Stepping Stone Symposia

SSSTC

Sino Swiss Science and Technology Cooperation

Conference on

Medical Technology

November 6－7, 2013

Shanghai Jiao Tong University, China

Host organisers:

SJTU，SSSTC

Organisers：

Med-X Research Institute of SJTU

Shanghai Institute of Traumatology and Orthopedics

Institute of Forming Technology and Equipment of SJTU

Sponsers:

Johnson and Johnson Medical Companies

Shanghai Ingenious Automation Technology Co., Ltd.

Supporter:

Swissnex China

 (find the detailed programme on Page 8)

SSSTC (Sino Swiss Science and Technology Cooperation) Stepping Stone Symposium on Medical Technologies

Conference Agenda

Date	Time	Program Schedule//Venue	
06/11 Wednsday	**Morning** **8:00—8:30** Registration	**Medical Robotics & Imaging Session**	**Tissue Engineering Session**
	Morning 8：30—8：45 Opening address 8:45—12:00 Presentation 25 Min/Person Coffee break 20 Min	**Medical Robotics, Imaging,** **& Tissue Engineering** **Haoran Building 102**	
	12:00-13:00 Lunch	**Faculty Club**	
	Afternoon 13:15—17:25 Presentation 25 Min/Person Coffee break 25 Min	**Medical Robotics & Imaging（Ⅰ）** **Medical Robotics & Imaging（Ⅱ）** **(The Museum of SJTU's History,108)**	**Tissue Engineering（Ⅰ）** **Tissue Engineering（Ⅱ）** **(Med-X School, 218)**
	18:00—19:30	**Shun Feng Restaurant**	
07/11 Thursday	**Morning** 8:30—11:50 Presentation 25 Min/Person Coffee break 25 Min	**Medical Robotics & Imaging（Ⅲ）** **(The Museum of SJTU's History, 108)**	**Laboratory Visits**
	11:50—12:50 Lunch	**Faculty Club**	
	Afternoon/Evening 13:30—21:30	**Sightseeing: Shanghai City**	

Welcome to the Stepping Stone Symposium on Medical Technologies

Dear symposium participants,

It is our honour and pleasure to welcome you to the Stepping Stone Symposium on Medical Technology.

In this symposium, we bring together researchers and clinicians from renowned Swiss and Chinese universities and hospitals so as to ensure scientific excellence. We also invited practitioners of innovation as speakers in order to keep societal needs in the perspective. We wish all participants an exciting and mentally stimulating conference.

Representing organising committee, we thank Shanghai Jiao Tong University, SSSTC, Med-X Research Institute of SJTU, Institute of Forming Technology and Equipment of SJTU, Shanghai Institute of Traumatology and Orthopedics, Johnson and Johnson Medical Companies, Shanghai Ingenious Automation Technology Co., Ltd., and Swissnex China for their moral, intellectual, and financial support. Last but not least, we thank the scientific board members and various session chairs for shaping the programme and the speakers for their scientific contributions: without your support, this symposium would not have been possible.

Sincerely yours,

Le Xie

Lianfu Deng

Organising Committee

Shanghai Institute of Traumatology and Orthopedics

Information

Directions

The symposium will take place in the **Xuhui campus of Shanghai Jiao Tong University**.

How to reach the conference location **from Hengshan Hotel**:

Walk down Wanping Road and turn right to Guangyuan Road at the first crossing.

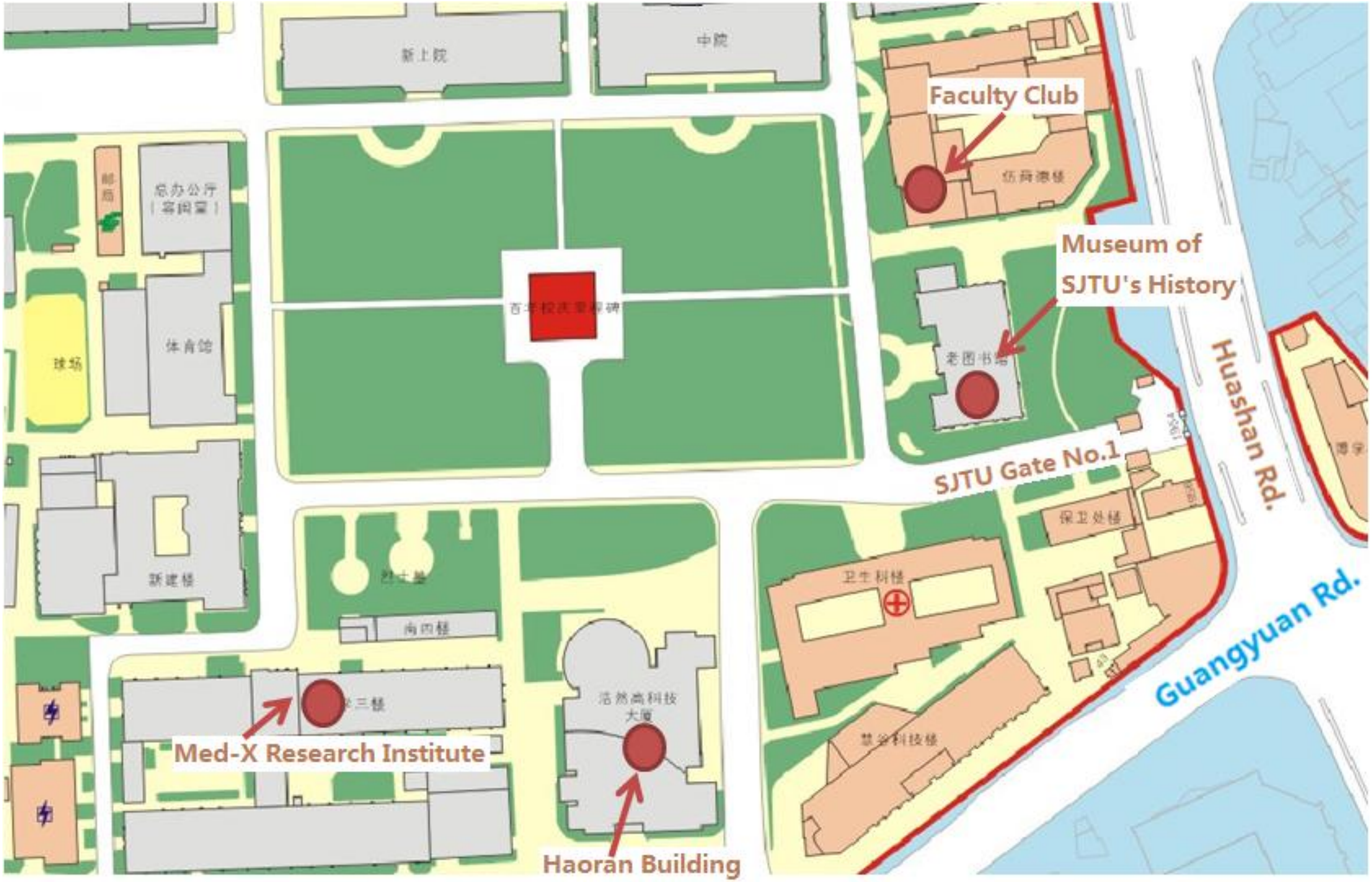
Walk on for about 10 mins (600 meters) to the crossing and turn right to Huashan Road. Lastly walk for 50 meters and you will see **Shanghai Jiao Tong University** on your left.

How to find the conference venues:

After you enter the **Xuhui campus of Shanghai Jiao Tong University** through Gat No.1, you will find the **Museum of SJTU's History** and the **Faculty Club** on your right, and the **Haoran Building** and **Med-X Research Institute** on your left.

The directions in details can be found from the following maps.

From Hengshan Hotel to Shanghai Jiao Tong University



Conference Venues (within the Xuhui Campus of Shanghai Jiao Tong University)

Registration desk:

The registration desk is located in front of the conference room**: Haoran Building 102.** See also the site map above for further details.

It will open at 08:00am on Wednesday, November 6, 2013. After the first session it will be open and occupied every morning 30 min before the conference starts as well as before and after each session.

Walk-in registration will be possible during the conference at the beginning of each session.

Instructions to speakers:

To ensure that your presentation is loaded timely onto the presentation computer, please follow the instructions below and submit your presentation slides on November 5, 2013 to Juan Fang or Le Xie, or at the registration table on November 6/7.

- Save your presentation file on a USB memory stick as a PDF or Power Point (.ppt or.pptx) file. The USB memory stick should be inserted into an envelope ready to hand-in at the time of your registration.

  The envelope should be labeled with:

  - Your first name and last name
  - Date of the presentation
  - Time of the presentation
- The presentation on the USB memory stick must be named: NAME_DD_time.ppt where DD is the day of your oral presentation.
- You can collect your USB memory stick from the registration desk after your presentation.
- Each speaker has 25 minutes, including 20-minute speech and 5- minute discussion.

Emergency contact numbers

Should you encounter any emergencies, please do not hesitate to dial the following numbers:

Juan Fang +86 13511643570

Le Xie +86 13816057961

Maio Chen-Su: +41 44 632 8101

For general information, please contact:

Juan Fang +86 13511643570, juanfang@sjtu.edu.cn, or

Le Xie +86 13816057961, Lexie@sjtu.edu.cn.

Maio Chen-Su: +41 44 632 8101, maio.chen-su@sl.ethz.ch

(email would be more reliable)

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Programme

Wednesday, November 06, 2013 **Haoran Building 102**

08:00—08:30 **Registration**

08:30—08:45 **Opening Ceremony**

Session Ⅰ Medical Robotics, Imaging & Tissue Engineering

Session chairs: **Shao-Xiang Zhang**（Third Military Medical University）

and **Ralph Müller**（ETH Zurich）

(Wednesday, November 06, 2013 Haoran Building 102)

(Each speaker has 25 minutes, including 20-minute speech and 5- minute discussion)

08:45—09:10 **Kerong Dai**（Shanghai Jiao Tong University）

"Orthopaedic Application of 3D Printing Technology" find the abstract on page 14

09:10—09:35 **Ralph Müller**（ETH Zurich）

"Mechanobiology in Bone Tissue Engineering and Skeletal Regeneration" page 15

09:35—10:00 **Shao-Xiang Zhang**（Third Military Medical University）

"Chinese Visible Human Project and its application" page 16

10:00—10:20 **Coffee Break**

10:20—10:45 **Nikos Stergiopulos**（EPFL）

"The Role of the Academic Lab in the Development of Frontline and Clinically -Relevant Medical Technologies" page 33

10:45—11:10 **Marco Domenico Caversaccio**（University Hospital Bern）

"Navigation and Robotics in Paranasal Sinuses and Ear Surgery" page 31

11:10—11:35 **Yubo Fan**（Beihang University）

"Modeling and Its Applications of Orthopedic Biomechanics" page 45

11:35—12:00 **Marco Stampanoni**（ETH Zurich）

"Phase Contrast X-ray Imaging: New Frontiers in Medical Diagnostic" page 37

12:00—13:00 **Lunch** **Faculty Club**

Session Ⅱ Medical Robotics & Imaging（Ⅰ）

Session chairs: **Erik Schkommodau**（University of Applied Sciences Northwestern Switzerland）and **Tiange Zhuang**（Shanghai Jiao Tong University）

(Wednesday, November 06, 2013 The Museum of SJTU's History, 108)

(Each speaker has 25 minutes, including 20-minute speech and 5- minute discussion)

13:15—13:40 **Wenwei Yu**（Shanghai Jiao Tong University）

"Functional Electrical Stimulation for Lower Limb Function Restoration" page 44

13:40—14:05 **Guoyan Zheng**（University of Bern）

"Medical Image Computing for Orthopaedic Applications" page 29

14:05—14:30 **Le Xie**（Shanghai Jiao Tong University）

"Medical robot & virtual surgery" page 25

14:30—14:55 **Christoph Teichler (Johnson & Johnson Medical Companies)**

"Product Development for Trauma Surgery in China: Current Challenges and Opportunities" page 46

14:55—15:20 **Lei Tang**（Southern Medical University of China）

"Construction and Visualization of High-Resolution Three-Dimensional Anatomical Structure Datasets for Chinese Digital Human" page 30

15:20—15:45 **Coffee Break**

Session Ⅲ Medical Robotics & Imaging（Ⅱ）

Session chairs: **Le Xie**（Shanghai Jiao Tong University）

and **Guoyan Zheng**（University of Bern）

(Wednesday, November 06, 2013 The Museum of SJTU's History, 108)

(Each speaker has 25 minutes, including 20-minute speech and 5- minute discussion)

15:45—16:10 **Erik Schkommodau**（University of Applied Sciences Northwestern Switzerland）

"Tool Mounted Navigation System For Computer Aided Surgery" page 35

16:10—16:35 **Tiange Zhuang**（Shanghai Jiao Tong University）

"From Xero(radio)graphy to Modern X-ray Based Medical Imaging" page 21

16:35—17:00 **Brett Bell**（University of Bern）

"High Accuracy Minimally Invasive Robotic Cochlear Implant Surgery" page 43

17:00—17:25 **Junjun Pan**（Beihang University）

"A Medical VR Simulator in Laparoscopic Surgery for Rectum Cancer" page 38

18:00—19:30 **Dinner** **Shun Feng Restaurant**

Session Ⅳ Tissue Engineering（Ⅰ）

Session chairs: **Doninique Pioletti**（EPFL）

and **Guo-Yuan YANG**（Shanghai Jiao Tong University）

(Wednesday, November 06, 2013 Med-X School, 218)

(Each speaker has 25 minutes, including 20-minute speech and 5- minute discussion)

13:15—13:40 **Weihai Yin**（Shanghai Jiao Tong University）

"Strategies and Mechanisms of Tissue Injury and Neuroprotection" page 23

13:40—14:05 **Marcus Textor**（ETH Zurich）

"3D Cell Culture Platforms for Drug Development and Screening" page 17

14:05—14:30 **Tingting Tang**（Shanghai Jiao Tong University）

"Stem Cells: Two Sides of the Coin" page 32

14:30—14:55 **Ursula Graf-Hausner**（Zurich University of Applied Sciences）

"Tissue Engineering for Drug Development and Substance Testing" page 20

14:55—15:20 **Xiaoling Zhang**（Shanghai Jiao Tong University）

"The Stragety of Metallic Implants Coating Enhance BMSCs Osteogenesis and Bone Regeneration" page 34

15:20—15:45 **Coffee Break**

Session Ⅴ Tissue Engineering（Ⅱ）

Session chairs: **Weihai Yin**（Shanghai Jiao Tong University）

and **Marcus Textor**（ETH Zurich）

(Wednesday, November 06, 2013 Med-X School, 218)

(Each speaker has 25 minutes, including 20-minute speech and

5- minute discussion)

15:45—16:10 **Doninique Pioletti**（EPFL）

"Drug Delivery, Implant-Tissue Bed Preparation, and Biomechanical Stimulus as Tools to Enhance Musculoskeletal Tissues Formation" page 22

16:10—16:35 **Guo-Yuan YANG**（Shanghai Jiao Tong University）

"Silica-Coated Super Paramagnetic Iron Oxide Nanoparticles Targeting of EPCs in Ischemic Brain Injury" page 18-19

16:35—17:00 **Marcy Zenobi-Wong**（ETH Zurich）

"Engineering Cell/cell and Cell/tissue Adhesion for Regenerative Medicine Application" page 41

17:00—17:25 **Lianfu Deng**（Shanghai Jiao Tong University）

"The Therapeutic Potential of Hypoxiamimiing Agents in Guided Bone Repair and Regeneration" page 47

18:00—19:30 **Dinner** **Shun Feng Restaurant**

Thursday，November 07, 2013

Session Ⅵ Medical Robotics & Imaging（Ⅲ）

Session chairs: **Lixu Gu**（Shanghai Jiao Tong University）

and **Markus Rudin**（ETH Zurich）

(Thursday, November 07, 2013 The Museum of SJTU's History, 108)

(Each speaker has 25 minutes, including 20-minute speech and

5- minute discussion)

08:30—08:55 Markus Rudin（ETH Zurich）

"Noninvasive Imaging: from Anatomical Structures to Cellular and Molecular Processes" page 24

08:55—09:20 Lixu Gu（Shanghai Jiao Tong University）

"Image Guided Cardiac Intervention Using MTS and Intro-Operative US" page 28

09:20—09:45 Beat Werner（University Children's Hospital Zurich）

"Trancranial MR Imaging Guided Focused Ultrasound for the Treatment of Functional Brain Disorders" page 39

09:45—10:10 Gang Chai（Shanghai Jiao Tong University）

"Precise Osteotomy of Craniofacial Surgery Through Augmented Reality" page 36

10:10—10:35 Coffee Break

10:35—11:00 Daniel André Rüfenacht（Clinic Hirslanden, Zurich）

"Computational Aneurysm Phantom: Its Potential for Use in Clinical Sciences" page 26-27

11:00—11:25 Juan Fang（Shanghai Jiao Tong University）

"Robotics Design for Early Rehabilitation of Walking Based on Circle Approximation of the Toe Trajectory" page 40

10:25—11:50 Qing Wang（University Hospital of Lausanne）

"Wireless Blood Pressure Monitoring System" page 42

11:50—12:50 Lunch **Faculty Club**

Speakers

Family name:	Dai
First name:	Kerong
Title:	Life Tenured Professor
Institution:	Engineering Research Center of Digital Medicine and Clinical Translation, Ministry of Education, PRC Med-X Institute, Shanghai Jiao Tong University
Position:	Director
E-Mail:	krdai@163.com

Research Interest:

Structural and functional reconstruction of bone and joints
Regeneration of bone and cartilage

Professional History:

1955 Graduated from Shanghai First Medical College
1975- Dept.of Orthopaedics, Ninth People's Hospital, Shanghai Second Medical University
1983-1984 Research Fellow, Orthopaedic Biomechanics Lab., Mayo Clinic, Rochester, MN, USA
1985-2000 Director, Dept.of Orthopaedics, Ninth People's Hospital, Shanghai Second Medical University
1993-1998 Superintendent, Ninth People's Hospital, Shanghai Second Medical University
2003- Director, Shanghai Medical Center of Joint Surgery
2003- Director, Bone & Joint Research Center, Shanghai Jiao Tong University School of Medicine
2003- Academician, Chinese Academy of Engineering
2006- Director, Engineering Research Center of Digital Medicine and Clinical Translation, Ministry of Education, PRC
2007- Chairman ,National Experts Committee of Med-X Research Institute, Shanghai Jiao Tong University

AbstractTitle: Orthopaedic Application of 3D Printing Technology

Author/s: Kerong Dai

Keywords:

Abstract:

U.S. “Time” magazine listed 3D printing technology into “America's top ten fastest-growing industries”, and British “Economist” magazine believes that 3D printing technology will “promote the realization of the third industrial revolution together with other digital production modes”.

In the medical field, 3D printing technology could meet the demand for individualized treatment that the patients and surgeons dreamed of. We could customize personalized prosthesis of all the joints and bones in limbs, head and face. Furthermore, the tissue engineering scaffolds that meet the individual requirements can be made through 3D printing technology, thus bone, cartilage, tendons and other tissues or bone/cartilage composite could be constructed by tissue engineering technology, and even in the process of 3D printing, the “planting” of cells and growth factors are completed simultaneously.

Family name:	**Müller**
First name:	**Ralph**
Title:	**Prof. Dr.**
Institution:	**ETH Zurich, Institute for Biomechanics**
Position:	**Deputy Head, Department of Health Sciences and Technology**
E-Mail:	**ram@ethz.ch**

Research Interest: Mechanobiology, Bioimaging, Tissue Engineering and Regenerative Medicine

Professional History: Ralph Müller is a Professor of Biomechanics and the Deputy Head of the Department of Health Sciences and Technology at ETH Zurich. He received his doctoral degree in Electrical Engineering from ETH in 1994. Prior to his tenure at ETH Zurich, he served as an Assistant Professor of Orthopaedic Surgery at Harvard University. The research he has completed and is currently pursuing employs state-of-the-art biomechanical testing and simulation techniques as well as novel bioimaging and visualization strategies for biological tissues. His approaches are now often used for precise phenotypic characterization of tissue response in regenerative medicine, mechanobiology and mammalian genetics. He is an author of over 500 peer-reviewed publications in international scientific journals and conference proceedings.

Abstract Title: Mechanobiology in bone tissue engineering and skeletal regeneration

Author/s: ***Ralph Müller***

Keywords: ***Mechanobiology, tissue engineering, skeletal regeneration***

Abstract: Mechanical forces play a central role in determining the 3D spatial organization of biological tissues. Biological processes such as tissue remodeling and repair are all influenced by a variety of mechanical and biochemical stimuli. Bone tissue, for example, utilizes mineralized collagen to resist both tensile and compressive stresses. Various elements such as cell migration, shape-change, orientation, or matrix synthesis, can be explained in terms of cell attachment sites, matrix anisotropy, stress-shielding, force vectors, or rates of strain. The research field investigating how cells interpret external loads imposed on their extracellular environment and how cell-substrate interactions are converted into biochemical signals in mechanically active tissues such as bone is referred to as mechanobiology. The importance of mechanobiology in tissue engineering is constantly growing: an understanding of the effect of mechanical stimuli on tissue growth is increasingly seen as the next major research focus in this area. Additionally, when designing novel materials and manufacturing methods for scaffold production, it is mandatory to consider deficiencies of scaffolds currently on the market, for example related to efficacy, handling, biocompatibility, biodegradability, and mechanical performance. In order to test in a systematic and controlled way the interaction between cells and scaffolds, and to assess the optimal scaffold parameters, both in vitro studies and computer simulations are necessary. Recently, a number of new microstructural imaging modalities have been put forward allowing quantification with high precision and accuracy. Using this approach, quantitative endpoints have become an important factor for success in functional tissue engineering and skeletal regeneration. Microtomographic imaging is key to these developments and is expected to shed light on the relationship between cell in-growth and viability and structural features of the host material. As part of the presentation, new strategies for advanced imaging techniques to improve and control tissue engineering strategies in skeletal applications will be presented. The focus will be on hierarchical micro- and nano-imaging as well as image-guided biomechanics and mechanobiology using both experimental and computational models of tissue regeneration in vitro and in vivo.

Family name:	**Zhang**
First name:	**Shao-Xiang**
Title:	**Ph.D, MD**
Institution:	**Third Military Medical University**
Position:	**Head, Institute of Digital Medine**
E-Mail:	**zhangcvh@aliyun.com**

Research Interest: Visible human, digital medicine, computer assisted surgery

Educational History:

1991 Ph.D.,M.D, Medical Science, Third Military Medical University, China

1988 M. Sc., Medical Science, Third Military Medical University, China

1983 B. Sc., Medical Science, Third Military Medical University, China

Previous Positions:

12/1994 – Present Professor, Head , Institute of digital Medicine
9/2006-9/2013 Vice Chirman, Third Military Medical University
1/1994 – 12/1994 Associate Professor, Dept. of Anatomy , College of Medicine,
Third Military Medical University
7/1991 – 10/1993 Visiting scholar, Bonn University, Germany

AbstractTitle: **Chinese Visible Human Project and its application**

Author/s: ***Shao-Xiang Zhang and Li-Wen Tan***

Keywords: ***Visible human, Chinese visible human, 3D reconstruction, Digital medicine***

Abstract:

"Visible Human Project (VHP)" was initiated by US National Library of Medicine in 1989. Afterwards, the library signed contract with Health Science Center of the University of Colorado to formally carry out the project in August 1991. Accordingly, research team at the University of Colorado collected a structural data set of human body after obtaining successive sectional images. A digital image data set of a complete human male cadaver was acquired and made available for public use in November 1994, which aroused worldwide enthusiasm in this field. And remarkable social and economic benefit has been gained. Thereafter, some countries initiated their visible human project one after another. Korea started 5-year "Visible Korean Human (VKH)" project (Mar.2000—Feb.2005) in 2000 and first data set was derived from a patient with acquired cerebroma in 2001. China started its project in 1999 which the first data set of Chinese visible human was set up at The Third Military Medical University in October 2002. Before then, by utilizing data made public by US VHP, Chinese scientists in informatics had exerted themselves on preliminary work to pave the way for further achievement. Now VHP research is so promising a scientific field to meet the need of digital era and will be increasingly common in many areas relating with structure and function of human body, the deployment of Chinese Visible Human Project (CVHP) is of great strategic significance in science and technology.

Since it was build up nine years ago, CVH data set has been widely applicated in various fields including creating a human body model for radiation protection and for comparing images for B ultra sound diagnosis and making models for surgary simulation.

Family name:	Textor
First name:	Marcus
Title:	Prof. em.
Institution:	ETH Zurich, Dept of Materials
Position:	Professor em.
E-Mail:	marcus.textor@mat.ethz.ch

Research Interest: Biointerface science; Polymer chemistry; Surface patterning; Nanoparticles; 3D cell culture systems; Drug delivery systems

Professional History:

1966 – 1972	University of Zurich, Chemistry
1972	Ph.D. University of Zurich, Chemistry Department
1973 - 1974	Assistant and Lecturer, Univ. of Zurich, Chemistry Department
1975 - 1976	Postdoctoral Fellowship (Royal Society): Univ. of Sussex, Brighton, UK
1976 – 1977	Assistant and Lecturer at Univ. of Zürich, Chemistry Department
1978 – 1994	Alusuisse Technology Center, Neuhausen am Rheinfall, Switzerland
1994 – 2011	Federal Institute of Technology (ETH) Zurich, Department of Materials,
2006 - 2009	Director of the Competence Center for Materials Research and Technology (CCMX), Unit “Materials for the Life Sciences”

AbstractTitle: **3D cell culture platforms for drug development and screening**

Author/s: ***Maria Hakanson, Stefan Kobel, Matthias P. Lutolf, Marcus Textor, Edna Cukierman***

Keywords:

Abstract: Increasing evidence shows that the cancer microenvironment affects both tumorigenesis and the response of cancer to drug treatment. Therefore in vitro models that selectively reflect characteristics of the in vivo environment are greatly needed. Current methods allow us to screen the effect of extrinsic parameters such as matrix composition and to model the complex and three-dimensional (3D) cancer environment. However, 3D models that reflect characteristics of the in vivo environment are typically too complex and do not allow the separation of discrete extrinsic parameters.

In this study we used a poly(ethylene glycol) (PEG) hydrogel-based microwell array to model breast cancer cell behavior in multilayer cell clusters that allows a rigorous control of the environment. The innovative array fabrication enables different matrix proteins to be integrated into the bottom surface of microwells. Thereby, extrinsic parameters including dimensionality, type of matrix coating and the extent of cell-cell adhesion could be independently studied.

Our results suggest that cell to matrix interactions and increased cell-cell adhesion, at high cell density, induce independent effects on the response to Taxol in multilayer breast cancer cell clusters. In addition, comparing the levels of apoptosis and proliferation revealed that drug resistance mediated by cell-cell adhesion can be related to altered cell cycle regulation. Conversely, the matrix-dependent response to Taxol did not correlate with proliferation changes suggesting that cell death inhibition may be responsible for this effect.

The application of the PEG hydrogel platform provided novel insight into the independent role of extrinsic parameters controlling drug response. The presented platform may not only become a useful tool for basic research related to the role of the cancer microenvironment but could also serve as a complementary platform for in vitro drug development.

Ref.: PLoS ONE 7(6): e40141. doi:10.1371/journal.pone.0040141

Family name:	**YANG**
First name:	**Guo-Yuan**
Title:	**M.D.Ph.D.**
Institution:	**Neuroscience & Neuroengineering Center**
Position:	**KC Wong Endowed Chair Professor**
E-Mail:	**gyyang0626@gmail.com**

Research Interest: Medical Image Analysis, Image Guided Intervention/Surgery

Professional History:

Dr. *Guo-Yuan Yang* received his MD/PhD degree from Shanghai Medical University in 1987, and conducted his post-doctoral research at University of California at San Francisco (UCSF) from 1989 to 1991. He then worked as a Research Investigator and Assistant Professor at the University of Michigan Medical Center from 1991 to 2001. Dr. Yang worked as Associate Professor and Professor at UCSF from 2001 to 2008. In 2008 he joined Med-X Research Institute as Associate Dean and Chair professor. Dr. Yang studied on the mechanisms of cerebrovascular diseases in both basic and clinical fields. He currently developed focal angiogenesis and focal microvessel dysplasia model in rodent brain for the cerebrovascualr research. Dr. Yang is also studying on neuro-imaging, neural rehabilitation, biomedical-materials, and medical device for stroke therapy. His research has been supported by K. C. Wong Foundation, 973 Program of China, National Natural Science Foundation of China, Shanghai Municipal Health Bureau, etc.. Dr. Yang has published more than 180 scientific papers and seven chapters of books. Dr. Yang is Director Board of the International Society of Cerebral Blood Flow and Metabolism, Associate Editor of CNS Neuroscience and Therapietics, Editor Board of Stroke, Aging and Disease, etc.

Dr. Yang's major achievements were including: 1) He was the pioneer in the world to develop a middle cerebral artery occlusion and reperfusion model in mice; 2) the first to apply gene therapy for ischemic stroke in the world using adenoviral vector; 3) established a focal angiogenesis to treat focal brain ischemia and developed an arteriovenous malformation model in mice; 4) pioneeringly studied the morphology and distribution of cerebral vessels in mice using a synchrotron radiation angiography and; 5) stem cell therapy for cerebral vascular diseases.

AbstractTitle: **Silica-coated superparamagnetic iron oxide nanoparticles targeting of EPCs in ischemic brain injury**

Author/s: *Guo-Yuan Yang*

Keywords:

Abstract:

Background and Purpose: Endothelial progenitor cells (EPCs) hold high therapeutic value for their capability of vascular re-pairing and post-ischemic neovascularization. Intravenous injection for stem cell transplantation is relatively non-invasive and more approximate to clinical application. However, only a small portion of injected cells migrate to sites of interest using this way. In present study, we investigate a novel approach to promote the migration of intravenously transplanted cells to cerebral ischemic region.

Methods: Human EPCs were transfected with superparamagnetic iron oxide nanoparticles (SPIO). Cell viability, proliferation, migration and tube formation were tested *in vitro*. Magnetic devices in the static and flowing condition were applied to test whether SPIO-transfected EPCs could be captured. Adult male ICR mice (n=60) underwent transient suture middle cerebral artery occlusion (tMCAO) and cell transplantation with or without magnetic application. Brain atrophy volume, neurobehavioral outcomes, microvessel counts, migration of EPCs and VEGF secretion quantification were examined at 2 weeks and 4 weeks after MCAO respectively.

Results: Cell viability, proliferation, migration and tube formation were not affected by SPIO and exterior magnetic field. SPIO-transfected EPCs can be captured *in vitro*. Brain atrophy volume was greatly reduced, neurobehavioral outcomes were largely improved and quantification of microvessel, EPCs migration and VEGF secretion were significantly increased in both magnet and SPIO-transfected EPCs treated mice compared with control mice at 2 weeks and 4 weeks after MCAO (p<0.05).

Conclusions: Magnetic targeting promoted cell engraftment and resulted in greater functional improvement in long-term observation. It proves to be a new and promising method in stem cell systemic transplantation.

is to target. The system was validated by animal studies on six porcine subjects.

Family name:	**Graf-Hausner**
First name:	**Ursula**
Title:	**Prof. Dr.**
Institution:	**Zurich University of Applied Sciences ZHAW**
Position:	**Head of competence centre TEDD**
E-Mail:	**Ursula.graf@zhaw.ch**

Tissue Engineering for Drug Development, Biomaterials, Bioprinting, 3D tissue models, automation

Professional History:

Ursula Graf-Hausner completed her diplomas in biology and chemistry at Heidelberg University Germany 1976 and received her PhD in biochemistry from University of Zurich 1981. She worked as research scientist for biotechnology in Sandoz AG, Basel. Since 1990 she has been professor of micro- and cell biology at Zurich University of Applied Sciences ZHAW. Sabbaticals enabled her to work with human primary cells and stem cells. Since 2001 she is founding member and vice president of biotechnet Switzerland, a national research consortium. Since 2008 she is head of R&D, Institute of Chemistry and Biological Chemistry, ZHAW. Current research interests: tissue engineering, biomaterials, organotypic 3D models, automation. 2011 she established the national competence centre Tissue Engineering for Drug Development.

AbstractTitle: **Tissue Engineering for Drug Development and Substance Testing**

Author/s: ***Ursula Graf-Hausner***
Keywords: ***3D organotypic tissue models, bioprinting, automation***

Abstract:

Physiological relevance is a key parameter to improve predictivity of cellbased assays in drug discovery and toxicity testing for compound de-risking. The continually rising numbers of compound failures and increasing costs of drug and substance development are fostering the use of biologically more complex cell models in drug development. Conventional 2D culture conditions are highly limited as native tissue morphology and cell composition is not properly reflected. To create tissue-specific structures and function in vitro, cell cultures have to be translated into the third dimension.

Therefore, 3D cell culture technologies and associated analytical tools are essential for basic and pharmaceutical research as well as for the evaluation of chemicals and cosmetics. The talk covers the newest developments in the key areas of 3D cell culture technologies. This comprises enabling technologies to create advanced 3D tissues models as well as their implementation in substance testing.

Family name:	**Zhuang**
First name:	**Tiange**
Title:	**Professor**
Institution:	**School of Biomedcial Engineering, Shanghai Jiaotong University**
Position:	**Professor**
E-Mail:	tgzhuang@sjtu.edu.cn

Research Interest: Medical Imaging Informatics, including Computed Tomography and PACS

Professional History:

Graduated from the Department. of Electric Engineering Shanghai Jiaotong University 1957.
Was the visiting scholar in Biomedical Computer Lab Washington University, St.Louis MO,and the senior visiting scholar in Medical Image Processing Group University of Pennsylvania USA ,from 1980-1982 and from 1993-1994 respectively.
He is author of 4 text books and published over 100 papers. He has won many prizes at the State level and Municiple level and has been the vice chairman of the "Biomedical Information & Cybernetic Sub-society of Chinese Society of Biomedical Engineering". He was the co-chair of the 27th Annual International Conference of IEEE Engineering in Medicine and Biology Society(EMBC'05) 2005, Shanghai.
Be the fellow of AIMBE (American Institute for Medical and Biology Engineering).

AbstractTitle: **From Xero(radio)graphy to modern X-ray based medical imaging**

Author/s: ***Zhuang Tiange***

Keywords: ***Xerography, CT, medical imaging***

Abstract:

In this topic the speaker will summarize the path of development of X-ray based medical imaging since 1895.The speaker indicates that the development course can be divided into three stages: the 1st stage covers the year from 1895 to 1971,. In this period radiology has not made any advance since Roentgen discovered X-ray except for the development of Xeroradiography. The later invoked a new principle in its method of recording; The 2 nd stage is from 1972 to 1989. In this period the landmark is the invention of CT. It dominated radiology area from 1972-1980. However from 1980 to 1989 it developed rather slow until spiral CT was invented in 1989.. The 3rd stage began from 1990 and is still going on in full swing. This is the most contributive period. Many new devices were developed. However, most of the ideas involved were conceived in the 1st and 2nd stages. The speaker then talk about the impact of IT to the X-ray imaging, especially the Flat Panel Detectors. The speaker indicated that Xeroradiography play a significant role in the development of FPD. Finally the speaker will share their research on triple-source helical cone beam CT.

Family name:	**Pioletti**
First name:	**Dominique**
Title:	**Professor**
Institution:	**Laboratory of Biomechanical Orthopedics, EPFL**
Position:	
E-Mail:	**dominique.pioletti@epfl.ch**

Research Interest:
(max. 80 characters)

Professional History:

Prof. Dominique Pioletti received his Master in Physics from the Swiss Federal Institute of Technology Lausanne (known as EPFL) in 1992. He pursued his education in the same Institution and obtained his PhD in biomechanics in 1997. He developed original constitutive laws taking into account viscoelasticity in large deformations. Then he spent two years at UCSD as post-doc fellow acquiring know-how in cell and molecular biology. He was interested in particular to gene expression of bone cells in contact to orthopedic implant. From 2006 to 2013, he was an Assistant Professor at EPFL and since August 2013, was appointed Associate Professor of Biomechancis at EPFL. He is the director of the Laboratory of Biomechanical Orthopedics. His research topics include: Biomechanics of the musculoskeletal system; Mechano-transduction in bone; Development of orthopedic implant as drug delivery system; and Functional tissue engineering.

AbstractTitle: **Drug delivery, implant-tissue bed preparation, and biomechanical stimulus as tools to enhance musculoskeletal tissues formation**

Author/s: ***Dominique Pioletti***

Keywords:

Abstract:

Anchorage of a screw in low bone quality, treatment of cartilage defect, sinus augmentation are all examples of clinical situations where a tissue formation is needed. In this talk I will present different strategies to increase tissue formation around implant or inside scaffold. These strategies are based on the use of the implant as drug delivery, the preparation of the implant-tissue bed preparation or the application of biomechanical stimulus. Corresponding clinical situations where these strategies could be used will be presented.

Family name:	**Yin**
First name:	**Weihai**
Title:	**PhD**
Institution:	**School of Biomedical Engineering and Med-X Research Institute,**
Position:	**Professor, Associate Dean**
E-Mail:	**weihaiy@sjtu.edu.cn**

Research Interest:

1) Strategies and mechanisms of brain Injury and neuroprotection;
2) Mechanisms of neural cell death and cancer cell death;
3) oxidative stress and energy metabolism;
4) mechanisms of synchrotron radiation X-ray-mediated tissue injury.

Professional History:

Since 2011: Professor and Associate Dean
School of Biomedical Engineering and Med-X Research Institute, SJTU
Since 2008: Professor and Assistant Dean
Med-X Research Institute, SJTU
2002–2008 Principal Investigator, Dept. of Neurology, UCSF School of Medicine
Grants:
PI of six grants from US;
PI of a number of national and local research funding.
Awards:
1) National Reseach Service Award (US)
2) American Heart Association Young Scientist Award (US)
3) Cover Story Person, Specail Issues for 2013' National Congress Meeting of leading magazines of Chinese Ministry of Science & Technology, Ministry of Education, and Chinese Society of Science.

AbstractTitle: **Strategies and Mechanisms of Tissue Injury and Neuroprotection**

Author/s: ***Weihai Ying, Tissue Injury, Neuroprotection, Cell Death, NAD+, Synchrotron Radiation X-ray***

Keywords:

Abstract:

I will present our novel findings on the following topics:

1) NAD+ in cell death and tissue injury;

2) Roles of NAD+ in tumor cell death;

3) Applications of nanoparticles to carry NAD+ into cells

4) Roles of SIRT2 in cell death and tissue injury;

5) Roles of CD38 in cell death and tissue injury;

6) Mechanisms underlying synchrotron radiation-induced tissue injury.

Family name:	**Rudin**
First name:	**Markus**
Title:	**Prof.Dr., PhD**
Institution:	**University and ETH Zürich, Institute for Biomedical Engineering**
Position:	**Full Professor**
E-Mail:	**rudin@biomed.ee.ethz.ch**

Research Interest: Structural, functional & molecular imaging in biomedical research; Neuroscience and Cancer

Professional History:

Markus Rudin received his diploma in chemistry at ETHZ in 1976 and his PhD at the Laboratory for Physical Chemistry in 1981 followed by a post-doctorate. In 1983 he moved to biomedical imaging, joining Sandoz AG to establish a biomedical imaging group. Within Sandoz AG, later Novartis AG, he became head of the Biophysics Group, of the In-vivo Models Unit and finally the Analytical and Imaging Science Unit within Discovery Technologies. In 1997 he became Assistant professor (PD) for Biophysics at the University of Basel. Since 2005 he is in his current position as full professor at both University and ETH Zürich.

From March 2005 to March 2013 he was member of the Research Council of the Swiss National Science Foundation.

AbstractTitle: **Noninvasive imaging: from anatomical structures to cellular and molecular processes**

Author/s: ***Markus Rudin***
Keywords: ***Biomedical imaging, Rodents, Neuroscience, Cancer***

Abstract:

Today, non-invasive multimodal imaging has emerged as indispensable tool in biomedical research enabling the characterization of tissue at a structural, physiological, metabolic, cellular and molecular level. This information is used to address fundamental biological questions, for phenotyping of pathological tissue transformation (diagnosis) and for the evaluation of therapeutic interventions. Imaging is inherently translational, i.e. the same methods can be applied in the clinical examination and in studies involving experimental animals. Depending on whether structural, functional or molecular issues are addressed, the imaging strategy has to fulfill different requirements regarding spatial resolution, temporal resolution, sensitivity, and molecular specificity.

Mice and in particular genetically engineered mice have become essential in biomedical research both for basic research studies and as model of human diseases. The challenge in mouse imaging is the need for high spatial resolution and correspondingly for high sensitivity (i.e. high signal to noise ratio SNR). Similarly, deriving molecular information faces sensitivity issues as molecular events may occur at low frequency. Increases in sensitivity, i.e. high SNR can be achieved by increasing the signal (increasing the payload, i.e. the amount of signal generating moieties), or by reducing the noise and/or the background signal. Physiological conditions have to be maintained as stable as possible in order to minimize fluctuations in the signal caused by the biological sample. Today, these problems are largely solved and high resolution images or images displaying specific physiological and molecular processes can be obtained from anaesthetized mice. The lecture will illustrate the potential of non-invasive multimodal mouse imaging using examples from neuroscience and oncology.

Family name:	**Xie**
First name:	**Le**
Title:	**Professor**
Institution:	**Shanghai Jiaotong University (SJTU)**
Position:	**Vice director of rehabilitation engineering institute of SJTU**
E-Mail:	**Lexie@sjtu.edu.cn**

Research Interest:

Minimally invasive surgical assistant robot; Rehabilitation robot;Virtual surgical training

Educational History:

Dr. Xie Le received his B.E in mathematics from East China Normal University, China, in 1985, M.S. in computational mathematics and PhD in Aeronautics and Astronautics manufacturing from Nanjing University of Aeronautics and Astronautics, China in 1995 and 1999. From 1999 to 2001, he researched as post doctor in Shanghai Jiaotong university,China.

Previous Positions:

Dr. Xie Le is a professor of Shanghai Jiao Tong University (SJTU), China, Where he carried out interdisciplinary research in digital manufacturing and digital medicine, He have led on more than 10 research projects on virtual surgery, surgical robot and rehabilitation robot, his research interest focus on Medical robot, Virtual Reality and Rehabilitation Engineering.

He is vice director of rehabilitation engineering institute of SJTU, the Committee Member of Bio-manufacturing Engineering Institution of Chinese Mechanical Engineering Society, Vice secretary-general of technical innovation strategic

AbstractTitle: **Medical robot&virtual surgery**

Author/s: ***Le Xie***

Keywords: ***Minimally invasive surgical robot; Rehabilitation robot; Virtual surgiery; haptic***

Abstract:

The minimally invasive surgical assistant robot is developed rapidly in the world recent years, the slave-master minimally invasive surgical assistant robot prototypesystem is developed, in which the force measuring in slave robot and haptic feedback in master robot are especially discussed.
The exoskeleton robotic could be used in rehabilitation engineering, the exoskeleton rehabilitation robot for upper limb and lower limb are developed, the key technology in which is dicussed.
The cardio surgery and laparoscope surgeryneed long time to train. Combining with surgery the virtual reality technology is able to use in surgical trainning, which could reduce the doctor trainning time, fee and practice operation risk. The virtual cardio surgery and laparoscope surgery are researched, especially the haptic technology in virtual surgery is discussed.
Virtual reality could also be used in the rehabilitation training and evaluating, the virtual rehabilitation training is discussed.

Family name:	**Rüfenacht**
First name:	**Daniel André**
Title:	**Prof. Dr. med..**
Institution:	**Clinic Hirslanden, Zurich, Switzerland**
Position:	**Consultant, Neuroradiology, Swiss Neuro Institute**
E-Mail:	**daniel.rufenacht@hirslanden.ch**

Research Interest: Neurovascular disease understanding, image biomarkers and endovascular

Professional History:

Swiss board certified in Radiology and Neuroradiology.

Medical School, Univ. of Berne, graduation 1981.

1981-1987 Postgraduate training in Radiology and Neuroradiology, Univ. Hospital of Berne and in interventional Neurorad. in 1984-85 at Univ. VII of Paris, France.

1988-1992 work in US with stays at Univ. of Wisconsin, Madison, WI; Mayo Clinic, Rochester, MI; and Univ. of Minnesota, Minneapolis, MI.

1992-2008 Prof. of Neurorad., Univ. Hospital of Geneva.

Since 2008, co-development of a diagnostic and interventional Neurorad. expert group, Swiss Neuro Institute, Clinic Hirslanden. Preclinical research at CABMM, Zurich

AbstractTitle: Computational Aneurysm Phantom: its Potential for Use in Clinical Sciences

Author/s: ***Daniel A. Rüfenacht***

Keywords: ***intracranial aneurysms, neurovascular disease, imaging biomarker, endovascular treatment***

Abstract:

Numerical assessment and simulation, as a "virtual reality" method for better disease understanding and planning endovascular treatment of aneurysms disease, has in recent years received increasing attention by engineering and by medical as well as by basic and by clinical scientists.

Intracranial aneurysm disease presents with a low, but risky incidence of hemorrhage (10/100'000/y) due to rupture, while there is a high prevalence of silent lesions (approx. 3000/100'000) that, today are increasingly found incidentally on a regular brain imaging examination. Once diagnosed, the incidental finding of an aneurysm leads to the difficult question of whether to treat or not a patient to prevent him from experiencing a risky aneurysm bleeding. With diagnosis based on imaging information, use of an image disease surrogate, a computational phantom, would be welcome and efficient in many ways. While the wall of an aneurysm is too thin to be directly visualized by imaging, the characterization of its biomechanical strength is a matter of indirect assessment. With all currently used medical imaging evaluation methods for aneurysms, able of providing flow-based and contrast-material enhanced visualization of the circulating blood, a digital 3D replica of the vascular lumen can be easily produced for more detailed analysis. Current concepts suggest that blood governs wall remodeling by multiple biological steps. The process starts with flow induced thrombus adhesion (atherothrombosis) to the wall, leading secondarily to the release of biological mediators of inflammation and ensuing destructive remodeling. Destructive wall remodeling jeopardizes the mechanical wall integrity (circumscribed softening and expansion of the aneurysm shape). These are the critical steps of the mechano-biological transduction chain in aneurysm disease as is understood today. Further illumination of the exact interconnection of these steps is a matter of continuous research, involving validation and computational biology studies, with the potential of further unraveling the secrets of this degenerative arterial disease in the interest of understanding and developing predictive capabilities to estimate the evolution potential of an incidental aneurysm and with the potential of simulating and designing flow modulating corrective endovascular measures.

Today, the computational aneurysm phantom has become the most promising instrument for characterizing reproducibly intracranial aneurysms, potentially allowing for predicting their evolution in an individual case and help prepare for flow correction measures using endovascular treatment methods involving devices such as special stents (flow diverters).

Family name:	**Gu**
First name:	**Lixu**
Title:	**Professor/PhD**
Institution:	**Shanghai Jiao Tong University**
Position:	**Professor/Researcher**
E-Mail:	**gulixu@sjtu.edu.cn**

Research Interest: Medical Image Analysis, Image Guided Intervention/Surgery

Professional History:

PhD in Computer Science (1996-1999), School of Computer Science, Toyohashi University of Technology, Toyohashi, Japan
Professor (01/2009 – Present)
Med-X Research Institute, Shanghai Jiao Tong University, Shanghai, China
Visiting Scholar (01/2008- 06/2008)
Surgical Plan Laboratory (SPL), Harvard University, Boston, USA
Appointed Professor (03/2003 – 12/2008)
Department of Computer Science / School of Software, Shanghai Jiao Tong University, Shanghai, China

Awards

The best poster award (2003), 17th congress of computer assisted radiology and surgery (CARS) in London, UK.
Shanghai Medical Science & Technology Award (2010), Third place, Shanghai, China
Shanghai Science & Technology Award (2011)**,** 2nd place, Shanghai, China
Chinese Medical Association Award (2012), 2nd Place, Beijing, China

AbstractTitle: **RImage Guided Cardiac Intervention Using MTS and Intro-operative US**

Author/s: ***Zhe Luo, Lixu Gur***

Keywords:

Abstract: We propose an augmented magnetic navigation system for Transcatheter Aortic Valve Implantation (TAVI) which employs a magnetic tracking system (MTS) with a dynamic aortic model and intra-operative ultrasound (US) images. The dynamic 3D aortic model is constructed based on the preoperative 4D computed tomography (CT), which is animated according to the real time electrocardiograph (ECG) input of patient. And a preoperative planning is performed to determine the target position of the aortic valve prosthesis. In order to synchronize the ECG signals, a synchronize mechanism designed by this research is performed to achieve the temporal alignment of the three different inputs. Afterwards, with the assistance of synchronized ECG signals, the spatial registration is performed to register the contour of aortic root automatic extracted from short axis US image by a feature based registration intra-operatively. Then the augmented MTS guides the surgeon to confidently position and deploy the aortic valve prosthesis to target. The system was validated by animal studies on six porcine subjects.

Family name:	**Zheng**
First name:	**Guoyan**
Title:	**PhD, PD**
Institution:	**University of Bern**
Position:	**Head – Information Processing for Medical Interventions Group**
E-Mail:	**guoyan.zheng@istb.unibe.ch**

Research Interest:	Information processing for medical interventions, medical image computing, augmented reality for medical applications, computer assisted surgery
Educational History:	2010, Privat Dozent (PD), Medical Faculty, University of Bern, Bern, Switzerland 2002, Doctor of Philosophy, University of Bern, Bern, Switzerland 1995, Master of Science, Southern Medical University, GuangZhou, China 1992, Bachelor of Science, Southern Medical University, GuangZhou, China
Previous Positions:	2005 – present, Head – Information Processing for Medical Interventions Group, Institute for Surgical Technology and Biomechanics, University of Bern 2003 – 2005, Postdoc research associate, Institute for Surgical Technology and Biomechanics, University of Bern

AbstractTitle: **Medical Image Computing for Orthopaedic Applications**

Author/s: ***Guoyan Zheng and Lutz-Peter Nolte***

Keywords: ***Medical Image Computing, Orthopaedics, statistical shape modeling, 2D/3D reconstruction***

Abstract:

The role of medical image computing in computer assisted orthopaedic diagnosis and interventions is continuously increasing. Recent innovations in medical imaging technology are revolutionizing diagnosis, therapy planning and follow-up, and allow for multi-modal, multi-temporal, and multi-subject assessment. A consequence is that accurate and automated quantitative image computing has become indispensable to computer assisted orthopaedic diagnosis and interventions. In this talk, I will discuss the state-of-the-art medical image computing technologies for orthopaedics, with a focus on the construction and the application of a variety of statistical shape models of human skeleton in orthopaedics.

Family name:	**Tang**
First name:	**Lei**
Title:	**Senior Engineer**
Institution:	**Southern Medical University of China**
Position:	**Institute Chief**
E-Mail:	**cdheg@126.com**

Research Interest: **Digital Humen & Digital Medicine**

Professional History:

Since 2004 Institute Chief of Digital Humen & Digital Medicine Research Institute, Southern Medical University, Guangzhou China.

Award
2007 State Science & Technology Advancement Second Prize
2009 Science & Technology Award of Ministry of Health First Prize

AbstractTitle: Construction and visualization of high-resolution three-dimensional anatomical structure datasets for Chinese Digital Human

Author/s: ***Tang Lei, Liu Qian LI Anan***

Keywords: ***Chinese Digital Human, anatomical atlas, extremely large data processing, three-dimensional modeling, visualization***

Abstract:

The objective of the China Digital Human Project (CDH) is to digitize and visualize the anatomicalstructures of human body. In the project, a database with information of morphology, physical characteristics and physiological function will be constructed. The raw data of CDH which was completed in the Southern Medical University is employed. In Huazhong University of Science and Technology (HUST), the frozen section images are preprocessed, segmented, labeled in accordance with the major

organs and tissues of human beings, and reconstructed into three-dimensional (3D) models in parallel on high performance computing clusters (HPC). Some visualization software for 2D atlas and 3D models are developed based on the new dataset with high resolution (0.1 mm × 0.1 mm × 0.2 mm). In order to share, release and popularize the above work, a website (www.vch.org.cn) is online. The dataset is one of the most important parts in the national information database and the medical infrastructure.

Family name:	**Caversaccio**
First name:	**Marco Domenico**
Title:	**Professor**
Institution:	**Dept of ORL, Head and Neck Surgery, University Hospital Bern**
Position:	**Chairman and Director**
E-Mail:	**Marco.caversaccio@insel.ch**

Research Interest:

Technological innovation in the area of the head (medical devices and medical robotics)

Professional History:

1990 Urology University hospital Geneva,
1990-1991 Neurosurgery University hospital Geneva,
1991-1992 ENT, H&N University hospital Geneva,
1992-1994 ENT, H&N Inselspital Bern,
1994 Maxillo-Facial Inselspital Bern,
1995 ENT, H&N Klinikum rechts der Isar, Technical University Munich,
1996-1998 ENT, H&N Resident Inselspital Bern,
1999 Biomedical sciences division: Research fellow, Imperial College of Science, Technology and Medicine, Leukocyte Biology Section, London,
2000- ENT,H&N 1st attending, Inselspital Bern,
2005-2008 ENT,H&N Deputy of the chief,
2009- ENT,H&N Chairman and Director + Vicedirector Artorg center for Biomedical Engineering

AbstractTitle: **Navigation and robotics in paranasal sinuses and ear surgery**

Author/s: **Caversaccio M, Bell B, Nolte LP, Wimmer W, Gerber N., Weber S.**

Keywords: ***Navigation, robotics, ORL***

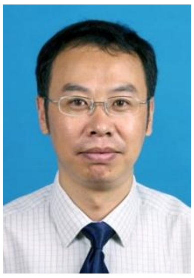
Abstract:

Navigation and robotics in paranasal sinuses and ear surgery MARCO CAVERSACCIO(Switzerland).

Navigation surgery of the paranasal sinuses its frequently performed, on the lateral skull base is a rare intervention in daily practice. In case of changed anatomy e.g. chronic infection, tumors the normal anatomical landmarks are often missing rendering the orientation for the surgeon more difficult. Navigation together with imaging like CT, MR and Angiography support the surgeon in such cases to perform the operation more accurate and in some cases also in shorter time. Worldwide, no clear indications for navigated surgery on the anterior and lateral skull base exist. With the incorporation of augmented reality, image guided PET, CT, actual cone beam CT images surgery will evolve into information guided surgery. Since 16 years we are developing and evaluating enabling navigations surgery tools for simulation, planning, training, education and performance in Bern. This clinically applied technological research was complemented by a series of patients who were treated between 1996 and 2012. Our last development focused on a telemanipulator(robot) supporting the surgeon during the operation for hearing implants.

The goal of this instructional course is to learn more about the basics and clinical application with the navigation and robot technology.

Acknowledgment: supported by the Swiss national research foundation and the commission of technology and innovation in Switzerland. ISTB: Prof. L.P. Nolte, Prof. S. Weber



Family name:	**Tang**
First name:	**Tingting**
Title:	**Prof. Dr.**
Institution:	**Shanghai Jiao Tong University School of Medicine**
Position:	**Director of Shanghai Key Laboratory of Orthopaedic Implants**
E-Mail:	**tingtingtang@hotmail.com**

Research Interest:

Stem cells research related to bone repair and bone disease
Orthopaedic implant and biomaterials

Professional History:

1988: Bachelor of Medicine, Anhui College of Traditional Chinese Medicine;
1993: Master of Medicine, Specialty: Orthopaedics and Traumatology;
1996: Doctorate of Medicine, Specialty: Orthopaedic Surgery.
7/1996—present: Dept. of Orthopedics, Shanghai Ninth Peoples Hospital.

Currently serves as Director of Shanghai Key Laboratory of Orthopeadic Implants, vice Director of Orthopedic Department of Shanghai Ninth People's Hospital affiliated to Shanghai Jiao Tong University School of Medicine.

Abstract Title: Stem cells: two sides of the coin

Author/s: ***Tingting Tang***

Keywords: ***Mesenchymal stem cells, bone regeneration, osteosarcoma***

Abstract: Stem cells, especially for the bone marrow derived mesenchymal stem cells (MSCs), can promote the tissue repair or regeneration with great application potential in orthopaedic clinic. By applying the BMP-2 gene transfected MSCs loading on several kinds of scaffolds, we have demonstrated enhanced bone repair in various animal models including the critical-size segmental bone defects in weight bearing animals or aged animals, periprosthetic bone defects, and experimental necrosis of femoral head.

However, recent studies also indicated that the stem cells could contribute to the tumor growth. We have demonstrated that the hMSCs could target osteosarcoma and promote its growth and pulmonary metastasis. We found that the conditioned medium from MSCs could stimulate the growth of osteosarcoma cells (Saos-2) *in vitro*. It was also found that STAT3 was activated and that the activation could be blocked by an IL-6-neutralizing antibody. The inhibition of STAT3 in Saos-2 cells by siRNA or AG490 decreased cell proliferation, migration and invasion, down-regulated the mRNA expression of Cyclin D, Bcl-xL and Survivin and enhanced the apoptotic response. Furthermore, a nude mouse osteosarcoma model was established by injecting luciferase-labeled Saos-2 cells into the tibia, and the effect of STAT3 on tumor growth was determined by treating the mice with AG490. Altogether, our data indicate that MSCs in the bone microenvironment might promote the progression of osteosarcoma and protect tumor cells from drug-induced apoptosis through IL-6/STAT3 signaling.

Family name:	**Stergiopulos**
First name:	**Nikos**
Title:	**Professor**
Institution:	**EPFL**
Position:	**Full professor, CEO**
E-Mail:	**nikolaos.stergiopulos@epfl.ch**

Research Interest: Cardiovascular mechanics, hemodynamics, implantable medical devices

Professional History: Nikos Stergiopulos studied Mechanical Engineering at the National Technical University of Athens, Greece and obtained his Ph.D. in Biomedical Engineering from Iowa State University in 1990. His research interests are Hemodynamics, Cardiovascular Mechanics and Medical Implant Technology. He has authored more than 140 publications and holds more than 15 patents in medical technology. He co-founded EndoArt, world leader in telemetric implants for the treatment of congenital heart disease and morbid obesity, Antlia SA, developer of implantable drug delivery pumps and Rheon Medical, developer of the implantable shunt for the surgical treatment of glaucoma.

AbstractTitle: **The role of the academic lab in the development of frontline and clinically-relevant medical technologies**

Author/s: ***Nikos Stergiopulos***

Keywords: ***Swiss medtech landscape, startup creation, implantable devices***

Abstract: Switzerland holds a prominent place in the medical device world. Academic institutions furnish qualified scientists and engineers and collaborate closely with the medical device industry. As major medical device companies become increasingly risk-averse and medical device startups are often under money and time pressure during their development, I believe there is a huge potential for academic labs to invest energy and know-how into not only inventing technology and developing prototypes but also going through the entire cycle of development of clinically-relevant devices. In my talk I will discuss this opportunity and I will use as example the strategy and approach we use at the Laboratory of Hemodynamics and Cardiovascular Technology in developing a novel implant for the surgical treatment of glaucoma. I will also make reference to earlier developments done on devices to treat congenital heart disease, morbid obesity as well as devices for local drug delivery.

Family name:	**Xiaoling**
First name:	**Zhang**
Title:	**Prof.**
Institution:	**Institue of Health Sciences,** SJTUSM&SIBS, CAS
Position:	**Prof.**
E-Mail:	**xlzhang@sibs.ac.cn**

Research Interest: Stem cells and bone and cartilage regeneration, development of novel tissue engineering biomaterial scaffolds and nano-gene delivery system

Professional History: Xiaoling Zhang, Ph.D. **,** Professor of Institute of Health Sciences, Shanghai Jiao Tong University School of Medicine (SJTUSM) & Shanghai Institutes for Biological Sciences (SIBS), Chinese Academy of Sciences (CAS). She received her Ph.D. in sports medicine from Peking University, China in 2003. Dr. Zhang got many awards, such as, Award of Shanghai Unilever (2005), Best Paper Awards for Young Investigator of 29th FIMS World congress of Sport Medicine (2006), Shanghai Rising-star Program of Science and Technology Commission of Shanghai Municipality (2007), Raine International Visiting Research Fellowship of University of Western Australia (2008), Meiji Life Sciences Award (2010), Shanghai Aurora talent program of Shanghai Municipal Education Commission (2010), Shanghai Rising-star Following Program of Science and Technology Commission of Shanghai Municipality (2011)， Morningstar A program of Shanghai Jiao Tong University (2012).Dr. Zhang has authored over 50 scientific papers including some in Biomaterials, J Ortho Res, Arthritis Res Ther, Spine, J Control Release, Osteoporos Int, J Cell Mol Med.

AbstractTitle: **The Stragety of Metallic Implants Coating Enhance BMSCs Osteogenesis and Bone Regeneration**

Author/s: ***Xiaoling Zhang, Ze Tang, Fei Yang,Kerong Dai***

Keywords: ***porous tantalum, CaO-ZrO2-SiO2, coating, osteogenesis, bone regeneration***

Abstract: In the last few years, great interest has been focused on tissue engineering as a potential therapeutic approach for musculoskeletal diseases. The role of metallic implants either for osteo-synthesis or for arthroplasty has been tested in preclinical and clinical settings. An ideal implant material should have appropriate elastic modulus, corrosion resistance, good biocompatibility and favor bone anchorage. However, most medical implant materials do not simultaneously fulfill all these characteristics. Accordingly, various coatings have been developed to improve the biocompatibility and osseoinductivity of load-bearing materials. In our study, porous tantalum coating and CaO-ZrO2-SiO2 (CZS) coating were first successfully fabricated on titanium substrates by plasma spraying, porous tantalum coating exert the excellent biocompatibility of tantalum and alleviate the elastic modulus of tantalum for bone tissue, CZS coating have good bioactivity, high bonding strength with the substrate.We evaluated cytocompatibility and osteogenesis activity of these coatings using human bone marrow stromal cells (hBMSCs) and its ability to repair rabbit femur bone defects . The morphology and actin cytoskeletons of hBMSCs were observed via electron microscopy and confocal, and the cell viability, proliferation and osteogenic differentiation potential of hBMSCs were examined quantificationally by PrestoBlue assay, Ki67 immunofluorescence assay, real-time PCR technology and ALP staining. For in vivo detection, the repaired femur were evaluated by histomorphology and double fluorescence labeling 3 months postoperation. Porous tantalum coating and CZS coating surfaces promoted hBMSCs adhesion, proliferation, osteogenesis activity and had better osseointegration and faster new bone formation rate than titanium coating control. Our observatiobs suggested that the porous tantalum coating and CZS coating had good biocompatibility and could enhance osseoinductivity in vitro and promote new bone formation in vivo, which is a promising strategy for bone regeneration.

Family name:	**Schkommodau**
First name:	**Erik**
Title:	**Prof. Dr.-Ing.**
Institution:	**University of Applied Sciences Northwestern Switzerland**
Position:	**Head of Institute for Medical Technologies**
E-Mail:	**erik.schkommodau@fhnw.ch**

Research Interest: surgical therapy systems, implant development

Professional History:

Electrical Engineering studies at RWTH Aachen University;

Semester abroad and research project at Trinity College Dublin, Ireland;

Ph.D. in Biomedical Engineering at RWTH-Aachen University

Co-founder of Surgitaix AG, Mininavident AG, Mimedis AG

Head of Institute for Medical Technologies at University of Applied Sciences Northwestern Switzerland

AbstractTitle: **TOOL MOUNTED NAVIGATION SYSTEM FOR COMPUTER AIDED SURGERY**

E. Schkommodau, F. Coigny, G. Imboden, C. Findeisen, M. Hirschmann, P. Jürgens, S. Hemm, B. Knobel

Author/s:

Keywords: ***Computer assisted surgery, miniaturized tracking system***

Abstract:

Background: Currently existing optical navigation systems have ergonomic disadvantages such as size, the "line of sight" problem and extended registration procedures. The operation room becomes crowded by additional installations and competitive supporting devices around the patient. These points reduce and limit the acceptance of navigation systems for further applications. But especially for surgical quality management, navigation systems have a high potential as objective measurement systems.

Method: A miniaturised measuring and navigation system, which is directly fixed at the surgical tool, could overcome these limitations and fulfil the requirements demanded by current and future operation rooms. Minimizing the distance between situ and camera promises an increased accuracy, a reduced "line of sight problem", intuitive handling and one coordinate transformation less. However, such a setting reduces the navigation working space available, needs a sterile system, a new marker design and special requirements for the cameras. The developed prototypes were tested in vitro using Synbones™ and ex vivo at anatomical specimen. Following surgical pilot applications were defined and considered during the studies: maxillofacial restoration osteotomy, hip replacement and unicondylar knee replacements (UKR). Special emphasis was placed on measured and recorded accuracy and miniaturised hardware.
Results: Hard and software components have been tested for UKR application in an ex vivo study. Clinical trials for maxillofacial restoration osteotomy were carried out at the University Hospital Basel.

The accuracy of the presented systems was evaluated in vitro with two setups. After intrinsic and extrinsic camera calibration with a 3D calibration specimen, the accuracy (RMS) of a single point of the 3D point coordinates of the calibration specimen could be determined with 0,020 mm in z-axis and 0,010 mm in x/y-axis. In another setup the accuracy was measured in 3D with a fixed camera system and two markers rigidly fixed together. The marker system was moved around working space. The repeat accuracy of the distances between the two markers was 0,025 mm (RMS).

Family name:	**Chai**
First name:	**Gang**
Title:	**MD,PhD**
Institution:	**University of Shanghai JiaoTong**
Position:	**Vice professor**
E-Mail:	**13918218178@163.com**

Research Interest: Plastic surgery; Computer aid surgery;

Professional History:

2008- vice professor Shanghai No 9 people hospital

2001-2007 Fellow Shanghai No 9 people hospital

1996-2001 Resident Shanghai No 9 people hospital

1991-1996 Shanghai second medial university

AbstractTitle: Precise osteotomy of craniofacial surgery through augmented reality

Author/s: *Chai Gang*

Keywords: *Augmented reality ;craniofacial;*

Abstract:

Background: Augmented reality (AR) can provide an overlay of the anatomical structure, or visual cues of specific landmarks, which were previously scanned with computed tomography (CT). In this study, an AR Toolkitused to define osteotomy according to operative plan.

Methods: 20 patients were involved in our study. All the patients performed pre-operative CT scan.The dental castalong with the occlusal splint were prepared by doctors, which could be recognized by the AR Toolkit. The occlusal splint and marker (OSM) were transformed to 3D data by scanning. Afterwards OSM digital data and the mandible image were integrated to generate the virtual image. By video monitoring system, we acquired a virtual image of the designed plan onto the anatomical sites.

Results: The technology was successfully used in 20 patients. The deviations of positionand angle between the pre-operative designed cutting plane and the actual cutting plane were minor without significant difference.

Conclusion: Augmented reality tools like AR Toolkit may be helpful for precise osteotomyin craniofacial surgery.

Family name:	**Stampanoni**
First name:	**Marco**
Title:	**Prof.**
Institution:	**ETH Zürich and Paul Scherrer Institute**
Position:	**Head of Tomography Group at Swiss Light Source**
E-Mail:	**stampanoni@biomed.ee.ethz.ch**

Research Interest: X-ray imaging and microscopy; Medical imaging;

Professional History:

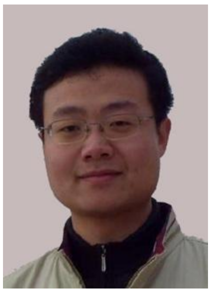
Marco Stampanoni is Associate Professor for X-ray Imaging at D-ITET at ETH Zurich (ETH), and leads the division for X-ray Imaging and Microscopy. At the Paul Scherrer Institut, he is the head of the Swiss Light Source (SLS) X-ray tomography group. Born on May 10, 1974 in Lugano (Switzerland) he studied physics at the ETH. After receiving his diploma in 1998, he graduated at the ETH in 2002 in the area of synchrotron-based tomographic microscopy. In 2000 he got post-graduate degree in Medical Physics. In 2002 he started as an Instrument Scientist at the SLS and was appointed Beamline Scientist in 2004. In 2005 he was elected Head of the "X-ray Tomography Group" at SLS. In 2008 he was appointed Assistant Professor (Tenure Track) for X-ray Microscopy at the ETH and, in 2010, Director of the ETH-Master of Advanced Studies (MAS) in Medical Physics.

AbstractTitle: **Phase contrast X-ray imaging: new frontiers in medical diagnostic**

Author/s: ***Marco Stampanoni***

Keywords: ***Medical X-ray imaging, coherent X-ray imaging, phase contrast X-ray imaging, mammography***

Abstract: A crucial characteristic of coherent beams is their intrinsic capability of generating interference signals and, as a consequence, to provide access to phase information in the investigated sample. The Swiss Light Source operates TOMCAT, a beamline dedicated to TOmographic Microscopy and Coherent rAdiology experimenTs. This beamline provides cutting-edge equipment for tomographic experiment and offers the necessary instrumentation for phase contrast imaging at spatial resolution ranging over three orders of magnitude and a time frequency of few Hz for a whole 3D data set. Recently, as a result of our translational imaging activities, we successfully carried out the first phase-contrast enhanced mammography clinical study on humans, investigating non-fixed breast mastectomy samples using a conventional X-ray source and a grating interferometer. Grating-based phase contrast and scattering X-ray imaging are intrinsically capable of detecting subtle differences in the electron density of soft tissue and of measuring the effective integrated local small-angle scattering power generated by the microscopic density fluctuations in a specimen. Our approach simultaneously records absorption, differential phase and small angle scattering signals and combine these quantities into novel, high frequency enhanced radiographic images. Supported by scientific cases, this talk will illustrate the methods implemented to record phase contrast 2D and 3D dataset for imaging single cells, at 100 nm resolution, tiny samples and small animals, at 1 and 10 micron resolution respectively. Further, I will discuss issues related to the interpretation of phase-contrast enhanced mammographic images (50-100 microns resolution) and discuss their relevance and the potential for early breast cancer detection.



Family name: Graf **Pan**

First name: **Junjun**

Title: **Prof. Dr.**

Institution: **State Key Laboratory of Virtual Reality Technology and Systems, Beihang University**

Position: **Associate Professor**

E-Mail: **pjunjun@bournemouth.ac.uk**

Research Interest: Virtual reality based surgery simulation, sketch-based modeling and animation, medical visualization, Haptic rendering and application

Professional History:

2013-present, Associate Professor, State Key Laboratory of Virtual Reality Technology and Systems, School of Computer Science, Beihang University, China

2012-2013, Postdoctral Research Associate, Center for Modeling, Simulation and Imaging in Medicine, Rensselaer Polytechnic Institute, USA

2010-2012, Postdoctral Research Fellow, Lead of Medical Group, National Centre for Computer Animation, Bournemouth University, UK

2010, PhD, National Centre for Computer Animation, Bournemouth University, UK
2006, MSc, Northwestern Polytechnical University, Computer Science, China
2003, BSc, Northwestern Polytechnical University, Computer Science, China

Abstract Title: A Medical VR Simulator in Laparoscopic Surgery for Rectum Cancer

Author/s: ***Junjun Pan***

Keywords: ***laparoscopic surgery simulation; virtual reality; Rectum Cancer***

Abstract: Colorectal cancer is the third commonest cancer in the UK, with approximately 40,000 new cases diagnosed every year. And 90% of cases are suitable for a laparoscopic surgery treatment. At present there is a relative lack of surgeons trained to perform such demanding surgery. This is particularly true for rectal cancer surgery, which is the most complex and technically challenging for the laparoscopic colorectal surgeon. Medical simulators with vision and haptic feedback techniques offer a cost-effective and efficient alternative to the traditional medical trainings. They have been used to train doctors in many specialties of medicine, allowing tasks to be practised in a safe and repetitive manner. In this research, we design and develop a virtual-reality (VR) system which will help to influence surgeons' learning curves in laparoscopic surgery of the rectum.

Data from MRI of the rectum and real operation videos are used to construct the virtual models. A haptic force filter based on radial basis functions is designed to offer realistic and smooth force feedback. To handle collision detection efficiently, a hybrid model is presented to compute the deformation of intestines. Finally, a multi-layer mass spring model is presented to cope with the deformation and the dissection simulation of the rectum.

Fast and realistic solutions of soft tissues with large deformation, such as intestines, prove extremely challenging. We introduces our latest contribution to this endeavour. With this system, the user can haptically operate with the virtual rectum and simultaneously watch the soft tissue deformation. Our system has been tested by colorectal surgeons who believe that the simulated tactile and visual feedbacks are realistic. It could replace the traditional training process and effectively transfer surgical skills to novices.

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Title:	**MSc**
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Position:	**Senior Physicist**
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Research Interest: Application of MRgFUS in brain for ablation and drug delivery

Professional History: Graduated form the faculty of physics of ETH Zurich, Switzerland in 1988 I started working at University Children's Hospital on C-13 MR-spectroscopy. I left MR-research in 1990 and worked for several years in software development and marketing communication with new media. In 2002 I joined again the Center for MR-Reasearch at University Children's Hospital. Since 2005 I am involved in the MRgFUS brain project for technical and physical aspects of the clinical and preclinical research projects.

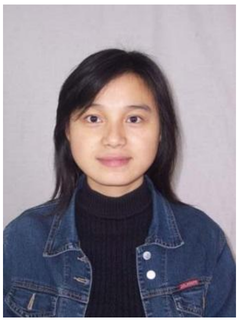
AbstractTitle: **Trancranial MR Imaging Guided Focused Ultrasound for the Treatment of Functional Brain Disorders**

Author/s: ***Beat Werner***

Keywords: ***Focused Ultrasound, Brain, Neurosurgery, Non-invasive***

Abstract: For over 50 years researchers have been seeking for a way to perform non-invasive thermal ablation for brain treatments. Recent technical advances allowed the clinical introduction of Magnetic Resonance guided High Intensity Focused Ultrasound for non-invasive surgery under closed loop image guidance and control throughout all steps of the intervention process. MR-imaging allows for precise intraprocedural localization of the ablation target, definition and verification of safety margins for the ultrasound treatment, real-time monitoring of thermal ablation dynamics, and intra- and post-treatment assessment of intervention results. Thanks to its non-invasiveness Focused Ultrasound minimizes the risk of bleeding and infection and avoids collateral damage to non-targeted tissue. In addition, it does not involve ionizing radiation. Transcranial application of MR guided Focused Ultrasound, therefore, promises to become an important new modality for neurosurgical interventions and is envisioned to enable novel treatment strategies against a variety of brain diseases.

Here, we will present a short introduction into this exciting technology and give an overview of the clinical studies conducted at the Center for MR-Research in Zurich.



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Title:	**PhD**
Institution:	**Shanghai Jiao Tong University**
Position:	**Postdoctoral Researcher**
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Research Interest: Design and control of rehabilitation robots

Professional History:

Since 2013 Research Assistant–Institute of Rehabilitation Engineering, Med-X Research Institute, Shanghai Jiao Tong University, China

2011–2012 Research Assistant - Institute for Rehabilitation and Performance Technology, Bern University of Applied Sciences, Switzerland

2008–2011PhD Student - Centre for Rehabilitation Engineering, University of Glasgow, UK.

Awards：

China Scholarship Council Award (30,000 Pounds)

GU68 Engineering Award (500 Pounds)

AbstractTitle: **Robotics Design for Early Rehabilitation of Walking Based on Circle Approximation of the Toe Trajectory**

Author/s: ***Juan Fang, Guo-Yuan Yang, Le Xie, Kenneth J. Hunt***

Keywords: ***Pendulum model, locomotion, toe trajectory, early rehabilitation of walking***

bstract: Rehabilitation of walking is an essential element of therapy for patients with motor impairments. To promote walking function in the early post-injury phase for patients who cannot maintain an upright position, robotic system for the early rehabilitation of walking requires with two features: 1) provision of stepping for users in a supine position; 2) coordinated walking-like movements in the hip, knee and ankle joints.

End-effector control of the foot trajectory is an effective design approach for gait orthoses. Normal gait data suggest that the toe trajectory relative to the hip joint over the whole gait cycle can be well approximated by a circle with center near the hip and radius approximately equal to the leg length. The functions of the center offset and the radius with the walking speed and the leg length were obtained through the walking data from a gait experiment on 24 able-bodied subjects walking at 7 different speeds. This circle-approximation of the toe movement provides the basis for using a swaying rigid driven bar for toe movement during normal gait.

Based on circle approximation of the toe trajectory, we developed three prototype gait robots for supine stepping: the Gait Orthosis for Early Rehabilitation (GOER), the Leg Drive system and a modified Erigo system. Each adopts a swaying driven bar connected to a rotating foot plate with axis at the toe. The driven bar pivots near the hip joint, and moves the toe upwards and downwards for generation of the swing and stance phases. The three systems employ different actuator setups for foot rotation but they all produce walking-like motion.

It is demonstrated that the circle-approximation concept for the toe trajectory embodied in these devices provides a unique tool for the design of robotic orthoses for early gait rehabilitation.

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Position:	**Assist. Prof.**
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Research Interest: Tissue engineering, biomaterials, bioprinting

Professional History:

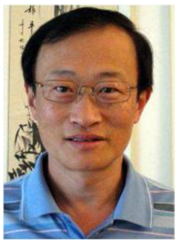
- PhD: Mechanical Engineering, Stanford University
- PostDoc Fellowship: Orthopaedic Research Laboratories, University of Michigan
- Habilitation: Dept. of Clinical Research, University of Bern
- Assistant Professor: ETH Zürich, Dept Health Science & Technology

AbstractTitle: **Engineering cell/cell and cell/tissue adhesion for regenerative medicine application**

Author/s: ***M. Zenobi-Wong***

Keywords: ***Cartilage, Tissue Engineering, Schiff base linkages Bioadhesion, Biomimetics***

Abstract: Current cell-based therapies for tissue regeneration are hampered by poor cell retention and poor control over the cell's microenvironment. As a result, fibrous tissue is often formed instead of true regenerated tissue. In our laboratory, we use multiple approaches to improve the outcome of clinical treatments, with a particular focus on healing cartilage lesions. Our approach includes designing functional materials which mimic certain aspects of the native 3D extracellular environment, by the use of collagen mimetic peptides or high sulfation. We have found that these materials induce cells to proliferate while preserving their organotypic expression. Furthermore we are developing techniques to treat the surface of tissues, to become adherent to cells and biomaterials important in regeneration. Finally, biofabrication techniques such as 3D printing can be used to assembly these materials into layers, thereby recreating the zonal structure of tissue. This research lays the foundation for improving current clinical strategies for treating cartilage lesions.



Family name:	**WANG**
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Title:	**MD**
Institution:	**Centre Hospitalier Universitaire Vaudois (CHUV) or University Hospital of Lausanne, Switzerland**
Position:	**Research Project Leader**
E-Mail:	**Qingwangchuv@gmail.com & Qing.Wang@chuv.ch**

Research Interest:

Na/K/RAAS, hypertension, cardiovascular damage and protection
MEMS based wireless blood pressure monitoring device

Professional History:

1984 BS, Xianning Medical College, Hubei, China
1990 MSc, Tongji Medical University, Wuhan, China
2002 MD, University of Lausanne, Switzerland
1990-1995 Professor Assist. and chairman, Department of Physiology, Guangzhou Medical College, China
1996-2006 Medical Assist & Postdoctoral, Division of Hypertension, CHUV, Lausanne,Switzerland
2006 Research Project Leader, Department of Medicine & Service of Nephrology and Hypertension, CHUV, Lausanne, Switzerland
2010 Professor Adjunct, Huazhong University of Science & Technology, Wuhan, China
2011 Guest Research Fellow, Chinese Hypertension League Institute, Beijing, China
2011 Maitre Assist.(part-time), Institute of Physiology, University of Fribourg, Switzerland
Hornor： 2007 Pfizer Award for Medical Research, Switzerland

AbstractTitle: **Wireless blood pressure monitoring system**

Author/s: ***Q. Wang* and T.H. Guo***

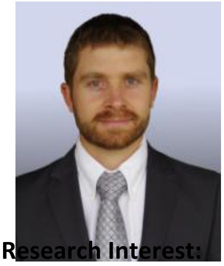
Keywords: ***Vascular and ventricular pressure, intensive care, telemetry, monitoring, device***

Abstract:

Invasive blood pressure (BP) monitoring system is daily used for operated and intensive care patients in hospital. This conventional BP monitoring system is complicated and inconvenient, and has potential risks of thrombosis, infection, and bleeding. Moreover, this system is difficult to move with the patient or hospital beds. Although non-invasive method including 24-hour ABPM is widely employed for measuring BP at home and hospital, it is not used for beat-bybeat continuously and accurately monitoring BP and is difficult to accurately monitor BP in some physiological and pathological state such as renal dialysis patient with arterial calcification or during sleep period, etc.

Today, wireless biosensors are increasingly applied for improving Human and animal vital signal monitory system that can improve research and medical practice quality. This requires innovative high-precision micro technology. We have recently developed an implantable and portable wireless pressure monitoring system that can be applied for real-time continuously and accurately monitoring BP. The new system consists of a battery-free telemetric pressure sensing unit that can be easy connected to cardiovascular catheter, a Bluetooth relay station, specific software, and computer/notebook. BP signals can be sent to a notebook via the telemetric pressure sensing unit and the Bluetooth unit. This telemetric BP monitoring system is enabling for (1) real-time continuously and accurately monitoring arterial and venous blood pressure, and ventricular pressure, etc; (2) blood sampling and drug delivery. This telemetric BP monitoring system has been tested in intensive care patients and animals.

Further investigation is to increase communication distance between the implantable telemetric pressure device and receiver, and to improve the telemetry chip's data transmission bandwidth in order to accurately monitoring some high frequency vital signals such as left ventricular pressure etc in small rodent animals.



Family name:	**Bell**
First name:	**Brett**
Title:	**PhD**
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Research Interest: Minimally invasive & robot assisted surgery

Professional History:

Since 2010 Group Head of Surgical Robotics- ARTORG Center for Biomedical Engineering, University of Bern, Switzerland
2004–2009 Research Assistant / PhD Student Tissue Engineering Laboratory (Prof. Sherry Voytik-Harbin) West Lafayette, IN

Awards
Winner Ypsomed Innovation Prize (30,000 CHF)
Winner CTI Swiss Medtech Best Poster Award (5,000 CHF)
Travel stipend German Society of Robot and Computer Assisted Surgery (500 €)
Best Poster, Biomedical Engineering Day, University of Bern

Abstract Title: **Robot Assisted Minimally Invasive Surgery for Cochlear Implantation**

Author/s: ***Brett Bell, Marco Caversaccio, Stefan Weber***
Keywords:

Abstract: The main aim of cochlear implants (CIs) is to overcome hearing loss by direct electrical stimulation of the spiral ganglion cells of the inner ear. While technological progress in the past two decades has led to powerful implantable devices, the actual implantation procedure remains a challenging task. Conventionally, the surgical procedure involves a mastoidectomy, which is the surgical removal of a large portion of the region of the skull directly behind the ear (mastoid) in order to safely uncover and identify anatomical landmarks which aid the surgeon in creating a mental map of the area. This process enables the surgeon to determine the approximate location of and to avoid damage to critical anatomy such as the facial nerve (responsible for motor responses of the face), labyrinth (part of the greater cochlea), chorda tympani (the 'taste' nerve), etc. Once access is gained to the middle ear cavity, a small hole is created in the cochlea, and the implant electrode is inserted.

We have developed a robot assisted minimally invasive intervention for cochlear implantation. The robot system consists of a five degree of freedom serial kinematics arm, a custom drill unit attached to the end effector, a high precision stereo camera system, and a non-invasive head holder. The surgical workflow associated with its use has been investigated extensively over the past 3 years. The process begins with the insertion of small fiducial screws into the mastoid bone. Next, a high resolution CT scan is made, followed by computer assisted planning of the intervention, wherein anatomical structures of the facial recess are identified. Finally, the patient is brought to the OR and prepared for surgery. The robotic procedure begins with registration of the fiducial screws. Once performed, the robot can then automatically drill the small tunnel to the cochlea for insertion. Finally, the electrode is inserted into the cochlea.

photo

Family name: Yu
First name: Wenwei
Title:
Institution:
Position:
E-Mail:

Research Interest:

Professional History:

AbstractTitle: “**Functional Electrical Stimulation for Lower Limb Function Restoration**”

Author/s:
Keywords:

Abstract:

photo

Family name: Fan
First name: Yubo
Title:
Institution:
Position:
E-Mail:

Research Interest:

Professional History:

AbstractTitle: **"Modeling and Its Applications of Orthopedic Biomechanics"**

Author/s:
Keywords:

Abstract:

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Family name:	**Teichler**
First name:	**Christoph**
Title:	**Mr.**
Institution:	**DepuySynthes Trauma (Johnson & Johnson)**
Position:	**Group Manager Product Development Asia Pacific**
E-Mail:	**Teichler.christoph@synthes.com**

Research Interest:
(max. 80 characters)

Anatomy analysis across regions, gender & age.

Professional History:
(max. 700 characters)

2005-2007: Development Engineer, Synthes Trauma, Switzerland
2007-2009: Product Manager, Synthes Trauma, Switzerland
2009-2011: Product Manager, Synthes Trauma, Charite Berlin
2011-Present: Group Manager Product Development Asia Pacific, DepuySynthes, Suzhou China

AbstractTitle:
(max. 200 characters)

Product development for Trauma Surgery in China: Current Challenges and opportunities.

Author/s: ***C. Teichler***

Keywords: ***Trauma, Emerging Markets, China, Anatomy, Value***

Abstract:

Developing Orthopedic Trauma products for Asia poses several challenges. Asia-Pacific is a regional term, which presents a vast diversity of cultures, developmental status and needs. While some populations are well developed, having similar needs as western countries, others are at an earlier stage of development.

Chinas strong growth in particular has attracted increased focus from multinational companies previously primarily focusing on western markets. This change of focus brings forth a multitude of challenges.

Language barriers, different needs, cultural barriers new customer profiles in the new markets demand a different approach than what these companies are accustomed to.

A discussion on the different approaches.

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Family name: Deng
First name: Lianfu
Title:
Institution:
Position:
E-Mail:

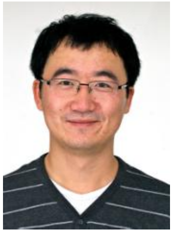
Research Interest:

Professional History:

AbstractTitle: **"The therapeutic potential of hypoxiamimiing agents in guided bone repair and regeneration"**

Author/s:
Keywords:

Abstract:



Family name:	**Wang**
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Title:	**Dr.**
Institution:	**Paul Scherrer Institut**
Position:	**PostDoc**
E-Mail:	**zhentian.wang@psi.ch**

Research Interest: X-ray physics and imaging; Phase contrast imaging; Mammography

Professional History:

2010-05 - present	PostDoc, Paul Scherrer Institut, Switzerland
2005-07 - 2010-05	Ph.D candidate, Department of Engineering Physics, Tsinghua University, Beijing, China
2001-07 -2005-07	Bachelor, Department of Engineering Physics, Tsinghua University, Beijing, China

AbstractTitle: **Quantitative volumetric breast density estimation using phase contrast mammography**

Author/s: ***Zhentian Wang, Nik Hauser, Rahel A. Kubik-Huch, Fabio D'Isidoro, Marco Stampanoni***

Keywords: ***Breast density, phase contrast imaging, mammography***

Abstract: Phase contrast mammography using a grating interferometer is an emerging technology for breast imaging. It provides complementary information to the conventional absorption-based methods. Additional diagnostic values could be further obtained by retrieving quantitative information from the three physical signals (absorption, differential phase and small-angle scattering) yielded simultaneously. We report a non-parametric quantitative volumetric breast density estimation method by exploring the absorption and small-angle scattering signal together. The proposed method is evaluated by phantom study and clinical mastectomy breast dataset.27 samples with known in-vivo diagnostic breast densities (BI-RADS scores) were included in the study and the diagnostic results were used as the ground-truth for comparison. The estimated VBD results using the proposed method are consistent with the pre-surgical diagnostic results, indicating the effectiveness of this method in breast density estimation. A positive correlation is found between the estimated VBD and the diagnostic BI-RADS score for both the CC view ($p=0.033$) and AP view ($p=0.001$). A linear regression between the results of the CC view and AP view showed a correlation coefficient $\gamma = 0.77$, which could further confirm the effectiveness and robustness of the proposed method. This method is believed to provide more accurate, quantitative information regarding the breast density and solve the subjectivity of the current clinical methods.