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LINKING THE INTERNATIONAL COMMUNITY OF TERMIS

IN THIS ISSUE

# Letter from the President

by Rui L. Reis

Dear Colleagues,

We are three months into 2017 and I hope that the New Year has brought you good health and happiness. I also hope that your research, clinical or industrial work, has been progressing well.

As you should be aware, the *mission* of TERMIS is *to bring together the international community of persons engaged or interested in the field of tissue engineering and regenerative medicine (TERMIS) and to promote education and research within the field of tissue engineering and regenerative medicine through regular meetings, publications and other forms of communication*.

This year, TERMIS will host three Chapter conferences.

- TERMIS-EU: Davos, Switzerland – June 26-30
- TERMIS-AP: Nantong, China – September 21-24
- TERMIS-AM: Charlotte, North Carolina – December 3-6

It is my great honor to continue to lead TERMIS as a Society, together with the members involved in our different society Global bodies and continental Chapters. I really appreciate their involvement, leadership and continuous support. But it is all of you, as members of the Society, which moves the research within the field forward. We encourage you to participate in the conferences through submitting an abstract(s) and proposals for the organization of workshops and symposia. Your contributions help to formulate the programs, which enables you to share your research findings and provides you with an opportunity to collaborate with professionals from around the world. I also encourage SYIS members to be even more involved in all our TERMIS meetings and in the specific activities for young members that are a major part of our TERMIS meetings.

If you have ideas on how the Society can further its mission, please do not hesitate to contact me. TERMIS continues to grow because of your involvement.

We look forward to seeing you in 2017!

Sincerely,

Rui L. Reis

TERMIS President

## *Tissue Engineering, Parts A, B and C*, the official journal of TERMIS


As a member of TERMIS you have FREE online access to, *Tissue Engineering, Parts A, B and C* (http://www.liebertpub.com/ten) the leading biomedical journal on all aspects of tissue growth and regeneration. Multidisciplinary in scope, the Journal provides a variety of original articles, reviews, and methods papers that can be delivered right to your inbox!

**Be notified as new articles publish:** Sign Up for TOC Alerts at http://www.liebertpub.com/ten/connect

For your online access login, please contact, swilburn@termis.org.

### "Tissue Engineering Resource Center" - "How to Write a Good Paper"

http://www.liebertpub.com/TEResourceCenter

*Tissue Engineering*, the Official Journal of TERMIS, is a leading biomedical journal advancing the field with cutting-edge research and applications on all aspects of tissue growth and regeneration.

The Journal is proud to present the "*Tissue Engineering* Resource Center" to all TERMIS members, presenting helpful tools and resources for researchers around the world. Included in this resource center is our initial lecture and presentation on "How to Write a Good Paper" along with a PowerPoint presentation and PDF. We will be adding many additional presentations and helpful resources as we build this "tool box" so make sure to access our Resource Center on a regular basis.

*Tissue Engineering* works diligently to facilitate and advance research and communication across academia, industry, and government, as well as provide authors with tools to support their contribution to this evolving field of science. We hope you enjoy these tools.

If you would like to contribute to the *Tissue Engineering* Resource Center, please email Sophie Mohin smohin@liebertpub.com for more information.

## ScienceDocs Inc.

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**"ScienceDocs is a TERMIS partner which is providing a perpetual 15% discount to active members for all research support services including medical editing, translation and statistics consulting. "**

**Click here for more information.**

## TERMIS-AM IMPORTANT DEADLINES

**2017 Awards Program**

**Nominations packages dues: June 16, 2017**

**2020 Conference Call for Proposals**

**Due: July 31, 2017**

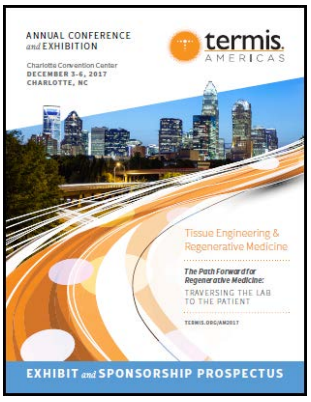
**2017 TERMIS-AM Conference: Charlotte, NC**
**December 3-6**

**Call for abstracts to open: April 2017**

## 2017 Awards Program

*Nominations are being accepted for the Lifetime Achievement, Senior Scientist, Young Investigator, Mary Ann Liebert, Inc. Outstanding Student, Educational and Innovation/Commercialization Awards.*
*https://www.termis.org/chapters_am_awards.php*

## 2017 TERMIS-AM Conference: Charlotte, North Carolina

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Click on the image to view the opportunities available.

## TERMIS-EU Important Deadlines

### 2020 Conference Proposals – Due 1 June 2017

On behalf of the TERMIS-EU, we would like to announce the solicitation of proposals for consideration to host the 2020 TERMIS-EU Conference.

If you are interested in hosting the 2020 TERMIS-EU conference, please submit your request to Sarah Wilburn at swilburn@termis.org. You will be provided with a meeting host form that asks detailed questions about the meeting organizers, location/venue, program, and meeting financials. When proposals are submitted, they are reviewed by the TERMIS-EU Council. *The proposers are asked to present their proposals during the TERMIS-EU Council meeting that will be held during the 2017 TERMIS-EU Conference in Davos, Switzerland.*

## Upcoming Conference Deadline


### Late Breaking Poster Abstracts

**Deadline for submission: 21st April**

https://aof.conference-services.net/authorlogin.asp?conferenceID=5211&language=en-uk

*Conference Program*
*An overview of the programming for the conference is posted online.*

**Plenary Speakers Announced!**

**Opening Symposium:** Corrado Cancedda MD, PhD, Partners In Health, Brigham and Women's Hospital, Harvard Medical School, Boston, USA; *Title: Strengthening the Health System while Responding to the Ebola Virus Disease Epidemic: Lessons Learned by Partners In Health in Sierra Leone*

**Plenary Speakers:**

**Shinya Yamanaka**, Professor, Director of CiRA (Centre for iPS cell Research and Application), Kyoto University. Nobel Prize in Physiology or Medicine 2012. *Title: Recent Progress in iPS Cell Research and Application*

**Pamela Robey**, Professor, Chief, Craniofacial and Skeletal Diseases Branch, DIR, Co-Coordinator, NIH Bone Marrow Stromal Cell Transplantation Center, Chief, Skeletal Biology Section, CSDB, DIR. *Title: The role of tissue-specific stem/progenitors cells in tissue engineering and regenerative medicine*

**Jeffrey M Karp**, Professor, Brigham & Women's Hospital, Harvard Medical School, Harvard-MIT Division of Health Sciences and Technology, Boston, USA. *Title: From Conception to the Clinic, Making Ideas Useful*

**Katja Schenke-Layland**, Professor of Medical Technologies and Regenerative Medicine, Department for Women's Health at the University Women's Hospital, Tubingen, Germany. Interim Director of the Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB) and Department Head of the Department of Cell and Tissue Engineering. Adjunct Associate Professor, Department of Medicine/Cardiology, the University of California in Los Angeles (UCLA). Executive Editor of Advanced Drug Delivery Reviews (Elsevier).
*Title: Enhanced imaging techniques and their role in regenerative medicine*

# 5th TERMIS/Expertissues Winterschool 2017

## „Science never freezes“

Research is resisting even at bitterly cold temperatures. That was proved by a group of international scientists and students who met in Radstadt, Austria, at the hotel „Zum Jungen Römer“ for the TERMIS/Expertissues/Biodesign Winterschool 2017. From January 15th to 18th all the discussions were focussed on „In Vitro/In Vivo Preclinical Models and Imaging in Musculoskeletal Tissue Regeneration“ which was the topic of the biennial meeting. And also this time the participants were impressed with the range of presentations. One of the highlights of this year was the participation of Prof. Pete Zammit from King's College London. The invited speaker was convincing on the first day of the Winterschool with his interesting talk about the „Role of Muscle Satellite Cells in Health and Disease“. But also the following days of the meeting were fully covered with exciting topics like Bone Regeneration and Cartilage Engineering (with Prof. Rotter as a clinician translational researcher). One presenter of this field was Dr. Jon Bernhard. He had to take the longest trip for joining the Winterschool as he came from the Columbia University New York for talking about „The Role of hypertrophic Chondrocytes in Bone Regeneration and stable Cartilage Formation“. Germany, on the other hand, was represented by the veterinary Dr. Dirk Barnewitz, who is a specialist in Orthopedic Surgery. Nor should we forget two guests of the University of Bayreuth who were attracting with their tissue engineering method with silk of spiders. And last but not least there were a quite successful group of the hosting Ludwig Boltzmann Institute for experimental and clinical Traumatology (Director: Heinz Redl) and several members of the Austrian Cluster for Tissue Regeneration.

Apart from the fruitful discussions there was of course time for breaks and social events. There were those who went skiing, those who had fun by playing an indoor golf tournament and others who preferred enjoying the wellness area of the hotel. But one thing was common to all the participants: while shaping the body, everybody took the opportunity for networking ☺

Finally, not to forget the traditional beautiful night-sledge ride!

## TERMIS-AP News


**Call for Abstracts Now OPEN!** **Website:** http://www.termis.org/ap2017

## TERMIS-AP Important Deadlines

2017 Awards Program

Nominations packages dues: March 31, 2017

2020 Conference Call for Proposals

Due: August 1, 2017


## Laboratory Feature: Zagreb TERM Group

***What is the goal of your lab and what problem are you hoping to impact in your work?***

Zagreb TERM Group was founded in 2010 at the University of Zagreb, Croatia with primary interest in tissue engineering and regenerative medicine of musculoskeletal tissues. The group is interdisciplinary and our doctrine is to focus on translational musculoskeletal research with ultimate goal of clinical application. Professor Alan Ivković is the PI of the group and being both clinician and scientist, stirs the direction of the group towards pragmatic, applicable and feasible scientific solutions to the most challenging clinical problems. There are several directions in which the group is developing.

In terms of eminent clinical application, the most advanced translational research projects are related to articular cartilage engineering and transplantation. Thanks to very competitive EU grants from FP7 (**BIO-COMET**, **BIO**reactor-based, **C**linically **O**riented **M**anufacturing of **E**ngineered **T**issues) and H2020 (**BIO-CHIP**, **BIO**engineered grafts for **C**artilage **H**ealing **I**n **P**atients) in collaboration with our international partners (consortium led by prof. Ivan Martin from the University of Basel), we were able to challenge traditional paradigms in cartilage tissue engineering. In BIO-COMET project we addressed shortcomings of traditional cell-based cartilage engineering based on conventional manual benchtop techniques, which due to the large number of manual and labor intensive manipulations required, possess inherent risks of contamination, potential high intra- and inter-operator variability, limited scale-up opportunity, and high manufacturing costs in the long-term. After four years of dedicated work not only that the main goal of the project - to integrate established research based technologies and processes into an *automated and controlled bioreactor-based tissue manufacturing system*, was achieved, but we also proved that different source of cells (nasal instead of articular chondrocytes) is a feasible option (Figures 1. and 2.). Following the BIO-COMET success, the group has recently started to work on unprecedented multicenter, phase II clinical trial within the BIO-CHIP project, and the main goal of this project is to compare the clinical efficacy of a tissue therapy (i.e., nasal chondrocyte-derived engineered cartilage) with that of a cellular therapy (i.e., nasal chondrocyte delivery from a matrix) for the treatment of cartilage lesions in the knee. In addition to the clinical trial, Zagreb TERM Group will test this technology in large animal model for more demanding clinical scenarios (pre-osteoarthritis).

Another important part of the Group's work is bone repair and regeneration. Currently we are working on the development of several bioactive nanocomposite scaffolds. By using proprietary protocols we developed highly-efficient osteoinductive scaffolds with slow release of bioactive molecule. It has been tested in bioreactors and the small animal study is under design (Figure 3.). Several patents have been filed as a result of this research.

We are also very much interested in bone-tendon healing process, since it is a very common clinical problem, especially in reconstructive surgery such as rotator cuff, ACL (anterior cruciate ligament) and Achilles tendon repair. Our approach is to harness intrinsic healing capacities of the autografts by stimulating cell recruitment and directing it towards osteogenesis and better tendon-to-bone healing.

Finally, the Group has recently started an ambitious resarch project led by prof. Inga Marijanović on ostesarcoma gene therapy. Osteosarcoma is an aggressive pediatric tumor of growing bones that, despite surgery and chemotherapy, is prone to relapse. The cancer stem cell hypothesis posits that tumors are maintained by stem cells and it is the incomplete eradication of a refractory population of tumor-initiating stem cells that accounts for drug resistance and tumor relapse. Our strategy lies in targeting of the cancer stem cells in osteosarcoma with gene therapy, being a promising avenue to explore to develop new therapies for this devastating childhood cancer.

***What do you think is unique about your lab/approach?***

Interdisciplinary is the key word in Zagreb TERM Group modus operandi (Figure 4.). By definition interdisciplinary brings together different disciplines to address complex questions. It does not mean that experts from different field are just trying to solve the problem by using their own set of skills and knowledge. It actually means that integration of different analytical and methodological approaches results in completely new and innovative concepts and solutions. In fact it is the way that many new disciplines (such as neuroscience and biochemistry) evolved, and tissue engineering is an obvious example as well. It seems rather obvious to adopt interdisciplinary approach, but the reality is much different. Collective thinking about complex problems requires crossing the borders both horizontally (across the disciplines) and vertically (across experts, policymakers, practitioners and public). Although bringing together scientists and clinicians from different fields is not always easy, the real challenge lies in facilitating interdisciplinary with respect to the rigid academic, regulatory and governmental institutions. From the beginning we are determined to be a truly interdisciplinary group, and we strongly believe it brings the edge in comparison to similar teams and projects.

***Who are your team?***

The Group partners are Veterinary Faculty University of Zagreb (extensive experience in large animal models) led by prof. Dražen Matičić, Faculty of Science University of Zagreb (molecular analysis, GLP graft production, bioreactor technology, osteosarcoma research) led by prof. Inga Marijanovć, University Hospital Sveti Duh (extensive experience in conducting clinical studies) and School of Medicine University of Zagreb (morphological and imaging studies, project management) led by prof. Davor Ježek, which also has a role of a group leader (Figure 5. and 6.). At this point the group has four PhD candidates from different fields (Andreja Vukasović, MD, PhD candidate in biomedical sciences; Maja Pušić, mag.exp.biol., PhD candidate in biology; Petar Kostešić and Mirta Stilinović, both DVM and PhD candidates in veterinary medical sciences). We are particularly proud that the member of our team - dr. Andreja Vukasović has been awarded with *L'Oréal-UNESCO For Women in Science International Award* for 2016 (Figure 6.). Although we belong to different faculties and schools within our University, we operate as a functional group which gives us efficiency and flexibility. Internationally the group is also very active, with ongoing bilateral projects with University of Maribor and University of Bristol.

***What emerging areas of tissue engineering and regenerative medicine are most exciting to you and why?***

The reprogramming of adult cells to form induced pluripotent stem cells continues to be one of the most exciting scientific fields and is radically transforming our thinking about cell therapies. The technology promises to allow adult cells, matched to the patient, to be turned into a cell that can form any tissue in the body. Reprogramming is also being used to turn one type of adult cell into another type without forming a pluripotent intermediate. The use of 3D printing to produce functional patient-specific skeletal tissues is another example of the technology that could radically change the replacement surgery in orthopaedics and traumatology. Instead of using titanium alloys and polyethylene to replace joints, it might be feasible in the future to perform a biological resurfacing with 3D printed tissues. Development of new biomaterials with specific surface and chemical properties to control cell fate is a field in its own right and will bring interesting and feasible solutions for clinical application. Finally, controlled release of different bioactive molecules from scaffolds will give us new and exciting opportunities to use some old substances and technologies in unexpected and innovative manner with better clinical success, fewer unwanted side effects and much lower costs of production.

***What do you hope the field has achieved in 20 years?***

It is difficult to predict and foresee something so uniquely unpredictable such as future achievements in science in technology, but if we should pick one thing to hope for, it would most certainly be - to diminish existing translational gap. It is arguably the greatest challenge we have not only in tissue engineering and regenerative medicine, but in healthcare in general. Removing the impediments to collaborative translational research is an ongoing process, and all key players from academia, regulatory organs, government and industry should participate in it.

ACKONWLEDGEMENT: *The research leading to these results presented in this feature has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement n°278807 - Bioreactor based, clinically oriented manufacturing of engineered tissues* (BIO-COMET), *European Union's H2020 Programme under grant agreement n°681103* - Bioengineered grafts for cartilage healing in patients *(*BIO-CHIP) *and under Business Inovation Croatia (BICRO) Proof of Concept Grant*

**FIGURES**

**Figure 1.** Sheep knee implantation of cartilage tissue cultured on nanocomopsite bilayer scaffold in perfusion bioreactor.

**Figure 2**. Safranin-O histology section of the sheep knee 12 month after implantation of tissue grown in perfusion bioreactor. It shows smooth surface, excellent side to side integration, abundant glicosaminoglycans, columnar chondrocyte orientation and minimal subchondral plate migration.

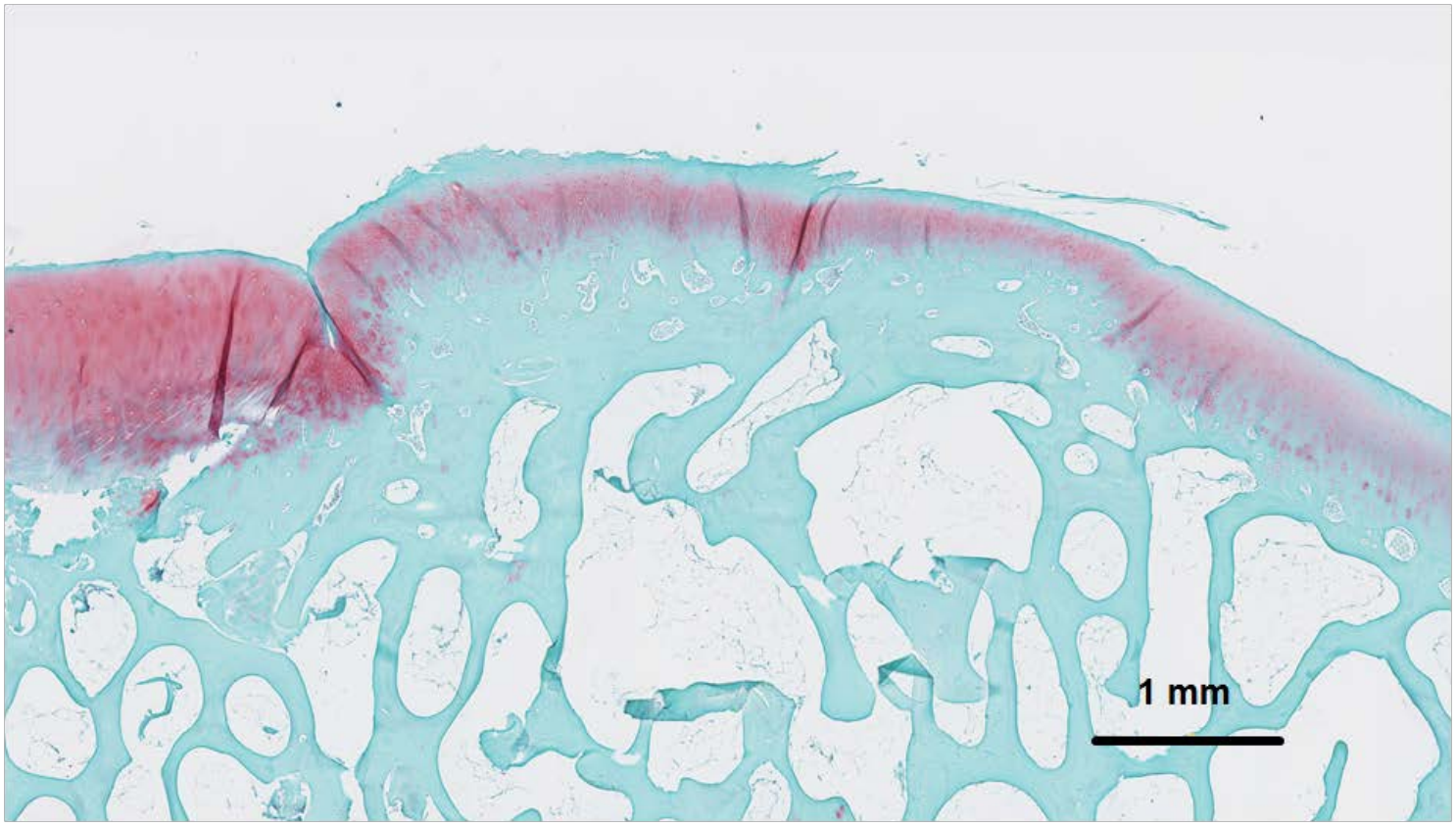

**Figure 3**. Bone graft grown on proprietary bioactive nanocomposite scaffold. Section of graft staint with hemalaun/eosin staining shows equal cell distribution, formation of extracellular matrix and scaffold residues.

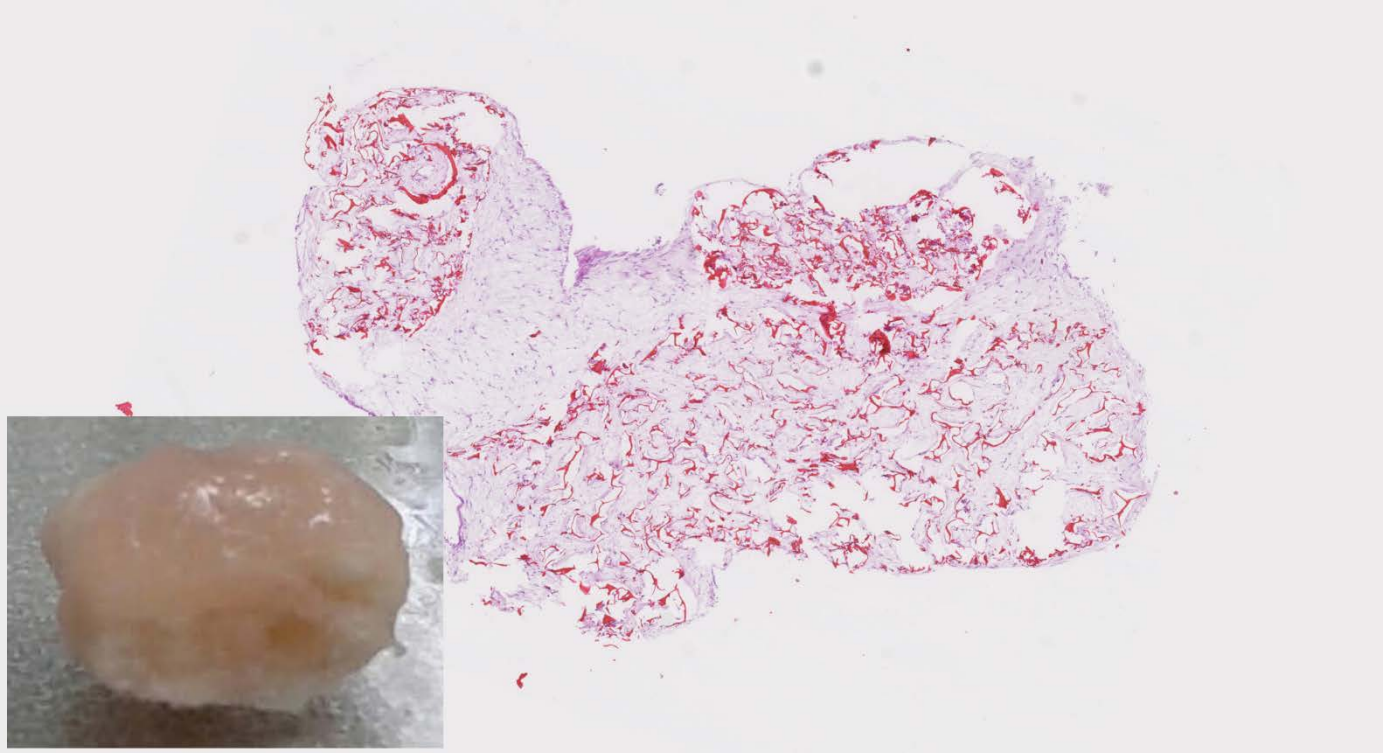

**Figure 4**. Interdisciplinary nature of the Zagreb TERM Group depicted by organogram.

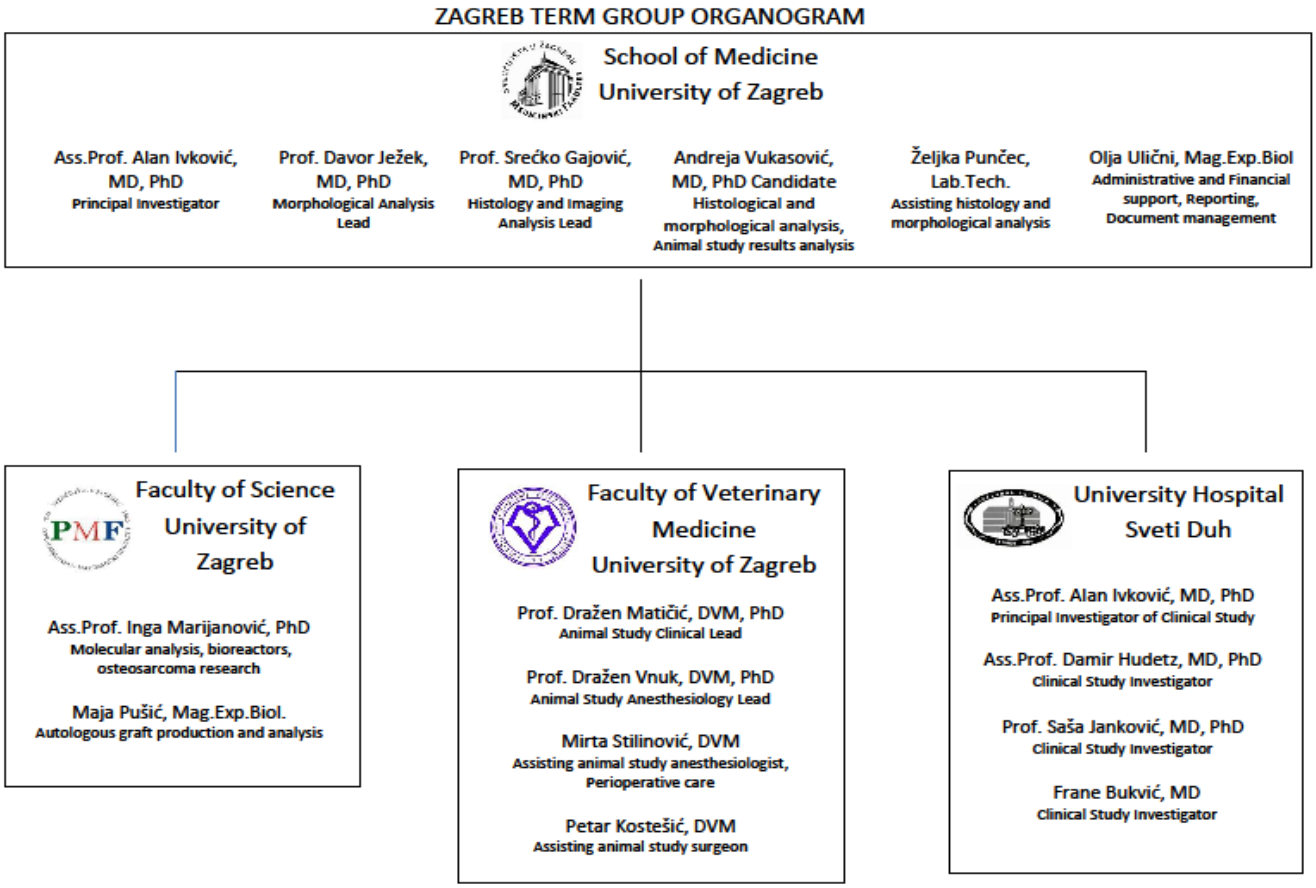

**Figure 5**. State of the art facilities for large animal surgeries at the Veterinary faculty.

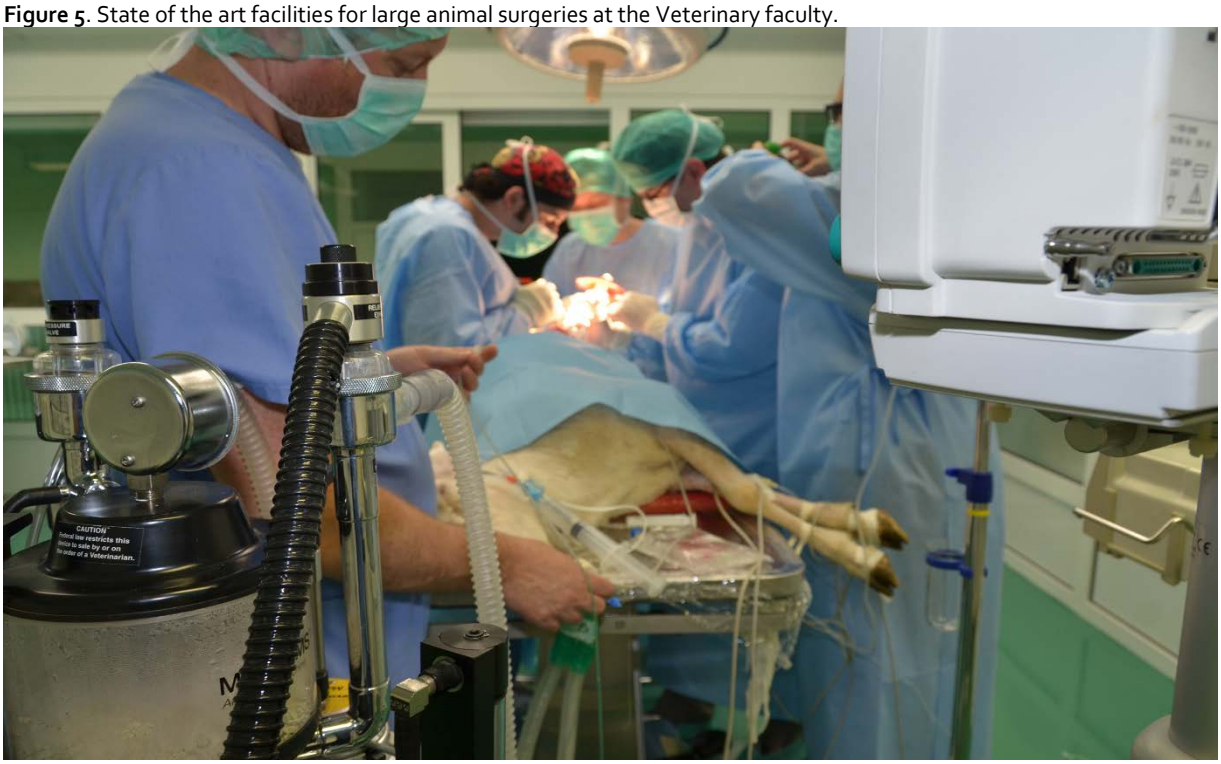


**Figure 6**. Various staining techniques for cartilage histology.

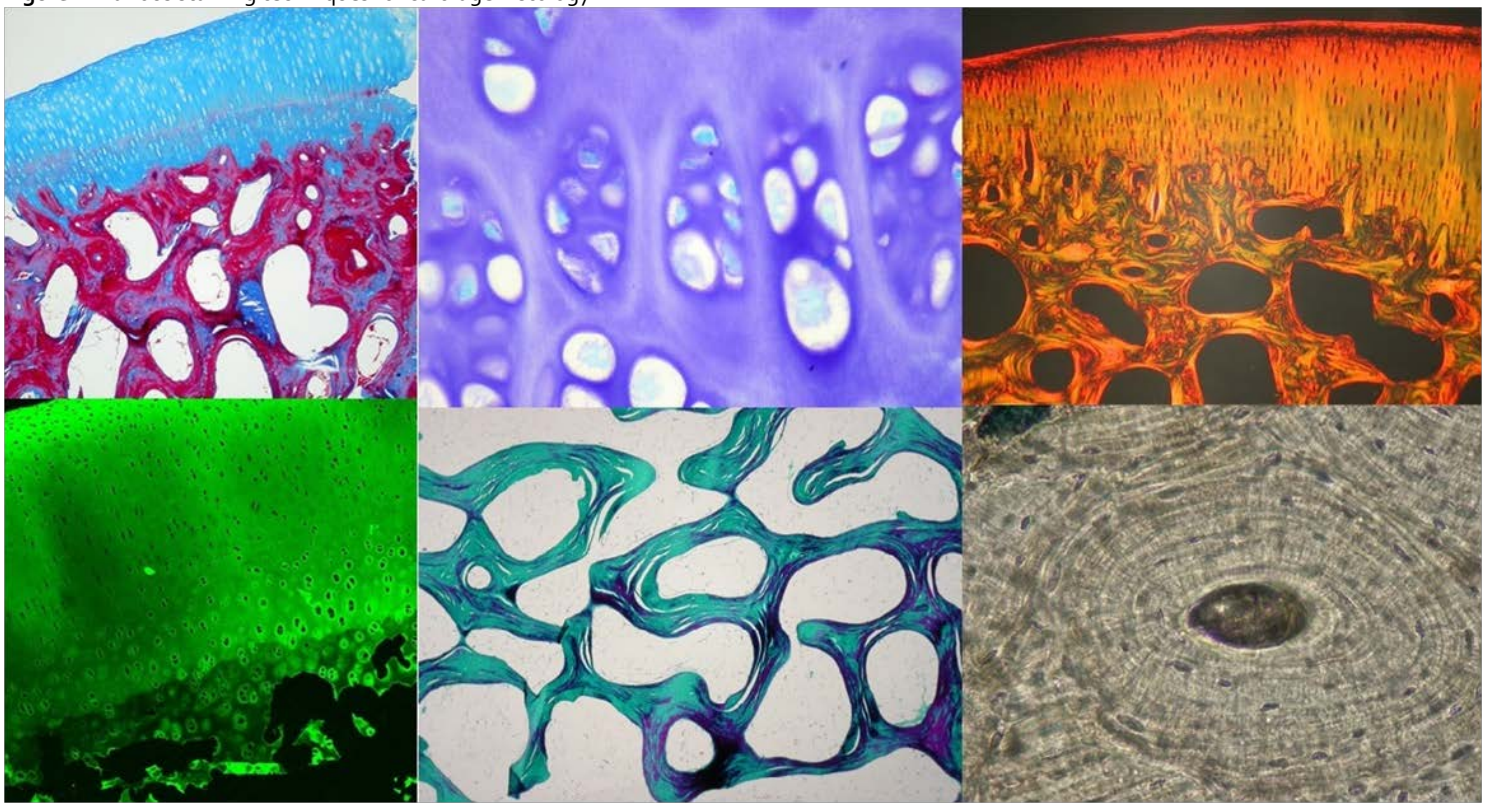

**Figure 7**. PI of the group prof. Alan Ivković and *L'Oréal-UNESCO for Women in Science International Award* for 2016 recipient Dr. Andreja Vukasović with President of the Republic of Croatia Mrs. Kolinda Grabar-Kitarović

**Figure 8**. Zagreb TERM Group members at the 3rd International Conference on Regenerative Orthopaedics and Tissue Engineering held in Zagreb (November 2015)

# Upcoming Conferences

All conferences listed have been reviewed and approved for endorsement by the TERMIS Endorsement Committee.

**April 2017**

- **6th Annual Penn Orthopaedics Cartilage Repair Symposium**
  Symposium Dates: April 28-29, 2017
  Symposium Theme: Cutting Edge of Cartilage Repair: Advances in Biological Joint Replacement
  Symposium Location: Smilow Center for Translational Research, Philadelphia, PA

**May 2017**

- ISCT 2017 Meeting
  Meeting Dates: May 3-6, 2017
  Meeting Location: ExCeL London, UK
  Meeting Co-Chairs: Miguel Forte, MD, PhD (France), Mark Lowdell, PhD, FRCPath, FRBS (UK) and Katy Rezvani, MD, PhD, FRCP, FRCPath (USA)
- Cell-Based Therapies and Tissue Engineering Short Course
  Short Course Dates: May 23-25, 2017
  Short Course Location: Case Western Reserve University, Cleveland, OH
  TERMIS members receive a registration discount.

**June 2017**

- Regenerative Medicine Summer School 2017
  Summer School Dates: June 4-10, 2017
  Summer School Location: University of Pittsburgh, Pittsburgh, PA
- 6th International Conference on Tissue Engineering in conjuction with the 3rd International Conference on Regenerative Biomedical Materials
  Conference Dates: June 14-19, 2017
  Conference Location: Aldemar Knossos Royal Village Conference Center, Heraklion, Crete, Greece
- 2017 TERMIS-EU Conference
  Conference Dates: 26-30 June 2017
  Conference Location: Davos Conference Center, Davos, Switzerland
  Conference Chair: R. Geoff Richards, PhD
  Conference Program Chair: Mauro Alini, PhD

**July 2017**

- 2nd International Conference on Tissue Engineering and Regenerative Medicine
  Conference Dates: July 26-30, 2017
  Conference Location: Tshwane University of Technology, Vanderbijlpark, South Africa

**August 2017**

- 2017 Advances in Tissue Engineering Short Course
  Short Course Dates: August 9-12, 2017
- Short Course Location: Rice University, Houston, Texas
  25th Anniversary

**September 2017**

- 2017 TERMIS-AP Conference
  Conference Dates: September 21-24, 2017
  Conference Location: Nantong, China
  Conference Chairs: Prof. Dr. Xiaosong Gu, Dr. Xiaobin Fu, and Dr. Yilin Cao
  Program Chairs: Dr. Fei Ding and Dr. Wei Liu

**December 2017**

- 2017 TERMIS-AM Conference
  Conference Dates: December 3-6, 2017
  Conference Location: Charlotte Convention Center
  Conference Chair: Anthony Atala, MD
  Conference Program Chair: Shay Soker, PhD

**May 2018**

- 10th Symposium on Biologic Scaffolds for Regenerative Medicine
  Symposium Dates: May 3-5, 2018
  Symposium Location: Silverado Resort, Napa, CA
  Symposium Chair: Stephen Badylak, DVM, PhD, MD

**September 2018**

- 2018 TERMIS World Congress - Kyoto, Japan
  World Congress Dates: September 4-7, 2018
  Location: Kyoto International Conference Center
  Co-Chairs: Yasuhiko Tabata, PhD and Yoshiki Sawa, MD, PhD

**June 2019**

- 2019 TERMIS-EU Conference - Crete, Greece
  Conference Dates: 24th - 28th June 2019
  Conference Location: Creta Maris Convention Center
  Conference Theme: Tissue Engineering Therapies: From Concept to Clinical Translation & Commercialisation
  Conference Chair: Dr. Dimitrios Zeugolis
  Program Chair: Dr. Maria Chatzinikolaidou

**October 2019**

- 2019 TERMIS-AP Conference - Brisbane, Australia
  Conference Dates: October 14-18, 2019
  Conference Location: Brisbane Convention & Exhibition Centre
  Conference Chair: Prof. Yin Xiao

*To accomplish its mission, TERMIS brings together the international community of persons engaged or interested in the field of tissue engineering and regenerative medicine and promotes education and research within the field of tissue engineering and regenerative medicine through regular meetings, publications and other forms of communication. The Society also serves as an international forum to promote the informed discussion of challenges and therapeutic benefits of the application of tissue engineering and regenerative medicine technologies.*

*Most importantly, the Society is committed to bringing you closer to key professionals to support your mutual understanding of the field, accelerate your research in the field and to enable you to contribute to the ultimate care of patients in this very important way.*

# interLink

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INTERESTED IN CONTRIBUTING TO THE TERMIS NEWSLETTER?

CONTACT THE EXECUTIVE ADMINISTRATOR