

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 Prokić Bogomir-Bolka, assistant professor Dr Risto Dučić, teaching assistant
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	13.06.2021.
Travel end date	16.06.2021.

Summary report:	<p>First day of our visit to Medical University of Graz, Division of Biomedical Research started with traveling and accommodation. Our mentor, Dr Vladimir Bubalo introduced us with work program and all protocols and procedures on the Clinic.</p> <p>During our visit, we have got opportunity to improve our theoretical and practical knowledge in the field of experimental surgery.</p> <p>Kidney transplantation is always a challenge for whole surgery team. Evaluation of new perfusion liquid which can prolong period between explantation from donor to implantation to the patient was the goal of this experiment. We followed our mentor on the training program from basic examination of the animals (in this case 3 mini pigs, 1 donor, and two patients who received kidneys), blood sampling, premedication, induction of anesthesia, intubation, placing central vein catheter and following up the patient through the whole anesthesia and surgery transplantation procedure.</p> <p>First animal was the kidney donor, and after induction of anesthesia, two kidneys were surgically removed and put on the perfusor machine with evaluation liquid. Next day, kidneys were implanted to the two patients. Procedure of implantation included anesthesia, surgically removing of one kidney, and then, on his place donor kidney was transplanted.</p> <p>Postoperative management included also ultrasound examination. Third day after implantation, animals were sacrificed and samples were sent to histopathology evaluation.</p>
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	<p>Second part of our visit was related to implantation of new materials based on magnesium to rat's femur and continues <i>in vivo</i> evaluation of biomaterials biocompatibility. After induction of anaesthesia in anaesthesia induction chamber and IP injection of the drugs, we proceeded to surgery implantation of tested materials. Preparation of the surgical site for aseptic surgical procedures included hair removal using a clipper with a #40 surgical blade. Surgical scrub solution was applied to the clipped area and the skin scrubbed with gauze sponges. Surgical site was then rinsed with saline solution and cleaned with gauze sponge passed over the site, and then scrubbed with soaked gauze sponges in 70% isopropyl alcohol. Rats were placed on surgery table, while the the approach to the operating site was from the lateral site of the animal leg. Straight, 2,5 cm incision in length was made on the skin with the scalpel from proximal to the distal part of rats femur. Soft tissues with blood vessels were lateralized with retractor and the femur bone was completely exposed. With surgical drill artificial hole was made through the central part of the body of femur, which was filled with tested material. After implantation, tissue was carefully repositioned and restored in multilayer with interrupted sutures. Confirmation of successfully surgical procedure was done with micro CT, which was used for long-term evaluation of biomaterials.</p> <p>Third part of our visit was related to implantation of biomaterials and their use in haemostasis. For this part of our visit two mini pigs were used to simulate possible bleeding during operation, bleeding caused by trauma (first mini pig was demonstrating model of regular laparotomy, and second one for laparoscopic surgery). After preoperative examination, induction of anaesthesia, intubation, placing central vein catheter and fluid therapy, we followed the course which was related to haemostasis, supported by application of biomaterials (in a form of gel, spray and absorbable gauze) and their possible use in emergency situations on all organs of abdomen.</p>
<p>Objectives of training:</p>	<ul style="list-style-type: none"> • Implantation of biomaterials • Anaesthesia and implantation of magnesium based biomaterials into the rats femur • Micro CT diagnostic • Use of biomaterials in trauma caused bleedings • Surgery and Anaesthesia protocol for kidney transplantation • Ultrasound evaluation kidney transplantation
<p>Tasks of trainings:</p>	<ul style="list-style-type: none"> • Improve our theoretical and practical knowledge in the field of experimental surgery and anesthesia of different animal species • Selection of adequate animal model for biomaterial evaluation studies • Use of different surgery techniques for biomaterials implantation • Practical use of biomaterials • Introduce and learn to use needed equipment for anesthesia and surgery • Understanding of using micro CT device for long term studies
<p>Plan of visit (per a day):</p>	<p>First day Setup Perfusor machine Management of kidney donor, anesthesia of mini pig, two kidneys surgically removed and put on the perfusor machine with evaluation liquid. Second day Anesthesia and transplantation of perfused kidneys. Ultrasound and circulation evaluation of transplanted kidneys. Implantation magnesium based biomaterials into the rat's femur. Surgery evaluation of implantation with micro CT Third day</p>

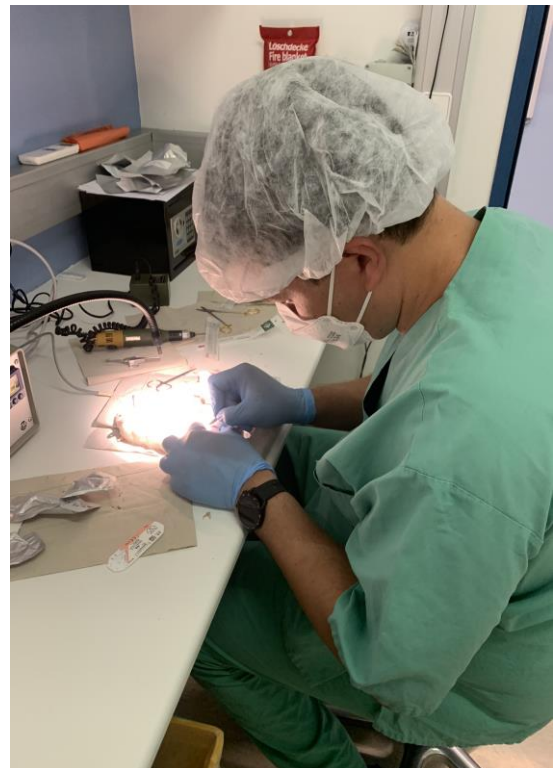


	<p>Evaluation of transplanted kidneys, euthanasia, sampling for histopathology. The use of biomaterials course in trauma caused bleedings.</p>
<p>Description of gained techniques:</p>	<p>Training program from basic examination of the animals (in this case 3 mini pigs, 1 donor, and two patients who received kidneys), blood sampling, premedication, induction of anesthesia, intubation, placing central vein catheter and following up the patient through the whole anesthesia and surgery transplantation procedure.</p> <p>Anesthesia and surgery procedure of implantation new materials based on magnesium to rat's femur and continues <i>in vivo</i> evaluation of biomaterials biocompatibility.</p> <p>Course which was related to haemostasis, supported with application of biomaterials (in a form of gel, spray and absorbable gauze) and their possible use in emergency situations on all organs of abdomen.</p>
<p>Description of gained skills:</p>	<p>Selection of adequate animal model for biomaterial evaluation studies. Significant improvement anesthesia protocols and surgery techniques for implantation of biomaterials. Introduced with modern technology equipment and new approaches to biomaterial implantation .</p>
<p>Conclusions:</p>	<p>During our visit to the Medical University of Graz, Division of Biomedical Research, Dr Vladimir Bubalo and his team made very organized and professional plan of our visit with very friendly atmosphere. Every minute was carefully planned and dedicated to us in purpose, so we can see, do, improve manual skills and learn new ones. Our time spent In Graz was priceless.</p> <p>We are very satisfied with the chance to be a part of the training. This is a great experience for us and motivation to go further in our professional improvement and to continue implementation of learned techniques and skills to our home institution.</p>

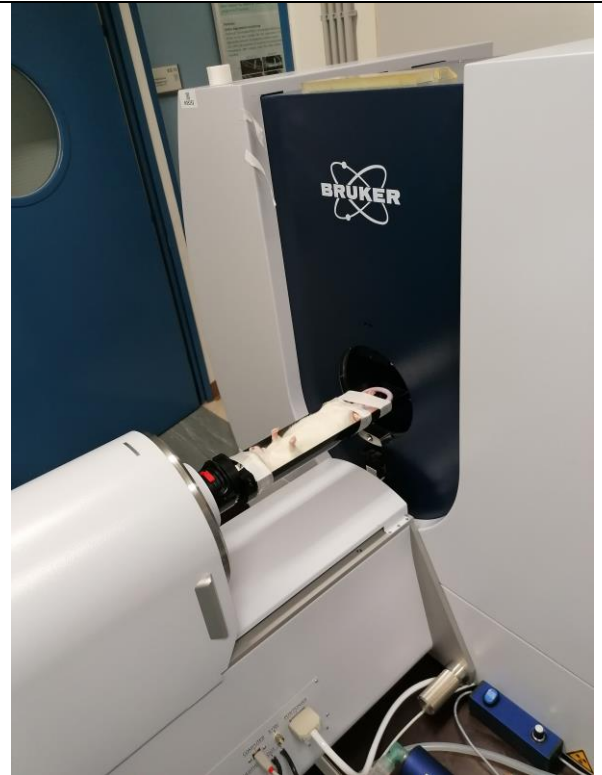
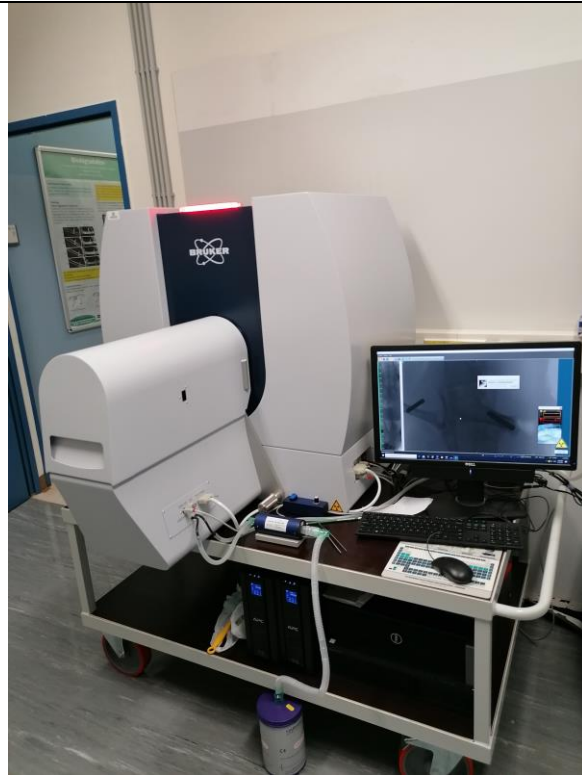
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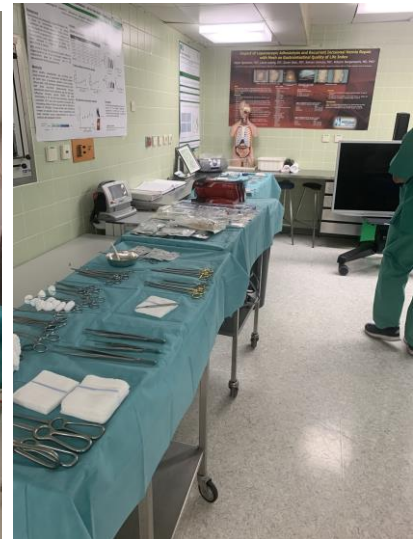
Anaesthesia induction chamber for rats



Implantation of magnesium based biomaterials into the rats femur



Postsurgical evaluation of biomaterials with micro CT.



Preparing for kidney transplantation.



Assisting on kidney transplantation surgery procedure



Taking care of the patient after the surgical procedure.



The use of biomaterials course in trauma caused bleeding



Practical use of biomaterials in trauma caused bleedings