
Seven Leads Wireless Cardiac Monitoring System

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Figure 1: New seven leads Holter monitoring placed on the patient's chest.



Figure 2: Three Holter monitoring traces are presented demonstrating a very significant benefit of this new system. The upper 2 leads are those recorded based on a conventional Holter monitoring configuration. The 7 leads below are those recorded with the new 7L monitoring. The examples show that having 7 leads is useful, as different leads show better P waves, ST segments and ECG quality across the different examples.

(A): High-grade second-degree AV block. The 2 leads on the top are those recorded with a Holter monitoring set-up. Even if the P waves are visible on the first lead, they are much better demonstrated with seven leads trace below. On the second lead P waves are not visible.

(B): This trace is from a patient with chest pain. The top 2 leads from the classic Holter do not show significant ST segment modifications, although ST segment elevation is clearly visible in leads 4 and 6 of the seven leads Holter monitoring.

(C): This trace clearly demonstrates a very poor quality of the 2 leads monitoring compared with the 7 leads shown below. On the 2 leads monitoring, QRS complexes are even difficult to identify.

Clinical Image

Diagnosis and effective treatment of arrhythmia can reduce the morbidity and mortality of the disease. Twenty-four hours ECG monitoring are commonly used to characterize the arrhythmia, although the sensitivity of this investigation is rather low as symptoms are generally transitory. Moreover, the patients are often asymptomatic during the investigation. New wireless system, called adhesive patch have been developed. Even one lead system has been proposed and used in daily practice, but their performance is not optimal. Especially atrial contraction can be difficult to identify. A new seven leads (7L) monitoring wireless adhesive system (SmartCardia, Lausanne, Switzerland) has been recently developed and even recently obtained the FDA approval. The 7L platform is a system comprising a wireless sensor component, an adhesive patch to which the 7L Sensor connects, a mobile component (the SmartCardia Phone), and a cloud-based backend server that houses the patient database. The SmartCardia Phone is an Android OS mobile phone that is configured such it can only be used by the SmartCardia mobile application. Data are wirelessly communicated from the 7L Sensor to the SmartCardia Phone via Bluetooth Low Energy.

The SmartCardia Phone is an Android OS phone that is pre-configured and part of the system. The phone running the SmartCardia application communicates patient data to the back-end cloud-based server. The back-end server receives and stores the data transferred by the phone, hosts the 7L Web browser, provides supplemental analysis, and communicates the results to the clinician.

We show, below, 3 examples in which this new device really helped in the diagnosis. The seven leads device recorded the two leads with a two-lead system and adds five new ones. It is obvious that the quality and the performance of the tracing are better. The P waves are better visible as are the modifications of the ST segment and even the QRS complex morphology. Although this system is not perfect, it certainly provides major advantages in ECG diagnosis and interpretation of Holter monitoring in daily practice. Moreover, it is a user-friendly device with constant accessibility to the patient's data during recording.

Keywords: Holter monitoring; Wireless monitoring system; Arrhythmia; Cardiac monitoring