3], S. I. Vecherinski[3], M. S. Belsley[1]; [1]Minho Univ., Portugal, [2]Inst. of Physics, Natl. Acad. of Sciences of Belarus, Belarus, [3]MTZ Medservice, Belarus.* The effect of glucose on the dynamical properties of whole human blood was studied by the optical Doppler method.

TuH5
Interstitial Single Fiber Multi-Decay-Probe for Light Dosimetry in Photodynamic Therapy: Modelling, *Artur Bednarkiewicz, Wieslaw Strek; Inst. of Low Temperature and Structure Res., Poland.* Theoretical considerations concerning new method for interstitial photodynamic therapy light dosimetry and distribution at different depths, by means of single-fiber multiple-decay-probes is presented, basing on deconvolution of multi-exponential decay.

TuH6
Multi-Wavelength Transmittance Photoplethysmography with Near Infrared Laser Diodes during Exercise, *Sonnia M. López-Silva; IUMA, Spain.* The transmittance photoplethysmogramms recorded with multiple NIR laser diodes in an athlete along a maximal exercise test by treadmill ergometer and the results after processing, are presented and compared with the established reference techniques.

TuH7
Kubelka-Munk Theory Based Diagnostic Algorithms to Discriminate Healthy and Atherosclerotic Animal Model Aorta, *Dimitris S. Gorpas, Eleni Alexandratou, Costas Politopoulos, Dido Yova; Lab of Biomedical Optics and Applied Biophysics, Greece.* The scope of this work was to determine the Kubelka-Munk scattering and absorption coefficients of healthy and atherosclerotic animal model aorta, based on spectroscopic measurements, and to develop a diagnostic algorithm via multivariate statistical analysis.

TuH8
Complex Refractive Index of Hemoglobin in the Wavelength Range from 250 to 1100 nm, *Martina Meinke[1], Moritz Friebel[2]; [1]Charite-Univ. Berlin, Germany, [2]Laser-und Medizin-Technologie GmbH, Berlin, Germany.* In this paper the real and imaginary part of the refractive index of hemoglobin solutions were measured in the wavelength range of 250 to 1100 nm using Fresnel reflectance and transmittance measurements.

TuH9
Glucose Content Monitoring with Time-of-Flight Technique in Aqueous Intralipid Solution Imitating Human Skin: Monte Carlo Simulation, *Alexey Popov[1,2], Alexander Priezzhev[1], Risto Myllyla[2]; [1]M.V. Moscow State Univ., Russian Federation, [2]Univ. of Oulu and Infotech Oulu, Finland.* In this paper, propagation of laser pulses through a sample of aqueous Intralipid solution with glucose is simulated by Monte Carlo technique. It is shown that glucose level within the physiological range can be sensed.

TuH10
Laser-Induced Photoacoustic Imaging for Characterizing Colon Tissues, *Yasser H. Elsharkawy, Y. Badr; Cairo Univ., Egypt.* Photoacoustic response has been used to characterize human colon tissues for the purpose of discriminating between normal and tumor areas. Thermoelastic waves generated in tooth by the absorption of laser pulses produced by Excimer laser.

TuH11
New Horizons of Noninvasive Reflectance Oximetry, *Dmitrii A. Rogatkin, Vasiliy N. Karpov, Roman V. Gorenkov, Oleg A. Bychenkov, Pavel Yu. Polyakov; Moscow Regional Res. and Clinical Inst., Russian Federation.* For capillary blood oxygenation (CBO) monitoring new spectrophotometric apparatus was applyed. It was estimated that CBO has rhythms like perfusion measured by Doppler Fowmetry. It opens new horizons: frequency analysis application to analyze CBO.

TuH12
Cancer Diagnosis via Visible Light Spectroscopy, *Filiz Ates[1], Haşim Ö. Tabakoğlu[1], Özgüncem Bozkulak[1], Murat Gülsoy[1], Murat Canpolat[2]; [1]Bogazici Univ., Turkey, [2]SpectraPath Technologies Inc., USA.* System consists of white light source, single fiber optical probe, and spectrometer. Elastic-scattering spectroscopy spectra were used to differentiate cancerous and normal human tissues. Single optical fiber probe was used for light delivery and collection.

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TuH13
***In vivo* Macroscopic HP Fluorescence Reflectance Imaging on Small Animals Bearing Surface ARO/NPA Tumor,** *Maddalena Autiero, Giuseppe Roberti, Luigi Celentano, Paolo Laccetti, Marcello Marotta, Giovanni Mettivier, Maria C. Montesi, Paolo Russo, Patrizia Riccio; Univ. di Napoli, Italy.* *In vivo* macroscopic optical imaging measurements on anesthetized mice bearing a solid human surface tumor (thyroid carcinoma ARO/NPA) have been performed following the administration of a water solution of a fluorescent marker (hematoporphyrin dichlorohydrate).

TuH14
Study of Red Blood Cell Aggregation by Optically Controlled Collisions, *Zheng Li, Zhenxi Zhang, Jing Wang, Youli Yu, Xiaochao Qu; Inst. of Biomedical Engineering, Xi'an Jiaotong Univ., China.* Red blood cells are controlled to collide by single optical tweezer. After collision the adhesion probability of them is effective pointer of red blood cell aggregation at the micro level.

TuH15
Application of Detection of Hemoglobin Concentration and Oxygen Saturation to Diagnosis of Breast, *Liu Shenglin[1], Li Kaiyang[1], Zhang Xianlin[2]; [1]Dept. of Physics Science and Technology, Wuhan Univ., China, [2]Tumor Hospital of Hubei Province, China.* A novel method to detect distribution of CHb (hemoglobin concentration) and SaO_2 (oxygen saturation) is applied to diagnosis of breast. Results show that malignant tissue of breast exhibits higher CHb and lower SaO_2 values usually.

TuH16
Optical Transillumination Spectroscopy: A Biomarker of Breast Tissue Density and an Intermediate Indicator of Cancer Risk, *Lothar Lilge[1], Kristina M. Blackmore[1], Julia A. Knight[2], Roberta Jong[3]; [1]Ontario Cancer Inst., Canada, [2]Samuel Lunenfeld Res. Inst., Canada, [3]Sunnybrook and Women's College Health Science Ctr., Canada.* Optical transillumination spectroscopy provides an alternative to mammographic density as a biomarker of breast density and hence cancer risk, permitting frequent and early use thereby extending cancer risk assessment to younger women.

TuH17
Principal Components Analysis as a De-Noising Method Applied to Laser Doppler Reactive Hyperemia Signals, *Chemseddine Mansouri[1], Anne Humeau[1], Pierre Abraham[2], Jean-Pierre L'Huillier[3]; [1]Groupe ISAIP-ESAIP, France, [2]Ctr. Hospitalier Universitaire, France, [3]Ecole Natl. Supérieure d'Arts et Métiers, France.* De-noising of reactive hyperemia signals obtained with laser Doppler flowmetry could lead to improved diagnoses of peripheral arterial occlusive diseases. An algorithm based on principal component analysis was applied to signals acquired on different subjects.

TuH18
Noninvasive Glucose Monitoring by Optical Reflective and Thermal Emission Spectroscopic Measurements, *Vladimir Saetchnikov[1], Elina Tcherniavskaia[1], Gerhard Schiffner[2]; [1]Belarusian State Univ., Belarus, [2]Ruhr Univ., Germany.* Noninvasive method for blood glucose monitoring in cutaneous tissue based on reflective spectrometry combined with a thermal emission spectroscopy has been developed. Regression analysis, neural network algorithms and cluster analysis are used for data processing.

TuH19
Cerebral Measurements of Hemoglobin Concentration and Oxygen Saturation Using Near-Infrared Spectroscopy and the Spectroscopy Analysis Tool, *Sonal Thaker, Tina Chaves, George Themelis, Pamela Almeida, Kalpathy Krishnamoorthy, Kara Arvin, Ellen Grant, Maria Angela Franceschini; Massachusetts General Hospital, USA.* We performed measurements in eight cerebral regions of neonates with NIRS frequency domain system. We were able to accurately measure hemoglobin concentration and saturation and detect changes in hemoglobin with age and head location.

TuH20
Measurement of Optical Aberrations in the Human Eye by Curvature Sensing: Preliminary Simulations, *David López[1], Susana Ríos[1], Salvador Bará[2], Justo Arines[2]; [1]Univ. de La Laguna, Spain, [2]Univ. de Santiago, Spain.* Adaptive optics has been extended from astronomy to the correction of aberrations in the human eye. In this work we present computer simulations to determine the feasibility of curvature sensing technique to detect eye aberrations.

TuH21
Respiratory Sensor Based on Macrobending Fiber with Side Disturbances, *Anatoly Babchenko, Jonathan Maryles, Noam Itzkovich, Meir Nitzan; Jerusalem College of Technology, Israel.* The concept for highly sensitive respiratory measurement using a fiber optic sensor is presented. It is based on macrobending fiber with disturbances in the form of cavities. The theoretical principles and experimental results are discussed.

TuH22
A Low-Cost Optical Mapping System by Use of Voltage Sensitive Dyes, *Jing Wang[1,2], Zhenxi Zhang[1,2], Zhenghong Xu[1], Yanshu Jin[1], Zheng Li[1]; [1]School of Life Science and Technology, Xi'an Jiaotong Univ., China, [2]Key Lab of Biomedical Information Engineering of Ministry of Education of China, China.* We describe a low-cost optical mapping system combining a Dalsa CCD camera and a normal mercury arc lamp. The imaging system can capture images at 490 fps, with a spatial resolution of 128x128 pixels.

TuH23
Study of the Erythrocyte Adhesion Mediated by Antibodies Using the Digital Image Processing, *Bibiana Riquelme, Virginia Danieli, Mabel D'Arrigo; Facultad de Ciencias Bioquímicas y Farmacéuticas, Univ. Nacional de Rosario, Argentina.* The objectives of this work were: to study the erythrocyte adhesion mediated by antibodies of the ABO system and to achieve quantitative values of the intercellular binding energy using the digital image processing.

TuH24
Microtopographic Inspection for Skin Cancer Early Detection, *Manuel F. Costa[1,2], Maria C. Pacheco[2], Eva R. Gallegos[2], Judith P. Aura[2]; [1]Univ. do Minho, Portugal, [2]Lab de Citopatología Ambiental. Dept. Morfología. ENCB-IPN, Mexico.* Early detection of skin cancer is fundamental to a successful treatment. The work herein reports on a system and procedure for the identification of diagnostic patterns of benign and malign skin lesions by optical microtopography.

TuH25
Videooculograph for Computer Diagnostics of Eye Nistagmus, *Anatoli V. Skripal[1], Dmitry A. Usanov[1], Anton V. Abramov[1], Tatjana Usanova[2]; [1]Saratov State Univ., Russian Federation, [2]Saratov State Medicine Univ., Russian Federation.* Method for quantitative characterization of involuntary eye movements based on computer image analysis, which allows one to estimate objectively nystagmus parameters, has been developed. Method for synchronous registration of eyes movements has been shown.

TuH26
Monte Carlo Simulation for Predicting Scattering Effect on Point Spread Function of OCT System, *Taro Okuyama, Eiji Okada; Dept. of Electronics and Electrical Engineering, Keio Univ., Japan.* The point spread function of optical coherence tomography system is predicted by Monte Carlo simulation to investigate the influence of tissue scattering on the spatial resolution of the OCT image.

TuH27
Analysis of Different Scattering Orders Contribution to the OCT Signal from Blood by Means of Monte Carlo Simulations, *Mikhail Yu. Kirillin[1,2], Alexander V. Priezzhev[1], Risto Myllylä[2]; [1]M. V. Lomonosov Moscow State Univ., Russian Federation, [2]Univ. of Oulu, Finland.* Basing on Monte Carlo-simulated OCT signals from plain blood samples of various thicknesses the distributions of contributing photons over scattering orders were analyzed. Contributions of least- and multiple scattering, diffusive and non-diffusive fractions were estimated.

TuH28
Two Channel Laser Speckle Instrument for Biological Microflow Localization and Velocity Measurements, *Ivan V. Fedosov, Valery V. Tuchin; Saratov State Univ., Russian Federation.* The instrument based on space-time correlation of scattered coherent light intensity was developed for the investigation of biological microflows. Two independent optical channels provide the flow velocity measurements and flow localization along the probing beam.

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TuH29
Imaging of Biological Tissues with Optical Coherence Tomography System Using Jones-Mueller Calculus, *Shamaraz Firdous, Masroor Ikram; Pakistan Inst. of Engineering and Applied Sciences (PIEAS), Pakistan.* The exact tissue parameters measurement predicts about the malignant and normal tissues. We have established the analytical modeling with Jones-Mueller matrix, which experimentally extract the birefringence, depolarization, absorption and scattering information of tissues.

TuH30
PDT Techniques with Therapeutic Dose Saturation, *Boris Ya. Kogan; Organic Intermediates and Dyes Inst., Russian Federation.* Photodynamic therapy with saturating of photochemical dose (PD) using three different techniques was studied theoretically. At saturation PD does not depend on the light fluence and is determined by concentration of photosensitizer or oxygen.

TuH31
3-D Optical Imaging and Localization of a Fluorescent Contrast Agent Target Embedded in a Slab of *ex vivo* Human Breast Tissue Using Independent Component Analysis, *M. Alrubaiee, M. Xu, S. K. Gayen, R. R. Alfano; City College of New York, USA.* Images and location of a fluorescent sphere within a breast tissue slab were obtained using a scanning laser beam excitation, sensing fluorescence with a CCD camera, and using the independent component analysis for information retrieval.

TuH32
Crosstalk in the Measurement of Focal Brain Activation by Near-Infrared Topography, *Nobuhiro Okui, Eiji Okada; Keio Univ., Japan.* Crosstalk between oxy- and deoxy-haemoglobin observed in near-infrared topography is investigated. The crosstalk depends on the relative position of the focal absorption change to source-detector pairs. Appropriate wavelength selection is effective to reduce the crosstalk.

TuH33
Experimental Study of Time-Resolved Measurements on Turbid Media: Determination of Optical Properties and Fluorescent Inclusions Characterization, *Aurélie Laidevant, Anabela da Silva, Michel Berger, Jean-Marc Dinten; CEA-LETI Recherche Technologique, France.* Time-resolved measurements were performed using TCSPC techniques. Determination of the optical properties has permitted to validate the experimental set-up and the equations derived from the diffusion approximation. A study on fluorescent inclusions is then realized.

TuH34
A Time Resolved NIR Topography System for Two Hemispheres of the Brain, *Michal Kacprzak, Adam Liebert, Roman Maniewski; Inst. of Biocybernetics and Biomedical Engineering, Poland.* Multichannel, double-wavelength time-resolved system for brain imaging uses 18 emitting points and 8 detectors allowing to measure changes of oxy- and deoxyhemoglobin in two grids 4x4 located on both hemispheres of the brain.

TuH35
Frequency-Domain Optical Diffusion Tomography of Fluorescent Proteins, *Ilya V. Turchin[1], Vladimir I. Plehanov[1], Anna G. Orlova[1], Vladislav A. Kamensky[1], Ekaterina A. Sergeeva[1], Lev S. Dolin[1], Vladimir A. Vorob'ev[1], Alexander P. Savitsky[2]; [1]Inst. of Applied Physics RAS, Russian Federation, [2]A. N. Bach Inst. of Biochemistry of RAS, Russian Federation.* We propose utilization of a relatively new method, Fluorescence Frequency-Domain Optical Diffusion Tomography, in application to fluorescent proteins visualization. Preliminary experiments with DsRed fluorescent protein using experimental setup with low-frequency modulated light were conducted.

TuH36
Diffuse Optical Tomography of Breast Cancer during Neoadjuvant Chemotherapy, *Regine Choe, Alper Corlu, Kijoon Lee, Turgut Durduran, Soren D. Konecky, Britton Chance, Arjun G. Yodh; Univ. of Pennsylvania, USA.* Multi-spectral diffuse optical tomography was utilized to track treatment progress in a female subject during neoadjuvant chemotherapy. Our measurements reveal tumor shrinkage during the course of chemotherapy, in a good agreement with MRI.

TuH37
Goniometric Measurement of the Phase Function of Different Fat Emulsions, *René Michels, Alwin Kienle, Florian Forster, Raimund Hibst; Inst. für Lasertechnologien in der Medizin und Meßtechnik, Germany.* Fat emulsions like Intralipid are frequently used in research of light propagation as tissue phantoms. We investigated the phase functions of different major brands and concentrations of these fat emulsions.

TuH38
Dual Channel Photoplethysmography Studies of Cardio-Vascular Response to the Body Position Changes, *Renars Erts, I. Kukulis, J. Spigulis; Univ. of Latvia, Latvia.* The dual-channel photoplethysmography studies of physiological responses during 3-stage orthostatic test were performed. Clear differences in heartbeat rate, pulse wave transit time and blood pressure variations of healthy volunteers and diabetic patients have been observed.

TuH39
Evaluation of a Segmentation-Based Reconstruction Scheme for Fluorescence-Enhanced Diffusion Optical Tomography, *Anabela da Silva, Anne Planat-Chrétien, Jean-Marc Dinten, Alain Glière; LETI-CEA Recherche Technologique, France.* A reconstruction scheme based on the resolution of the light diffusion adjoint problem by the Finite Element Method for fluorescence-enhanced tomography is presented. Prior knowledge is introduced via a segmentation performed on a rough pre-reconstruction.

TuH40
Combined Pulse-Oximeter-NIRS System for Biotissue Diagnostics, *Vladimir A. Hovhannisyan; Yerevan Physics Inst., Armenia.* Multiwavelength device combining methods of conventional pulse oximetry and NIRS is developed. The portable system allows to measure heart pulse rate, blood oxygen saturation and local absolute concentration of oxyhemoglobin, deoxyhemoglobin, other IR absorbed compounds.

TuH41
Coupled Radiative Transfer Equation and Diffusion Approximation, *Tanja Tarvainen, Marko Vauhkonen, Ville Kolehmainen, Jari P. Kaipio; Univ. of Kuopio, Finland.* A coupled radiative transfer equation and diffusion approximation model for light propagation in tissues is proposed. The coupled equations are solved using finite element method.

TuH42
Direct Light Sensors in Laser Biostimulation: Possible Role of E. coli DOS Protein and Mammalian Soluble Guanilate Cyclase, *Olga A. Tiflova; Inst. of Laser and Info. Technologies RAS, Russian Federation.* Based on the existence of irradiation time independent maximum on growth stimulation vs dose curves the involvement of direct light sensors: heme-based E. coli DOS protein and mammalian soluble guanylate cyclase was proposed.

TuH43
Infrared Free Electron Laser Enhanced Transdermal Drug Delivery, *Kunio Awazu, Takeuyuki Uchizono, Sachiko Suzuki; Graduate School of Engineering, Osaka Univ., Japan.* Enhancement of the lidocaine penetration without ablation using an MIR-FEL. Lidocaine flux at 0.5 hour with the irradiated skin using an MIR-FEL was enhanced 10 fold faster than with the non-irradiated skin.

TuH44
Selective Damage of Coloration Centers Inhomogeneously Distributed in Skin by Nanosecond Near-IR Laser Pulses, *Ludmila V. Chernyshova, Dmitrii M. Kulakov, Vladimir M. Chernyak; State Res. Ctr. of Russian Federation, Russian Federation.* Results are presented on the study of animal skin specimens ex-vivo irradiated by nanosecond repetitive Nd-glass laser pulses. Mechanism responsible for tissue destruction is selective photodisruption due to energy absorption by endogenic skin pigments.

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TuH45
Correction of Biochemical and Functional Disorders in Brain Ischemia with Laser Therapy, *Musienko Julia[1,2], Natalia Nechipurenko[1], Ludmila Vasilevskaya[1]; [1]Inst. of Neurology, Belarus, 25th Clinical Hospital, Belarus.* Aim of this study to investigate the influence of intravenous laser irradiation of blood with helium-neon laser with different power on blood oxygen transport, cerebral microhaemodynamics and hydro-ion balance after local brain ischemia modeling.

TuH46
External and Intralesional Photocoagulation of Hemangioma in Children with the Use of Infrared Diode Laser, *Ivan A. Abushkin, Valery A. Privalov, Alexander V. Lappa, Evgeny L. Bezshtanko; Medical Physics Ctr. at Chelyabinsk State Univ. and Chelyabinsk State Medical Acad., Russian Federation.* 1060 nm diode laser was applied in treatment of 163 children with 221 hemangiomas. Capillary hemangiomas were exposured externally, cavernous hemangiomas—both externally and interstitionally. Good results were achieved in 96 % of patients.

TuH47
Pulse Laser Heating of Blood Vessels, *Liudmila G. Astafyeva[1], Georgy Zheltov[1], Wolf-Dieter Schmidt[2]; [1]Stepanov Inst. of Physics of Natl. Acad. of Sciences of Belarus, Belarus, [2]Gesellschaft fur Medizin-, Bio- und Umwelttechnologie e.V., Dept. of Photonics and Sensors, Germany.* Calculations of the dynamics of temperature field inside blood vessel taking into account an inhomogeneous distribution of volumetric heat release within it under the action of pulse laser irradiation of skin were made.

NOTES

ROOM 3

8:30 a.m.–10:00 a.m.
WA • Functional Optical Imaging of the Brain I
Rainer Macdonald; PTB Berlin, Germany, Presider

WA1 • 8:30 a.m. Invited
A Spatial-Temporal Comparison of fMRI and NIRS Hemodynamic Responses to Motor Stimuli in Adult Humans, *Theodore J. Huppert, Rick D. Hoge, Maria A. Franceschini, David A. Boas; Massachusetts General Hospital, USA.* We use forward matrices obtained through Monte Carlo simulations to predict the NIRS source-detector based time-courses from the fMRI signal. We report a spatial correlation of R = 0.73 between the NIRS and BOLD signals.

WA2 • 9:00 a.m.
3-D Optical Tomography of the Neonatal Brain, *Adam Gibson, Nicholas Everdell, Roza Yusof, Gilberto Branco, David Jennions, Jeremy Hebden, Topun Austin, Judith Meek, John Wyatt, Martin Schweiger, Simon Arridge; Univ. College London, UK.* Optical tomography images are presented from twins, one of whom had an intraventricular haemorrhage, shown as an increase in blood volume and decrease in oxygenation, and the other was anatomically normal, shown as symmetrical images.

WA3 • 9:15 a.m.
System for the Measurement of Blood Flow and Oxygenation in Tissue Applied to Neurovascular Coupling in Brain, *Matthias Kohl-Bareis[1], Roland Guertler[1], Ute Lindauer[2], Christoph Leithner[2], Heike Sellien[2], Georg Royl[2], Ulrich Dirnagl[2]; [1]Univ. of Applied Sciences Koblenz, RheinAhrCampus Remagen, Germany, [2]Experimental Neurology, Humboldt-Univ. Berlin, Germany.* A system for the simultaneous measurement of blood oxygenation and blood flow is designed and applied to the investigation of neurovascular coupling in rat following somatosensory stimulation during normal or hyperbaric hyperoxygenation.

ROOM 5

8:30 a.m.–10:00 a.m.
WB • Tissue Diagnostics by Optical Absorption and Scattering
Georges Wagnieres; EPFL, Switzerland, Presider

WB1 • 8:30 a.m. Invited
***In vivo* Detection of Pre-Cancerous Changes in Barrett's Esophagus Using Elastic Scattering Spectroscopy (ESS),** *Benjamin R. Clark[1], Kristie Johnson[1], Gary D. Mackenzie[1], Marco R. Novelli[1], Chelliah R. Selvasekar[1], Sally M. Thorpe[1], Irving J. Bigio[2], Steven G. Brown[1], Laurence B. Lovat[1]; [1]Natl. Medical Laser Ctr., Univ. College London, UK, [2]Dept. of Biomedical Engineering, Boston Univ., USA.* We present the results of a clinical study using ESS to detect pre-cancerous changes in the esophagus. We focus on the use of novel statistical techniques and the clinical benefits this technique provides.

WB2 • 9:00 a.m.
Elastic Scattering Spectroscopy for Detection of Sentinel Lymph Node Metastases in Breast Carcinoma, *Dennis W. Chicken[1], Andrew C. Lee[1], Kristie Johnson[1], Benjamin R. Clarke[1], Mary Falzon[2], Irving J. Bigio[3], Stephen G. Bown[1], Mohammed R. Keshtgar[4]; [1]Natl. Medical Laser Ctr., UK, [2]Dept. of Histopathology, Univ. College London, UK, [3]Dept. of Biomedical Engineering, Boston Univ., USA, [4]Dept. of Surgery, Univ. College London, UK.* Sentinel node biopsy is the new standard for lymphatic staging of breast carcinoma. Elastic scattering spectroscopy offers the potential for near-instantaneous detection of sentinel node metastases with an accuracy approaching that of existing pathological techniques.

WB3 • 9:15 a.m.
Diffuse Reflectance Spectroscopy of Human Skin Lesions, *Monica Cordo[1], Jose Ramon Sendra[1], Agustin Viera[2], Sonnia M. Lopez-Silva[1]; [1]Inst. for Applied Microelectronics, Univ. of Las Palmas de Gran Canaria, Spain, [2]Dermocanarias Medico-Quirurgica, S. L., Spain.* We have applied VIS-NIR diffuse reflectance spectroscopy to study different human skin lesions. A new set of features has been derived through the analysis of their spectra to discriminate among melanocytic and non-melanocytic lesions.

ROOM 11

8:30 a.m.–10:00 a.m.
WC • Methods and Instruments I
Claude Boccara; ESPCI, France, Presider

WC1 • 8:30 a.m.
Measurements of Human Motor and Visual Activities with Diffusing-Wave Spectroscopy, *Jun Li[1], Gregor Dietsche[1], Sergey E. Skipetrov[2], Georg Maret[1], Brigitte Rockstroh[1], Thomas Elbert[1], Thomas Gisler[1]; [1]Univ. Konstanz, Germany, [2]Lab de Physique et Modélisation des Milieux Condensés/CNRS, Univ. Joseph Fourier, France.* Diffusion coefficients in the human sensorimotor and visual cortices were measured using diffusing-wave spectroscopy. Motor and visual activation leads to increases of the diffusion coefficients in the respective cortical areas over the values at rest.

WC2 • 8:45 a.m.
The Improvement of the 3-D Reconstruction Uniformity Using Depth-Adaptive Regularization in the Diffuse Optical Tomography (DOT), *Reiko Endoh, Mamiko Fujii, Kiyoshi Nakayama; Dept. of Electrical and Electronics Engineering, Sophia Univ., Japan.* We study DOT using 2-D CW source-detector arrays, aiming at the real-time imaging of the redox state change with the brain activity, and demonstrated the improvement of the 3-D reconstruction using depth-adaptive regularization.

WC3 • 9:00 a.m.
Assessment of Non-Specific Dyes for Early Detection of Arthritis, *Bernd Ebert[1], Diethard Petzelt[1], Jan Voigt[1], Rainer Macdonald[1], Thomas Fischer[2], Ines Wojner[2], Dorothee V. Stieglitz[2], Kai-Geerd A. Hermann[2], Matthias Taupitz[2], Bernd Hamm[2], Kai Licha[3], Michael Schirner[3], Veit Krenn[4]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Dept. of Radiology, Charité Campus Mitte, Medizinische Fakultät der Humboldt-Univ. zu Berlin, Germany, [3]Schering AG, Res. Labs, Germany, [4]Dept. of Pathology, Charité Campus Mitte, Medizinische Fakultät der Humboldt-Univ. zu Berlin, Germany.* Fluorescence imaging in the near infrared spectral range following intravenous administration of non-specific contrast agents revealed that fluorescence intensity is enhanced in inflammatory joints. First examples for imaging of human hands are given.

WC4 • 9:15 a.m.
Optical Traps Array for Lab-on-a-Chip Applications, *Gerben C. Boer, Johann Rohner, Fabrice Merenda, Guy Delacrétaz, Robert Johann, René P. Salathé; EPFL, Ecole Polytechnique Fédérale de Lausanne, Switzerland.* We present a set-up that combines an optical trap array produced by four independent lasers with a pressure controlled PDMS micro-fluidic system. Using different colored solutions and fluorescence detection, potentials for biochemical applications are demonstrated.

Wednesday, 15 June, 2005

ROOM 3

WA4 • 9:30 a.m.
Improvements in Brain Activation Detection Using Time-Resolved Diffuse Optical Means, *Bruno Montcel, Renee Chabrier, Patrick Poulet; Inst. de Physique Biologique, France.* MRI-based models and diffusion theory FEM simulations suggest that cortical activation detection could be improved by time-resolved NIR methods. Experiments conducted with an MCP-PMT-, TCSPC-based apparatus on the motor cortex confirm this hypothesis.

WA5 • 9:45 a.m.
A Time-Domain NIR Brain Imager Applied in Functional Stimulation Experiments, *Heidrun Wabnitz[1], Michael Moeller[1], Adam Liebert[1,2], Alfred Walter[1], Rainer Macdonald[1], Hellmuth Obrig[3], Jens Steinbrink[3], Rainer Erdmann[4], Olaf Raitza[5]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Inst. of Biocybernetics and Biomedical Engineering, Poland, [3]Dept. of Neurology, Charité, Humboldt Univ., Germany, [4]PicoQuant, Germany, [5]LOPTEK Glasfasertechnik, Germany.* We present our prototype of a 3-wavelength time-domain brain imager. The instrument was tested on inhomogeneous phantoms. Various functional stimulation experiments on adults demonstrate its ability to combine lateral resolution with depth selectivity.

10:00 a.m.–10:30 a.m.
Coffee Break

ROOM 5

WB4 • 9:30 a.m.
Automated Histopathology through High Throughput Fourier Transform Infrared Spectroscopic Imaging, *Rohit Bhargava, Stephen M. Hewitt, Ira W. Levin; NIH, USA.* By coupling high throughput Fourier transform infrared (FTIR) spectroscopic imaging, varied and large scale tissue sampling and statistical pattern recognition of vibrational spectra, we demonstrate the histopathologic characterization of human prostate biopsies.

WB5 • 9:45 a.m.
Transcranial Imaging of Intrinsic Optical Signal in Cold-Injured Brain in Rats, *Yoshinori Ueda[1], Shunichi Sato[2], Hiroshi Ashida[2], Hidetoshi Ooigawa[3], Hiroshi Nawashiro[3], Katsuji Shima[3], Daizoh Saitoh[4], Yoshiaki Okada[4], Minoru Obara[1]; [1]Dept. of Electronics and Electrical Engineering, Keio Univ., Japan, [2]Div. of Biomedical Information Sciences, Natl. Defense Medical College Res. Inst., Japan, [3]Dept. of Neurosurgery, Natl. Defense Medical College, Japan, [4]Dept. of Traumatology and Critical Care Medicine, Natl. Defense Medical College, Japan.* Intrinsic optical signal imaging may be useful not only for monitoring of brain function but also for diagnosis of brain injuries and diseases. We attempted transcranial imaging of IOS in cold-injured brain in rats.

10:00 a.m.–10:30 a.m.
Coffee Break

11:30 a.m.–12:30 p.m.
WD • ECBO Tutorial

WD1 • 11:30 a.m. **Tutorial**
Multiphoton Tomography and Nanoprocessing of Biological Targets with Near-Infrared Femtosecond Laser Pulses, *Karsten Koenig; Fraunhofer Inst. of Biomedical Technology (IBMT), Germany.* Picojoule MHz laser pulses have been used to perform 4-D imaging (2-photon fluorescence, SHG) with high sub-micron spatial and picosecond temporal resolution. Precise sub-100 nm cutting and drilling effects can be realized at TW/cm^2 intensities.

12:30 p.m.–2:00 p.m.
Lunch Break

ROOM 11

WC5 • 9:30 a.m.
Multiple Optical Traps Based on Micro-Lenses Arrays, *Fabrice Merenda[1], Johann Rohner[1], Gerben C. Boer[1], Guy Delacrétaz[1], Toralf Scharf[2], René P. Salathé[1]; [1]Ecole Polytechnique Fédérale de Lausanne, Switzerland, [2]Uni. of Neuchâtel, Switzerland.* We demonstrate a method to generate arrays of 3-D-traps by using micro-lenses arrays and a high NA microscope objective. We measured trapping strengths of 3.5 pN with a 19 traps array for 2-5 μm beads.

WC6 • 9:45 a.m.
Beam Shaping for Large Assemblies of Optical Traps, *Johann Rohner, Jean-Marc Fournier, René-P. Salathé, Robert Johann, Pierre Jacquot; EPFL, Switzerland.* Large number of optical traps can be generated through interference of one or several laser beams. Various types of multiple optical tweezers are implemented in microfluidic channels, aiming towards lab-on-chip experiments.

10:00 a.m.–10:30 a.m.
Coffee Break

NOTES

ROOM 3

2:00 p.m.–4:00 p.m.
WE • Functional Characterization and Monitoring of Malignant and Normal Tissues
Paola Taroni; Dept. of Physics, Politecnico di Milano, Italy, Presider

WE1 • 2:00 p.m. Invited
Monitoring of Radiation Therapy Response of Head and Neck Tumors by Non-Invasive Optical Blood Flow Measurements, *Ulas Sunar, H. Quon, J. Zhang, J. Du, T. Durduran, C. Zhou, G. Yu, A. Kilger, R. Lustig, L. Loevner, S. Nioka, A. G. Yodh, B. Chance; Univ. of Pennsylvania, USA.* Here we show the usefulness of optical blood flow for predicting early tumor response to radiation therapy in patients with head and neck tumors. The results suggest a correlation between flow changes with clinical outcome.

WE2 • 2:30 p.m.
Improved Depth Localization and Characterization of Breast Lesions Employing a Multi-Channel Scanning Optical Time Domain Mammograph, *Michael Moeller[1], Heidrun Wabnitz[1], Dirk Grosenick[1], Rainer Macdonald[1], Thomas Moesta[2], Herbert Rinneberg[1]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Robert-Roessle-Klinik, Charité, Universitätsmedizin Berlin, Germany.* We present patient measurements employing a scanning time-resolved optical mammograph for breast cancer detection featuring an extended wavelength range for enhanced spectroscopic information and six off-axis channels for improved depth localisation.

WE3 • 2:45 p.m.
MRI-Guided Near-Infrared Tomography of the Breast to Quantify Hemoglobin, Oxygen Saturation, Water and Particle Density *in vivo*, *Brian W. Pogue[1], Ben Brooksby[1], Subhadra Srinivasan[1], Xin Wang[1], Shudong Jiang[1], Hamid Dehghani[1], Keith D. Paulsen[1], John Weaver[2], Christine Kogel[2], Steven P. Poplack[2]; [1]Dartmouth College, USA, [2]Dartmouth Medical School, USA.* The fibroglandular and adiopose tissue boundary was used to segment MR breast images to enhance the reconstruction of NIR parameters. Absolute images of hemoglobin, oxygen saturation, water, scattering particle size and density were recovered.

ROOM 5

2:00 p.m.–4:00 p.m.
WF • Confocal, Multiphoton and Biomedical Applications
Wolfgang Becker; Becker & Hickl GmbH, Germany, Presider

WF1 • 2:00 p.m.
***In situ* Multiphoton Microscopy for Monitoring Femtosecond Laser Eye Surgery in the Human Cornea and Sclera,** *Karsten Plamann[1], Olivier Albert[1], Damien Giulieri[1], David Donate[2], Frank May[3], Jean-Marie Giraud[4], Jean-Marc Legeais[5]; [1]Lab d'Optique Appliquée, France, [2]Service d'Ophtalmologie, Hôpital Édouard Hériot, France, [3]Service d'Ophtalmologie, Hôpital d'Instruction des Armées Legouest, France, [4]Service d'Ophtalmologie, Hôpital d'Instruction des Armées du Val de Grâce, France, [5]Lab Biotechnologie et Œil, Service d'Ophtalmologie, Hôpital Hôtel Dieu, France.* We present a multiphoton imaging system mounted on a microsurgery experimental set-up using a Nd:glass femtosecond laser permitting to induce laser incisions in human cornea and sclera and to perform nonlinear imaging during the intervention.

WF2 • 2:15 p.m.
Multiphoton Imaging of an *in vitro* Ovarian Tissue Model, *Nathaniel D. Kirkpatrick, Molly Brewer, Urs Utzinger; Univ. of Arizona, USA.* In order to understand the distribution of endogenous fluorescence in the ovary, ovarian biopsies were maintained with a viable tissue imaging system and characterized with multiphoton imaging. Tissue images provided correlative data for spectroscopic measurements.

WF3 • 2:30 p.m.
***In vivo* Two Photon Microscopic Study of Short Term Effects of Microbeam Radiation Therapy on the Micorvasculature in Healthy Mouse Brain,** *Pascale Verant[1], Raphael Serduc[2], Regine Farion[2], Chantal Remy[2], Boudewijn Van Der Sanden[2], Jean-Claude Vial[1], Elke Brauer[3], Alberto Bravin[3], Jean Laissue[4], Hans Blattman[5]; [1]Lab de Spectrometrie Physique, France, [2]INSERM U594, France, [3]European Synchrotron Facility, France, [4]Univ. of Bern, Switzerland, [5]Paul Scherrer Inst., Switzerland.* The effects of spatial fractionation of high X-Ray doses on mouse brain microvasculature were studied by two-photon microscopy. No breakdown of the BBB was observed at 312Gy which would make it appropriate for glioma treatments.

WF4 • 2:45 p.m.
2-Photon Laser Scanning Microscopy on Native Cartilage, *Jörg Martini[1], Katja Tönsing[1], Dario Anselmetti[1], Kristin Kirchhof[2], Ronald Schade[2], Klaus Liefeith[2], Veronika Kunert[3], Korinna Hinterkeuser[3], Volker Andresen[4], Heinrich Spiecker[4]; [1]Bielefeld Univ., Germany, [2]IBA e.V., Germany, [3]Verigen AG, Germany, [4]LaVision BioTec GmbH, Germany.* Hyalin cartilage was investigated with 2-photon laser scanning microscope . NIR-2-photon-excitation and a specialized long distance objective lens allowed for autofluorescence and SHG measurements of the extracellular matrix up to 400 µm inside the sample.

ROOM 11

2:00 p.m.–4:00 p.m.
WG • Methods and Instruments II
Jens Steinbrink; Charite, Germany, Presider

WG1 • 2:00 p.m.
Multimodal, Multiplex, Raman Spectroscopy of Alcohol in Diffuse, Fluorescent Media, *Scott T. McCain, Michael E. Gehm, Yanqia Wang, Nikos P. Pitsianis, Michael E. Sullivan, David J. Brady; Duke Univ., USA.* Optical diagnostics in biological materials are hindered by fluorescence and scattering. We have developed a multimodal, multiplex, coded-aperture Raman spectrometer to detect alcohol in a lipid tissue phantom solution.

WG2 • 2:15 p.m.
Cost-Efficient THz-Resonators for Label-Free Detection of DNA Hybridization, *Michael Nagel, Heinrich Kurz; RWTH Aachen Univ., Germany.* THz-technology provides new ground for label-free detection of biomolecules by taking advantage of existing hybridization techniques. Recent developments for label-free analysis of genetic material with femtomol-sensitivity using integrated functionalized THz sensors are presented.

WG3 • 2:30 p.m.
Vapor-Phase Infrared Spectroscopy on Solid Organic Compounds with a Pulsed Resonant Photoacoustic Detection Scheme, *Richard Bartlome, Cornelia Fischer, Markus W. Sigrist; Inst. of Quantum Electronics, Switzerland.* We present first vapor-phase infrared spectra of solid organic compounds recorded with an optical parametric generator-based photoacoustic spectrometer. Emphasis is put on doping substances as used by athletes in sports.

WG4 • 2:45 p.m.
Optical Fiber Sensor for Allergen Detection, *Bendoula Ryad[1], B. Wacogne[1], R. Giust[1], R. Ryad[2], P. Sandoz[1], T. Gharbi[1]; [1]Dept. LOPMD, Inst. Femto-St, France, [2]Dept. LPMO, Inst. Femto-St, France.* The sensor is dedicated to the detection of allergens. We use a biochemical reaction in the vicinity of the core of an optical fiber which modifies the propagation conditions of optical wave by evanescent coupling.

ROOM 3

WE4 • 3:00 p.m.
Muscle Oxygenation during Exercise under Hypoxic Conditions Assessed by Spatial-Resolved Broadband NIR Spectroscopy, *Dmitri Geraskin[1], Petra Platen[2], Julia Franke[2], Christiane Andre[1], Wilhelm Bloch[2], Matthias Kohl-Bareis[1]; [1]RheinAhrCampus Remagen, Univ. of Applied Sciences Koblenz, Germany, [2]Inst. of Cardiology and Sports Medicine, German Sport Univ., Germany.* Broad-band spatially resolved spectroscopy is used for the analysis of muscle oxygenation during an incremental exercise under hypoxic oxygen conditions (0, 2000 and 4000 m altitude above sea level).

WE5 • 3:15 p.m.
Experimental Assessment of Analytical Models for Estimating Tumor Optical Properties in Laser Pulse Mammography, *Dirk Grosenick[1], Bernhard Wassermann[1], Rainer Macdonald[1], Herbert Rinneberg[1], Alessandro Torricelli[2], Lorenzo Spinelli[2], Rinaldo Cubeddu[2]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Politecnico di Milano, Italy.* We used different analytical models (photon density waves, perturbation theory) to analyze optical properties of spherical objects embedded in scattering media. The models were assessed based on phantom experiments and on finite element calculations.

WE6 • 3:30 p.m.
Diffuse Optical Tomography with Spectral Constraints, *Alper Corlu[1], Turgut Durduran[1], Regine Choe[1], Kijoon Lee[1], Martin Schweiger[2], Elizabeth M. C. Hillman[3], Simon R. Arridge[2], Arjun G. Yodh[1]; [1]Univ. of Pennsylvania, USA, [2]Univ. College London, UK, [3]Massachusetts General Hospital, Harvard Medical School, USA.* We derive conditions for unique and simultaneous recovery of chromophore concentrations and scatterering coefficients in multi-spectral continuous wave diffuse optical tomography. We introduce and demonstrate a general methodology for choosing those wavelengths.

WE7 • 3:45 p.m.
NIR Image Reconstruction Using a Single-Rotating-Source/Detector Scanning Device, *Min-Chun Pan[1], Chien-Hong Cheng[1], Wei-Hua Huang[1], Ching-Shiow Tseng[1], Min-Cheng Pan[2]; [1]Dept. of Mechanical Engineering, Natl. Central Univ., Taiwan Republic of China, [2]Dept. of Computer Science and Information Engineering, Tung-Nan Inst. of Technology, Taiwan Republic of China.* The study aims at developing an NIR tomography system using a single rotating-source/detector scanning device associated with an image reconstruction scheme. It is validated by a hemoglobin phantom inserted by another different volume density one.

4:00 p.m.–4:30 p.m.
Coffee Break

ROOM 5

WF5 • 3:00 p.m.
Use of Optical Clearing Agents in Human Dermis Imaging by Two Photon Microscopy, *Riccardo Cicchi[1], Francesco S. Pavone[1], Daniela Massi[1], David D. Sampson[2]; [1]Univ. of Florence, Italy, [2]Univ. of Western Australia, Australia.* We investigate the application of optical clearing agents to improve the image contrast in two-photon microscopy of human dermis. Results obtained with glycerol, propylene glycol and glucose in aqueous solution are presented.

WF6 • 3:15 p.m.
Microscopic Characterization of Bacteria-Hard Tissue Interaction, *Saji George, Anil Kishen; Natl. Univ. of Singapore, Singapore.* Present study describes different microscopic techniques used in the characterization of Enterococcus faecalis biofilm and its interaction with dentine which is a mineralized hard tissue.

WF7 • 3:30 p.m.
Experimental and Theoretical Investigation of a Femtosecond Laser Pulse Scattering in Dense Turbid Media, *Alexey I. Korytin, Ekaterina A. Sergeeva; Inst. of Applied Physics of the RAS, Russian Federation.* Temporal structure of femtosecond laser pulse upon its scattering in dense turbid medium is studied experimentally and theoretically. The experimental data obtained by noncollinear second harmonic generation are in good agreement with the analytical results.

WF8 • 3:45 p.m.
Fiber Optic Reflectance Confocal Imaging: *In vivo* Detection of Cervical Dysplasia, *Kristen D. Carlson[1], Kung-Bin Sung[1], Brette L. Luck[1], Michael R. Descour[2], Michele Follen[3], Rebecca R. Richards-Kortum[1]; [1]Univ. of Texas at Austin, USA, [2]Univ. of Arizona, USA, [3]Univ. of Texas M. D. Anderson Cancer Ctr., USA. In vivo* cellular and nuclear morphologic information could improve detection of epithelial pre-cancer and cancer. We present *in vivo* images of normal and dysplastic human cervical tissue obtained using a fiber optic reflectance confocal microscope.

4:00 p.m.–4:30 p.m.
Coffee Break

ROOM 11

WG5 • 3:00 p.m.
A Single Photon Spectrometer for Biomedical Application, *Salvatore Tudisco; INFN-LNS & DMFCI Catania Univ., Italy.* A monolithic micro-device, capable of measuring simultaneously time distribution and the photons spectrum coming from a weak source like Delayed Luminescence of biological systems. Two innovative construction aspects: Deep Lithography with Particles and SPAD detectors.

WG6 • 3:15 p.m.
Respiratory Monitoring Using Fibre Long Period Grating Sensors, *Thomas Allsop[1], R. Revees[1], D. J. Webb[1], I. Bennion[1], T. Earthrowl[1], B. Jones[1], M. Miller[2]; [1]Aston Univ., UK, [2]Univ. of Birmingham, UK.* We demonstrate the use of a series of in-line fibre long period grating curvature sensors on a garment, used to monitor the thoracic and abdominal volumetric tidal movements of a human subject.

WG7 • 3:30 p.m.
Development of a Novel Real-Time PCR Machine, *Ping-Hei Chen[1], Da-Sheng Lee[2], Jui-Hung Chien[1], Meng-Hsun Wu[1]; [1]Dept. of Mechanical Engineering, Natl. Taiwan Univ., Taiwan Republic of China, [2]Dept. of Air Conditioning and Refrigeration, Natl. Taipei Univ. of Technology, Taiwan Republic of China.* A Real-Time PCR machine with fluorescence spectrometer and thermal cycler was built to perform DNA quantification. Besides, an analytical model was developed for predicting fluorescence. This scheme is as accurate as the commercial quantification system.

WG8 • 3:45 p.m.
GaSb-Based Infrared Diode Lasers for Biomedical Applications, *Axel Huelsmann, Marcel Rattunde, Eva Geerlings, Gudrun Kaufel, Johannes Schmitz, Joachim Wagner; Fraunhofer - IAF, Germany.* GaSb lasers cover the absorption band of water in human tissue as well as the transmission window through human skin. Tuneable diode lasers are ideally suited for non-invasive diagnostics based on multiple-wavelength densitometry.

4:00 p.m.–4:30 p.m.
Coffee Break

ROOM 3

4:30 p.m.–6:00 p.m.
WH • Functional Optical Imaging of the Brain II
Adam Gibson; Univ. of College London, UK, Presider

WH1 • 4:30 p.m.
Diffuse Optical Measurements of Cerebral Blood Flow, Oxygenation and Oxygen Metabolism in Adult Brain, *Turgut Durduran, Guoqiang Yu, Mark G. Burnett, Chao Zhou, Jiongjiong Wang, John A. Detre, Joel H. Greenberg, Arjun G. Yodh; Univ. of Pennsylvania, USA.* We have developed diffuse optical and correlation spectroscopies to measure the oxygenation, volume and blood flow in adult brain during hypercapnia and sensorimotor stimulation allowing calculation of the metabolic rate of oxygen using all-optical methods.

WH2 • 4:45 p.m.
Non-Invasive Detection of Fluorescence from Exogenous Chromophores in the Adult Human Brain, *Adam Liebert[1,2], Heidrun Wabnitz[2], Michael Moeller[2], Rainer Macdonald[2], Jens Steinbrink[3], Hellmuth Obrig[3], Rainer Erdmann[4]; [1]Inst. of Biocybernetics and Biomedical Engineering, Poland, [2]Physikalisch-Technische Bundesanstalt, Germany, [3]Dept. of Neurology, Charité, Humboldt Univ., Germany, [4]PicoQuant, Germany.* We report on non-invasive excitation and detection of fluorescence of a dye inside the adult human brain. The ICG bolus passage in the brain was monitored by time-resolved fluorescence detection following amplified ps laser excitation.

WH3 • 5:00 p.m.
Discrimination between Superficial and Cerebral Signals during Functional Brain Imaging with a Time-Gated System, *Juliette J. Selb, Elizabeth M. Hillman, Danny K. Joseph, David A. Boas; Massachusetts General Hospital, USA.* We present a time-gated system for functional brain imaging. For all detectors, simultaneous detection in 7 temporal windows is achieved on an intensified CCD camera. Different windows enable discrimination between superficial and cortical responses.

WH4 • 5:15 p.m.
Estimation of Path Length Factor for Measurement of Haemoglobin Concentration in the Exposed Cortical Tissue, *Koichiro Sakaguchi[1], Tomoya Tachibana[1], Kentaro Yokoyama[1], Shunsuke Furukawa[1], Eiji Okada[1], Takushige Katsura[2], Atsushi Maki[2], Hideo Kawaguchi[2]; [1]Keio Univ., Japan, [2]Advanced Res. Lab, Hitachi Ltd., Japan.* The optical path length factor, which reflects the wavelength dependence of mean optical path length, is experimentally estimated from the multi-spectral images of exposed cortex of guinea pigs.

ROOM 5

4:30 p.m.–6:15 p.m.
WI • Optical Biosensing Methods and Assays
Brian Pogue; Dartmouth College, USA, Presider

WI1 • 4:30 p.m.
Photoacoustic Sensor for VOC's: First Step towards a Lung Cancer Breath Test, *Marcus Wolff[1], Hinrich G. Groninga[1], Hermann Harde[2], Matthias Dressler[2]; [1]PAS-Tech GmbH, Germany, [2]Helmut-Schmidt-Univ., Germany.* We present a photoacoustic sensor for VOC's based on a room-temperature DFB-diode laser. Detecting certain "biomarkers" such as butane, it has the potential to enable a future breath test for early-stage lung cancer diagnostics.

WI2 • 4:45 p.m.
Saliva Assay Based on Surface Enhanced Raman Scattering (SERS) in the Early Detection of Oral Cancer, *Olivo Malini[1], Kiang Wei Kho[1], Kiang Wei Kho[1], Ze Xiang Shen[2], Khee Chee Soo[1,2]; [1]Natl. Cancer Ctr. of Singapore, Singapore, [2]Natl. Univ. of Singapore, Singapore.* In this study, we use Surface Enhanced Raman Scattering (SERS) to acquire molecular vibrational information from saliva samples with an attempt to detect oral-cancer early. Preliminary results will be presented.

WI3 • 5:00 p.m.
Multidimension Potential of Surface Plasmon Resonance Imaging for Dynamic Surface Characterization: Application to Optical Biochip Systems, *Pierre Lecaruyer, E. Maillart, M. Canva, J. Rolland; Lab Charles Fabry de l'Inst. d'Optique, France.* We have realized a surface plasmon resonance imaging system allowing accurate characterization of biochips. In this paper, the Rouard approach has been extended in complex value to model the reflectivity information.

WI4 • 5:15 p.m.
Development of a Homogeneous Assay Format for p53 Antibodies Using Fluorescence Correlation Spectroscopy, *Hannes Neuweiler, Silvia Scheffler, Markus Sauer; Univ. Bielefeld, Germany.* Fluorescently modified peptide epitopes are applied for detection of p53 antibodies in homogeneous solution. Fluorescence correlation spectroscopy enables simultaneous detection of altered diffusional mobility and confinement of conformational flexibility of the epitopes upon antibody binding.

NOTES

ROOM 3

WH5 • 5:30 p.m.
Cerebral Blood Flow and Volume Measurement in Piglets Using CW NIRS System, *George Themelis, Helen D'Arceuil, Sonal Thaker, Solomon G. Diamond, MariaAngela Franceschini; Athinoula A. Martinos Ctr., Massachusetts General Hospital, USA.* We present a method to measure noninvasively changes in cerebral blood flow and volume from the shape of the heart beat pulse. We present some preliminary data taken on piglets using a CW NIRS system.

WH6 • 5:45 p.m.
Design and Characterization of a Fast 16-Source 64-Detector Time-Resolved System for Functional NIR Studies, *Davide Contini[1], Antonio Pifferi[1], Lorenzo Spinelli[2], Alessandro Torricelli[1], Rinaldo Cubeddu[1]; [1]Politecnico di Milano, Italy, [2]Istituto di Fotonica e Nanotecnologie - CNR, Italy.* We developed a fast 16-source 64-detector time-resolved system for functional NIR studies. Description of the main blocks of the system (source, optics, detection, acquisition, and control) and system characterization are presented.

ROOM 5

WI5 • 5:30 p.m.
Optical Detection of Structural Changes in Atherosclerotic Plaque, *Renee M. Korol[1], Peter B. Canham[1], Helen M. Finlay[1], Rob R. Hammond[1], Mackenzie Quantz[2], Gary G. Ferguson[1], Alexandra R. Lucas[3]; [1]Univ. of Western Ontario, Canada, [2]London Health Sciences Ctr. (Univ. Campus), Canada, [3]John P. Robarts Res. Inst., Canada.* We have demonstrated that *in vitro* fluorescence spectroscopic analysis of diseased carotid arteries can identify clinically relevant compositional changes in connective tissue (collagen type I, III, IV and elastin) associated with plaque remodeling and instability.

WI6 • 5:45 p.m.
Histogram Analysis of Fluorescence Variance in Tissues: Examining the Effect of the Sampling Volume, *Brian W. Pogue, Bin Chen, Xiaodong Zhou; Dartmouth College, USA.* Heterogeneity of a fluorescent drug in tumor tissue was examined through histogram analysis. Sampling areas near 1mm decreased the observed variance of the fluorescence distribution, whereas microscopic sampling reveals a larger variance in the histogram.

WI7 • 6:00 p.m.
LIBS Diagnostics of Dental Tissue Pathologies with the Fiber System of a Radiation Transmission, *Elena L. Surmenko[1,2], Tatiana N. Sokolova[1], Valery V. Tuchin[2], Uliana A. Pushkarenko[2]; [1]Saratov State Technical Univ., Russian Federation, [2]Saratov State Univ., Russian Federation.* LIBS-studies of dental tissues elemental composition and for diagnostics of its various pathologies are described. The special fiber optical system of a radiation transmission to a dental tissue and to a registration system is presented.

NOTES

Thursday, 16 June, 2005

ROOM 3

8:30 a.m.–10:00 a.m.
ThA • Diffuse Spectroscopy and Fluorescence Tomography
Henricus J. Sterenborg; Erasmus Medical Center Rotterdam, Netherlands, Presider

ThA1 • 8:30 a.m.
Dynamic Time-Resolved Diffuse Spectroscopy Based on White Light Generation in a Photonic Crystal Fiber, *Cosimo D'Andrea[1], Andrea Bassi[1], Johannes Swartling[2], Antonio Pifferi[1], Alessandro Torricelli[1], Rinaldo Cubeddu[1]; [1]Politecnico di Milano, Italy, [2]Univ. of Cambridge, UK.* We present a detailed characterization of a time-resolved diffuse spectrophotomer based on supercontinuum light generation in a photonic crystal. We also present the first *in vivo* real-time dynamic spectral measurements by monitoring tissue oxygenation changes.

ThA2 • 8:45 a.m.
A New Scheme for Time-Resolved Diffusing Wave Spectroscopy, *Sigrid Avrillier, Ha Lien Nghiem, Monia Cheikh, Eric Tinet, Jean-Michel Tualle; Lab de Physique des Lasers (CNRS UMR 7538), France.* We present a new scheme for time-resolved measurements in Diffusing Wave Spectroscopy which can be very helpful for blood flow measurements in muscle or brain, and/or for tumors detection in mammography.

ThA3 • 9:00 a.m.
Characterization of Tissue Using Four Wavelength Time-Resolved Near-Infrared Spectroscopy, *Tomas Svensson[1], Johannes Swartling[1], Paola Taroni[2], Alessandro Torricelli[2], Christian Ingvar[3], Pia Lindblom[3], Stefan Andersson-Engels[1]; [1]Lund Inst. of Technology, Sweden, [2]Politecnico di Milano and INFM, Italy, [3]Dept. of Surgery, Lund Univ. Hospital, Sweden.* Four-wavelength time-resolved spectroscopy for tissue (breast, prostate) characterization with respect to optical properties and tissue constituents was performed. Instrumentation for use in clinical environments, for example during surgery and photodynamic therapy, is described.

ThA4 • 9:15 a.m.
A Time-Resolved and Multi-Wavelength, Fluorescence and Diffuse Optical Tomography System for Small Animals, *Bruno Montcel, Renee Chabrier, Patrick Poulet; Inst. de Physique Biologique, France.* Time-resolved acquisitions recorded at several wavelengths and positions are used to map the optical properties of tissues and the distribution of fluorescent probes. Surface coordinates are previously recorded with a conoscopic holographic technique.

ROOM 5

8:30 a.m.–10:00 a.m.
ThB • Modeling for Quantitative Tissue Spectroscopy and Imaging
Mary-Ann Mycek; Univ. of Michigan, USA, Presider

ThB1 • 8:30 a.m. Invited
Computer Aided Visualizations of 3-Dimensional Light Distributions in Tissues for Quantitative Optical Diagnostics, *Karthik Vishwanath, Mary-Ann Mycek; Univ. of Michigan, USA.* Numerical simulations of time-resolved light transport in inhomogeneous tissues reveal quantitative, 3-D-distributions of excitation and fluorescent light. Visualizations generated can assist the optimization of endoscopy-compatible fiber-optic probes and optical imaging systems.

ThB2 • 9:00 a.m.
Depth Localization of Fluorescent Heterogeneities in Semi-Infinite Media: A Numerical Approach Using Early-Arriving Photons, *Anne Humeau[1], Jean-Pierre L'Huillier[2]; [1]Groupe ISAIP-ESAIP, France, [2]Ecole Natl. Supérieure d'Arts et Métiers, France.* The depth-localization of a fluorescent lesion embedded within semi-infinite tissues is determined with a model based on the finite elements method. The work relies on the time to reach half of the maximum fluorescence intensity.

ThB3 • 9:15 a.m.
Performance of Diffusion Theory vs. Monte Carlo Methods, *Lise Lyngsnes Randeberg[1], Andreas Winnem[1], Rune Haaverstad[2], Lars O. Svaasand[1]; [1]Dept. of Electronics and Telecommunications, Norwegian Univ. of Science and Techology, Norway, [2]Dept. of Cardiothoracic Surgery, Trondheim Univ. Hospital, Norway.* Diffuse skin reflectance was simulated by Monte Carlo methods and diffusion theory. Diffusion theory proved to agree well with measurements, and might in some applications supersede Monte Carlo methods due to faster, more efficient algorithms.

ROOM 11

8:30 a.m.–10:00 a.m.
ThC • New Instrument and Imaging Methods
Colin Sheppard; Data Storage Inst., Singapore, Presider

ThC1 • 8:30 a.m.
STED Microscopy far beyond the Diffraction Limit Enables Imaging of Lithographic Nanostructures, *Volker Westphal, Stefan W. Hell; Max Planck Inst. für Biophys. Chem., Germany.* Stimulated emission depletion (STED) microcopy utilizes the strong nonlinearity generated at a reversible saturable transition to overcome the diffraction barrier. We demonstrate an up to 8-fold resolution enhancement on single molecules and lithographic nanostructures.

ThC2 • 8:45 a.m.
Confocal Microscopy and Variable Focal Length Microlenses, *Aaron Mac Raighne[1], Jiangang Wang[1], Eithne Mc Cabe[1], Toralf Scharf[2]; [1]Trinity College Dublin, Ireland, [2]Inst. of Microtechnology, Switzerland.* Addition of variable focal length microlenses to the confocal system has shown some initial promise. Arrays of microlenses with varying parameters are fabricated and their characteristics evaluated in terms of the requirements of confocal microscopy.

ThC3 • 9:00 a.m.
Point Spread Functions with Extended Depth of Focus, *Tony Wilson, Edward Botcherby, Rimas Juskaitis; Univ. of Oxford, UK.* We present a method to engineer a point spread function with extended depth of focus using a diffractive optical element in a light efficient manner. Experimental tow-photon images will be presented.

ThC4 • 9:15 a.m.
Improved Depth Resolution in Video-Rate Line-Scanning Multiphoton Microscopy Using Temporal Focusing, *Eran Tal, Dan Oron, Yaron Silberberg; Weizmann Inst. of Science, Israel.* By introducing spatiotemporal pulse shaping techniques to multiphoton microscopy, it is possible to obtain video-rate images with depth resolution similar to point by point (2D) scanning multiphoton microscopy while mechanically scanning in only one dimension.

ROOM 3

ThA5 • 9:30 a.m.
Quantifiability and Image Quality in Noncontact Fluorescence Tomography, *Ralf B. Schulz[1], Joerg Peter[1], Wolfhard Semmler[1], Cosimo D'Andrea[2], Gianluca Valentini[2], Rinaldo Cubeddu[2]; [1]German Cancer Res. Ctr., Germany, [2]Ctr. for Ultrafast Sciences and Biomedical Optics, Politecnico di Milano, Italy.* Non-contact detection in fluorescence tomography enables image acquisiton without matching fluids or fiber optics. We present experimental results showing quantifiability of noncontact measurements as well as improvements in image quality between conventional and non-contact detection.

ThA6 • 9:45 a.m.
Monte Carlo Simulations of Fluorescence Spectra for 3-D Molecular Imaging, *Jenny Svensson[1], Stefan Andersson-Engels[1], Johannes Swartling[2]; [1]Lund Inst. of Technology, Sweden, [2]INFM-Dipartimento di Fisica and IFN-CNR, Politecnico di Milano, Italy.* We have performed Monte Carlo simulations to determine the depth of a fluorescent layer located in a tissue-like phantom. The depth was determined by forming a ratio of simulated fluorescence intensities at two detection wavelengths.

10:00 a.m.–10:30 a.m.
Coffee Break

10:30 a.m.–12:30 p.m.
ThD • Photon Migration Theory
Sigrid Avrillier; Univ. of Paris, France, Presider

ThD1 • 10:30 a.m.
Analysis on Photon Migration to Brain by Dark Fluence Rate Method, *Hideo Eda; Natl. Inst. of Information and Communications Technology, Japan.* To analyze photon migration to inhomogeneous media, Dark Fluence Rate Method was used. This assumed dark fluence rate at the absorbing materials. Experimental data of brain phantom and analyzed data were agreed well.

ThD2 • 10:45 a.m.
Iterative Perturbation Approach to Light Propagation through Diffusive Layered Media, *Fabrizio Martelli[1], Samuele Del Bianco[1], Giovanni Zaccanti[1], Steven L. Jacques[2], David D. Sampson[3]; [1]Dipartimento di Fisica dell'Univ. degli Studi di Firenze, Italy, [2]Depts. of Biomedical Engineering and Dermatology, Oregon Health & Science Univ., USA, [3]School of Electrical, Electronic and Computer Engineering, Univ. of Western Australia, Australia.* An iterative perturbation approach is proposed to account for the effects of absorbing inhomogeneities on modelling light propagation through diffusive layered media. The procedure shows significant improvement in performance over the Born approximation.

ROOM 5

ThB4 • 9:30 a.m.
Detection of Heterogeneities within Turbid Media by Time-Gated Laser Line Scan Transillumination: Study Based on the Finite Element Method, *Jean-Pierre L'Huillier[1], Anne Humeau[2]; [1]Ecole Natl. Supérieure d'Arts et Métiers, France, [2]Groupe ISAIP-ESAIP, France.* A finite element method is presented to solve the time-dependent light transport within turbid slab media containing different embedded objects. Time-gated simulations show the possibility to improve the spatial localization of these inhomogeneities.

ThB5 • 9:45 a.m.
Simulation of Oblique-Incidence Probe Geometries for Depth-Resolved Fluorescence Spectroscopy, *Josh Pfefer[1], Anant Agrawal[1], Rebekah Drezek[2]; [1]FDA/CDRH, USA, [2]Rice Univ., USA.* Monte Carlo simulations were performed to investigate the optical behavior of oblique-incidence probes used in fluorescence spectroscopy. Selective interrogation can be achieved and varied for a range of depths within 0.5 mm of the surface.

10:00 a.m.–10:30 a.m.
Coffee Break

10:30 a.m.–12:30 p.m.
ThE • Static and Dynamic Biological Fluorescence Sensing
Dietrich Schweitzer; Experimental Ophthalmology, Univ. of Jena, Germany, Presider

ThE1 • 10:30 a.m. Invited
Comparison of Time-Resolved Autofluorescence in the Eye-Ground of Healthy Subjects and Patients Suffering from Age-Related Maculer Degeneration, *Dietrich Schweitzer, Frank Schweitzer, Martin Hammer, Stefan Schenke, Sandra Richter; Experimental Ophthalmology, Univ. of Jena, Germany.* A laser scanner ophthalmoscope, modified for lifetime measurements of autofluorescence of the human eye-ground, was tested in first clinical applications. Healthy subjects were compared with patients suffering from age-related macular degeneration.

ROOM 11

ThC5 • 9:30 a.m.
Real-Time Scanning Confocal Microscope for the Life Sciences, *Ralf Wolleschensky, Bernhard Zimmermann, Michael Kempe; Carl Zeiss Jena GmbH, Germany.* To image fast biological processes in three-dimensional space we introduce a highly sensitive fluorescence line scanner with image acquisition speeds in excess of 100 frames per second (512x512) and with confocal optical sectioning capabilities.

10:00 a.m.–10:30 a.m.
Coffee Break

10:30 a.m.–12:30 p.m.
ThF • Fluorescence, FLIM and Nonlinear Microscopy
Stefan Hell; MPI Biophys. Chemistry, Germany, Presider

ThF1 • 10:30 a.m.
Active Substrates Improving Sensitivity in Biomedical Fluorescence Microscopy, *E. Le Moal[1,2], S. Lévêque-Fort[2], Emmanuel Fort[1], J. P. Lacharme[1], M. P. Fontaine-Aupart[2], C. Ricolleau[1]; [1]Univ. Paris 7, France, [2]Lab de Photophysique Moléculaire, France.* Fluorescent measurements sensitivity can be greatly improved by using active substrates instead of common glass-slides. These substrates can be applied to a wide range of biomedical studies and furthermore can be used with conventional microscopes.

ThF2 • 10:45 a.m.
Single Molecule Detection in Tissue Sections of Human Lymph Nodes by Confocal Fluorescence Microscopy, *Steffen Rüttinger[1], Benedikt Krämer[1], Rainer Macdonald[1], Jörg Neukammer[1], Martin Roos[2], Kerstin Büchner[2], Richard Kroczek[2]; [1]Physikalisch-Technische Bundesanstalt, Germany, [2]Robert Koch-Inst., Germany.* A method to quantify the number of fluorochromes and to derive the antibody binding capacity of activated T-cells in tissue sections of human tonsils is presented employing microscopic single molecule detection.

ROOM 3

ThD3 • 11:00 a.m.
Modelling the Influence of Interfaces and Multiples Layers on Light Propagation in a Slab Geometry with the Radiative Transport Equation, *Rachid Elaloufi, Simon Arridge; Univ. College London, UK.* We show that the role of interfaces in calculating the transmitted and reflected intensity from a slab is important and cannot be neglected for all regimes. We use RTE for a slab and multilayers slab.

ThD4 • 11:15 a.m.
Solutions to the Transport Equation Using Variable Order Angular Basis, *Stephen D. Wright, M. Schweiger, S. Arridge; Univ. College London, UK.* The solution of the Radiative Transfer Equation using the Pn method is computationally expensive. Results are presented that indicate a potential solution to this problem, adaptive Pn, where the order of angular basis is varied.

ThD5 • 11:30 a.m.
Image Reconstruction Using Spatial Sensitivity Profile with the Constraint of Spatial Frequency in Image for Near-Infrared Topography, *Hiroshi Kawaguchi, Eiji Okada; Keio Univ., Japan.* The image reconstruction algorithm using prior knowledge about light path length in tissue and spatial frequency in image was proposed and evaluated by simulation. The most appropriate reconstruction method depends on the arrangement of fibres.

ThD6 • 11:45 a.m.
An Adaptive Diffusion Regularization Method of Inverse Problem for Diffuse Optical Tomography, *Abdel Douiri, Martin Schweiger, Jason Riley, Simon Arridge; Univ. College London, UK.* This paper develops and analyzes the performance of an adaptive diffusion regularization method with a specific algorithm reconstruction method called the Lagged Diffusivity Newton-Krylov method for Diffuse Optical Tomography inverse problem.

ROOM 5

ThE2 • 11:00 a.m.
Time- and Wavelength-Resolved Autofluorescence Detection by Multi-Dimensional TCSPC, *Wolfgang Becker[1], Axel Bergmann[1], Dietrich Schweitzer[2], Martin Hammer[2]; [1]Becker & Hickl GmbH, Germany, [2]Experimentelle Ophthalmologie, Augenklinik der Friedrich-Schiller Univ. Jena, Germany.* We present a TCSPC technique that simultaneously records the photon distribution over the time in the fluorescence decay, the wavelength, and the coordinates of a two-dimensional scan and demonstrate its application to tissue autofluorescence.

ThE3 • 11:15 a.m.
Application of Fluorescence Lifetime and Hyperspectral Imaging to Tissue Autofluorescence: Arthritis, *Clifford Talbot, Richard Benninger, Pieter de Beule, Jose Requejo-Isidro, Daniel Elson, Christopher Dunsby, Ian Munro, Mark Neil, Ann Sandison, Nidhi Sofat, Hideaki Nagase, Paul French, John Lever; Imperial College London, UK.* We present the application of fluorescence lifetime imaging (FLIM) and hyperspectral FLIM to autofluorescence of normal and arthritic cartilage tissue.

ThE4 • 11:30 a.m.
Cellular Autofluorescence Imaging for Early Diagnosis of Cancers, *Karine Steenkeste[1], Ariane Deniset[1], Sandrine Lévêque-Fort[1], Marie-Pierre Fontaine-Aupart[1], Sophie Ferlicot[2], Pascal Eschwège[3]; [1]Lab de Photophysique Moléculaire, France, [2]Service d'Anatomie Cytologie Pathologiques, Hôpital Bicêtre, France, [3]Service d'Urologie, Hôpital Bicêtre, France.* We developed a method for early diagnosis of cancers based on spectrally- and time-resolved endogenous fluorescence as a contrast factor. Promising results have already been obtained for bladder cancers. A detailed clinical study is presented.

ThE5 • 11:45 a.m.
Quantitation of NAD(P)H in Normal and Tumoral Esophageal Epithelial Cells by Spectroscopic and Biochemical Methods, *Sandrine Villette, Sophie Deshayes, Christine Vever-Bizet, Genevieve Bourg-Heckly; Univ. Paris 6, France.* Autofluorescence under 351 nm excitation was characterized in normal and malignant esophageal epithelial cells. NAD(P)H intracellular content determined by fluorescence based methods on single living cells and cell suspensions was consistent with biochemical assay results.

ROOM 11

ThF3 • 11:00 a.m.
Aberrations and Adaptive Optics for Confocal and Multiphoton Microscopy, *Tony Wilson, Martin J. Booth, Michael Schwertner; Univ. of Oxford, UK.* We present measurements of specimen induced aberrations in numerous biological specimens using high NA objectives. We characterise their effects on image quality and distortion, discuss approaches to remove them using adaptive optics and present images.

ThF4 • 11:15 a.m.
Nonlinear Laser-Scanning-Microscopy and Microprocessing of Biological and Technical Materials Using a New Diode Pumped Solid State Femtosecond Laser with Cavity Dumping, *Tiemo Anhut[1], Iris Riemann[1,2], Karsten König[1], Ronan Le Harzic[2,3], Alexander Killi[3], Uwe Morgner[3]; [1]Fraunhofer IBMT, Germany, [2]JenLab GmbH, Germany, [3]Max-Planck-Inst. für Kernphysik, Germany.* A custom made diode pumped Yb:glass femtosecond laser oscillator with electro-optical cavity dumping has been applied for nonlinear laser-scanning microscopy and processing of biomaterials. The high energy pulses proved very efficient for micro-processing of biomaterials.

ThF5 • 11:30 a.m.
The Directionality of Harmonic Generation in High Numerical Aperture Microscopy, *Pu Xu[1], Ian Cooper[1], Colin Sheppard[2]; [1]Sydney Univ., Australia, [2]Natl. Univ. of Singapore, Singapore.* Direction of coherent propagation of second harmonic generation (SHG) was studied for high numerical aperture microscopy. Computation result shows that significant off-axis propagation occurs due to phase anomaly in the focal region.

ThF6 • 11:45 a.m.
FLIM and FCS by Multi-Dimensional TCSPC, *Wolfgang Becker[1], Axel Bergmann[1], Elke Haustein[2], Zdenek Petrasek[2], Petra Schwille[2], Laimonas Kelbauskas[3], Christoph Biskup[3], Tiemo Anhut[4], Iris Riemann[4], Karsten Koenig[4]; [1]Becker & Hickl GmbH, Germany, [2]Biotec TU Dresden, Inst. for Biophysics, Germany, [3]Inst. of Physiology II, Friedrich Schiller Univ., Germany, [4]Fraunhofer Inst. for Biomedical Engineering, Germany.* Multi-dimensional time-correlated single photon counting (TCSPC) in combination with laser scanning microscopes and pulsed lasers delivers both fluorescence lifetime images and fluorescence correlation data. We present applications to autofluorescence imaging and diffusion phenomena in cells.

ROOM 3

ThD7 • 12:00 p.m.
Light Propagation in a Cubic Biological Tissue Having Anisotropic Optical Properties, *Alwin Kienle, Rene Michels, Raimund Hibst; Inst. of Laser Technologies in Medicine and Metrology, Germany.* The light propagation in a cubic biological tissue having anisotropic optical properties is investigated. Monte Carlo simulations employing the phase function of infinitely long cylindrical scatterers are performed and compared to reflectance and transmittance measurements.

ThD8 • 12:15 p.m.
Space-Varying Restoration of Diffuse Optical Tomograms Reconstructed by the Filtered Backprojection Algorithm, *Alexander B. Konovalov[1], Dmitry V. Mogilenskikh[1], Vladimir V. Lyubimov[2]; [1]Russian Federal Nuclear Center, Inst. of Technical Physics, Russian Federation, [2]Res. Inst. for Laser Physics, Russian Federation.* The possibility of high-resolution deblurring of diffuse optical tomograms reconstructed by the backprojection algorithm is substantiated. The spatially variant point spread function is simulated and the linear space-variant blur model is applied for tomogram restoration.

ROOM 5

ThE6 • 12:00 p.m.
Spectral Analysis of Delayed Luminescence as a Tool to Discriminate between Normal and Cancer Skin Cells, *Francesco Musumeci[1,2], Agata Scordino[1,2], Salvatore Tudisco[1,2], Lee Ann Applegate[3], Hugo J. Niggli[4]; [1]DMFCI - Univ. di Catania, Italy, [2]LNS-INFN, Italy, [3]Dept. of Orthopedics, Lab of Oxidative Stress and Ageing, Univ. Hospital, Switzerland, [4]BioFoton AG, Switzerland.* The time resolved emission spectrum of delayed luminescence from human fibroblast and melanoma cells was measured. Noticeable differences both in the emission spectra, and in the time trend of the spectral components were found.

ThE7 • 12:15 p.m.
A New Approach to Interpretation of Heterogeneity of Fluorescence Decay in Complex Biological Systems, *Jakub Wlodarczyk, Borys Kierdaszuk; Univ. of Warsaw, Poland.* Model of continuous lifetime distribution led to a power-like function called Tsallis q-exponential function. The power-like function provides new information, is simpler then traditional multi-exponential functions, and better describes heterogeneous nature of studied systems.

ROOM 11

ThF7 • 12:00 p.m.
Multifocal Multiphoton Fluorescence Lifetime Microscopy for Biomedical Applications, *Ariane Deniset[1], Sandrine Lévêque-Fort[1], Marie-Pierre Fontaine-Aupart[1], Gérard Roger[2], Patrick Georges[2]; [1]LPPM, France, [2]Lab Charles Fabry, France.* Two-photon microscopy is a key method for biomedical imaging but leads to a long recording time for three-dimensional and FLIM images. To speed up acquisitions, we have developed a time resolved multifocal multiphoton microscope.

ThF8 • 12:15 p.m.
Fluorescence Lifetime Imaging Microscopy Using a Tunable Continuum Source and a Nipkow Disk Confocal Microscope, *David Grant[1], Egidijus Auksorius[1], Damian Schimpf[1], Daniel S. Elson[1], Christopher Dunsby[1], Jose Requejo-Isidro[1], Ian Munro[1], Mark A. Neil[1], Paul M. French[1,2], Patrick Courtney[2]; [1]Imperial College London, UK, [2]Perkin Elmer Inc., UK.* Multi-beam confocal sectioned fluorescence lifetime imaging microscopy is demonstrated using a Yokogawa spinning disk. The singlehoton excitation source is a supercontinuum generated from a Ti:sapphire seeded photonic crystalline fibre.

NOTES