Graft Quality Assessment in Kidney Transplantation by Monitoring Lipidomic Changes in the Organ During Transplantation Using Solid Phase Microextraction (SPME)

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**Introduction**
Transplantology is one of the fastest-growing areas of medicine and, undoubtedly, organ transplantation is a life-saving treatment for millions of people with end-stage organ dysfunction. Over the past few decades, kidney transplantation has significantly developed and has become a standard procedure. However, it faces many serious problems, such as organ shortage or lack of effective tools for organ quality assessment. Since tissue biopsy is invasive and macroscopic visual assessment is unreliable, new technologies are strongly needed. Solid phase microextraction (SPME) is a technology already validated in many different applications in bioanalysis including in vitro and in vivo sampling. This method offers several advantages of in vitro tissue sampling, such as low invasiveness, extraction of unstable species, and lower consumption of organic solvents. Due to the small size of the SPME probe, it is possible to perform so-called chemical biopsy, which enables extraction of small molecules directly from the organ without any tissue collection. The aim of this study was to test SPME probes as a low invasive tool for monitoring lipidomic changes in the organ during transplantation.

**Methods**
SPME was used for direct kidney sampling and as a sample preparation method. The study was performed on kidneys from two types of porcine model donors: heart beating donor (HBD) and donor after cardiac death (DCD). Extraction was executed via SPME probe coated with a 7mm mix-mode sorbent.

**Results**
1. Profiles of summary area for selected classes of lipids. The obtained results indicate that levels of lipids from the glycerophosphocholine category decreased during perfusion. Glycerophosphocholines are involved in a number of pathogenic processes but may also play a protective role against oxidative stress. Decreased levels of these lipids may reflect their consumption during perfusion due to increased ROS production.

**Conclusions**
- The results suggest that low invasive SPME tissue sampling, so called chemical biopsy, may provide important information about biochemical status of the graft
- Received results indicated that metabolites related to lipid metabolism may be important in study of ischemia/reperfusion grafts injury
- The observed lipidomic alterations should be confirmed in further experiments on larger cohort
- After expansion of the study and validation of the results the presented approach can be foreseen as adjunct diagnostic tool to standard protocol of graft quality assessment in the future