



# 1st EDUCATIONAL COURSE ON COMPUTER SURGERY

MICARS Mediterranean Institute of Computer Assisted Radiology and Surgery

MICARS is linked to the International Foundation of CARS and promotes research, development and educational activities on new technologies and their medical applications with special focus on countries in the Mediterranean Area

In collaboration with:



[www.micars.org](http://www.micars.org)

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Dear friends,

The organizing committee of MICARS should like to invite you to the 1st MICARS Educational Course on Computer Assisted Surgery to be held on 20 and 21 October 2011 in the Lecture Rooms of the Hospital de la Santa Creu i Sant Pau, where specialists in Maxillofacial Surgery and Orthodontics, Orthopedic Surgery, Neurosurgery and Interventional Radiology will present the latest advances in the application of technologies in their practice.

These expert speakers, through lectures, discussion groups, roundtables and workshops will present new technological advances available to the surgeon to substantially improve diagnosis and therapy for the patient.



**Javier Herrero**  
Chairman MICARS



**Heinz U. Lemke**  
Chairman CARS

#### **TOPICS**

#### **Planning, navigation, implants, robotics, PSM (Patient Specific Model)**

- Integration and Digital Operating Rooms
- Surgical model surgery planning and their systems, advanced navigation tools
- 3D stereoscopy and image intrasurgical
- Custom Implants
- 3D Cad / Cam
- 3D stereoscopy in neuroendoscopy
- Intraoperative imaging
- Advanced neuronavigation and planification systems
- Brain-machine interfaces
- Endovascular treatment in brain aneurysm
- Image technology & implementation "custom made" in knee prosthesis

**ENGINEERING**



**Heinz U. Lemke**

- 1975-2006 Professor of Computer Science (Computer Graphics and Computer Assisted Medicine) at the Technical University Berlin, Germany.
- 2006-2010 Visiting Professor at the Innovation Center Computer Assisted Surgery, University of Leipzig, Germany.
- Research Professor of Radiology, University of Southern California, Los Angeles.
- Director of the International Foundation for CARS (IFCARS).
- Organizer of the annual CARS congress series.
- Editor-in-Chief of the International Journal of CARS.



**Pere Brunet Crosa**

- Industrial Engineer (1971) in the ETSI Industrial de Barcelona, UPC Doctor Ingeniero Industrial (1976) in Polytechnic University Catalonia.
- Professor of Languages and Systems University Computer Politecnica de Catalunya.
- Responsible of the group of research on Modelling, Visualization and Computer Graphics in his University.
- Premio Nacional de Informática 2010

**MAXILOFACIAL, ORTHODONTICS & IMPLANTOLOGY**



**Juan Antonio Hueto Madrid**

- Oral and Maxillofacial Surgeon.
- Medical Specialist Hospital General Universitario Vall d'Hebron (Barcelona).
- Quiron Barcelona Hospital Consultant. Director of the robotics program and craniofacial surgery, Institut Recerca Vall d'Hebron Hospitals.



**Samir Aboul-Hosn Centenero**

- Oral and Maxillofacial Surgeon.
- Doctor of Medicine (PhD).
- Fellow European Board in Oral and Maxillofacial Surgery (FEBOMS).
- Associated Professor of the International University of Catalonia.
- Head of Maxillofacial Surgery Unit, Hospital Plató, Barcelona.



**Marcos Costa Kurzhals**

- UB Graduate Dentistry.
- Master in Orthodontics UV.
- Associate professor at UIC Master of Orthodontics.

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**NEUROSURGERY**



**Gerardo Conesa Bertrán**

- Neurosurgeon.
- Head of Neurosurgery department of Hospital del Mar, Barcelona.
- Associate Professor at the Universitat Autònoma de Barcelona.
- Areas of particular interest: Surgery cerebral eloquent areas, vascular neurosurgery, surgery Advanced neuronavigation epilepsy.

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**INTERVENTIONAL RADIOLOGY**



**Juan M. Macho Fernández**

- Radiologist, guided since its professional debut on Radiology Interventional and special commitment to endovascular treatment in vascular brain disease.
- He is currently Section Chief of Angio radiology at the Hospital Clinic Barcelona.
- He has participated in different multidisciplinary projects as neurist.

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**ORTHOPEDIC SURGERY & TRAUMA**



**Francisco Maculé Beneyto**

- Orthopaedic surgeon, PhD.
- Senior Consultant Clinic Hospital Barcelona.
- Clinical Chief of Orthopedic Surgery and Traumatology.
- Knee Unit Coordinator l'Hospital Clínic.
- Associate Professor at the University of Barcelona.

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**PLASTIC SURGERY**



**Javier Herrero Jover**

- Plastic surgeon in CM Teknon.
- Ph.D., University Autònoma de Barcelona.
- Member of CARS scientific committee.
- President of Alma IT Systems.

# GENERAL INFORMATION



## Venue

### Hospital de Santa Creu i Sant Pau

Conference Hall  
Mas Casanova, 90  
08025 Barcelona

## Technical Secretariat

### Torres Pardo

Meritxell Velázquez  
Napsols, 187 2 - 08013 Barcelona  
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m.velazquez@micars.org

## Web

[www.micars.org](http://www.micars.org)

## Official languages

Catalan, Spanish and English  
(no simultaneous translation available)

## Dates

20 & 21 October 2011

torres pardo

## Registration

Registration online available at [www.micars.org](http://www.micars.org)

Registration fee: 220€ (8% VAT included)



## VENUE

### Hospital de Santa Creu i Sant Pau

Conference Hall  
Mas Casanova, 90  
ACCESS FROM FLOOR 2



Historical building from the  
Hospital Santa Creu i Sant Pau



Metro:



Guinardo  
Hospital de Sant Pau



Sant Pau  
Dos de Maig



## SCIENTIFIC PROGRAM AT A GLANCE



### Thursday, October 20th

	AUDITORI	ROOMS 1&2	ROOM 3
MORNING	PRESENTATION - DIGITAL OPERATION ROOM	WORKSHOP: CAD-CAM CUSTOM MADE TMJ PROSTHESIS HANDS ON WORKSHOP Presented by Acuña y Fombona SL and Biomet Microfixation	
AFTERNOON	DIGITAL OPERATION ROOM WORKSHOP		

### Friday, October 21st

	AUDITORI	ROOMS 1&2	ROOM 3
MORNING	SESSION-MAXILLOFACIAL SURGERY, ORTHODONTICS & IMPLANTOLOGY	SESSION-ORTHOPEDIC SURGERY & TRAUMA	SESSION-INTERVENTIONAL NEURORADIOLOGY
AFTERNOON	SESSION-MAXILLOFACIAL SURGERY, ORTHODONTICS & IMPLANTOLOGY	SESSION-NEUROSURGERY	



# DIGITAL OPERATING ROOM



## SCIENTIFIC PROGRAM

Thursday, October 20th

SESSION I 09:00 - 11.00 h

### DIGITAL TECHNOLOGY IS CENTRAL IN THE DAILY PRACTICE IN THE OPERATING ROOMS. ADVANTAGES, NEEDS AND OPPORTUNITIES

President: S. Aboul-Hosn Centenero, Hospital Plató, Barcelona

Chairman: M. Gonzalez, Alma IT

Discussor: P. Jannin, Centre Hospitalier Universitaire de Rennes, France

- 09:00 h The operating room - State-of-the Art of and future developments  
The use of the PSM (Patient Specific Model) in the personalized medicine  
**J. Herrero. Hospital Teknon, Barcelona**
- 09:10 h The advantages of data analysis, the use of PSM and the systematization of a model.  
How the digital age can improve our results  
**J. Macho. Hospital Clínic, Barcelona**
- 09:20 h Technological challenges of medical technologies in operating rooms today:  
sensing, non-invasive augmented reality and real-time registration  
**P. Brunet. UPC, Barcelona**
- 09:30 h From Surgical PACS to TIMMS (Therapy Imaging and Model Management Systems).  
How the present technology is from the Radiological PACS and what is our near future?  
**D. Caramella, University of Pisa, Italy**
- 09:40 h Management and Assessment of OR Systems Integration.  
Engineering support in neurosurgery  
**P. Jannin, Centre Hospitalier Universitaire de Rennes, France**
- 09:50 h DICOM and IHE in Surgery  
How can we better integrate our needs and the equipments?  
Why do we need to define standards?  
**H.U. Lemke, CARS Organization**
- 10:00 h Discussion: Why Digital Operating Rooms?  
**J. Herrero, Centro Médico Teknon, Barcelona**  
**J. Macho, Hospital Clínic, Barcelona**  
**P. Brunet, UPC, Barcelona**  
**D. Caramella, University of Pisa, Italy**  
**P. Jannin, Centre Hospitalier Universitaire de Rennes, France**  
**H.U. Lemke, CARS Organization**
- 11:00 h Coffee break



## DIGITAL OPERATING ROOM



**SESSION II** 11:30 - 12.30 h

### **WHY DO SURGEONS NEED TECHNOLOGY? REAL NEEDS? WHAT TECHNOLOGY OFFER THEM?**

President: J.A. Hueto, Hospital de la Vall Hebrón. Barcelona  
Chairman: J. Herrero, Centro Médico Teknon, Barcelona  
Discussor: D. Caramella, University of Pisa, Italy

- G. Conesa, Hospital del Mar, Barcelona
- F. Maculé, Hospital Clínic, Barcelona
- A. de Lacy, Hospital Clínic, Barcelona
- L. Molins, Hospital Clínic, Barcelona
- E. Targarona, Hospital de Sant Pau, Barcelona

**SESSION III** 12:30 - 13.30 h

### **WHAT KIND OF TROUBLES ARE FACING THE RESPONSIBLES FOR IMPLEMENTING THE NEW OPERATING ROOMS AND HOW CAN THEY BE SUPPORTED BY THE INDUSTRY**

President: J. Macho, Hospital Clínic, Barcelona  
Chairman: F. Maculé, Hospital Clínic, Barcelona  
Discussor: H. Lemke, CARS Organization  
Industry: Karl Storz, Smith & Nephew, Abast Grup - Rein Medical System - I&IMS

- J. M. Paya, Centro Médico Teknon, Barcelona
- J. Vilamasana, Hospital Clínic, Barcelona
- J. C. Rueda, Hospital de Sant Pau, Barcelona
- R. Cánovas, Hospital de la Vall Hebrón, Barcelona

13:30 h MICARS 2011 OFFICIAL OPENING

- J. Herrero, President MICARS
- H. U. Lemke, President IFCARS
- M. Trias, Chief of General Surgery & Digestive Department  
Hospital de la Santa Creu i Sant Pau, Barcelona
- J. Cornet, Executive President of Fundació TicSalut
- J. Guanyabens, General Coordinator Tic Salut, Health Department

**SESSION IV** 14:00 - 14.45 h

### **A NEW GENERATION OF SOLUTIONS FOR DIGITAL OPERATION ROOMS: OPEN, COMPATIBLE, MODULAR, SCALABLE, EASY TO USE, ACCORDING TO REGULATIONS AND MUCH LESS EXPENSIVE**

Chairman: Bruno Recolons, Consultor TIC Salut

- Angel Rodriguez, Director general de Rein Medical System en España,  
(fabricante Alemán de hardware médico, pionero y líder en Europa)
- Ismael Fuentes, Director general de I&IMS,  
(fabricante de soluciones Software de gestión, difusión y almacenamiento de imagen medica)
- David Albalate, Director unidad de negocio Enterprise & Comunicaciones de Abast Grup,  
(expertos en integración de soluciones e instalación de infraestructuras TIC)



14:45 h FAREWELL COCKTAIL

# MAXILLOFACIAL SURGERY, ORTHODONTICS & IMPLANTOLOGY



## INTRODUCTION

Dear colleagues,

It is a pleasure to invite you to the first Educational Course on Technology and Innovation MICARS 2011. This course comes from the need to show how technological development is influencing our scope of work, showing latest developments at our disposal in the treatment of the dento-skeletal deformities and oral implantology.

3D Cad / Cam, augmented reality, etc, are terms until recently we used in our day to day. Currently, there are frequent expressions invading our daily and sometimes do vary our protocols. So we've raised an ambitious scientific program with national experts, multiple international and round tables to provide dynamism to the event, similar to the changes taking place in our specialty. Under the unique setting of the Hospital de Sant Pau, symbol of modern Barcelona, we invite you to enjoy two days of this event which, by their format and content, we will mark a starting point for future events.

Organizing Committee hopes that the event we have prepared is of your interest and we look forward to seeing you.



Samir Aboul-Hosn



Juan Antonio Hueto



Marcos Costa Kurzhals

Under the patronage:





# MAXILLOFACIAL SURGERY, ORTHODONTICS & IMPLANTOLOGY



## SCIENTIFIC PROGRAM

Friday, 21st October 2011

08:00 h	Registration opens	12:30-14:10 h	<b>Round Table III: 3D Planning in orthognathic surgery. How do you do it?</b> Chairmen: J.A.Huetto, Barcelona S. Aboul-Hosn, Barcelona Speakers: G. Swennen, Belgium F. Hernández Alfaro, Barcelona J. Gateno, Houston, US Discussion
08:30-08:40 h	<b>Welcome &amp; Presentation</b> A.Huetto, M.Costa, S.Aboul-Hosn	14:10h	Lunch
08:45-10:45 h	<b>Round Table I</b> Chairman: F. Hernández Alfaro, Barcelona <b>CBCT vs CT</b> J. Pons, Radiology, Zaragoza <b>Data acquisition for an accurate virtual model</b> G. Swennen, Belgium J. Gateno, Houston, US I. Navazo, Informatic Engineering, Barcelona Discussion	15:30-17:00 h	<b>Round table IV: From the computer to the operating room: accuracy of CAD/CAM surgical splints and prediction of the orthognathic surgery results</b> Chairmen: J.A.Huetto, Barcelona S. Aboul-Hosn, Barcelona Speakers: J. Gateno, Houston, USA G. Swennen, Brujas, Bélgica F. Hernández Alfaro, Barcelona Discussion
10:45-11:15 h	Coffee Break	17.00-17.20 h	Coffee Break
11.15-11.30 h	<b>Presentation</b> J. Cornet, Tic Salut H. Lemke, Cars	17:20-18:50 h	<b>Round table V: Surgical splints and robotics in oral implantology</b> Chairmen: J.Grau, Barcelona E. Ferrés, Barcelona Speakers: I. Salmerón, Madrid J. Birbe, Barcelona J.C. Moreno, Badajoz Discussion
11:30-12:20 h	<b>Round Table II</b> Chairman: M. Costa, Barcelona <b>Three-dimensional studies of craniofacial</b> V. Hernández, Alicante <b>Use of Specific Patient Model in the planning of a rhinoplasty</b> J. Herrero, Plastic Surgeon, Barcelona <b>Anthropometric measurements of the skull</b> Daniel Turbón, Anthropologist, Barcelona Discussion	18.50-19.00 h	Closing remarks

## INTRODUCTION

**Neurosurgery** is a highly complex and highly technological surgical specialty, and has the need to be related with a full bunch of medical specialties in its trend to excellence. A complete neurosurgical operating room at the beginning of the 21st century is crowded with equipment and with patient information that needs to be organized and used in a useful and efficient workflow.

Preoperative planning may need to include the use of multiple imaging modalities, including functional and physiological information, as well as even movement in spinal cases. Once in the OR, the planning may be checked with the use of navigation systems, intraoperative imaging studies and functional and physiological monitoring in many instances. The intraoperative imaging can be in some cases an MR, a CT scan or an angiogram, and the patient may need to be taken to the next room or viceversa. In this kind of setting, the integration of all the different informations of the patient may come on line also from outside of the OR, from different departments of the hospital such as radiology or even from outside the hospital with new telemedicine applications.

So we are confronting a highly complex entourage where engineers and neurosurgeons must define the most efficient and friendly environment, where safety for the patient must play a central role. New frontiers with human machine interfaces and robotics put also a new challenge for the next decades and some achievements are already an actual fact. Neurosurgery as many other times is pioneering many of these developments and is devoted to participate as a core part of MICARS.



Gerardo Conesa Bertrán

## INTRODUCTION

**Radiology** is a young discipline within the Medicine, with just over 100 years of history, emerging hand of technological innovation and scientific and has taken in recent decades on a vital role significant in medicine based not only on its diagnostic application but also its application in surgical planning and in their own use as therapeutic tool.

Although radiology has been before the era of computing and digital, this has been an amazing revolution in the hands of these disciplines that have led to: the development of new image and new concepts in radiology to allow storage and subsequent handling of the information radiological equipment capable of generating. We have gone from simple x-ray film and a two dimensional virtual handling of morphological information for a volume that can be later reconstructed in any plane of space.

This stunning information obtained and stored has allowed its use as a model and planning of complex surgical procedures, and other direct application as a therapeutic tool to guide and control techniques used to treat multiple diseases. However, technology has also created challenges in managing and further use of this information and especially in its integration into therapeutic areas.

It is with this need for integration and redefinition of concepts that create a multidisciplinary knowledge and transverse Medical Radiology and where it is well included in a project like MICARS.



Juan M. Macho Fernández



# NEUROSURGERY & INTERVENTIONAL NEURORADIOLOGY



## SCIENTIFIC PROGRAM

Friday, 21st October 2011

## PLANNING AND SIMULATING NEUROSURGERY AND INTERVENTIONAL NEURORADIOLOGY

### BRAIN ANEURYSM

Chairman: J. Macho

- 10.30 h Advances in endovascular treatments: flow diversion concept  
J. Macho
- 10.50 h ANGIOLAB: a software for the image-assisted endovascular treatment planning of cerebral aneurysms.  
M.C. Vila Oriol, Ignacio Larrabide, Martha Aguilar (CISTIB)
- 11.05 h Coffee Break and Workshop  
ANGIOLAB: software for the image-assisted endovascular treatment planning of cerebral aneurysms

### STROKE: ACUTE PHASE TREATMENTS

Chairman: J. Macho

- 12.00 h Imaging evaluation of cerebral tissue at risk of infarction  
A. López Rueda
- 12.20 h Mechanical revascularization therapies  
J. Macho
- 13.00 h Lunch

### BRAIN SURGERY PLANNING AND SIMULATION

Chairman: E. Ferrer

- 14.00 h Planning and neuronavigation with the C-Byon system  
G. Feigl
- 14.20 h Advanced planning with Stealth viz station  
J.D. Sobrado
- 14.50 h DTI tractography: a neurosurgeon's perspective  
R. Diez-Valle

- 15.10 h Ventricular puncture trainer  
P. Brunet
- 15:25 h Discussion

### INTRAOPERATIVE 3D TO 5D MONITORING

Chairman: G. Conesa

- 15.40 h Intraoperative MRI: The Polestar system  
J. Ibañez and M. Brell
- 16.00 h Intraoperative MRI: The IMRIS system  
G. Feigl
- 16.30h Coffee break

### MEDTRONIC AND BRAIN LAB DTI PLANNING SYSTEMS HANDS ON

Chairman: E. Ramos

- 17.15 h Intraoperative/Portable CT: The Ceretom system  
J. Marquez
- 17.40 h Intraoperative CT: The O-Arm  
A. Vazquez

### Keynote lecture: ENGINEERING NEUROSCIENCE

- 18.00 h Brain machine interfaces in neurosurgery  
A. Ramos

### NEUROMODULATING THE BRAIN

Chairman: G. Conesa

- 18.30 h Neuromodulation in refractory epilepsy  
J. Rumia
- 19.00 h Neuromodulation in refractory depression  
J. Molet



## INTRODUCTION

### IMAGE TECHNOLOGY AND IMPLEMENTATION "CUSTOM MADE" IN KNEE PROSTHESIS

Total knee arthroplasty is the most effective treatment for advanced osteoarthritis of the knee. The technique for implantation of the knee prosthesis has been developing with increasing knowledge of the kinematics and the implant designs.

The use of cutting guides that help the surgeon to the proper placement of the implants has been a constant in prosthetic surgery has also evolved as they have been incorporating new technologies. From a purely mechanistic view of the extra rigid and intramedullary guides, they developed to techniques by navigation which provided greater accuracy and reliability of the bone cuts. The search for greater control of the cuts has added imaging techniques (MRI and CT) to create custom guides based on the anatomy of each patient.

Using this technology we can calculate the mechanical axis alignment and axial and coronal implant size. Visionaire system based on this technology, contributes to reducing costs by using fewer instruments reduces surgical time and increases safety because it is less invasive, globally optimizing the outcome of surgery.

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Francisco Maculé Beneyto



### SCIENTIFIC PROGRAM - Friday, 21st October, 2011

#### Application of imaging technology for custom knee surgery

09.00 - 09.10 h	Patient specific instrument F. Macule, Barcelona	11.00 - 11.20 h	<b>SURGICAL TECHNIQUES</b> Application to surgery - Technical requirements - Indications and contraindications E. Castellet, Barcelona
09.10 - 09.30 h	<b>BASIC SCIENCES</b> Engineering and image - Materials M. Doblaré, Zaragoza	11.20 - 11.40 h	<b>SURGICAL TECHNIQUES</b> Limits of the system. Reliability of the system F. Maculé, Barcelona
09.30 - 09.50 h	<b>APPLICATION OF BASIC SCIENCE</b> Basics of RNM, TAC R. Schmid, Germany	11.40 - 12.00 h	<b>CLINICAL EXPERIENCE AND RESULTS</b> Early clinical results. Optimization of OR time Optimization of operating room space JM Segur, Barcelona
09.50 - 10.10 h	<b>RADIOLOGY TECHNIQUES</b> Technical requirements Basic technic J. Pomés; X. Tomás, Barcelona	12.00 - 12.20 h	<b>ECONOMICS and INNOVATION</b> Innovation & Health Technology Assessment J. Bigorra, Barcelona
10.10 - 10.30 h	<b>RADIOLOGY TECHNIQUES</b> From the image to the design From the navigation to the "custom made" R. Schmid, Germany	12.20 - 13.00 h	Discussion
10.30 - 11.00 h	Coffee break		



**Les noves  
tecnologies  
al servei de  
la salut de  
les persones**



**Generalitat de Catalunya**  
**Departament de Salut**



**TicSalut**

Tecnologia, innovació i salut