Title: Innovative Arrhythmia Risk Assessment Methods

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Abstract

Malignant Ventricular Arrhythmias like ventricular tachycardia and fibrillation are the most common causes of sudden cardiac death. Although the number of these – usually tragic – events is significant, no adequate method exists for the estimation of malignant arrhythmia risk, according to the scientific statement of AHA/ACCF/HRS. One of the promising relevant methods is based on the non-dipolarity indices (NDIs) of high resolution body surface QRST integral maps. This way it is possible to measure the non-dipolarity of the QRST integral maps beat-to-beat, which is closely related to the level of action potential (AP) heterogeneity of the heart muscle cells. This is very important, since the pathologically increased AP heterogeneity is a necessary prerequisite of malignant ventricular arrhythmias and therefore sudden cardiac death. Because the measurement of high resolution body surface potential maps is complicated (due to the great number of electrodes), we try to investigate the possibilities of creating a simplified method similar to the NDI-based one. For this reason we derived the standard three limb lead ECG signals from our body surface potential map records and calculated the QRST integrals on these signals beat-to-beat. We found that the NDI values are inversely proportional to the QRST integrals of lead I, II and III. Furthermore, mean and standard deviation of limb lead QRST integrals proved to be discriminative parameters considering our 10 normal and 8 pathological cases. We hope that this technique can be the base of an innovative arrhythmia risk assessment method, available to the vast majority of the population.
Key Words: Malignant arrhythmia, QRST integral, Non-dipolarity index, Limb leads

Biography

Mr. Gergely Tuboly, Male, M.Eng. in Information Technology, graduated from information technology, University of Pannonia, 2010. He was awarded by the Scholarship of the Hungarian Republic in 2009. He studied as a Ph.D. student at the Doctoral School of Information Science and Technology, Faculty of Information Technology, University of Pannonia in Veszprém, Hungary, 2010-2013. In 2014, he became Ph.D. candidate. His fields of research are bioelectric imaging (body surface potential mapping), the inverse problem of electrocardiography and ECG processing. He performs teaching (seminars, thesis supervising) and project activity at the Department of Electrical Engineering and Information Systems, University of Pannonia. Now he has published more than 15 papers and had several national and international conference presentations. He is member of the John von Neumann Computer Society and the IEEE Engineering in Medicine and Biology Society since 2010, and became member of the International Society of Electrocardiology in 2013.