

PRESS RELEASE

## Clinical Study Confirms Effectiveness of CardioSecur® in Pre-Clinical Deployment in Ambulances

The swift positioning of CardioSecur in the preclinical area allows to save time while working with unparalleled data depth – this confirms a new study by the University of Heidelberg.

Frankfurt, January 2019. The study “CardioSecur® in the preclinical setting – When time does matter” of the University of Heidelberg confirms the advantages of the mobile ECG in acute cases. This was demonstrated by applying CardioSecur during a period of more than 7 months in ambulances in the area of Heidelberg, Germany. **85.7 % of participating emergency physicians** stated that CardioSecur’s 4 electrode system was **much faster and easier to position** in emergency situations and would prefer using it over a conventional 12-lead ECG. Additionally, CardioSecur’s 22-leads provide **more data (12 leads + V7-9, VR3-VR9) than a standard ECG**. The **360° view of the heart** enables more comprehensive diagnoses, for example of a posterior myocardial infarction, and **can be vital in acute situations**. Consequently, the study confirms the efficiency of CardioSecur in time-critical preclinical settings. The system also significantly reduces the risk of electrode misplacement in obese patients and women.

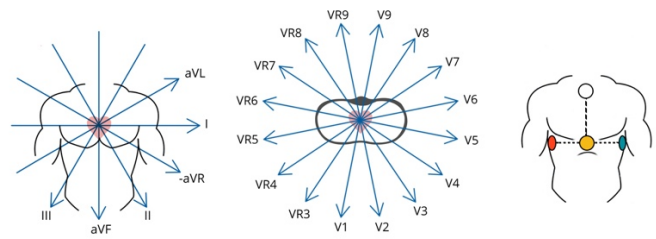
Time plays a crucial role in patients with suspected **acute coronary syndrome**, as the heart muscle begins to die off only 20 – 60 minutes after the coronary vessel’s blood supply has ceased. During the so-called “golden hour” immediate action is essential to minimize heart muscle damage and optimize patient recovery. Conventional 12 lead ECG systems require 10 electrodes and their placement affects the quality of the ECG significantly. Placement of the 6 chest leads can be particularly complex and time-consuming due to very different body anatomies. CardioSecur’s **4 electrode based 22-lead ECG** is faster and easier to position, while also providing more data to detect posterior, lateral and anterior myocardial infarctions.

*“Currently, 12-lead ECG systems provide insufficient data to detect posterior myocardial infarctions because in practice the electrodes are rarely placed on the patient’s back – even though the ESC guidelines require it,” says Felix Brand, founder and CEO of CardioSecur. “The repositioning of the dorsal electrodes also results in an asynchronous ECG (anterior and posterior). CardioSecur is currently the only ECG that meets the cardiological guidelines of the ESC without need for repositioning the electrodes. CardioSecur has already helped to detect posterior myocardial infarctions that were not visible on conventional 12-lead ECGs.”*

Additional information at [www.mobile-ecg.com](http://www.mobile-ecg.com)



Application of CardioSecur Pro in practice.  
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360° view of the heart through the CardioSecur 22-lead ECG.  
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Personal MedSystems GmbH develops and sells ECG systems and services for private users and healthcare professionals under the name CardioSecur. **CardioSecur Active** is an innovative, 15-lead, clinical-grade ECG for personal use. In a few seconds, it generates personalized feedback regarding changes in the heart's health and provides a simple recommendation to act regarding whether to see a doctor or not. The entire system consists of a 50g light cable with four electrodes, the complimentary CardioSecur Active App and the user's smartphone or tablet. **CardioSecur Pro** is the mobile, clinical ECG solution for physicians and medical professionals. CardioSecur Pro operates based upon guidelines from the European Society of Cardiology by providing 22 leads, making a 360° view of the heart possible. It is the only system that thereby recognizes infarctions of the anterior, lateral and posterior walls of the heart.

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## Resuscitation 2017, ERC Symposium on Guidelines: Abstract Presentations

### Oral Presentations

#### AS001

##### First real-world experience with CardioSecur<sup>®</sup> in the preclinical setting – When time does matter



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**Background:** The CardioSecur<sup>®</sup> (CS) (Personal MedSystems GmbH) is a novel electrocardiogram (ECG) device consisting of only 4 electrodes, but providing 22 leads. Whereas the conventional 12-lead ECG (cECG) derived from 10 electrodes is currently used as the gold standard, additional leads might provide more information, e.g. posterior myocardial infarction (MI).

This study reveals first real-world experience of CS in the pre-clinical setting.

**Materials and methods:** The CS system was implemented on two emergency ambulances from May to November 2016 in Heidelberg. All patients with suspected acute coronary syndrome (ACS) had an ECG recorded using both systems, cECG and CS, and were admitted to the chest pain unit in the University Hospital of Heidelberg. Definitive diagnosis, cardiac catheterization results and laboratory tests were obtained from the patients' records.

**Results:** In total, 64 patients (mean  $67.8 \pm 14.9$  years) with ACS were included. Thereof, 16 patients suffered from ST-elevation MI (STEMI), 15 patients from non-STEMI and 33 patients from unstable angina.

CS had the same sensitivity compared to cECG. In patients with STEMI, infarct area was misspecified in 3 (18.8%) patients using CS and in 5 (31.3%) subjects using cECG. Interestingly, our data showed that no additional leads were recorded by any emergency physician (EP), although strict posterior MI is often masked using the cECG, and leads V7–V9 are required for accurate diagnosis. In total, 18/21 (85.7%) EPs reported to prefer implementation of CS compared to cECG in the preclinical setting.

**Conclusion:** Major advantages of CS lie in quick and correct positioning of the electrodes, and quicker employment in the

acute situation. Moreover, producing more leads and, therefore, omitting the cumbersome additional affix of electrodes, CS might reveal more frequently strict posterior MI. This data support the effectiveness of CS in the preclinical setting.

<http://dx.doi.org/10.1016/j.resuscitation.2017.08.024>

#### AS002

##### Internal pacemaker pulse rejection in AEDs with low sampling rate front-ends



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**Introduction:** Automated External Defibrillators (AEDs) automatically analyse the patient's ECG acquired through defibrillation pads to identify life-threatening cardiac arrhythmias and treat them through defibrillation, when required. For patients with internal pacemakers (iPMK), pacing pulses may result in failure to identify a shockable rhythm. Detection and suppression of iPMK pulses has been traditionally performed in high sampling rate front-ends, well above 1 kHz, where these type of pulses are easier to identify.

**Purpose of the study:** To develop and evaluate an iPMK pulse rejection method for accurate shock/no-shock classification in AEDs with low sampling rate front-ends.

**Materials and methods:** An AHA-compliant ECG database containing 2782 records was split into a training and a test set. We synthetically generated iPMK pulses of different durations (0.1, 0.5, 1 and 2 ms) and amplitudes (5, 10, 50, 100 and 200 mV), and acquired them through the defibrillation pads of an AED to account for the distortion introduced by the acquisition front-end. Acquired iPMK pulses were combined with the ECG database, and resulting signals were resampled to 300 Hz. Using the training set, we developed an internal pacemaker pulse rejection algorithm based on slope and duration features of the ECG. With the test set, we evaluated the ability of the shock advice algorithm to identify shockable rhythms (Se) with and without applying the iPMK rejection algorithm.