

Abstract

This dissertation consists of three parts describing electrophysiological and contractile changes of the myocardium in sepsis, acidosis, and propofol-induced anaesthesia.

The first part is focused on heart rate variability analysis in a clinically relevant porcine model of sepsis/septic shock. Heart rate variability showed fast decrease few hours after sepsis induction which preceded changes in clinical parameters commonly used for sepsis diagnosis. The same fast kinetics of heart rate variability were demonstrated in progressive septic shock and in sepsis without serious multiorgan failure. Based on these results, it seems that heart rate variability could represent an early diagnostic tool in patients threatened with sepsis.

In the second part of this thesis acidosis and its effects on the cardiovascular system are analysed. Metabolic and hypercapnic acidoses were examined in domestic pigs using hemodynamic *in vivo* measurements and *in vitro* experiments focused on electrophysiology and contractility of the heart. Both types of acidosis affected circulation and reduced myocardial contractility; hence it could limit therapeutic use of hypercapnic acidosis.

The thesis is completed by a study of the effect of propofol, an anaesthetic used in two above mentioned studies. In rat ventricular tissue *in vitro*, no changes in action potential shape were detected but there was a marked reduction in contraction force, which was concentration-dependent. However, this contraction force decrease was observed only at propofol concentrations higher than the probable propofol blood levels in septic and acidotic pigs.