We simplify complex processes in 7 min

BodyK®

Digital Wellness Assessment

Wellness Score based on

Lifestyle Markers

Autonomic Nervous System Aging

Vascular Aging

Bodyk.net bodyknows@bodyk.net Miami, FL - USA

BodyK DIGITAL ASSESSMENT

WHAT IS **BodyK** ?

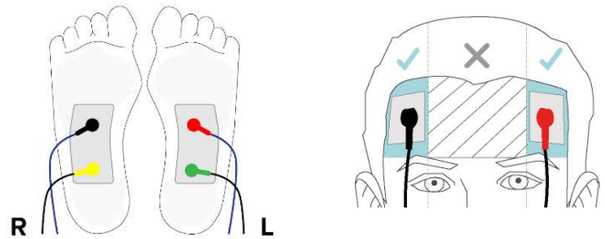
BodyK is a revolutionary cutting-edge technology for functional body assessments with the fastest, non-invasive, and most comprehensive, validated wellness screening, positioning your practice at the forefront of technology. We get to the root-cause of your patients' symptoms in just 7 minutes.

BodyK IS THE WAY TO HELP YOUR PATIENTS REACH THEIR OPTIMAL HEALTH,

WHILE INCREASING YOUR PRACTICE'S MONTHLY REVENUE.

INTEGRATED TECHNOLOGIES

- GALVANIC SKIN RESPONSE
- BIOIMPEDANCE ANALYSIS



- OXYMETER
- PHOTOPLETHYSMOGRAPHY

- BLUETOOTH BLOOD PRESSURE

FDA CLEARED AS A GENERAL WELLNESS DEVICE

PATENTED TECHNOLOGIES

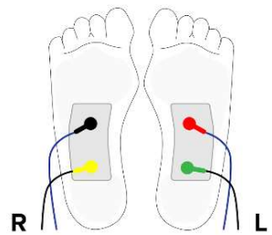
Manufacturer Certified

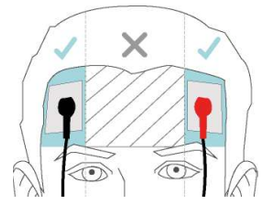
WMS TESTS METHOD AND PROCEDURE

PROCEDURE:

1. Patient is sitting and relax (at least for 5 min)
2. Set up patient – update software with patient info.
3. Place the disposable electrodes on the feet and forehead, then place cuff on the left arm, and finally place pulse oximeter on the finger of the right arm.
4. Start the exam and follow the instructions on the software.

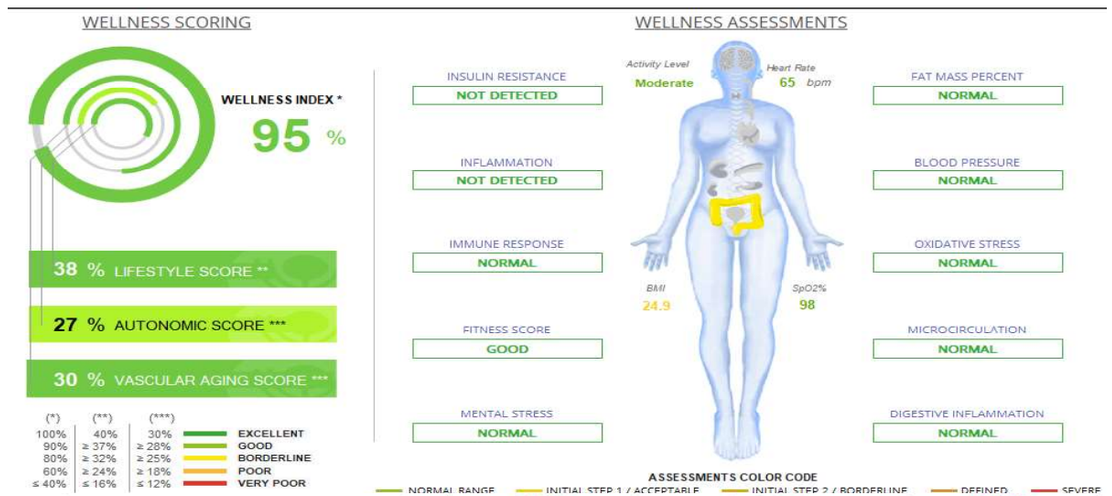
1- Setup patient





2-RECORDING

3-RESULTS



BodyK®

BODYK SYSTEM

OUTPUT DATA

BODYK OUTPUT DATA

Visit Date: 11/11/2023 **Visit Time:** 14:58

Client Name: [redacted]

Gender: Male **Height:** 5' 11" **BMI:** 33.2

DOB: 8/27/1986 **Weight:** 237 Lbs

Age: 37 **Vascular Age:** 42

WELLNESS SCORE

62 %

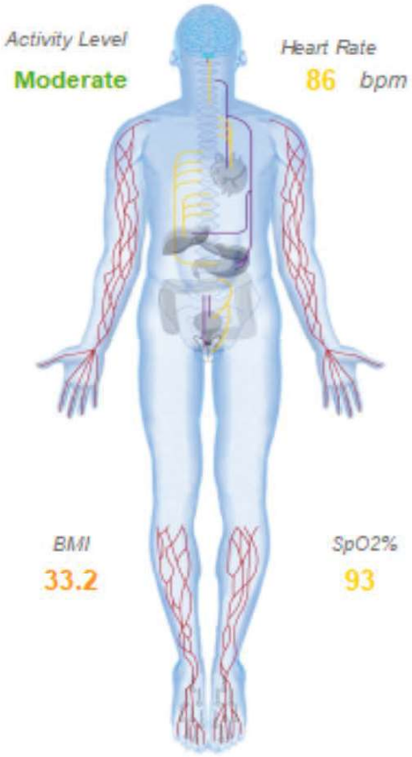
SCORE 0% - 100% *

100%	EXCELLENT
90%	GOOD
80%	BORDERLINE
60%	POOR
<= 40%	VERY POOR

Client Wellness Profile

WELLNESS ASSESSMENTS

- INSULIN RESISTANCE: DETECTED
- INFLAMMATION: BORDERLINE
- IMMUNE RESPONSE: NORMAL
- FITNESS SCORE: GOOD
- STRESS LEVEL: BORDERLINE



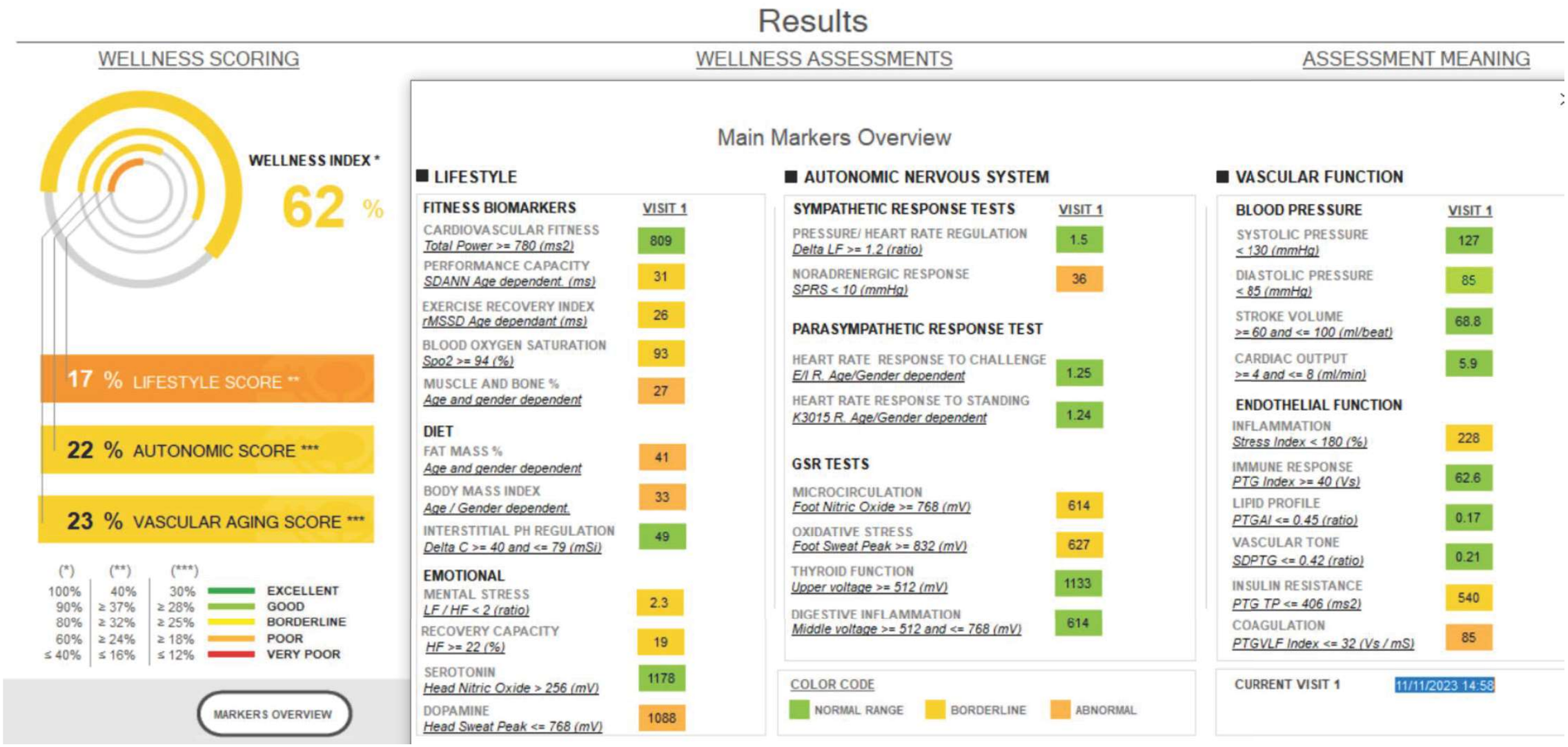
- FAT MASS PERCENT: ABNORMAL
- BLOOD PRESSURE: PRE-HYPERTENSION
- OXIDATIVE STRESS: BORDERLINE
- MICROCIRCULATION: BORDERLINE
- DIGESTIVE INFLAMMATION: NORMAL

ASSESSMENTS COLOR CODE

NORMAL RANGE | INITIAL STEP 1 / ACCEPTABLE | INITIAL STEP 2 / BORDERLINE | DEFINED | SEVERE

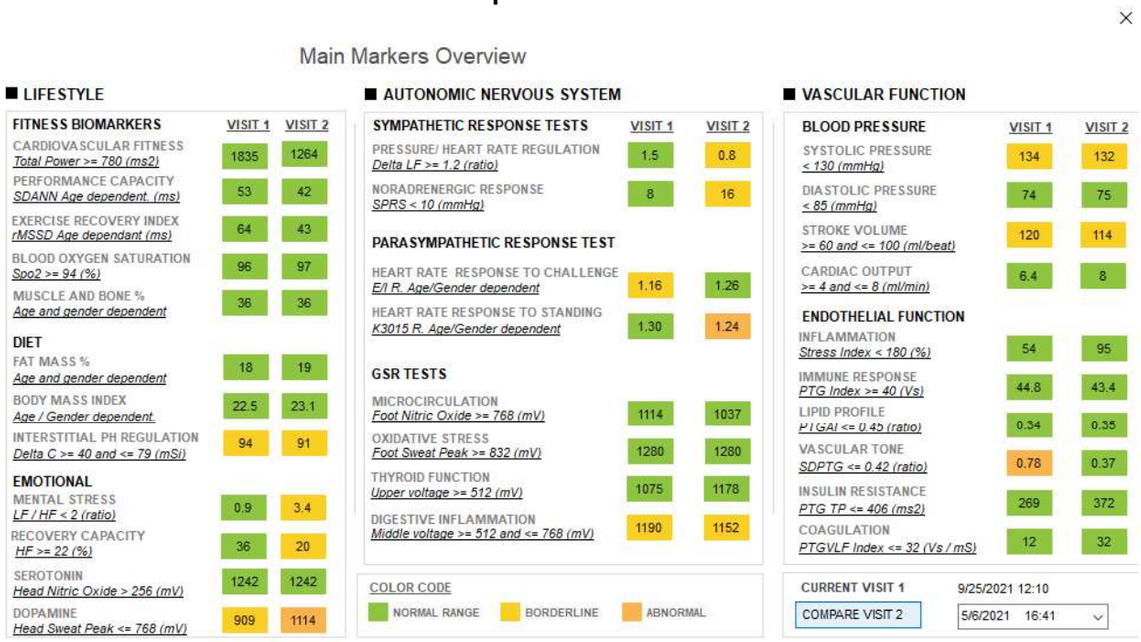
BODYK OUTPUT DATA

The BodyK outputs are an overview of markers related to a Wellness risk calculated as a score.

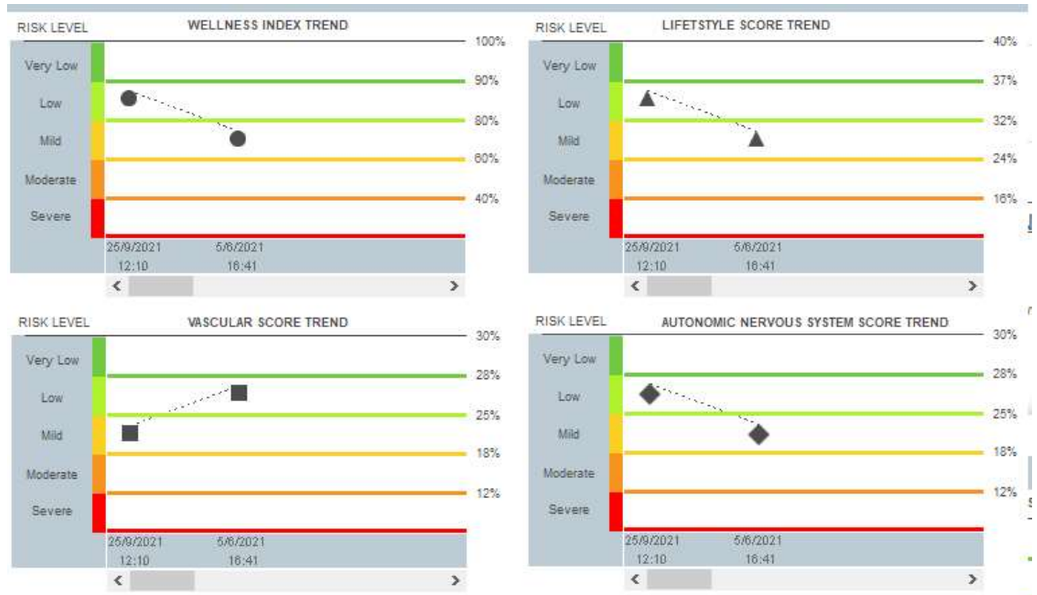


BODYK OUTPUT DATA

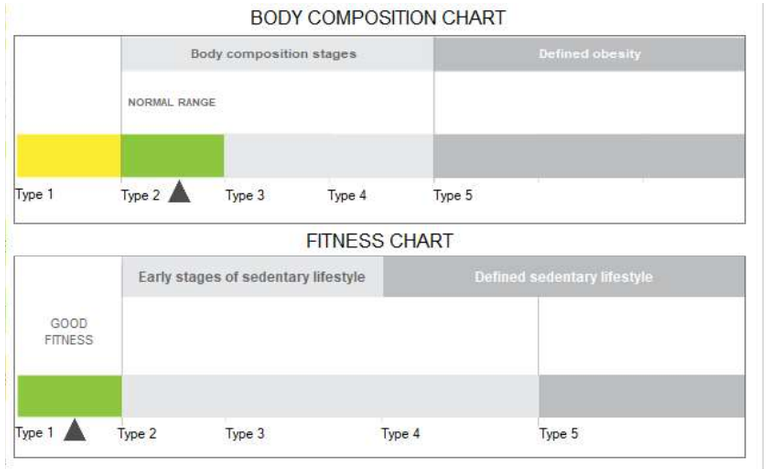
Marker overview and comparison with another exam

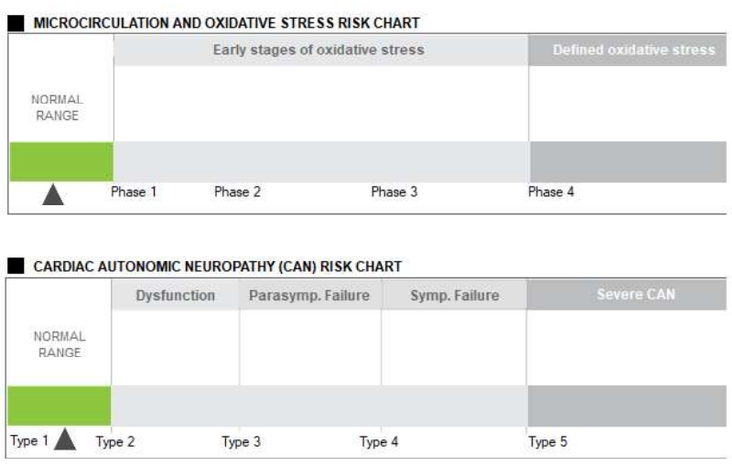


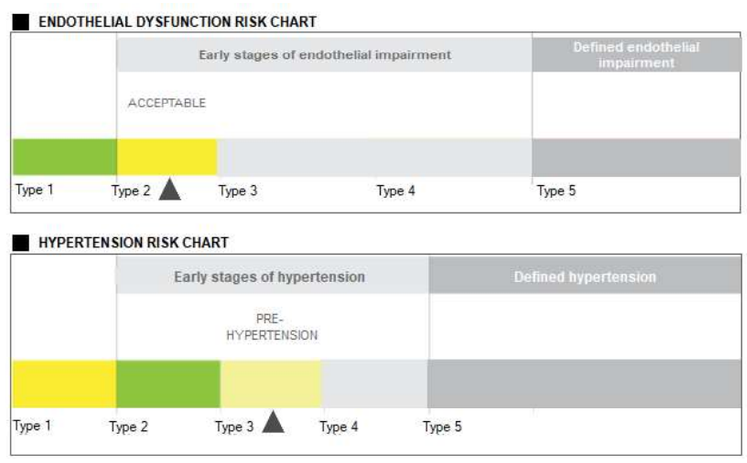
Score trends



Charts







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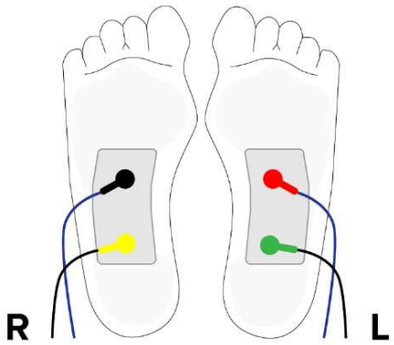
BODYK SYSTEM

GALVANIC SKIN RESPONSE TECHNOLOGY

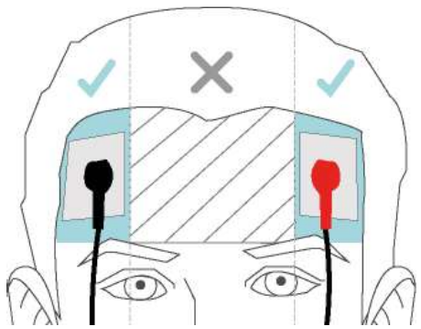
SWEATC : PROCESS OF MEASUREMENT



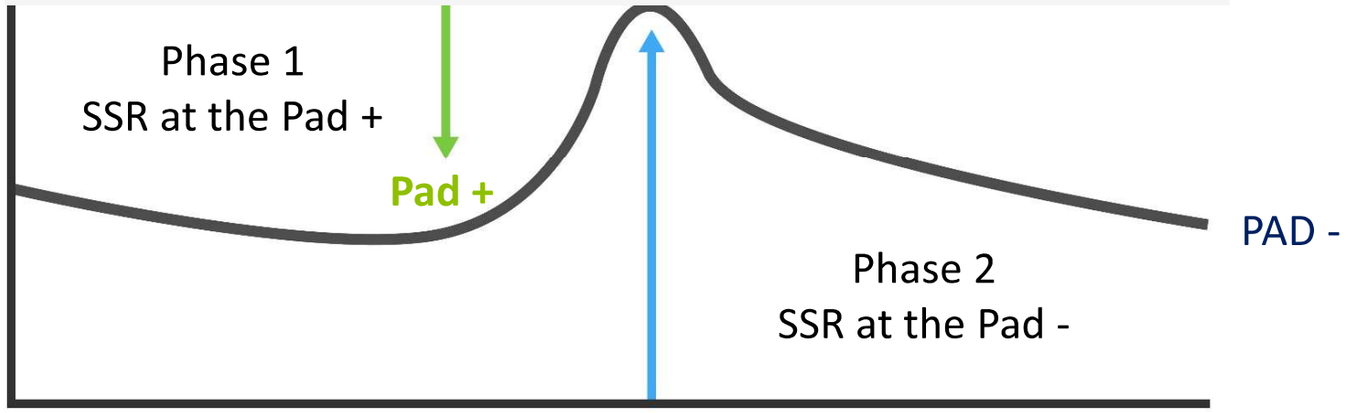
Pad -

Current generate by the hardware

Pad +

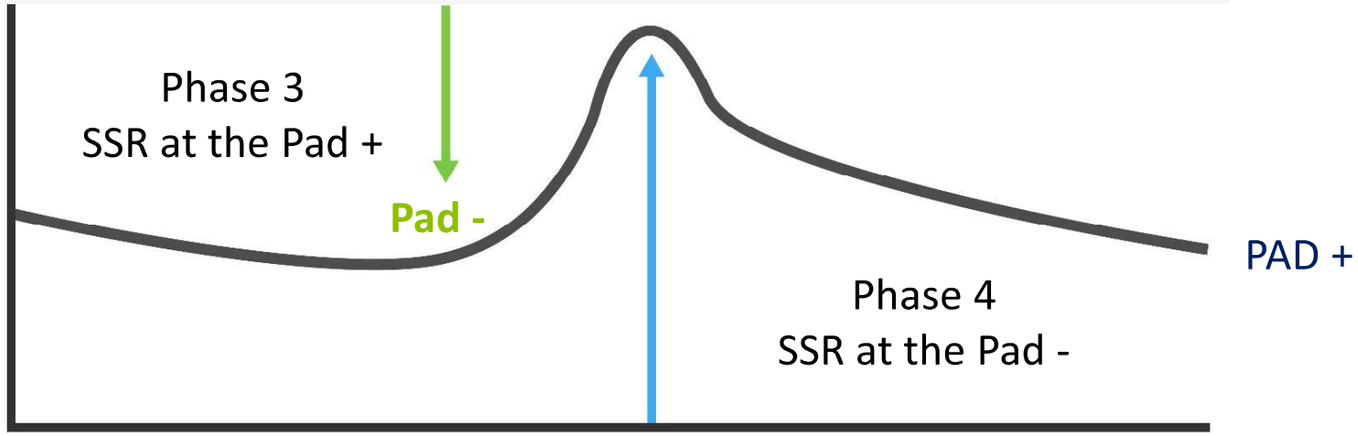


Inversion of current flow



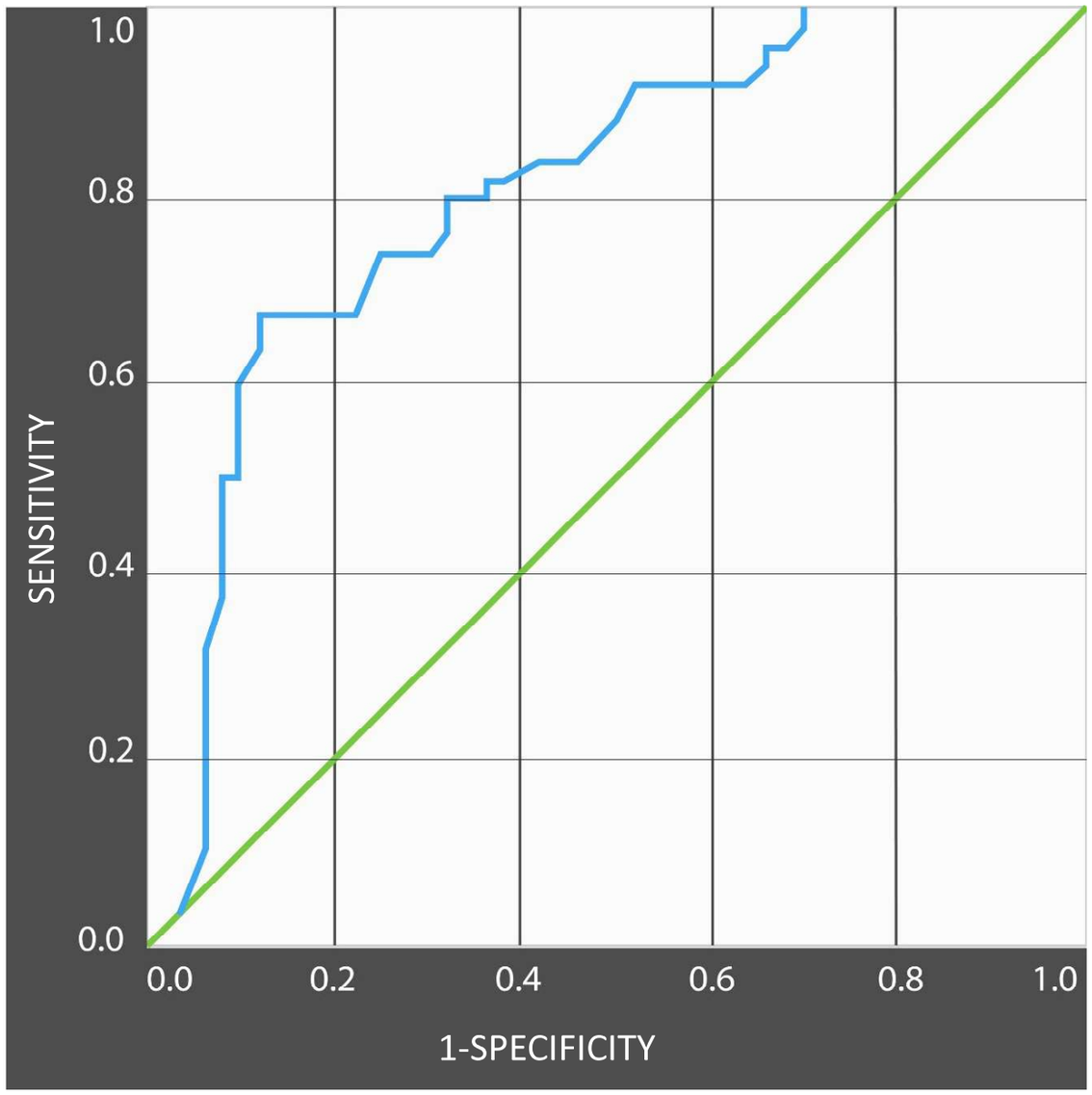
NO Sweat Peak Marker of microvascular disorders and PH

Inversion of current flow



Sweat Peak marker of Oxidative stress damaging the sympathetic cholinergic fibers

SWEATC CLINICAL EVALUATION



NO SWEAT PEAK MARKER OF MICROVASCULAR DISORDERS :

NO Sweat Peak inversely correlated with :

Lab tests:

BUN (Spearman ρ=-0.41, p<0.0001)

Homocysteine (Spearman ρ=-0.44, p<0.0001)

Fibrinogen (Spearman ρ=-0.41, p<0.0001)

Neuropathy (vascular disease)

CAN score (Spearman ρ=-0.68, p<0.0001)

HRV Total Power (Spearman ρ=-0.57, p<0.0001)

Marker of endothelial function:

PTGi (Spearman ρ=0.53 p<0.0001)

NO Sweat Peak had a sensitivity of 88% and specificity of 68% to detect retinopathy (microvascular disease)

ISWEAT PEAK MARKER OF PERIPHERAL NEUROPATHY

iSweat Peak inversely correlated with the severity of symptoms on the peripheral neuropathy scale (Spearman ρ=-0.56, p<0.0001).

University of Miami study . J. Lewis et al. 2017

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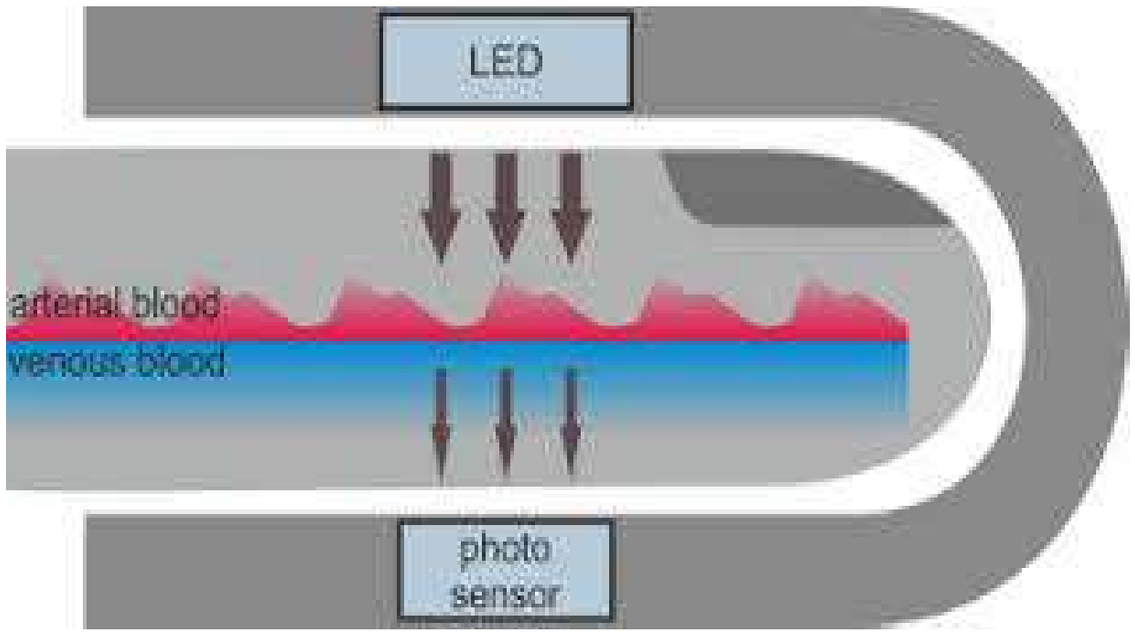
BODYK SYSTEM

PHOTOPLETHYSMOGRAPHY TECHNOLOGY

PHOTOPLETHYSMOGRAPHY

Incident Light (Red/IR)



PTG :Arterial vessel and changes in blood volume with cardiac cycle

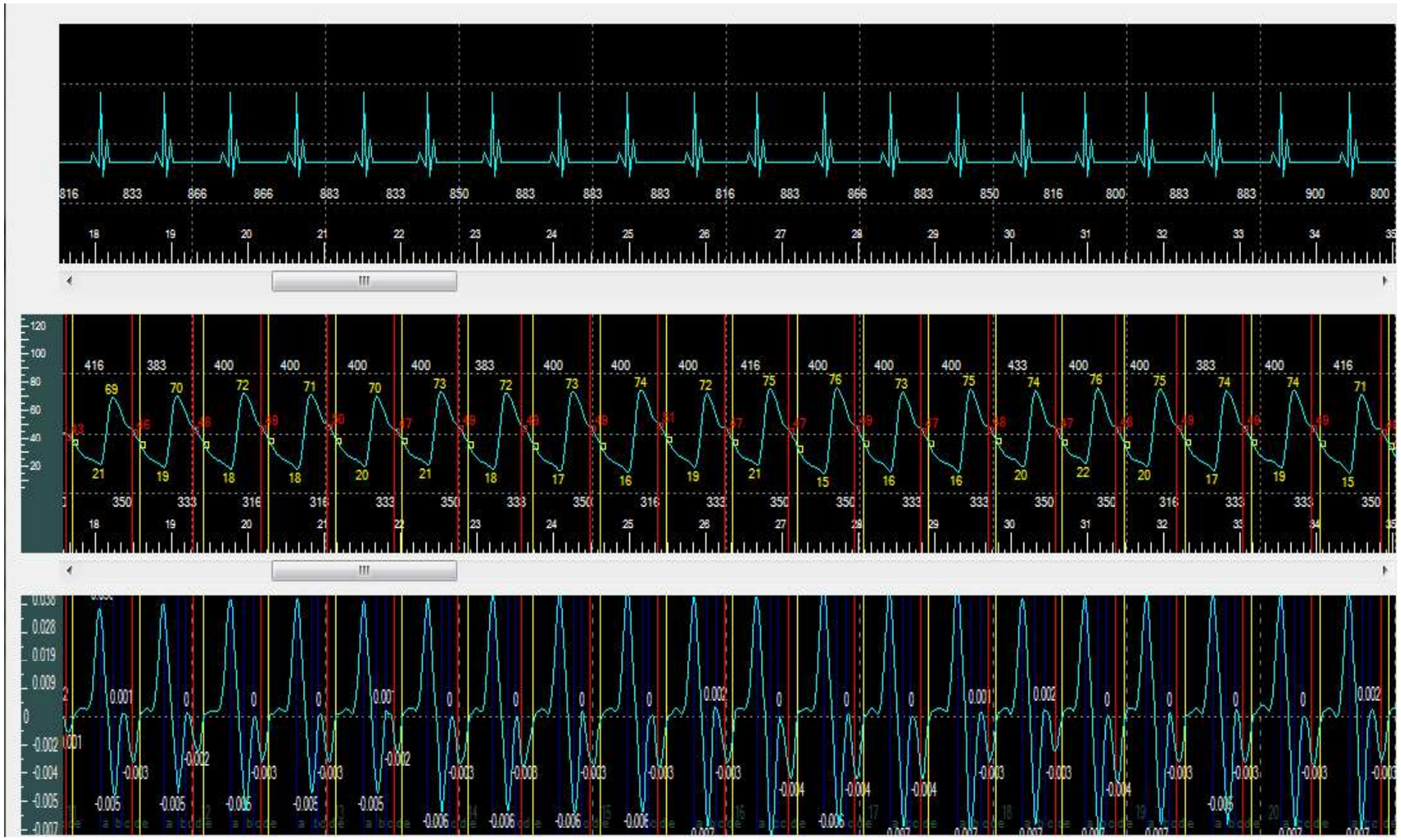
Venous vessel not affected

PHOTOPLETHYSMOGRAPHY (PTG) RECORDS AND ANALYSIS

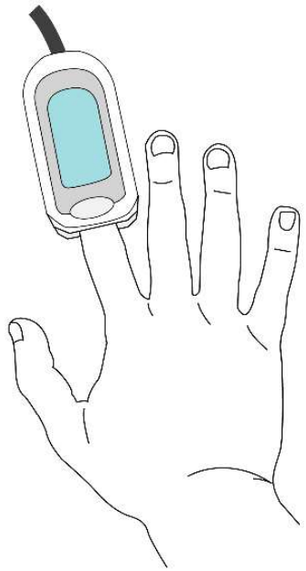
First derivative PTG Analysis

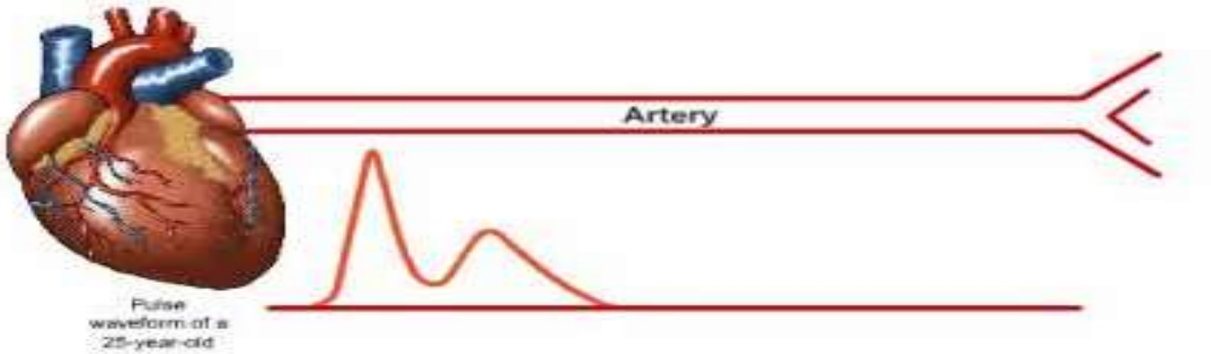
Original PTG Analysis

Second derivative PTG Analysis



Peripheral vascular tone related to age

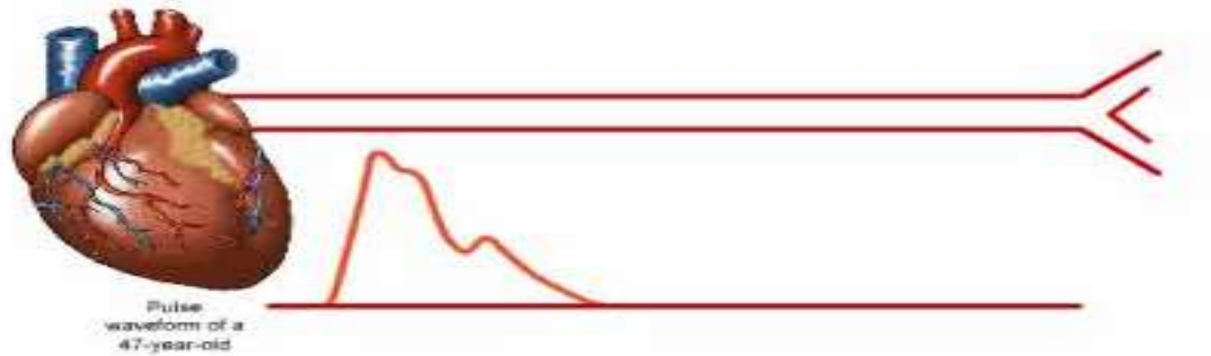




Pulse waveform of a 25-year-old

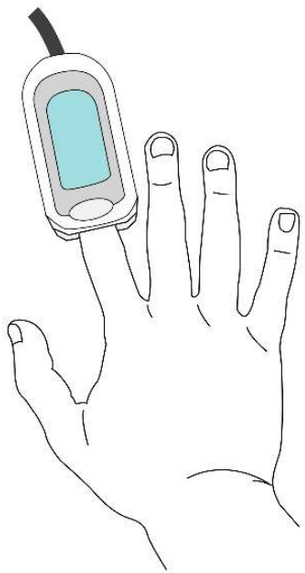
Pulse Waveform of a 47 year old person

With age, the arteries stiffen. Pulse wave velocity increases and the reflected wave now travels faster and gives rise to a "shouldering" at the primary wave, and occurs during systole. This effect prolongs the systolic cycle increasing the workload and oxygen requirement of the heart muscles. The poor notch also compromises the flow of the coronaries.



Pulse waveform of a 47-year-old

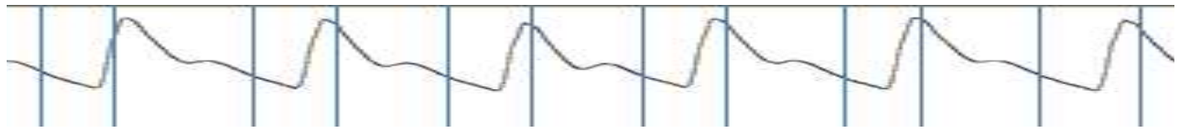
PHOTOPLETHYSMOGRAPHY ANALYSIS BACKGROUND



ANALYSIS

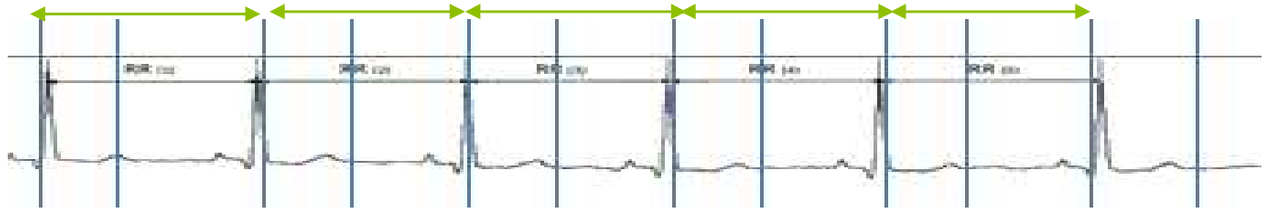
1

ORIGINAL PHOTOPLETHYSMOGRAPHY (PTG)



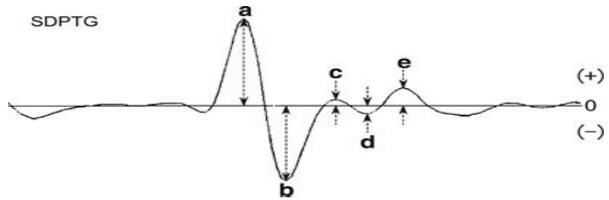
2

FIRST DERIVATIVE AND RR INTERVALS: TIME IN MS BETWEEN EACH HEARTBEAT



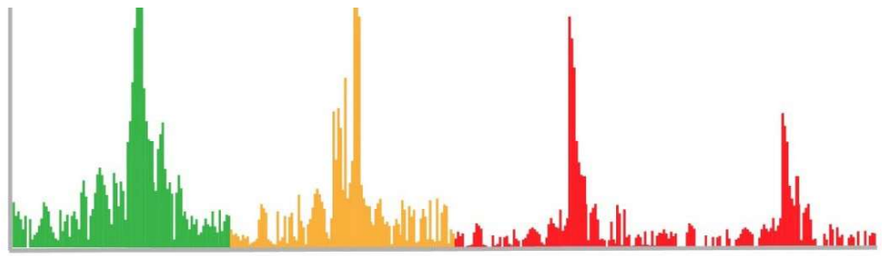
3

PTG SECOND DERIVATIVE



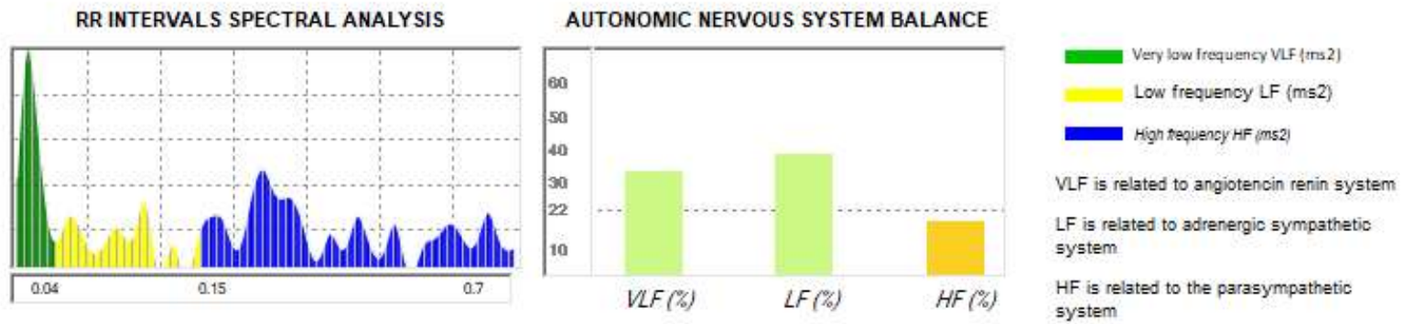
4

PATENTED FIRST DERIVATIVE SPECTRAL ANALYSIS



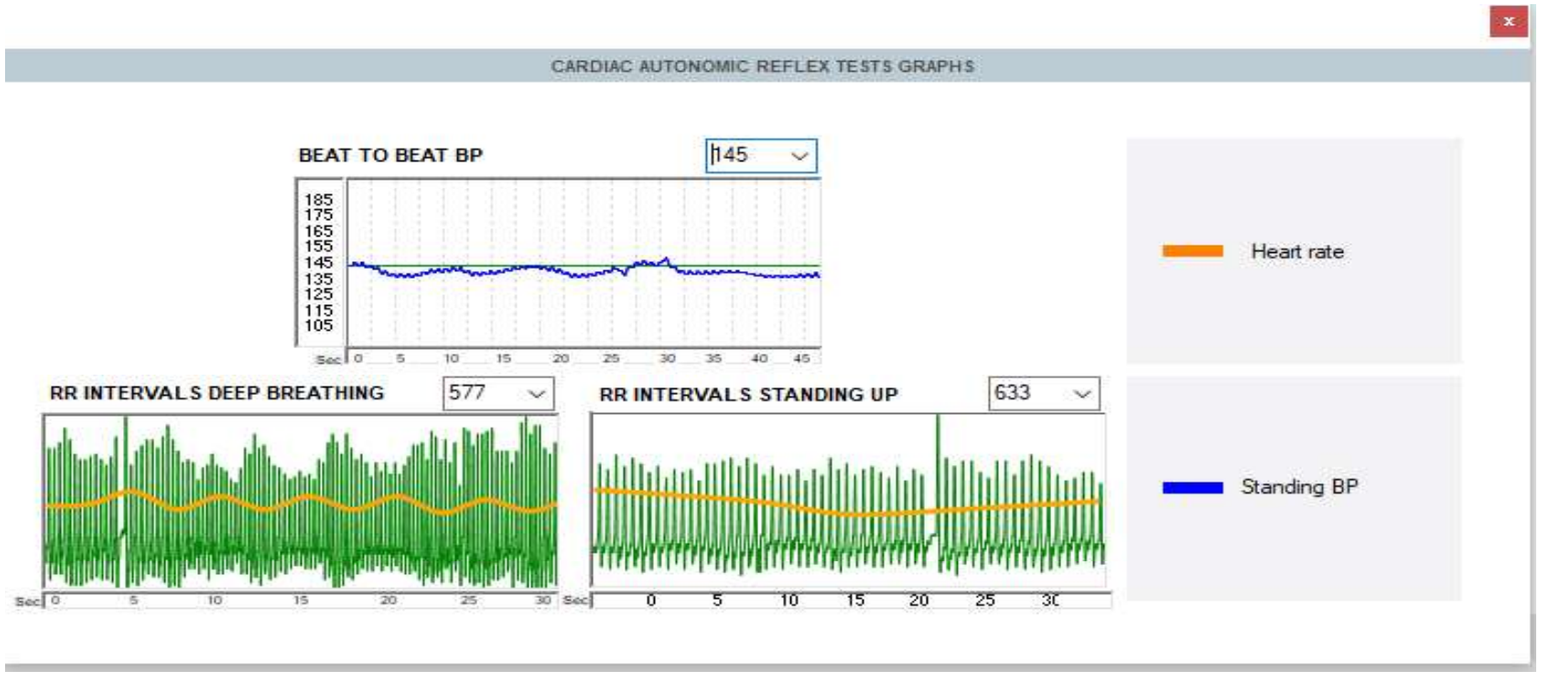
RR INTERVALS ANALYSIS AND BEAT TO BEAT BLOOD PRESSURE ANALYSIS

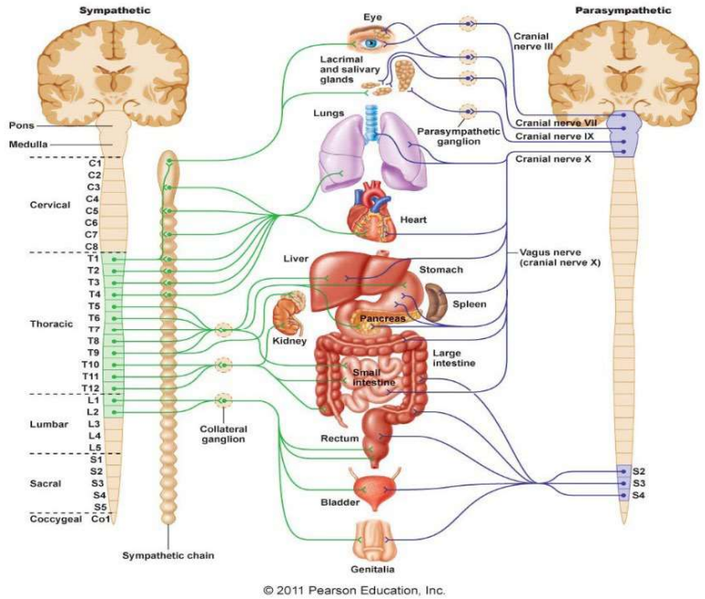
HEART RATE VARIABILITY ANALYSIS AT REST



Self body Regulation Assessment related to the fitness level

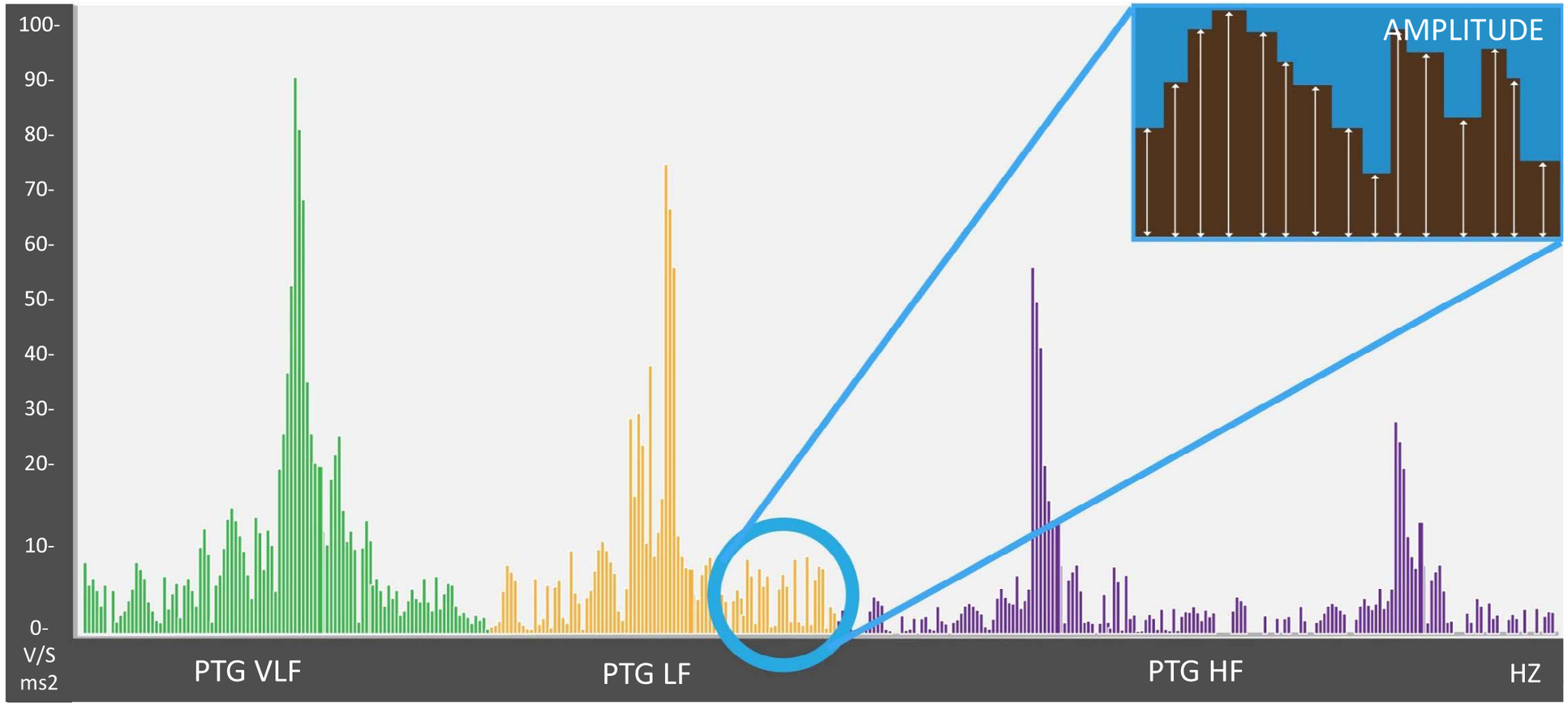
HEART RATE VARIABILITY AND BLOOD PRESSURE ANALYSIS DURING CHALLENGES





Diagnostic of Cardiac Autonomic Neuropathy (**CAN)**

PATENTED PTG SPECTRAL ANALYSIS AND MARKERS



PTG INDEX (PTGI) =
MARKER OF ENDOTHELIAL FUNCTION

It is the sum of amplitude between the Peaks of the Spectral analysis.

STRESS INDEX =
MARKER OF INFLAMMATION

It is the amplitude of the VLF peak of the Spectral analysis.

PTG TOTAL POWER (PTG-TP) =
MARKER OF INSULIN RESISTANCE

It is the area covering the 3 frequencies of the PTG spectral Analysis

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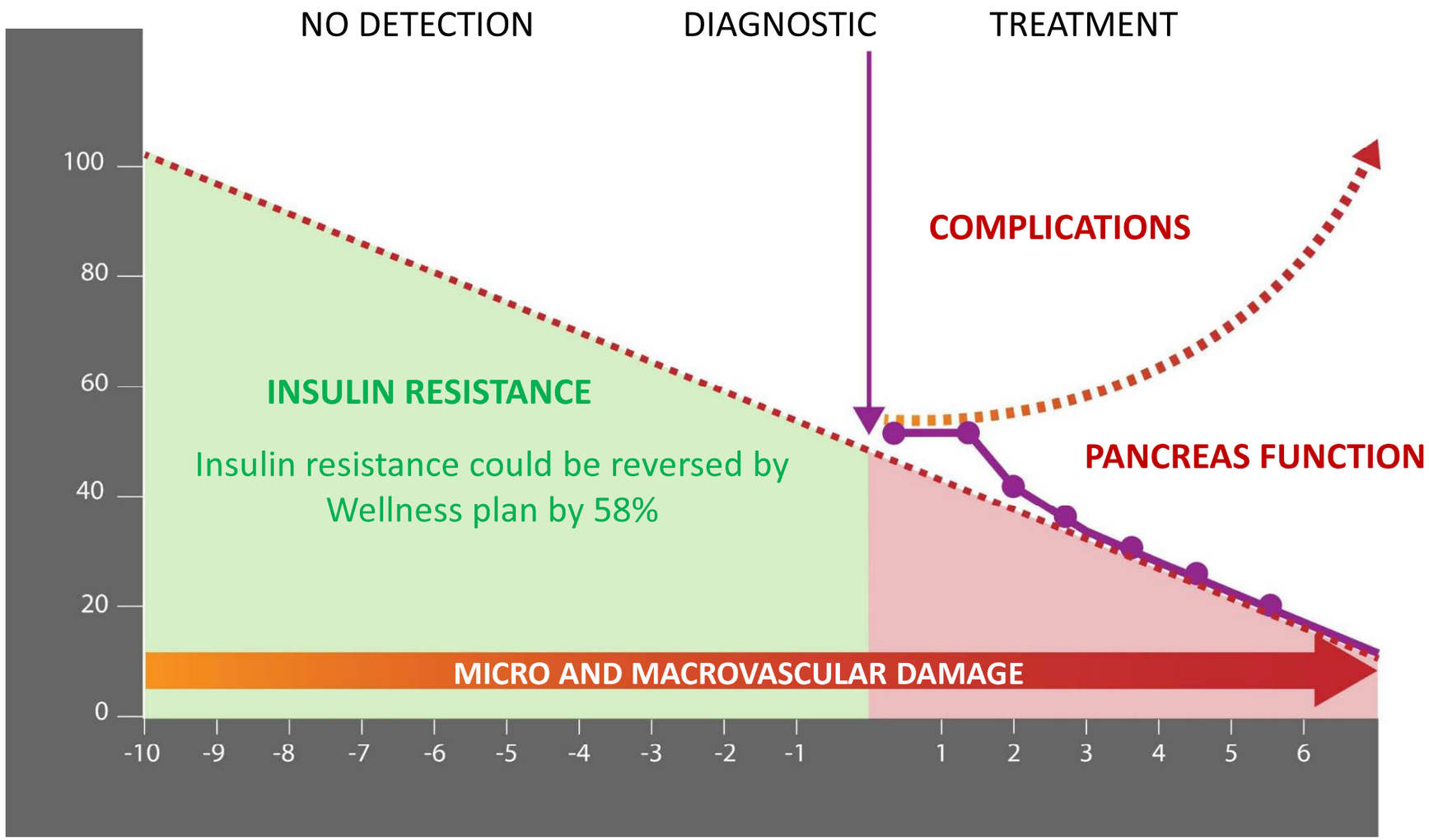
BODYK SYSTEM

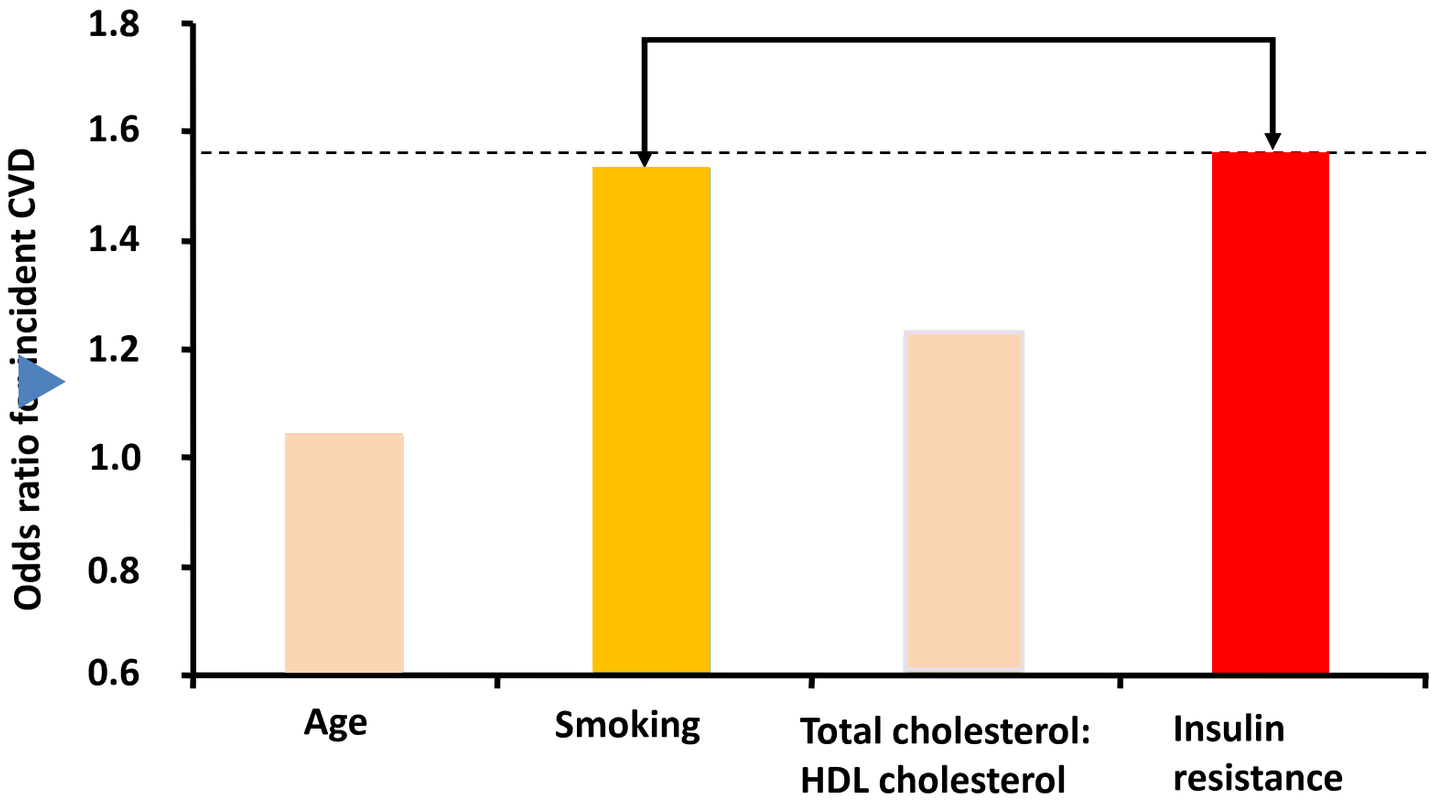
PATENTED PTG SPECTRAL ANALYSIS AND CLINICAL OUTCOMES

DIABETES PROCESS STARTED 10 YEARS BEFORE DIAGNOSIS



Insulin resistance and Health risk

1. Insulin resistance is the higher risk to be obese
2. 83% of patients with Insulin resistance will go in Diabetes
3. Insulin resistance is higher risk factor for cardiovascular disease :
   greater than smoking, cholesterol and aging



Bonora E, *et al. Diabetes Care* 2002; 25:1135–1141

<u>Insulin resistance could be reversed by 58% following lifestyle changes</u>

Aglecio Luiz De Souza, Gisele Almeida Batista, Sarah Monte Alegre
Journal of Diabetes and its complications.

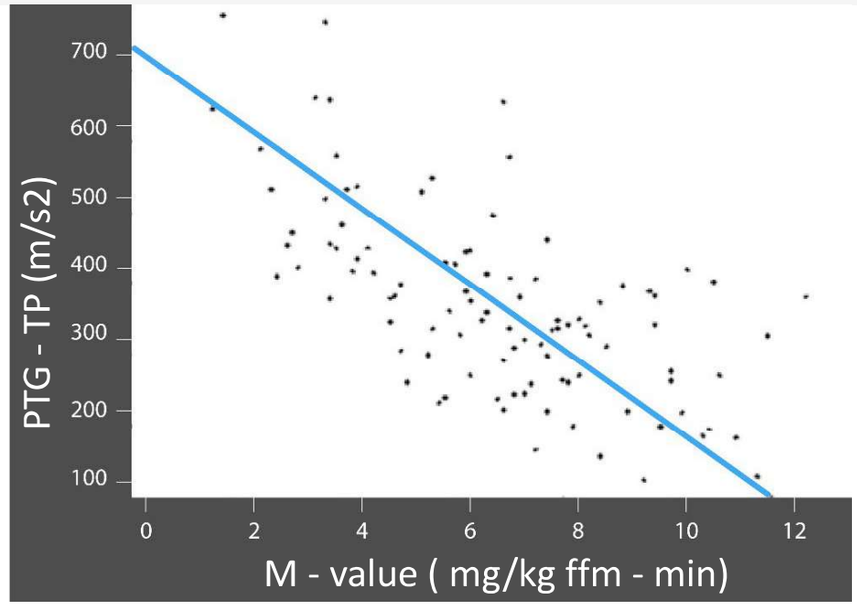
ASSESSMENT OF INSULIN SENSITIVITY BY THE HYPERINSULINEMIC EUGLYCEMIC CLAMP: COMPARISON WITH THE SPECTRAL ANALYSIS OF PHOTOPLETHYSMOGRAPHY

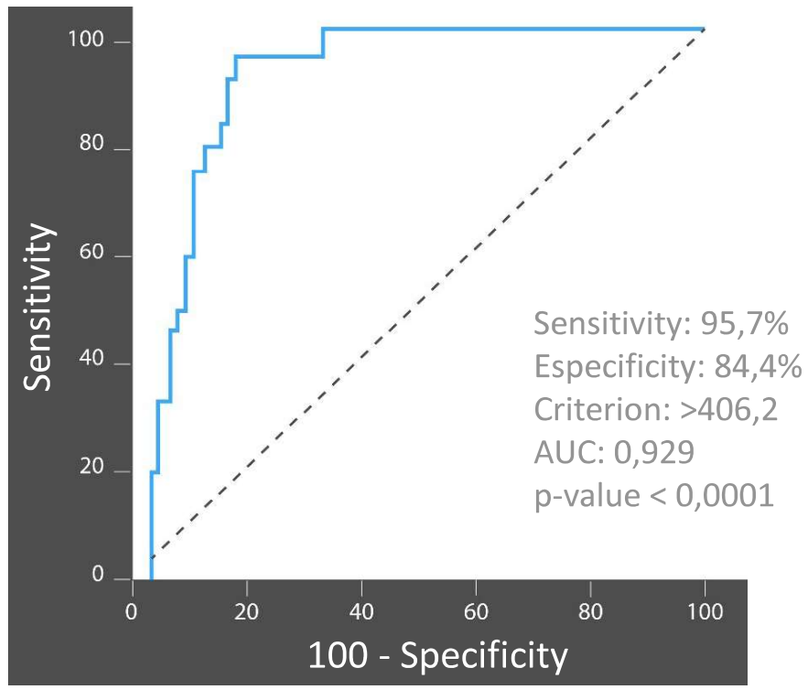
RESULTS

Correlation between insulin sensitivity (M-value) and PTG-TP (r= −0.64, p < 0.0001). PTG-TP had a sensitivity = 95.7%, specificity =84,4% and the area under the ROC curve (AUC) = 0.929 for identifying insulin resistance. (p < 0.0001).

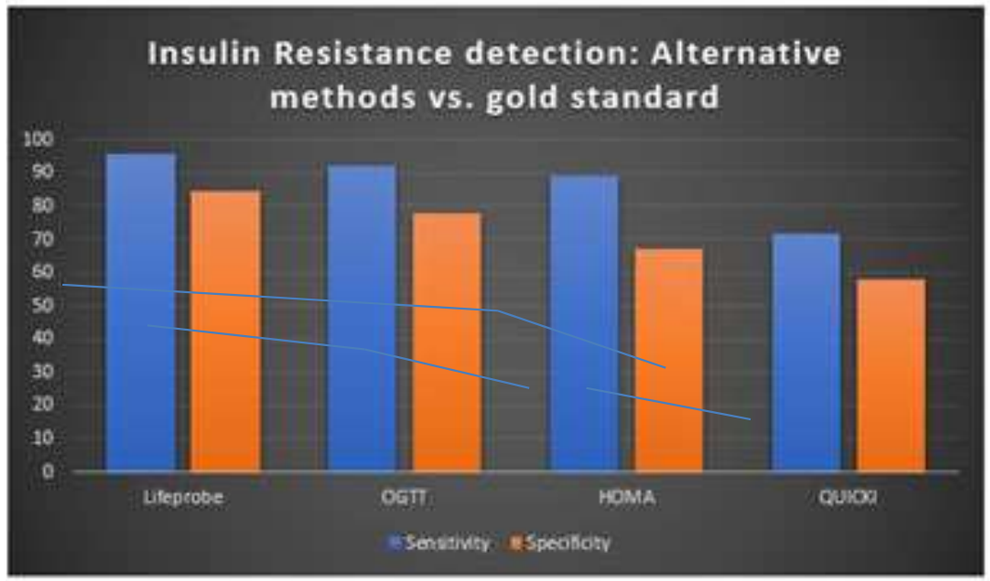
CONCLUSION

The use of the PTG-TP marker measured from the PTG spectral analysis is a useful tool in screening and follow up of Insulin Resistance (IR)





Insulin resistance detection marker (PTG-TP) vs. Gold standard and other alternative blood tests and algorithms



DE SOUZA ET AL. Assessment of insulin sensitivity by the hyperinsulinemic euglycemic clamp: Comparison with the spectral analysis of Photoplethysmography. Journal of Diabetes and its complications. Volume 31, (2017) 128–133

Gandhi PG, Rao GHR.

THE SPECTRAL ANALYSIS OF THE PHOTOPLETHYSMOGRAPHY TO EVALUATE AN INDEPENDENT CARDIOVASCULAR RISK.INT J GEN MED.

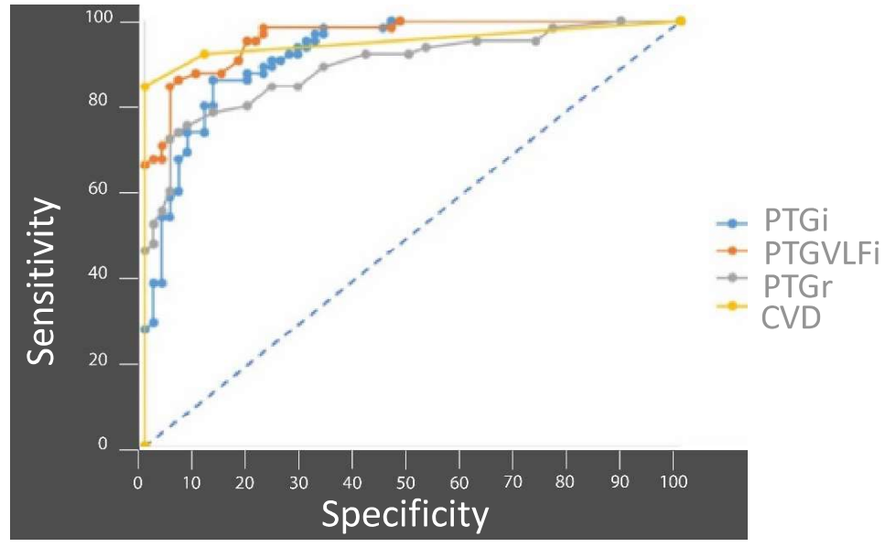
RESULTS

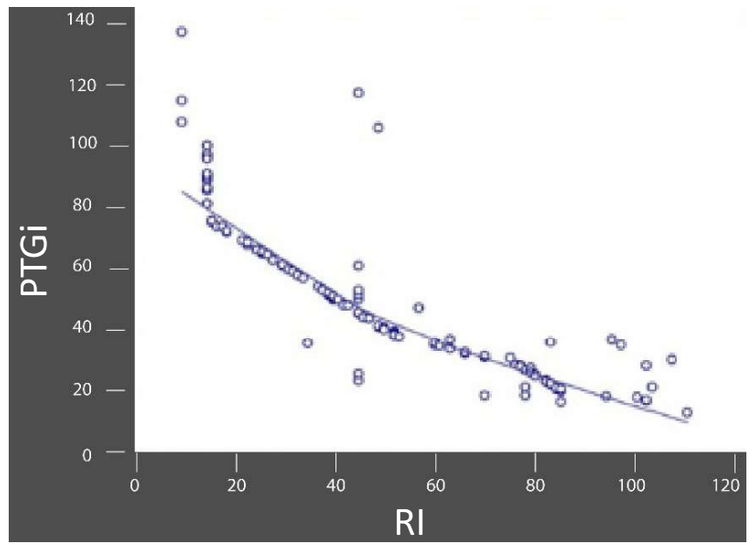
PTGi had a sensitivity of 86.5% and specificity of 87.8%, (P=0.0001; area under the receiver operating characteristic curve =0.967) to detect endothelial dysfunction in CAD population.
Patients that underwent CABG (n=18) had a higher PTGi value compared with the CAD without CABG surgery patients (n=47).

CONCLUSION

The spectral analysis techniques used on the photoplethysmogram, as outlined in this study, could be useful when used alongside conventional known cardiovascular disease risk markers.

RECEIVER OPERATING CHARACTERISTIC CURVES



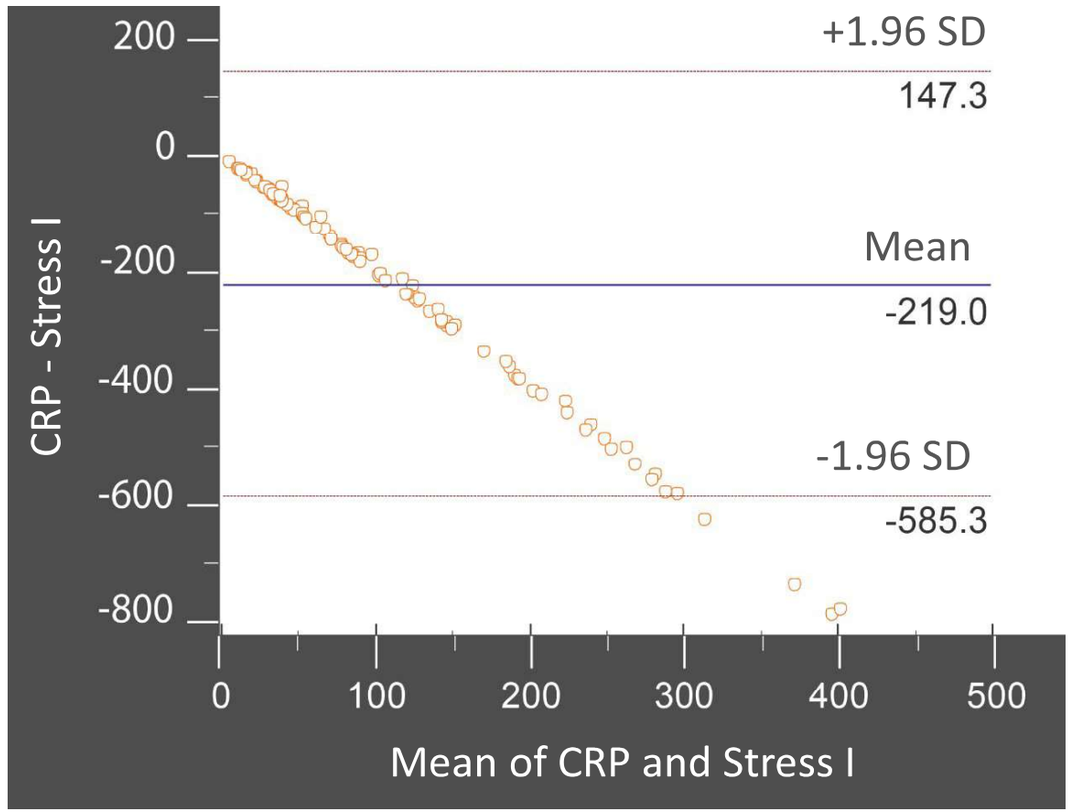


UM, Lewis et al. 2017

A NEW METHOD OF SUDOMOTOR FUNCTION MEASUREMENT TO DETECT MICROVASCULAR DISEASE AND SWEAT GLAND NERVE OR UNMYELINATED C FIBER DYSFUNCTION IN ADULTS WITH RETINOPATHY.

RESULTS

The marker Stress Index correlated with C-Reactive Protein (Spearman ρ=0.40, p<0.0001)



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BODYK SYSTEM

MODELING REFERENCES

PH , OXIDATIVE STRESS AND EMOTIONAL MARKERS

INTERSTITIAL PH is estimated from the delta of conductance of the left and right plates of the SweatC device. The scientific support is described in the following publication: Maarek A. Electro interstitial scan system: assessment of 10 years of research and development. Medical Devices: Evidence and Research. March 2012 Volume 2012:5 Pages 23 - 30.

OXIDATIVE STRESS is estimated from the conductance average of the Sweat Peak of the SweatC device. The scientific support is described in the following publication: Oxidative Stress in the Vincent A.M, Russell J.W, Low P, Feldman E. L. Pathogenesis of Diabetic Neuropathy
Endocrine Reviews, Volume 25, Issue 4, 1 August 2004, Pages 612–628,

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BRAIN SEROTONIN is estimated from the conductance average of the left and right forehead of the SweatC device. The scientific support is described in the following publication:
VG ALEXEEV VG, LV KUZNECOV. Bioimpedance in monitoring of effects of selective serotonin reuptake inhibitor treatment. Psychology Research and Behavior Management. p.81-86. Volume 4.2011.

MENTAL STRESS is estimated from the marker LF/HF of the HRV analysis. The scientific support is described in the following publication: Taelman J, Vandeput S , Spaepen A, Van Huffel S.4th European Conference of the International Federation for Medical and Biological Engineering pp 1366-1369 | Cite asInfluence of Mental Stress on Heart Rate and Heart Rate Variability.

BRAIN DOPAMINE is estimated from the conductance average of the left and right forehead of the SweatC device. The scientific support is described in the following publication:
F. CAUDAL. New marker using bioimpedance technology in screening for attention deficit/hyperactivity disorder (ADHD) in children as an adjunct to conventional diagnostic methods. Psychology Research and Behavior Management » Volume 4, P.113-117.2011

HYPOTHYROIDISM AND DIGESTIVE SYSTEM

HYPOTHYROIDISM is evaluated from the autonomic nervous system markers and adjusted with some side effects of the hypofunction such as , blood pressure and arterial stiffness . The scientific support is described in the following publication: Mahajan AS, Lal R, Dhanwal DK, Jain AK, and Chowdhury V. Evaluation of autonomic functions in subclinical hypothyroid and hypothyroid patients. Indian J Endocrinol Metab. 2013 May-Jun; 17(3): 460–464.

DIGESTIVE SYSTEM is evaluated from the autonomic nervous system markers. The scientific support is described in the following publication: Browning KN, Travagli RA. Central nervous system control of gastrointestinal motility and secretion and modulation of gastrointestinal functions. Compr Physiol. 2014 Oct;4(4):1339-68.

HEPATIC GLYCOLYSIS is evaluated from the autonomic nervous system markers. The scientific support is described in the following publication: Nonogaki K. New insights into sympathetic regulation of glucose and fat metabolism. Diabetologia. 2000 May;43(5):533-49

BodyKnows by BodyK®

BODYK SYSTEM

TECHNOLOGIES SUPPORTIVE STUDIES

MAIN CLINICAL STUDIES

- A.MAAREK.
  Endothelial and Autonomic Assessments in the Management of COVID-19.
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- LOPEZ ET AL.
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- LEWIS ET AL.
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- DE SOUZA ET AL.
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- GOBATO RC, SEIXAS CHAVES DF, CHAIM EA.
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- GANDHI PG, RAO GHR.
  The spectral analysis of the photoplethysmography to evaluate an independent cardiovascular risk.
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- GANDHI PG, RAO GHR.
  Detection of neuropathy using a sudomotor test in type 2 Diabetes. Degenerative Neurological and Neuromuscular Disease. January 2015, 5:1-7.
- MAAREK A A., GANDHI PG AND RAO GHR.
  Identifying Autonomic Neuropathy and Endothelial Dysfunction in Type II Diabetic Patients. EC Neurology 2.2(2015): 63-78.
- GUNDU HR RAO, PRATIKSHA G GANDHI AND VINEETA SHARMA.
  Clinical Complications of Type-2 Diabetes Mellitus in South Asian and Chinese Populations: An Overview. J Diabetes Metab. Volume 5 • Issue 8.
- GUNDU H R RAO, PRATIKSHA G GANDHI.
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  Disorders. Journal of Clinical and Preventive Cardiology,July 2014 | Number 3.
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  Flow Velocity, Fluid Dynamics and Vascular Pathophysiology. The scientific pages of Heart.2016,1.001,Volume 1.Issue1.
- MATJAZ Š, GERSAK G, MILLASSEAU SC, MEZA M, KOSIR A.
  Detection of peripheral arterial disease with an improved automated device: comparison of a new oscillometric device and the standard Doppler method. Vascular Health and Risk Management.2016. Volume 12.
- RAO GHR.
  Non-Traditional Approaches to Diagnosis and Management of Type-2 Diabetes Mellitus: Point of View. J Diabetes Metab (2015) 6: 489.

R & D PUBLICATIONS

- MAAREK A.

  Electro interstitial scan system: assessment of 10 years of research and development.

  Medical Devices: Evidence and Research.

  March 2012 Volume 2012:5, Pages 23 – 30.

- F. CAUDAL

  New marker using bioimpedance technology in screening for attention deficit/hyperactivity disorder (ADHD) in children as an adjunct to conventional diagnostic methods. Psychology Research and Behavior Management » Volume 4, P.113-117.2011

- VG ALEXEEV VG, LV KUZNECOV.

  Bioimpedance in monitoring of effects of selective serotonin reuptake inhibitor treatment. Psychology Research and Behavior Management. p.81-86. Volume 4.2011.

PEER REVIEWS

- Photoplethysmography and its application in clinical physiological measurement
- Diabetes Autonomic Neuropathy
- Diabetic Neuropathy: Diagnostic Methods
- Determination of age-related increases in large artery stiffness by digital pulse contour analysis
- Role of Endothelial Dysfunction in Atherosclerosis
- Impact of Reduced Heart Rate Variability on Risk for Cardiac Events
- Diabetes, Glucose, Insulin, and Heart Rate Variability
- Diabetic Neuropathies: The Nerve Damage of Diabetes
- Diabetes, Glucose, Insulin, and Heart Rate Variability
- Independent Determinants of Second Derivative of the Finger Photoplethysmogram among Various Cardiovascular Risk Factors in Middle-Aged Men
- Assessment of Vascular Aging and Atherosclerosis in Hypertensive Subjects
- Diabetes: Sweat Response and Heart Rate Variability During Electrical Stimulation in Controls and People With Diabetes
- Diagnosis and Treatment of Pain in Small Fiber Neuropathy
- Fitness markers – Department of Analytics and Physiology
- HRV fitness markers
- Physical capacity with heart rate variability