

Supervisor's opinion on the dissertation thesis

"Electrocardiographic manifestation of cardiac repolarization dispersion"

Author: Mgr. Ksenia Sedova
Study program: P3921 Biomedical and Clinical Technology
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Supervisor: Assoc. prof. Ing. Milan Tyšler, PhD
Academic adviser: Prof. Ing. Peter Kneppo, DrSc.
University: CTU in Prague, Faculty of Biomedical Engineering, Kladno
Department of Biomedical Technology

Mgr. Ksenia Sedova studied the Ph.D. program since 2012, in 2016 the study was changed to the combined form. She has fulfilled all duties connected with the study program and successfully passed the state exam in 2015.

Her work during the study was focused on the cardiac repolarization. Repolarization gradients under normal conditions and during ischemia/reperfusion, as well as reflection of their changes in surface electrocardiograms were studied in both, model simulations and animal experiments. Their connection with malignant ventricular arrhythmias and the possibility of arrhythmia prognosis from parameters of surface electrocardiograms was also evaluated.

Correspondingly, the dissertation thesis is devoted to study of electrocardiographic expression of the repolarization dispersion, including parameters of repolarization associated with ventricular fibrillation in the ischemia-reperfusion model.

The subject of the research has high actuality, as cardiovascular pathology is among most prevalent courses of death worldwide. Dispersion of repolarization has been established as proarrhythmogenic factor and determination of electrocardiographic indices of myocardial repolarization heterogeneity has both research and clinical importance.

The thesis is based on results presented in four papers published in established international journals with impact factor. In two of them the student is the first author. Three additional papers (in two of them the student is the first author) related to the subject of the study - contribution of pathophysiological changes in myocardial repolarization to electrocardiographic parameters - are enclosed in the appendices.

In her work, the student combined results of computer simulations and experimental animal studies in open-chest settings. The thesis is well designed to answer the stated hypotheses and contributes to better understanding of expression of repolarization heterogeneity changes in surface electrocardiograms.

Firstly, the contribution of different repolarization gradients in ventricles to electrocardiographic T_{peak}-T_{end} interval was established. Secondly, the changes in repolarization gradients under acute ischemia/reperfusion were analyzed. Third part of the thesis includes the correlation between alterations in ventricular repolarization and T-wave changes. Finally, the myocardial repolarization parameters associated with ventricular tachycardia/fibrillation during reperfusion were determined and ECG parameters which can serve as predictors of these tachyarrhythmias were suggested.

The results on contribution of repolarization gradients in ventricles to the morphology and parameters of the electrocardiographic T-wave in healthy heart and during acute ischemia are unique and essential for possible enhancement of the prognostic value of ECG methods.

During her study and in the submitted thesis Mgr. Sedova has demonstrated her ability of scientific work and creative solution of research problems. She also showed a lot of diligence, knowledge and personal effort necessary for successful fulfilment of the studied PhD program. Original results were achieved in the field of biomedical engineering and experimental cardiac electrophysiology and their potential exploitation in clinical cardiology was also suggested. With regard to these facts and according to my opinion, the submitted dissertation thesis is well conceived and I recommend it to be defended. Upon successful defense I recommend to award Mgr. Ksenia Sedova the degree Doctor of Philosophy (Ph.D.).

Bratislava, January 24, 2018.



Assoc. prof. Ing. Milan Tyšler, PhD.