ECGSIM: Interactive Simulation of the ECG for Teaching and Research Purposes

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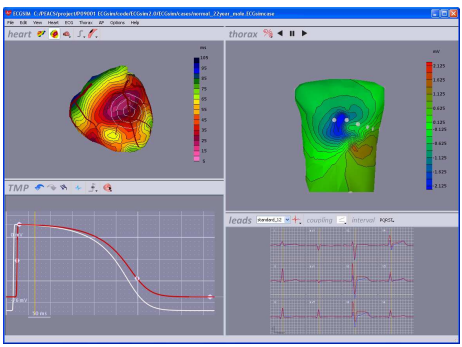
The expression of the electric activity of the heart in the ECG waveforms is complex. The understanding of this relation can be facilitated by using an interactive tool, enabling introduction of changes in the electrical activity of the heart and observing their effect on the ECG. **ECGSIM** (version 1.3) is such an interactive simulation tool. It has been found to be effective both in teaching and basic research. A new version (2.0) of **ECGSIM** has been designed in which the expression of atrial activity has been included and its functionality has been optimized.

ECGSIM is based on a mathematical model that links the ECG at the body surface to the local transmembrane potential (TMP) at the surface of the myocardium (epicardium and endocardium). It includes atrial, ventricular and torso geometries, reconstructed from human MR images. The user may change any of a set of parameters describing the TMP such as the depolarization time, the timing of repolarization and the TMP magnitude. These changes may be introduced at any section of the heart surface or globally; their effect on the ECG is displayed instantaneously. In the new version, several cases (heart and thorax models) can be selected. Currently, cases of healthy subjects and of a WPW patient are included. This collection will be extended by including additional cases. In this way the applicability of this tool in clinical education and research will be enhanced.



Main type of ECGSIM display

By using **ECGSIM** it is easy to intuitively induce abnormalities such as bundle branch block and infarction, and observe their effect on the ECG, version 2.0 will be even more helpful in teaching and research applications. **ECGSIM** may be downloaded of free of charge from http://www.ecgsim.org.