

Training Report



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| 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 Ivan Milosevic and DVM Dragan Ristanovic |
| 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 | 06.06.2021. |
| Travel end date | 11.06.2021. |

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| Summary report: | <p>Our visit to Medical University of Graz, Division of Biomedical Research started with meeting with our host and mentor, dr Vladimir Bubalo. Vladimir Bubalo introduced us to the team of employees and presented us with the organizational structure and capabilities of the Division of Biomedical Research. 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 practical and theoretical knowledge in the field of experimental surgery and laboratory technique.</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 two pigs, one donor, and one patient 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 perfusion machine with evaluation liquid. Next day, one kidneys were implanted to the patient. Procedure of implantation included anesthesia, surgically removing of one kidney, and then, on his place donor kidney was transplanted. Postoperative management included also ultrasound examination. Third day after start implantation, the second kidney of the recipient was removed and the second kidney of the donor was implanted in its place.</p> <p>Second part of our visit was related to inoculation of stem cells into the initial part of the rats caecum. After the preparation and disinfection of the operating field, a small</p> |
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| | <p>incision was made on the ventral side of the abdominal wall through which the laparoscope was placed. Using a colonoscope, a characteristic place at the transition of the colon to the caecum was visualized. After that, a special application needle was placed through the working channel of the colonoscope. The tip of the needle was placed in the mucosa of the caecum and stem cells resuspended in a specially colored fluid were applied. At the same time, the site of application from the abdominal cavity was controlled using a laparoscope. If purple-blue appeared in the abdominal cavity, the application of stem cells was considered unsuccessful. After successful application of stem cells, the abdominal wall was sutured and the animal was removed from anesthesia.</p> <p>Third part of our visit was related to evaluation of subcutaneous tumors in nude mice that developed after application of certain cell lines. Nude mice were kept under special sterile conditions and under such conditions were introduced into inhalation anesthesia. The ultrasound machine is equipped with transducers for this type of research and connected to special software for processing the results. After ultrasound measurement and analysis of tumor structure, animals were sacrificed and samples of tumors and various organs were sampled for pathohistological examination.</p> <p>The fourth part of our training was a visit, imaging department, PCR laboratory and sell culture laboratory. In the imaging laboratory, we were introduced to the possibilities of micro CT devices. After preparing the samples and starting the micro CT machine, we analyzed the obtained images. In the PCR laboratory, we participated in the performance and visualization of the reaction for the detection of Mycoplasma spp. in samples obtained from the experiment. In the laboratory for cell culture, we are acquainted with the basic principles of work organization in such a laboratory. We participated in the isolation and seeding of tumor cells obtained from very rare types of tumors.</p> |
| <p>Objectives of training:</p> | <ul style="list-style-type: none"> • Surgery and Anaesthesia protocol for kidney transplantation • Ultrasound evaluation kidney transplantation • Anaesthesia protocol for rats colonoscopy and laparoscopy • Postoperative treatment of animals with transplanted kidneys • Technique of rats colonoscopy and laparoscopy • Technique of PCR analysis, visualization and interpretation of results • Tissue sampling and processing for histology and histopathology • Basic principles of work in the cell culture laboratory • Micro CT diagnostic |
| <p>Tasks of trainings:</p> | <ul style="list-style-type: none"> • Improve 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 • Introduce and learn to use needed equipment for anesthesia and surgery • Understanding of using micro CT device for long term studies • Understanding adequate tissue sampling and preparation for histological and histopatological analysis • Appreciating the principles of work organization in the PCR laboratory • Understanding the principles of cell culture laboratory organization |
| <p>Plan of visit (per a day):</p> | <p>Our stay in Austria lasted for six days. First day we spent traveling. On the second day, we had a meeting with our host and mentor, Dr. Vladimir Bubalo.</p> |



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| | <p>Dr. Vladimir Bubalo introduced us to the team of employees and presented us with the organizational structure and capabilities of the Division of Biomedical Research.</p> <p>On the third day, we attended and participated in the surgical intervention of taking organs from donor pigs and the procedure of processing the taken organs. Management of kidney donor, anesthesia of pig, two kidneys surgically removed and put on the perfusion machine with evaluation liquid. We were in the imaging department the same day.</p> <p>On the fourth day, we participated in performing an experiment on rats. Inoculation of stem cells into the initial part of the rats caecum required colonoscopy. The potential outflow of contents into the abdominal cavity was controlled by laparoscopy. Induction of anesthesia in rats and postoperative treatment. On the same day, a visit was made to the department for ultrasound analysis of tumors. We participated in the ultrasound assessment of tumors in the subcutaneous tissue of nude mice.</p> <p>On the fifth day, we participated in the transplantation of the kidney to the recipient pig. Anesthesia and transplantation of perused kidneys into pig recipients. Ultrasound and circulation evaluation of transplanted kidneys.</p> <p>Surgery evaluation of implantation with micro CT</p> <p>The sixth day was dedicated to the postoperative treatment of a patient with transplanted kidneys . On the same day, we visited the department that deals with cell culture and PCR analysis. After the end of all activities, we left for Serbia.</p> |
| <p>Description of gained techniques:</p> | <p>Unique training program of experimental transplantation in pigs encompassed basic clinic examination of the animals, 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, colonoscopy,laparoscopy procedure in rats.</p> <p>Ultrasound assessment of subcutaneous tumors in the mice.</p> <p>PCR analysis and cell culture technique.</p> |
| <p>Description of gained skills:</p> | <ul style="list-style-type: none"> • Significant improvement anesthesia surgery and protocols techniques for organs transplantation. • Introduced with modern technology equipment and new approaches to biomaterial implantation • Selection of adequate animal model for biomaterial evaluation studies. • Handling with micro CT scanner and analysis of results. • Significant improvement the assessment of experimental animal welfare |
| <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 pleased how the training was conducted, and very satisfied for opportunity to gain new techniques and skills.</p> |

Uploaded photos
with description:



Room for sterilization and preparation of surgical instruments



Surgeon's hand preparation area



Section for processing samples taken during the operation



Clean and dirty area for preparing animals surgery



Classroom for discussions and practical training



Organ harvesting surgery



Organ harvesting surgery and tissue sampling for histology and pathohistology



Organ harvesting surgery and tissue sampling for histology and pathohistology



Anesthesia and monitoring equipment



Ultrasound evaluation kidney transplantation



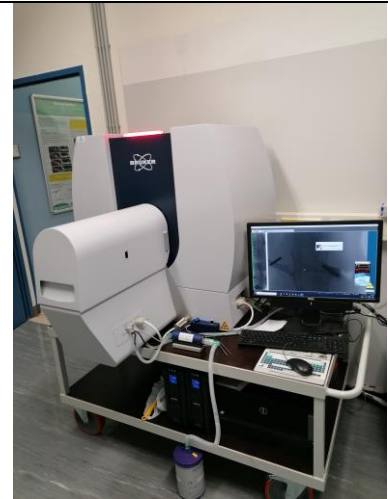
Ultrasound evaluation kidney transplantation



Anaesthesia induction chamber for rats



Preparation of rats for laparoscopy and colonoscopy



micro CT.

