

## Education the Spatial relation of the ECG

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**Introduction:** Accurate interpretation of the standard electrocardiogram (ECG) is one of the fundamental skills in medical practice as ECG is an important first-line examination method while encountering cardiovascular diseases. Since the medical curriculum allots limited educational hours for its teaching, which often does not exceed 2 hours, the urgent adoption of innovative techniques to enhance the ECG educational landscape is required.

**Methods:** EduECG represents a novel approach to teach the basics of ECG, offering direct anatomical insights into the cardiac activation and recovery processes associated with different cardiac diseases. EduECG concept integrates cardiac anatomy with a vectorial representation of the electrical cardiac activity. The vectorcardiogram (VCG) provides the direction of cardiac activation and recovery (dipole), and thus enables the relation to the cardiac anatomy. The VCG is also used to estimate the position and visualize of the average electrical activity, the PathECG (moving dipole).

**Results:** Utilizing the ECG-waveforms in combination with the VCG and PathECG, EduECG combines different clinical modalities, such as computed 12-lead ECG and computed tomography, to visualize the cardiac activity. The current version of EduECG contains 4 different clinical cases: 1) normal ECG, 2) acute coronary syndromes of different culprit vessels (see Figure 1 presenting the occlusion of proximal left descending artery), 3) different bundle branch blocks, and 4) premature ventricular contractions, thus provides a broad spectrum of cardiovascular pathologies for education and training.

**Conclusions:** The combination of the ECG waveforms, VCG, PathECG, and cardiac anatomy provides a whole new educational platform to teach the electro-anatomical relation between the electrical processes in the heart and the ECG waveforms. With the first version of EduECG we aim to create problem-based learning cases by visual representation of mechanisms underlying each pathology. Initial assessment showed advantages compared to standard ECG teaching methods among medical students.

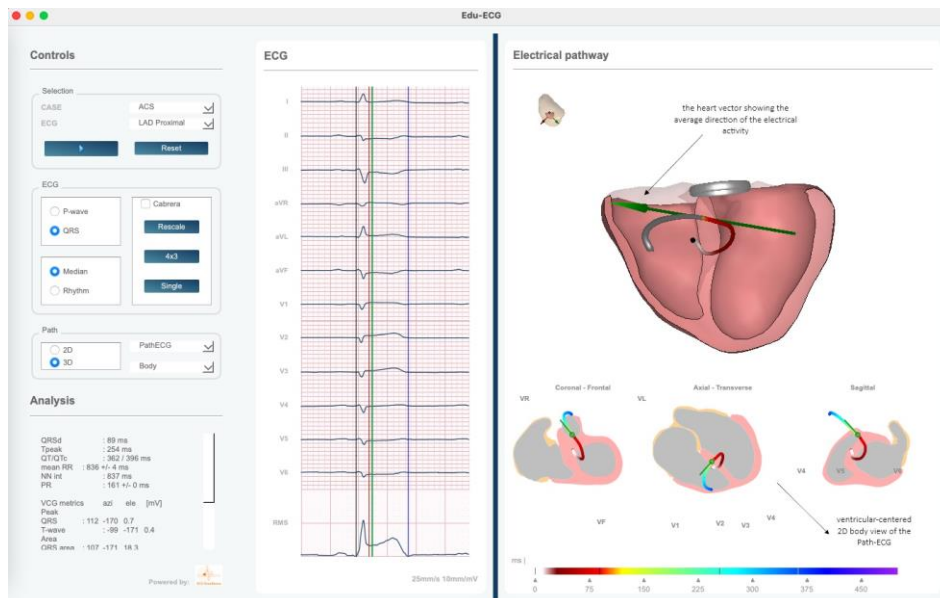


Figure 1. The program interface with the selected case of acute coronary syndrome involving left anterior descending artery.