

SQ-bar

- ◆ Supporting Corporate' s Stress Level Check System with [SQ-bar]
 - ◆ New Health Care Solution & Management That Monitors The Autonomic Nerves Balance
- ### Balance

SIMPLEX QUANTUM Inc. (Headquarters: Minato-ku, Tokyo, CEO: Nanako Suzuki) will release a new device [SQ-bar], which measures the autonomic nerves balance through the application of electrocardiographic sensing technology※, and a new health care application, which supports human' s health management by monitoring the autonomic nerves balance for a long-term.

※Schedule to obtain the medical device certification in August 2019.

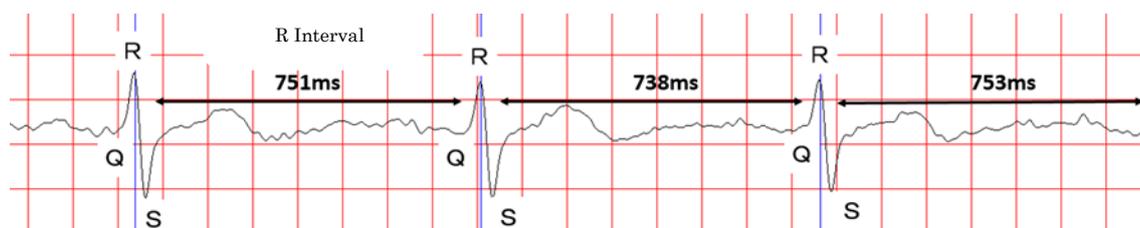
Measures Autonomic Nerve Balance From Heart Rate Variability



▲SQ-bar

▲Measures the autonomic nerve balance in 30 seconds

SQ-bar measures the electrocardiographic waveform by detecting the potential differences between left and right hands (1st induction).



▲Electrocardiographic waveform. The heartbeat interval (RR Interval) is changing.

Among electrocardiographic waveforms, the interval from the peak of the sharply rising part of

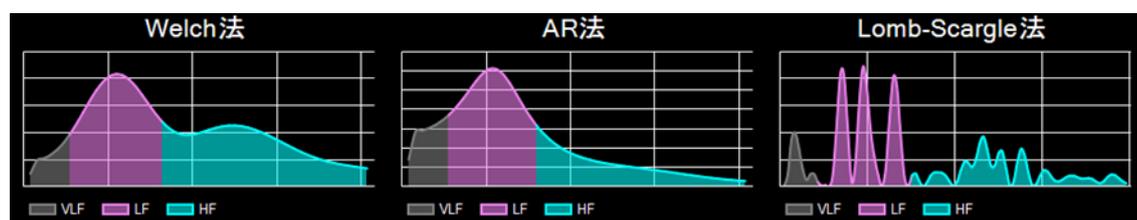
R wave to the next peak of R wave is called the RR interval. The RR interval changes, and it becomes slightly longer or shorter in millisecond units.

This [heart rate variability] is known as the reflection of the autonomic nerves (sympathetic nerve and parasympathetic nerve) balance.

The attached application of SQ-bar [SQ-bar App] extracts the heart rate variability data from the electrocardiographic waveform and measures the autonomic nerves (sympathetic never and parasympathetic nerve) balance. Heart rate variability can be measured from pulses detected from the fingertips, but SQ-bar can measure the RR interval more accurately since it detects the RR interval from electrocardiographic waveform directly.

High Precision Frequency Analysis Using 3 Different Fast Fourier Transform Algorithms

SQ-bar App analyzes the frequency of heart rate variability, and reflects the activity of both sympathetic nerve and parasympathetic nerve in low frequency wave (0.05Hz~0.15Hz, LF) and the activity of parasympathetic nerve in high frequency wave (0.15Hz~0.40Hz, HF) and confirm the dominance of sympathetic nerve and parasympathetic nerve with the ratio of LF/HF.



▲ Three algorithms with different characteristics are used (Red is for LF, and blue is for HF)

In general, the frequency analysis uses only fast Fourier Transform algorithm, and SQ-bar App offers high precision frequency analysis by using 3 different fast Fourier Transform algorithms: Welch Method, AR Method, & Lomb-Scargle Method.

Cloud Utilization For A Long-term Health Care Solution

The sympathetic nerve is a dominant when a person is active or nervous, and the parasympathetic never is a dominant when a person is relaxed or asleep.

The measurement of autonomic nerve balance works as an effective index of stress check since the sympathetic nerve is known to be a dominant when a person is stressed out.

SQ-bar offers a long-term health care solution by connecting SQ-bar device with [SQ-cloud], which registers, saves, and manages the measurement data.

In the near future, SQ-bar will not only measure the autonomic nerve balance, but also will detect sign of illness from the electrocardiographic waveform and notify the user with a notification

alert feature.

SQ-cloud is equipped with a viewer feature that keeps the measurement history of the autonomic nerve balance in various ranges such as daily, weekly, and monthly. In addition to the measurement data of SQ-bar, we aim to become a new style of health care standard by accumulating all user data obtained from all biological information measurement instruments released by SIMPLEX QUANTUM Inc with this cloud service.

SQ-bar uses its unique power supply separating technology (patent pending) to obtain power supply from high noise devices like PC' s USB port without any risk of electric shock. Simultaneously, user can use this device wirelessly for a long time since it is equipped with a built-in high-capacity battery. This device can be used portably and easily in daily lives, or in active training sites like sports gym and yoga school.

The release date and the price of this service are currently undecided, but we plan to sell the SQ-bar and SQ-bar App in the near future. We will start the SQ-cloud service on the release date of this device and application.

■ SIMPLEX QUANTUM Inc.

In addition to the electrocardiographic measurement technology, our company also developed advanced health care service, device, and solution that warn an individual about the stress level and risk of illness, measured from the balance of sympathetic nerve system and parasympathetic nerve system.

<http://simplex-q.com/>

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