

MAX PULSE

FREQUENTLY ASKED QUESTIONS

HOW DOES THE MAX PULSE GET ITS READINGS FROM A FINGER PROBE?

Simplistically, the Max Pulse uses an infrared light finger sensor which implements LEDs as both light emitter and detector to measure one's pulse wave. A Pulse Wave occurs when the heart pumps and it generates a contour wave that travels along the arterial tree. The wave form is generated from the left ventricular chamber of the heart to the big aorta, and is reflected back when the big aorta bifurcates or divides into two arteries.

The Max Pulse then uses pulse-based signal conversion techniques and converts the wave into a digital signal. The digital signal can then be broken down using a variety of mathematical algorithms. Some of the algorithms that are used include Time Domain Analysis (TDA) and Frequency Domain Analysis (FDA). TDA measures the RR interval variation in the time domain. FDA uses the Fourier Transformation (FFT) to access the frequencies and amplitude of the oscillatory components hidden in the variability signal.

WHAT IS A PHOTOPLETHYSMOGRAPH?

Photoplethysmography measures one's pulse wave signal that indicates pulsation of the chest wall and great arteries followed by the heartbeat. The change in volume caused by the pressure pulse is detected by illuminating the skin with the light from an LED, then measuring the amount of light either transmitted or reflected to a photodiode. Each cardiac cycle appears as a peak. Photoplethysmographs have been around for over 25 years and are currently being used in many clinical applications.

Photoplethysmography is classified into two groups in terms of physical characteristics of parameters. One is "pressure Photoplethysmography", which represents the change of intravascular pressure. The other is "volume capacity Photoplethysmography", which indicates the change of vascular volume capacity.

Volume Capacity Photoplethysmography is then classified into three categories by signal processing method for velocity. The categories are Photoplethysmography (PTG), Velocity Pulse Photoplethysmography, and Accelerated Photoplethysmography (APG). The Max Pulse uses PTG and APG analysis.

The Max Pulse uses Volume Capacity Photoplethysmo-

graph technology. Specifically, the PTG and APG applications for determining aging vascular health and Heart Rate Variability (HRV).

HOW DOES THE MAX PULSE MEASURE THE SYMPATHETIC AND PARASYMPATHETIC NERVOUS SYSTEMS?

When a person's pulse wave information is collected, the Max Pulse uses Frequency Domain Analysis (FDA) to gather the three different frequencies of the Autonomic Nervous System: VLF (Very low frequency) - 0.0033-0.04Hz, LF (low frequency) - 0.04-0.15Hz (Also known as "Mayer" waves), and HF (High frequency) - 0.15-0.4Hz (Vagus Nerve). Next, the frequencies are then used to see if they are in the normal ranges by using the following formulas: LF norm = $LF / LF + HF$ -> Sympathetic nerve and HF norm = $HF / LF + HF$ -> Parasympathetic nerve. Finally, depending on the information gathered, a LF:HF ration is determined and then plotted to show how the Sympathetic and Parasympathetic nervous systems are working in conjunction with their norm and each other (normal (balanced) or hyper or hypo to their norms).

HOW ACCURATE ARE THE READINGS?

The Max Pulse is used extensively in Asia. The parent company (Medicore) uses the Max Pulse in conjunction with 8 University Research Hospitals in Seoul, Korea. As a result, studies show that the Max Pulse has a + accuracy of 2% for the measurements it captures.

IS THE MAX PULSE FDA APPROVED?

Yes, after three years of review by the FDA, the Max Pulse was approved on June 16, 2011 as a Class II Medical Device.

HOW COME I HAVE NOT HEARD OF THE MAX PULSE BEFORE?

Plethysmography technology has been around for over 25 years. It has been used for different applications. It has been a growing science over the last few years specifically because of its significance in being a non-invasive simple test for determining Heart Rate Variability (HRV) and Aging Vascular Health. Since the Max Pulse obtained FDA approval June 16, 2011, The Cardio Group is using advertising campaigns, conferences, continuing education, conventions, referrals and a dedicated sales force, to get the word out to the health care industry.