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Estimation precordial rheography application for monitoring patients with cardiac arrhythmias

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Introduction
In the arrhythmias diagnosis electrocardiogram is not always show pathology, and various violations can hide one another, which leads to difficulties in diagnosis.

It is necessary to determine the changes in the mechanics of the heart movement and identify the scope of the precordial electrical impedance signal in the arrhythmias diagnosis in experimental studies.


Experiments and results
We used a multi-channel rheographic system REO-32. All electrode assemblies were individually prepared for each patient. Information about heart location were obtained by MRI and CT studies. Studies have examined two people: a healthy volunteer with the heart depth of 19 mm and a woman with atrial flutter and depth of 26 mm.

On the chest over the atria there were three assemblies arranged in parallel as shown in Fig. 1. EEG electrodes were used. Each electrode assembly is comprised of two active current electrodes and the potential of the two passive electrodes. There used symmetric assembly with distance between the current electrodes 120 mm and 60 mm between potential. To control the motion of the ventricles walls there were used assembly of 140x70 mm size. Rheographic signals recording carried in parallel with the ECG signal.

As a result investigations have revealed that the precordial atrial signals show easily reduction of the right atrium wall, which appear with a slight delay after the passage of an electrical heart impulse (Fig. 2). Thus on the rheogram right atrium wall movement can be seen even in the case where the electrocardiogram P peak obscured other peaks. It was calculated that the walls movement at the atria flutter was less than 1 mm, which is 5-7 times less than the amplitude of movement of a healthy patient atrium.

Conclusions
The precordial assembly allows to detect an abnormality in the heart, even when pathology is not seen on the ECG. For example, you can get more information about arrhythmias, which are manifested by imposing P-T peaks, or a loss of P-wave at the Wolff-Parkinson-White (WPW) syndrome. In such case, there is a differentiated analysis of the different heart parts. Increasing in useful diagnostic data can allow a physician to detect arrhythmias in the earlier stages and to prevent emerging diseases.

References