

„ASYS-Transplant“ – Development of an assistance system for the functional evaluation of donor kidneys in transplant medicine

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The project "ASYS-Transplant" is a translational cooperation project between the Institute for Biomedical Engineering of Technische Universität Dresden (IBMT) and the Medical Faculty of Technische Universität Dresden, Department of Urology at the University Hospital Carl Gustav Carus Dresden, with funding from the European Regional Development Fund (EFRE) and Freistaat Sachsen.

Introduction

Based on the shortage of donor organs, machine perfusion (MP) is gaining more and more importance. It is hypothesized that MP systems, especially with normothermic perfusion, may significantly expand the pool for so-called "marginal organs". However, a clinically applicable MP system has not been developed in Germany so far. Here we describe the idea of a translational cooperation project between the Institute of Biomedical Engineering (IBMT) and the Department of Urology at the University of Dresden for the development of a normothermic MP system with whole blood for kidneys.

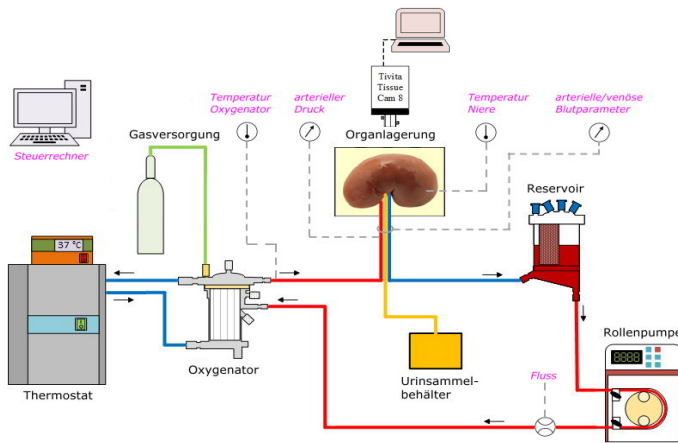


Fig. 2 – equipment configuration for normothermic machine perfusion of kidneys with whole blood
Published in:
Algorithms for mapping kidney tissue oxygenation during normothermic machine perfusion using hyperspectral imaging, Wenke Markgraf, Philipp Feistel, Christine Thiele and Hagen Malberg, Biomed Tech (Berl). 2018 Oct 25;63(5):557-566



Fig. 3 - prototype of one of the machine perfusion devices

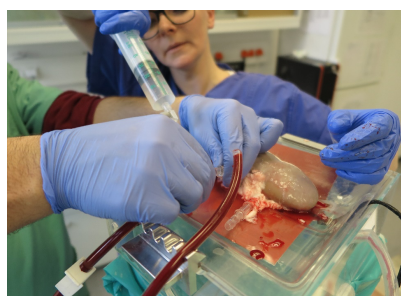


Fig. 4 – connecting the organ to the perfusion with whole blood



Fig. 5 – porcine kidney under whole blood perfusion

Results

The aim is to develop the existing laboratory prototype up to a **prototype** in order to make normothermic organ perfusion of kidneys applicable for practice in a human setting. The development of the device technology will be carried out according to the rules of the Medical Device Regulation (MDR), so that the project will create the prerequisites for an approval procedure as a medical device. In addition, a **scoring system** is to be implemented as an additional aid in the assessment of previous damage to the kidney and thus in deciding whether it is suitable for transplantation.

Conclusion

We can show that normothermic whole blood perfusion of kidneys in a large animal model is a physiologically favourable method for organ preservation. Based on the principle of translational medicine, it is planned to transfer the perfusion setup into human applications in the future. Measurement of different parameters before and after machine perfusion should provide an **additional tool as a decision aid** for the possible use of marginal organs for transplantation.

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Fig. 1 – harvesting of porcine kidneys in the slaughterhouse