Introduction:
Metabolomics is a novel approach that can characterize small molecules (metabolites) and has the potential to explore genotype-phenotype and genotype-environment interactions, delivering an accurate snapshot of the subject’s metabolic status. In this context, the aim of metabolomics is to improve early diagnosis, classification, and prediction over the development of a pathological condition. To this end, metabolomics have not been used in the characterisation of cardiac arrest (CA), cardiopulmonary resuscitation (CPR) and return of spontaneous resuscitation (ROSC). The aim of the present study was to explore whether metabolomics can characterize the CA versus ROSC in a swine model of ventricular fibrillation (VF).

Methods:
Ten animals were intubated and instrumented and VF was induced with the use of a cadmium battery. VF was left untreated for 6min and the animals were then resuscitated according to the 2010 guidelines. Defibrillation was attempted in all animals. Venous blood was drawn at baseline, 2min, 4min, 6min during untreated CA and finally at 2min, 30min, 2h, 6h after ROSC in order to determine the metabolomic profile during CA and during the early post-resuscitation period. ROSC was defined as the presence of an organized cardiac rhythm with a mean arterial pressure of at least 50 mmHg for >5 min. Blood was centrifuged and serum was analysed by high resolution 1H-NMR spectroscopy. NMR spectral data were submitted to multivariate discriminant analysis.

Results:
Eight animals survived the experiment and were included in the analysis. Metabolites upregulated in the immediate ROSC versus CA were succinate, hypoxanthine, choline and lactate. Metabolites upregulated in the 2 hour ROSC versus CA were ornithine and alanine. The 3 measured phases are shown in figure 1.

Conclusion:
It appears that different metabolic pathways are being activated in the ROSC period. Further studies are needed to accurately define the metabolic pathways.
Characterizing metabolites in return of spontaneous circulation (ROSC) versus cardiac arrest (CA).