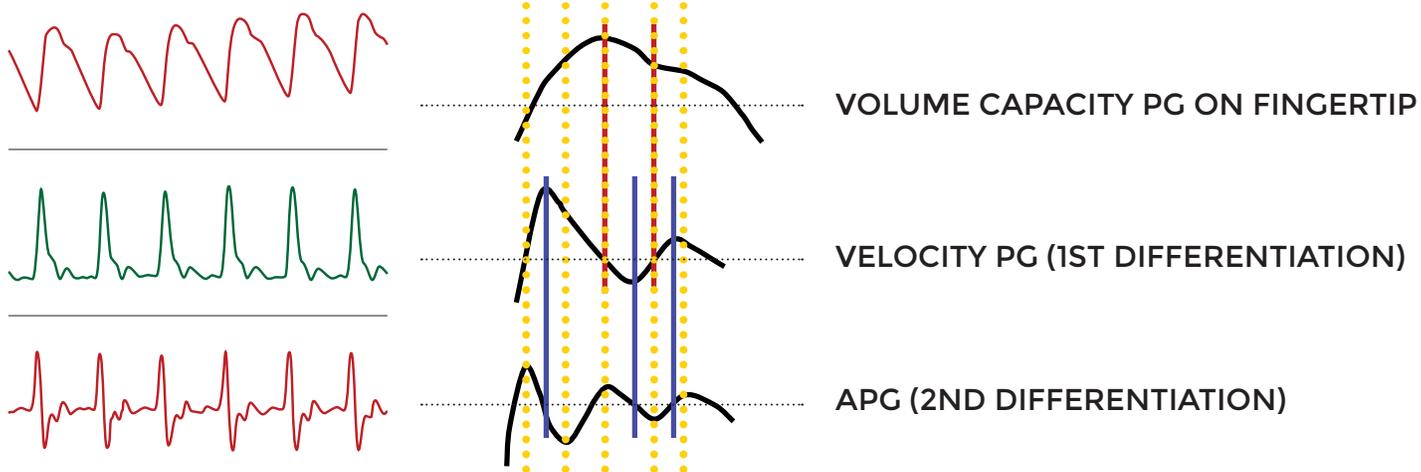


CARDIOVASCULAR ASSESSMENT RESULT INTERPRETATION GUIDE

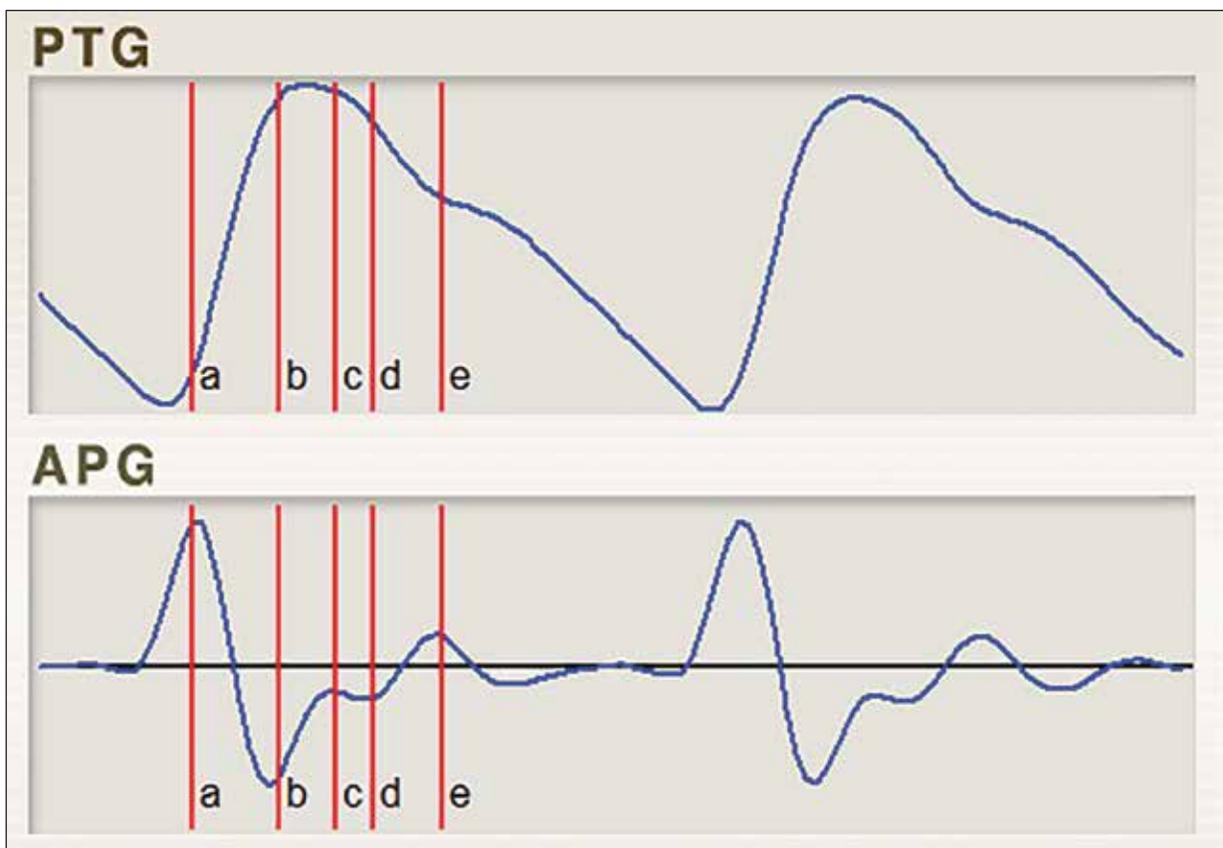
- PROVE CLINICAL EFFICACY
- IMPROVE CLINICAL OUTCOMES
- IMPROVE PATIENT ADHERENCE

PLETHYSMOGRAPHY

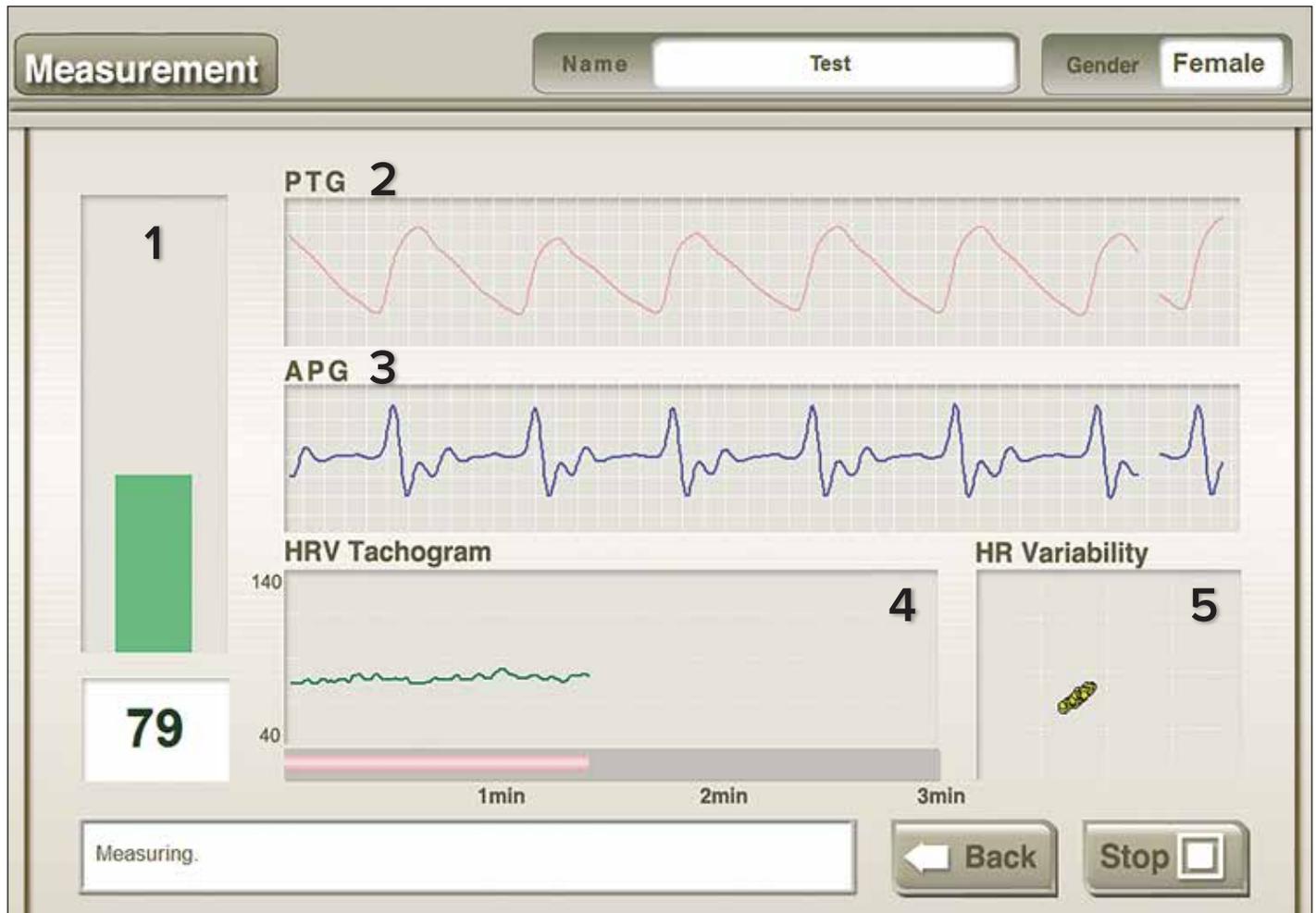


PTG (Plethysmograph) and APG (Accelerated Plethysmograph):

This screen displays the three minute test “average” for the basic and finalized wave forms. Mathematical calculations are then derived from the multiple data points collected (i.e. points a, b, c, d & e) and are represented graphically.



MEASUREMENT SCREEN



1. The Heart Rate or Beats per Minute is displayed using a graph and numerical value that will change during the course of the three minute test.

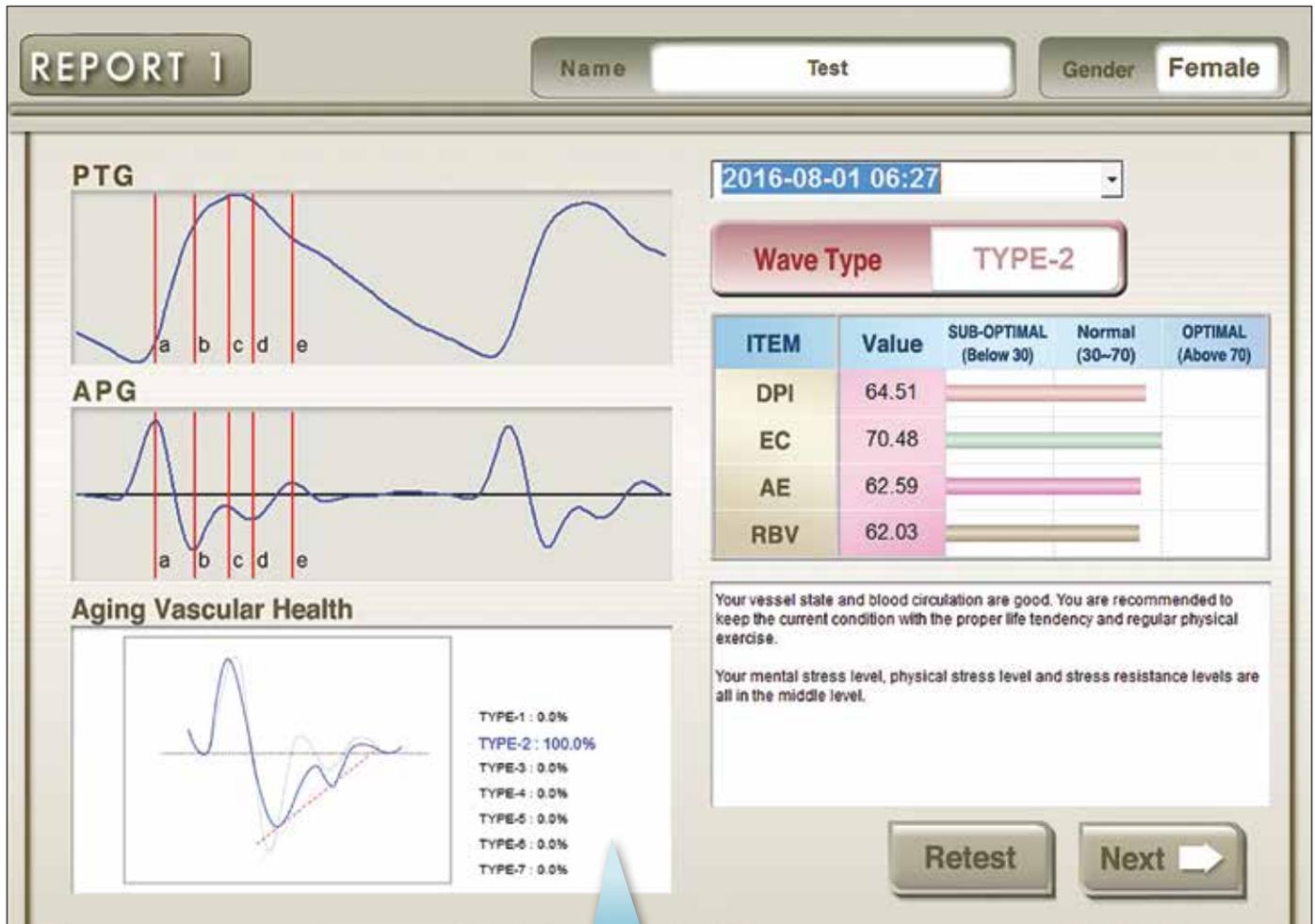
2. Plethysmograph (PTG): The “basic” wave form signal that indicates pulsation of chest wall and great arteries followed by the heart beat. This shows the device picking up the pulse wave from the patients heartbeat through the fingertip in real time.

3. Accelerated Plethysmograph (APG): The “final analysis” wave form. The APG measures the blood circulation state and aging level of blood vessels. APG uses the second derivative of the waveform to stabilize the baseline and to separate components of the waveform more clearly and distinctly.

4. HRV (Heart Rate Variability) Tachogram: A green linear record displaying the HRV information collected during a three minute period of time (indicated by the pink bar).

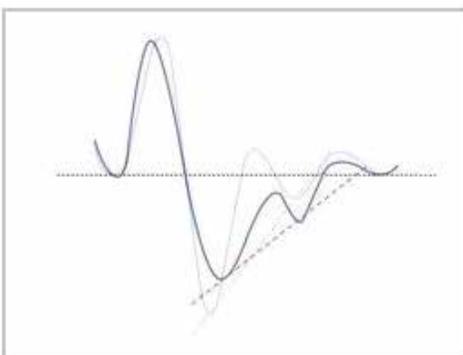
5. HR (Heart Rate) Variability: A graphical representation of time (yellow dots). The more the dots are dispersed and spread out in a group, the more adaptable the cardiovascular system.

VESSEL STATE, KINETICS OF BLOOD FLOW, ENDOTHELIAL DYSFUNCTION



WAVEFORM PATTERNS

Ageing Vascular Health

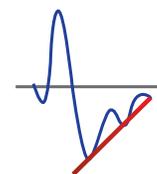


TYPE-1 : 0.0%
 TYPE-2 : 100.0%
 TYPE-3 : 0.0%
 TYPE-4 : 0.0%
 TYPE-5 : 0.0%
 TYPE-6 : 0.0%
 TYPE-7 : 0.0%

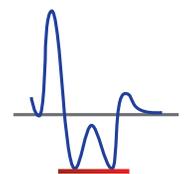
Type 1



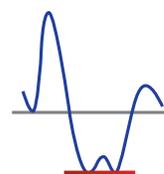
Type 2



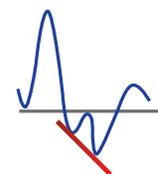
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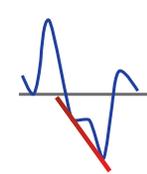
Type 4



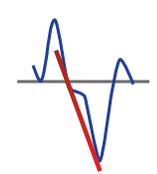
Type 5

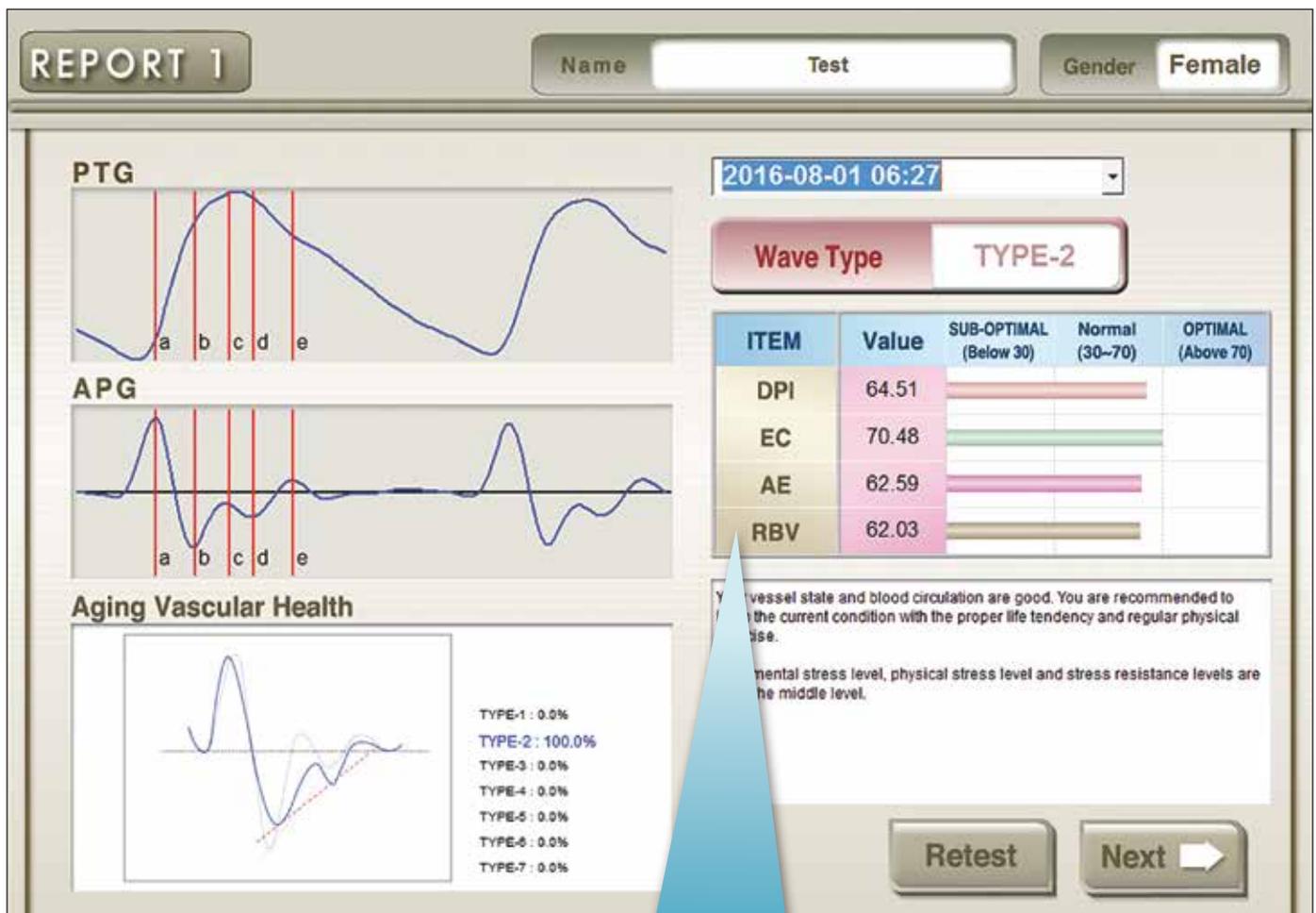


Type 6



Type 7





DPI - Differential Pulse Wave Index:

Represents the overall health of the cardiovascular system. DPI is the main indicator that represents aging vascular health.

EC - Eccentric Constriction:

Represents the contraction power of vessels from the left ventricle.

AE - Arterial Elasticity:

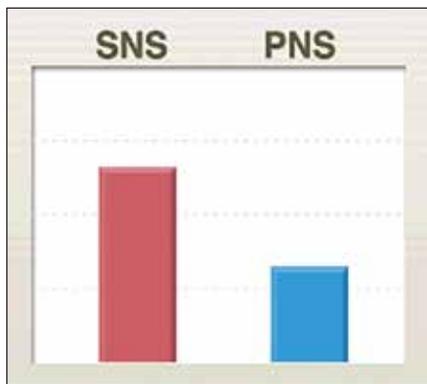
Analyzes the blood circulation, vascular elasticity and resistance of the vessels. It detects early cardiovascular disease like atherosclerosis and peripheral circulation dysfunction.

RBV - Remaining Blood Volume:

The remaining blood volume in the vessels after systolic contraction on the heart. If the blood vessels are healthy, there is little remaining blood volume. If the vascular state improves, the remaining blood volume will decrease, but will show an increase on the point scale. Please note this inverse relationship.

AUTONOMIC NERVOUS SYSTEM

Sympathetic (SNS) and Parasympathetic (PNS) Measurement: This measure indicates overall balance between sympathetic and parasympathetic systems. It is the ratio between the power of Low Frequency and High Frequency bands. A higher ratio reflects domination of the SNS, while a lower ratio indicates domination of the PNS. This ratio is used to quantify the overall balance between the sympathetic and parasympathetic systems. The balance is indicated on a bar graph with 2 bars, one each for SNS and PNS. Frequency domain measurement confirms that the LF and HF oscillatory components are relative indices of cardiac sympathetic and vagal (parasympathetic) activity respectively.



SYMPATHETIC NERVOUS SYSTEM

Fight or Flight

Muscle breakdown (catabolic)

Releases muscle destroying and fat storing hormones

Cortisol, Adrenaline (noradrenaline)

Increased heart rate, blood pressure, sweating, blood vessels and pupils dilate, blood flow to the limbs

Decrease in digestion and sexual function

Naturally active during the day

Everyday stress: Traffic, deadlines, kids, family, relationships

PARASYMPATHETIC NERVOUS SYSTEM

Rest and Digest

Muscle building (anabolic)

Releases muscle building hormones

Growth hormone, DHEA, Melatonin, Testosterone, Estrogen

Repairs the body and responsible for sexual arousal

Stimulates digestion and elimination

Naturally active at night (specifically between 10pm and 2am)

EFFECTS OF AUTONOMIC NERVOUS SYSTEM DYSFUNCTION

| | |
|--|---|
| Production of Energy | Blood sugar levels and the ability of your cells to make energy are compromised. Insulin resistance results in excess body fat, diabetes, and heart disease. |
| Sleep | The rapid eye movement stage (REM) of the sleep cycle is interrupted by high cortisol values at night. Since REM is the most regenerative stage of sleep, fatigue, depression, and lack of mental acuity can result. |
| Brain | Damage to neurons and receptors in your brain. This probably accounts for the problems with depression, learning, and memory observed in people who are chronically stressed. |
| Muscle & Connective Tissues (<i>Tendons, ligaments & joints</i>) | Reduced tissue repair, coupled with an increased rate of tissue breakdown (a normal part of body metabolism), leads to an increased risk for muscle and joint injury. The lowered rate of repair and increased breakdown prevents normal repair of injuries, even everyday wear-and-tear, and leads to chronic injuries and chronic pain. |
| Bone | If the night cortisol is elevated, your bones do not rebuild during sleep and you are more prone to osteoporosis. |
| Immune System | Decreased production of white blood cells; decreased immune response in the linings of the lungs, throat, kidneys, bladder, and intestinal tract. Lowered resistance to infection and increased risk for allergies. |
| Skin Regeneration | Thin, dry (even crepe-paper-like) skin. Human skin regenerates mostly during the night while you're asleep. Moist, resilient skin is a sign of healthy cortisol rhythm. |
| Thyroid Function | High cortisol levels inhibit thyroid hormone levels and result in fatigue, low body temperature, and weight gain. |
| Pituitary Gland | Low pituitary hormone levels inhibit thyroid, male and female, and growth hormone levels. |
| Liver | Abnormal cortisol levels stress liver detoxification pathways. |
| Intestines | Abnormal cortisol levels weaken the intestinal wall, resulting in ulcers, colitis, Crohn's Disease, Irritable Bowel Syndrome, and abnormal gut flora. |

FREQUENCY DOMAIN ANALYSIS

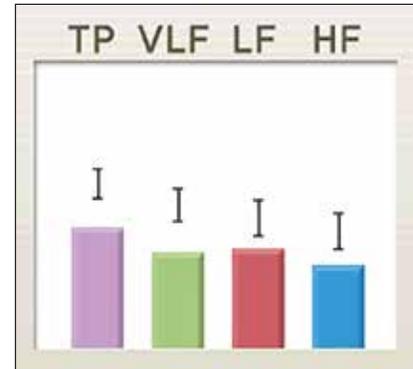
The frequency-domain graph indicates the strength of the signal within each frequency band over a range of frequencies. The device analyzes specific domain ranges associated with HRV and ANS function:

Total Power (TP) combination of the 3 frequencies

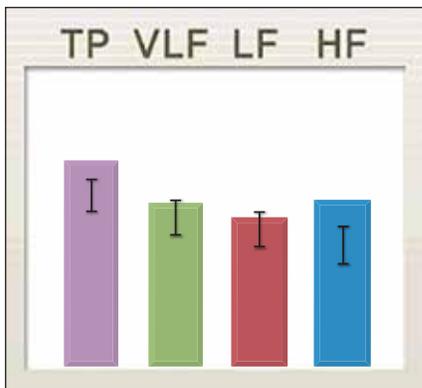
Very Low Frequency (VLF) at 0.0033 and 0.04 Hz

Low Frequency (LF) at 0.04 to 0.15 Hz

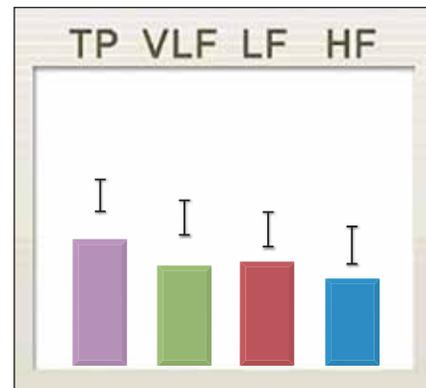
High Frequency (HF) at 0.15 to 0.4 Hz



HEALTHY



UNHEALTHY



REDUCTION OF TP

- Decreased ANS function
- Lowered regulation competence
- Decreased ability to cope with the requirement of continuously changing environment

REDUCTION OF VLF

- Inability to regulate body temperature
- Hormone disorder

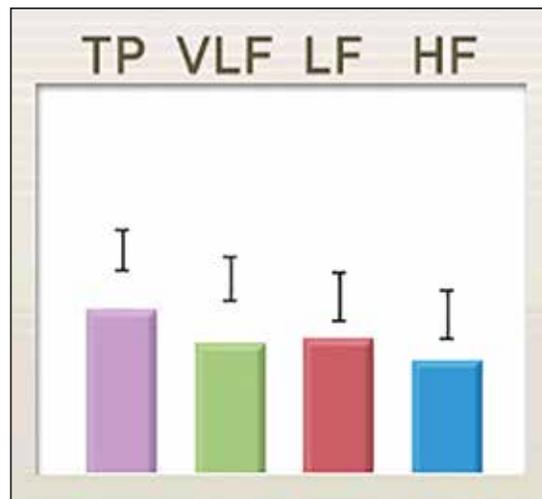
REDUCTION OF LF

- Loss of energy
- Fatigue
- Insufficient sleep
- Lethargy

REDUCTION OF HF

- Chronic stress
- Aging
- Reduced electrical stability of heart
- Functional indigestion

FREQUENCY DOMAIN ANALYSIS



- Total Power (TP):** Total Power is a short-term estimate of the total power, of the power spectral density, in the range of frequencies between 0 and .4 Hz. This measure reflects overall autonomic activity where sympathetic activity is the primary contributor, and is calculated in milliseconds squared (ms²). Total Power is a general reading obtained by each of the three specific frequencies above. If it is located within the I-bar or above, it means that the autonomic nervous system is functioning well. If it falls below the I-bar, it means the autonomic nervous system is functioning poorly and that stress resistance is also weak. The clinical meaning of TP in frequency domain is similar to that of HRV.
- Very Low Frequency (VLF):** Very Low Frequency is a band of power spectrum range between 0.0033 and 0.04 Hz. Generally this frequency range indicates overall activity of various slow mechanisms of sympathetic function. Very Low Frequency band is calculated in milliseconds squared (ms²). With longer time recordings it is considered to represent sympathetic tone as well as slower hormonal and thermoregulatory effects. There are some findings indicating that in shorter recordings VLF has fair representation of various mental stress factors (negative emotions, worries, rumination etc.)
- Low Frequency (LF):** Low Frequency is a band of power spectrum range between 0.04 and 0.15 Hz. This measure reflects both sympathetic and parasympathetic activity. Generally it is a strong indicator of sympathetic activity. Parasympathetic influence is represented by LF when respiration rate is lower than 7 breaths per minute or when taking a deep breath. Thus, when subject is in the state of relaxation with a slow and even breathing, the LF values can be very high indicating increased parasympathetic activity rather than an increase in sympathetic regulation. Low Frequency band is calculated in milliseconds squared (ms²). LF shows the activity of sympathetic nerve and parasympathetic nerve at the same time, but it mostly indicates the sympathetic nerve system.
- High Frequency (HF):** High Frequency is a band of power spectrum range between 0.15 and 0.4 Hz. This band reflects parasympathetic (vagal) activity. HF is also known as a 'respiratory' band because it corresponds to the beat-to-beat variations caused by respiration. This phenomenon is known as Respiratory Sinus Arrhythmia (RSA). Heart rate increases during inhalation and decreases during exhalation. This band reflects parasympathetic or vagal activity of the ANS, which was confirmed after a large number of studies indicated that total vagal blockade essentially eliminates the HF oscillations and reduces power in the LF range.

CARDIOVASCULAR ASSESSMENT



HEART RATE VARIABILITY (HRV)

Measures the degree of fluctuation in the length of intervals between heart beats. For healthy people, HRV shows a fluctuation in heart rate while unhealthy people have a simple and consistent heart rate.

HRV measures the adaptability of the cardiovascular system and autonomic nervous system, which is composed of the sympathetic nervous system (SNS) and parasympathetic nervous system (PNS). Your SNS plays the role of the accelerator, also known as flight or fight. Your PNS functions as the brake, also known as rest and repair. A healthy person has a balanced autonomic nervous system.



DEFINITIONS

DPI - Differential Pulse Wave Index: Represents the overall health of the cardiovascular system. DPI is the main indicator that represents the aging of arteries.

EC - Eccentric Constriction: Represents the contraction power of vessels from the left ventricle.

AE - Arterial Elasticity: Analyzes the blood circulation, the vascular elasticity and resistance of the vessels. It detects early cardiovascular disease like atherosclerosis and peripheral circulation dysfunction.

RBV - Remaining Blood Volume: The remaining blood volume in the vessels after systolic contraction on the heart. If the blood vessels are healthy, there is little remaining blood volume.



ARTERIOSCLEROSIS

Arteriosclerosis occurs when the blood vessels that carry oxygen and nutrients from your heart to the rest of your body (arteries) become thick and stiff — sometimes restricting blood flow to your organs and tissues. Healthy arteries are flexible and elastic, but over time, the walls of your arteries can harden.



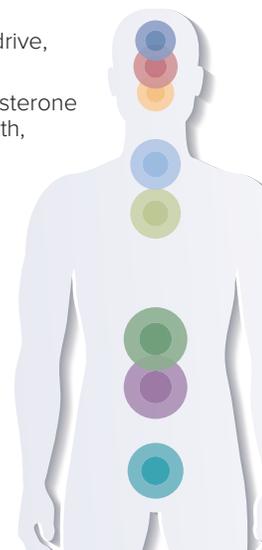
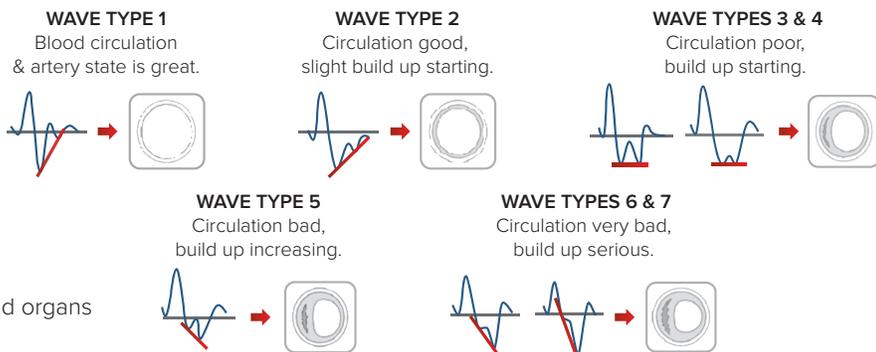
AUTONOMIC NERVOUS SYSTEM:

- Involuntary responses
- Pathways to the endocrine glands, blood vessels and organs

THE MAJOR ENDOCRINE GLANDS ARE:

- Adrenal Glands** – produce androgens and cortisol; gives your body odor and pubic hair, helps in how we respond to stress; regulates blood pressure and more.
- Hypothalamus** – produces hormones that regulate body temperature, appetite and weight, mood, sex drive, sleep, and thirst.
- Ovaries** – female reproductive glands that produce eggs and sex hormones – including estrogen, testosterone and progesterone – which are vital to reproductive organ development, breast development, bone health, pregnancy and fertility.
- Pancreas** – produces insulin, glucagon and other hormones but primarily responsible for controlling blood sugar levels.
- Parathyroid** – controls the amount of calcium in our bones and blood.
- Pineal Gland** – produces melatonin, which is important for sleep cycles.
- Pituitary Gland** – the “master control gland” makes hormones that control growth, reproduction, lactation, and the activity of other glands.
- Testes** – male reproductive glands produce sperm and secretes testosterone.
- Thymus** – active until puberty, produces cells crucial to the immune system that protect the body from threats such as viruses and infections.
- Thyroid** – produces hormones that control the rate at which the body burns calories and how fast the heart beats.

WAVEFORM PATTERNS & WHAT THEY MEAN FOR YOU



SAMPLE REPORT 1

REPORT

AUTONOMIC BALANCE & ACCELERATED PHOTOPLETHYSMOGRAPH

Name: ID: Gender / Age: F / 72 Reg.Date: 2015-11-18 14:26

HRV Tachogram



| | |
|--------------------|----|
| Heart Beat | 74 |
| Highest Heart Beat | 84 |
| Lowest Heart Beat | 68 |
| Artifact | 0 |

TP VLF LF HF SNS PNS



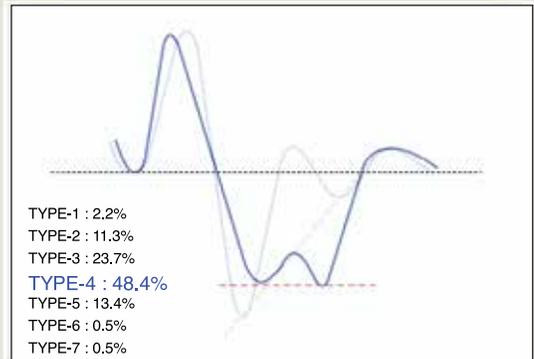
Power Spectral Density



Low Normal High Very High

| | | | | |
|-------------------|-----|--------|------|-----------|
| Physical Stress | Low | Normal | High | Very High |
| Mental Stress | Low | Normal | High | Very High |
| Stress Resistance | Low | Normal | High | Very High |

Aging Vascular Health



| ITEM | VALUE | SUB-OPTIMAL (Below 30) | Normal (30~70) | OPTIMAL (Above 70) |
|------|-------|------------------------|----------------|--------------------|
| DPI | 17.86 | Sub-optimal | | |
| E C | 20.06 | | Normal | |
| A E | 27.57 | Sub-optimal | | |
| RBV | 54.99 | | Normal | Optimal |

Score of your Stress

50 / 100

Wave Type

TYPE-4

SAMPLE REPORT 2

REPORT

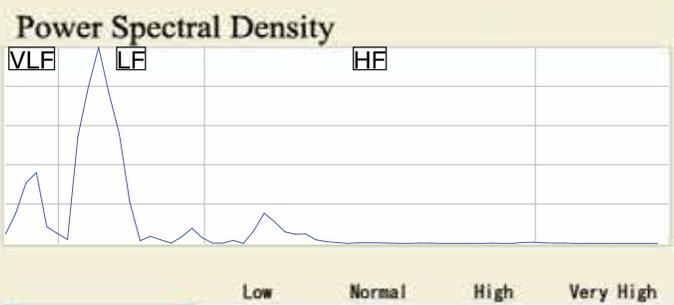
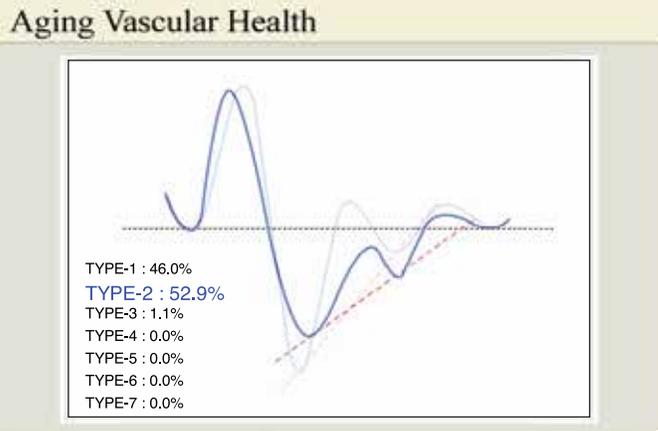
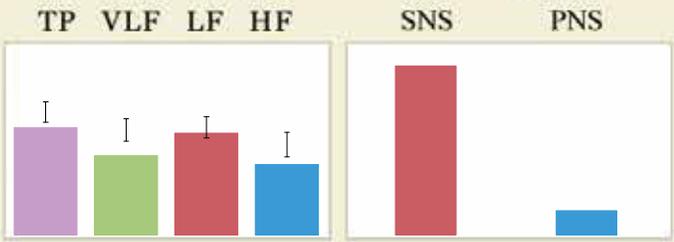
AUTONOMIC BALANCE & ACCELERATED PHOTOPLETHYSMOGRAPH

Name: ID: Gender / Age: M / 50 Reg.Date: 2016-04-12 06:05

HRV Tachogram



| | |
|--------------------|----|
| Heart Beat | 76 |
| Highest Heart Beat | 83 |
| Lowest Heart Beat | 68 |
| Artifact | 0 |



| | Low | Normal | High | Very High |
|-------------------|-----------------|--------|------|-----------|
| Physical Stress | Progressive bar | | | |
| Mental Stress | Progressive bar | | | |
| Stress Resistance | Progressive bar | | | |

| ITEM | VALUE | SUB-OPTIMAL (Below 30) | Normal (30~70) | OPTIMAL (Above 70) |
|------|-------|------------------------|-----------------|--------------------|
| DPI | 65.65 | | Progressive bar | |
| E C | 65.45 | | Progressive bar | |
| A E | 58.04 | | Progressive bar | |
| RBV | 58.32 | | Progressive bar | |

Score of your Stress: **63 / 100**

Wave Type: **TYPE-2**

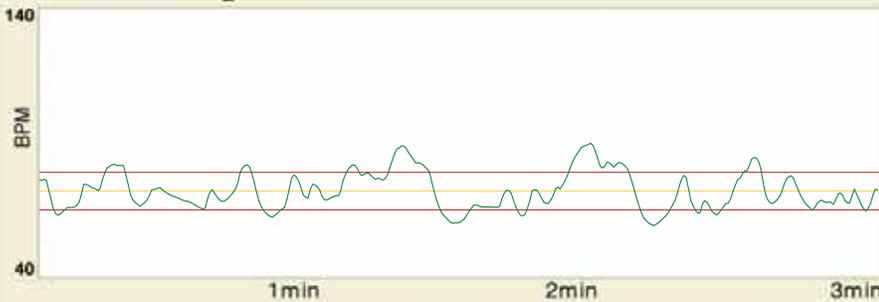
SAMPLE REPORT 3

REPORT

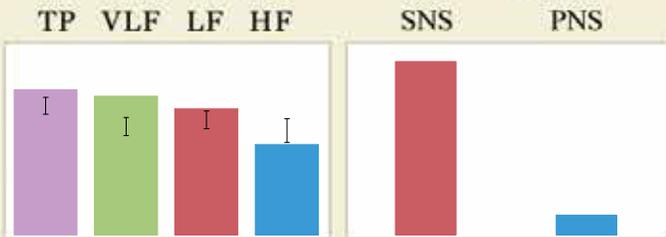
AUTONOMIC BALANCE & ACCELERATED PHOTOPLETHYSMOGRAPH

Name: ID: Gender / Age: F / 28 Reg.Date: 2016-06-09 13:08

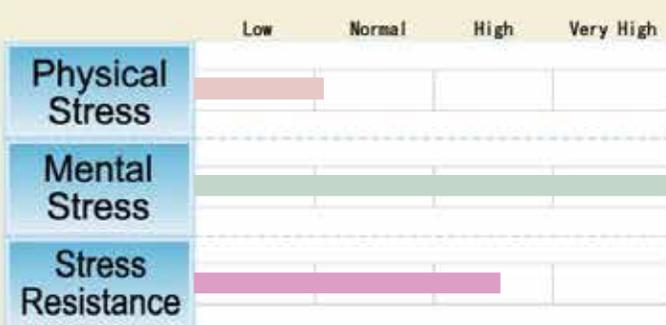
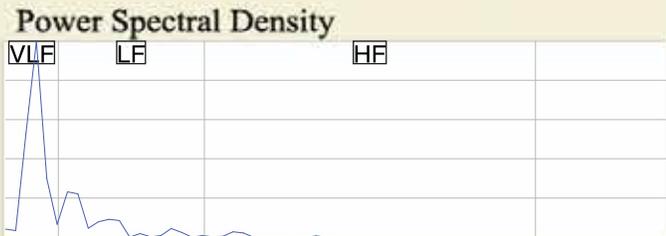
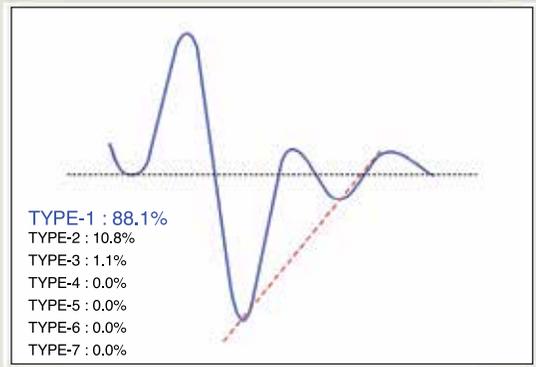
HRV Tachogram



| | |
|--------------------|----|
| Heart Beat | 71 |
| Highest Heart Beat | 89 |
| Lowest Heart Beat | 58 |
| Artifact | 1 |



Aging Vascular Health



| ITEM | VALUE | SUB-OPTIMAL (Below 30) | Normal (30~70) | OPTIMAL (Above 70) |
|------|-------|------------------------|----------------|--------------------|
| DPI | 65.29 | | | |
| E C | 74.97 | | | |
| A E | 58.55 | | | |
| RBV | 59.72 | | | |

Score of your Stress: 40 / 100

Wave Type: TYPE-1