

Training Report



Program	Serbian Science and Diaspora Collaboration Program: Knowledge Exchange Vouchers
Project title	Domestic animals as experimental models for evaluation of biomaterials compatibility
Project acronym	ANIMBIOCOMP
Principal Investigator (PI)	Dr Danijela Kirovski
Traveller	Dr Danijela Kirovski
SRO of the traveller	Faculty of Veterinary Medicine University of Belgrade
Host Institution (HI)	Medical University of Graz Division of Biomedical Research
Project Partner:	Dr Vladimir Bubalo
Travel location (city, country)	Graz, Austria
Travel start date	17.11.2021.; 24. 12. 2021.
Travel end date	22.11.2021.; 31. 12. 2021.

Summary report:	<p>According to the suggestion of Expert from Diaspora (dr Vladimir Bubalo) and organization of experiments at Host Institution my visit was divided into two parts. The first visit (17.11.2021.- 22.11.2021.) was related to meetings with the management of the Division of Biomedical Research, Medical University of Graz. During this travel I visit important departments that participate in experiments conducted within the Division of Biomedical Research.</p> <p>The second visit (24. 12. 2021.- 31. 12. 2021.) was directed in monitoring and controlling specific experiments conducted under the guidance of Expert from Diaspora.</p> <p>The first visit (17.11.2021.- 22.11.2021.)</p> <p>During first visit to Medical University of Graz, Division of Biomedical Research I had a series of meetings with management staff of division- dr Vladimir Bubalo, dr Bettina Hausegger-Bauer, and Aida Sarić DVM. I was introduced in all the activities of the Division in the field of planning biomedical experiments, supporting medical researchers in performing experiments as well as trainings conducted within the Division. I was also introduced in general research organization of Medical University of Graz.</p> <p>The research units at Medical University of Graz are focused on contemporary challenges in</p>
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medical science. The focus is on sustainable and high-quality research. A research unit consists of one or more working groups that have a unique selling point related to research within Medical University of Graz and are also recognized within the scientific community at the national level. To sustainably establish scientific expertise at Medical University of Graz, high-level research is conducted and published in the research units, which also promote junior researchers. Although the focus of research is on the employment of young researchers in practice, it is not always easy to realize their involvement through employment at the university itself, but they are involved as researchers through national and international research funds. One of the models of engaging young researchers is through exchanges with other countries, in which the Medical University of Graz has a long tradition. According to Academic Ranking of World Universities 2020 Medical University of Graz is placed at 401-500.

Research at the Medical University of Graz is classified into the following scientific groups and subgroups:

ANESTHESIOLOGY

Biomedical Technology in Anesthesia and Intensive Care;
Perioperative Platelet Function;
Epidemiology and Outcomes for the Critically Ill;
Complementary and Integrative Laser Medicine

OPHTHALMOLOGY, DERMATOLOGY, OTORHINOLARYNGOLOGY (ENT)

Dermatopathology;
Laryngeal Tracheal Tissue Engineering Graz (LTTEG);
Tele dermatology, Prevention and Innovative Diagnostic Procedures in Dermatooncology;
Photodermatology;
Aesthetic, Plastic and Reconstructive Facial Surgery;
DN interdisciplinary Developmental Neuroscience

SURGERY, NEUROSURGERY, ORTHOPEDICS AND TRAUMATOLOGY

Research Unit for Safety in Health;
Tissue Regeneration, Repair and Reconstruction;
Quality Assurance and Cost-effectiveness in Endoprosthetics, Arthroscopy and Joint Surgery;
Transplantation Research - Unit 1: Xenotransplantation;

GYNECOLOGY, UROLOGY

Fecal Incontinence from Complications of Childbirth or for Gynecological Reasons;
Gynecological Morphology and Cytology;
Human Teratogens;
Molecular pathology of mammary and gynecological tumors;

INTERNAL MEDICINE

Circulating Tumor Cells and Tumor Stem Cells;
Ion Channels and Cancer Biology;
Epigenetic and Genetic Tumor Biomarkers;



	<p>Working Group on Experimental and Molecular Hepatology; Genetic Epidemiology and Pharmacogenetics; Molecular Pathology of Gynecological Tumors (with Special Consideration of Mesenchymal Uterine Tumors); Lymphoid Malignancies; Clinical and Translational Cardiac Arrhythmia Research; Liquid Biopsies for Personalized Medicine in Cancer; Functional Proteomics and Metabolic Pathways;</p> <p>Myeloid Cells and Leukemia; Transplantation Research - Unit 3: Clinical Transplantation Research; Liver Failure Translational Nuclear Receptor Research in Liver Metabolism; Signal Transduction in Myeloid Malignancies; Myocardial Energetics and Metabolism; Non-Coding RNAs and Genome Editing in Cancer; Theodor Escherich Lab for Microbiome Research</p> <p>CHILDREN, ADOLESCENTS Micro- and Macrocirculation of Newborns; Neonatal Infectious Diseases and Epidemiology; Immunological and Molecular Foundations of Pediatric Immunodeficiencies; Pediatric Hematology and Immunology; Metabolism and Microbiome in Pediatric Surgery; Infectious Diseases in the Immunocompromised Host; Cerebral Development and Oximetry Research; Infectiology and vaccinology; Late Sequelae of Oncological Disease and Rehabilitation; Analytical Mass Spectrometry, Cell Biology and Biochemistry of Congenital Metabolic Disorders; Basic osteological research and analytical mass spectrometry.</p> <p>LABORATORY MEDICINE Clinical Serology and Immunohematology and Blood Group Genetics; Biomarkers of Inflammation and Lifestyle Diseases; Molecular Transplantation Medicine; Molecular Pathogen Diagnostics Hematopoietic stem cell differentiation; Nitric Oxide Stress Study Group; Special Coagulation Analysis and Coagulation Research; Medical Mycology; Electron Microscopy Procedures Single-cell analysis</p> <p>MEDICAL INFORMATICS AND STATISTICS Human Computer Interaction for Medicine & Health Care (HCI4MED); EBM (Evidence based Medicine) Review Center.</p> <p>NEUROLOGY, PSYCHOTHERAPY, PSYCHIATRY</p>
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Neuronal Plasticity and Repair;
Neurology Biomarker Research Unit;
Neurobiological Fundamentals and Anthropometric Features of Bipolar Affective Disorder;
Imaging in Neurological Research
Movement Disorders

RADIOLOGY, RADIATION THERAPY

Computer Tomography;
Digital Information and Image Processing;
Molecular and Applied Radiation Oncology

ENVIRONMENTAL MEDICINE

Gravitational Physiology and Medicine;
Molecular and Cellular Physiology;
Nutritional Research/Nutrition and Metabolism;
Environmental Hygiene
Genetic Epidemiology;
Immunopharmacology;
Metabolic and Vascular Pharmacology

The Division of Biomedical Research serves as a scientific service to a large number of research groups. Within the Division of Biomedical Research, conventional laboratory animals (mice, rats and rabbits) are bred, as well as domestic animals used in biomedical research (pigs and sheep). The basic task of the veterinarian in the division is to take care of the health of the animals before and during the experiments. In addition, a very important activity of veterinarians in the Division of Biomedical Research is to provide animals (supply from private farms) analyzing genetics and group uniformity of the purchased animals, and also plan the number of animals that will be used in experiments. Veterinarians also perform technical procedures during experiments and deal with anesthesia and analgesia of animals.

Special emphasis of the Division's activities is on the training of technical staff, students and experts (surgery and anesthesia). All trainings are conducted in accordance with the recommendations and rules of Federation of European Laboratory Animal Science Associations (FELASA). FELASA, represents common interests in the furtherance of all aspects of laboratory animal science (LAS) in Europe and beyond. FELASA puts the 3Rs of Laboratory Animal Science 'Replacement, Reduction and Refinement' centre stage. FELASA advocates responsible scientific conduct with animals in the life sciences with particular emphasis on ensuring animal welfare. FELASA publishes guidelines, recommendations and policy documents on topics relevant to laboratory animal science. FELASA maintains relations with national, international and governmental bodies concerned with laboratory animal science in Europe, notably the Council of Europe, the European Commission and European Parliament and continuously seeks collaborations with laboratory animal science associations outside Europe. Education and training is a key aspect of FELASA's mission to support professional competence in personnel working with animals, the implementation of the 3Rs leading to the conduct of ethical and high quality science and the mobility of researchers within the EU. The FELASA accreditation scheme encourages and assists the development of high-quality educational programmes in laboratory animal science (LAS) throughout Europe and internationally. FELASA accreditation was introduced on 1st of January 2003 and is recognised as the premier accreditation scheme in Europe for LAS courses. The scheme is in line with the EU Directive (EU Directive 2010/63, Article 23) and the EC guidelines on education (European Commission, 2014) requiring that education in LAS is to be mandatory in all EU countries and is regulated by Competent Authorities.



	<p>Following EU Directive 2010/63/EU and the working document on the development of a common education and training framework to fulfill the requirements under the Directive (Brussels, 19-20 February 2014), FELASA is accrediting courses using the "Functions' system", which replaces the "Categories' system". EU Functions:</p> <p>EU Function A: carrying out procedures on animals EU Function B: designing procedures and projects EU Function C: taking care of animals EU Function D: killing animals</p> <p>During the first visit, I had the opportunity to get acquainted with all the equipment and facilities used for training as well as virtual training programs.</p> <p>Second visit (24. 12. 2021.- 31. 12. 2021.)</p> <p>During the second visit (24. 12. 2021.- 31. 12. 2021.) I was involved in monitoring and controlling specific experiments within Division of Biomedical Research conducted under the guidance of Expert from Diaspora within Division of Biomedical Research. As one of the goals of the ANIMBIOCOMP project, my focus was on the challenges of testing new biomaterials. Medical devices and the biomaterials they are composed of need to be evaluated for their safety within the context of a risk management process. Safety issues related to toxicity can be evaluated using the ISO 10993 series of international standards for biological evaluation of medical devices. Special challenges are differences between in vitro and in vivo studies of evaluating certain biomaterial. In addition to general in vitro cytotoxicity tests, more specific in vitro tests for genotoxicity, interaction with blood, and irritation are highlighted. Furthermore, in vivo tests for irritation and sensitization, hemocompatibility, genotoxicity, carcinogenicity, implantation, and systemic toxicity are described. Given the similarities in the research interests with the research group at the Faculty of Veterinary Medicine, University of Belgrade, of which I am the leader, I especially followed the research that is being conducted at the Division of Physiology as a part of the Otto Loewi Research Center for Vascular Biology, Immunology and Inflammation. My special focus was on the analysis of experimental planning, scope of experiments, animal models used, control of experimental conditions, reliability of tests used for various analyzes (hormones, metabolites and other parameters of blood and body fluids). All the research that I had observed is basically interdisciplinary and involves the participation of a several teams from different scientific fields. I paid special attention to the assessment of welfare and the prevention of the state of opposite welfare in experiments conducted at Division of Biomedical Research.</p>
<p>Objectives of training:</p>	<ul style="list-style-type: none"> • Training in biomedical research planning • Training in biomedical research control • Training in biomedical research management • Challenges in using biomaterials • Trainings in protocols for biomedical researches • Conducting trainings of technical staff, students and experts (surgery and anesthesia) in accordance with the recommendations and rules of Federation of European Laboratory Animal Science Associations (FELASA) • Control of animal welfare used for biomedical research



Conclusions:	During my visits to Host Institution, I had great opportunity to learn about all aspects of planning, organizing and controlling research and experiments on animals. I have paid special attention to experiments conducted for the research of new biomaterials as well as trainings conducted in accordance with FELASA standards, respecting all the principles of animal welfare used in biomedical research. The experience shared by the Expert from Diaspora and the leaders of Division of Biomedical Research will be of great importance in the organization of the new “Experimental facility for conventionally raised animals” planned within the ANIMBIOCOMP project.
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Uploaded photos with description:



Meetings with management of Division of Biomedical Research



With Expert form Diaspora (dr Vladimir Bubalo)



Controlling animal welfare (facility for pigs)



Surgeon training.





Controlling animal welfare (facility for laboratory animals- rabbit).





Testing new therapeutic procedures on sheep



Testing new biomaterials.