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A WEAREBLE CARDIAC SURVEILLANCE SYSTEM BASED ON ECG RECORDING AND RESPIRATORY RATE USING A TEXTRONIC T-SHIRT- PRELIMINARY STUDY

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Heart failure is the most common cause of cardiovascular death, with sudden deaths occupying about 50 percent of the total. The rise in civilization diseases has resulted in an increased demand for easily accessible, easy-to-use systems for cardiac diagnosis and surveillance.

The aim of this study is to develop a system that can minimize the effects of myocardial infarction by enabling telemedicine cardiac surveillance and hybrid cardiac rehabilitation.

The research has produced a system including a patient-fitted, wearable garment equipped with a printed electrical connection network, connected to an electronic signal acquisition and wireless transmission module. This module, based on a high-performance microcontroller dedicated to mobile applications, provides fully autonomous operation, i.e. patient surveillance performed by the system at early warning levels, will not require the involvement of a medical specialist.

Tests were performed on a model system for recording ECG and respiratory waveforms of adults, of different ages, for varying physiques and physical condition. The study was carried out on healthy subjects, so as to exclude any abnormalities of ECG waveform registration that could originate in diagnosed cardiovascular dysfunction or pathology of the stimulus-conduction system. ECG signals were recorded using a newly developed series of textronic t-shirts, which served as reference and comparison material to ECG recordings using classic gel ECG electrodes. The study was conducted to visualize the features and quality of recorded signals obtained from the developed textronic T-shirt.

Functional tests show that the applied conductive material printed on the fabric exhibits uniform conductive properties, good electrical contact without the need for special preparation of the skin surface for ECG examination, and shows no signs of degradation after repeated putting on and taking off the T-shirt and hand washing performed several times.