EZSCAN
SCREENING AND PREVENTION OF CARDIOMETABOLIC RISK
Cardiometabolic risk

A growing concern
Cardiovascular diseases and Diabetes are two of the major health problems affecting the world. Both are closely linked. In fact, at least 65 percent of people with diabetes die from heart disease or stroke [1].

Cardiovascular diseases (CVD) are the single most important cause of death globally. An estimated 4.3 million people die from CVD each year in Europe [2]. Smoking, unhealthy diet, physical inactivity and alcohol abuse increase the risk of heart attacks and strokes [3].

More than 220 million people suffer from diabetes. People with diabetes are two to four times more likely to develop cardiovascular diseases. Diabetes and its complications can be prevented by timely screening and early detection [4][5].

What is cardiometabolic risk?
Cardiometabolic risk aggregates various risk factors, which may lead to type 2 diabetes and cardiovascular diseases (CVD). Specific risk factors include obesity (particularly central), hyperglycemia, hypertension, insulin resistance and dyslipoproteinemia [6].

Patients with multiple cardiometabolic risk factors run a seven times higher risk of developing diabetes and are twice as likely to die from a cardiovascular disease [7][8].

The early evaluation and prevention of Insulin resistance syndrome and diabetes risk could reduce a wide range of complications.

Avoiding complications
Insulin resistance and Type 2 diabetes as major risk factors
Insulin resistance syndrome is characterized by decreased tissue sensitivity to the action of insulin, leading to a compensatory increase in insulin secretion. This metabolic dysfunction leads to a cluster of abnormalities with serious clinical consequences including cardiovascular diseases, hypertension and stroke. When insulin resistant individuals cannot maintain the degree of hyperinsulinemia needed to overcome the resistance, type 2 diabetes develops [9].

Small fiber neuropathy and cardiometabolic risk
Several studies have proven that small fiber neuropathies are common in people with insulin resistance and prediabetes (IGT) [10][11].

Sudomotor function is known to reflect sympathetic activity and to provide insight into postganglionic autonomic innervation. Its assessment represents a useful tool to evaluate autonomic disorders [12].

Investigation of sudomotor function can help in early detection of cardiometabolic risk.
EZSCAN: A new tool for early detection of cardiometabolic risk

A new solution for early detection

› A dynamic non invasive test

EZSCAN measures the capacity of the sweat glands to release chloride ions in response to an electrochemical activation. It is a dynamic test equivalent to a stress test [13]. The information is then used to determine the patient’s cardiometabolic risk.

› Immediate results

EZSCAN is non invasive and provides immediate results, without any need for patient preparation, fasting or blood drawing. Findings are available following a simple 2-minute test. EZSCAN is therefore perfectly suited for the screening of cardiometabolic risk by general practitioners, pharmacists, cardiologists and neurologists.

Reliable screening test

Recent clinical studies have shown EZSCAN to be highly accurate and reproducible in head to head comparisons with conventional blood tests. ESC values measured by EZSCAN had a sensitivity of 75% and a specificity of 100% with an area under the ROC curve of 0.88 (figure 3). Coefficients of variation on hand and foot measurements were 7% and 5% respectively. Its good sensitivity, specificity and reproducibility make EZSCAN a reliable tool to assess sudomotor dysfunction, a clinical manifestation of autonomic neuropathy in patients with cardiometabolic risk [14][15].
EZSCAN and Cardiac Autonomic Neuropathy

A recent study has demonstrated that EZSCAN correlates well with Heart Rate Variability. The coefficient of correlation between EZSCAN cardiac neuropathy score and Low Frequency from frequency domain of Holter was 0.46 (p<0.0001) (figure 4) [16].

Test subjects, measuring ESC <40μS on the EZSCAN, are also more likely to have abnormal Ewing tests results reflecting the presence of cardiac autonomic neuropathy (figure 5).

EZSCAN and cardiorespiratory fitness level

A recent study showed that sudomotor dysfunction as assessed by EZSCAN is correlated to cardio-respiratory fitness levels measured by VO2 max. The correlation between sudomotor function score and VO2 max was r=0.57, p<0.0001 (women) (figure 6) and 0.48, p<0.0001 (men). EZSCAN can be used to assess CVD or metabolic disease risk early and for follow-up of an individual’s preventive interventions [17].
THE EZSCAN APPROACH

EZSCAN AT A GLANCE

- 2-minute test with no patient preparation
- Quantitative results immediately available
- Simple to use and easy to understand results
- Motivation tool for subjects involved in prevention programs
- Requires no specialist training
- Enhances patient compliance

Principle

➢ What we know
Degeneration of small nerve fibers reduces innervation of eccrine sweat glands.

➢ What is activated
A low voltage potential of variable amplitude is applied to electrodes on regions of the skin with a high density of sweat glands (hands and feet) to extract chloride from the sweat and produce a current. At a low voltage, the stratum corneum acts as a capacitor and only the sweat ducts allow the transmission of ions from the skin. This ensures that measurements correspond to the local sweat function.

➢ What is reacting
An electrochemical reaction between the chloride and the nickel electrodes is observed producing an electrical potential difference.

➢ What is measured
The Electrochemical Sweat Conductances linked to the concentration of the extracted chloride from sweat glands to the electrodes are measured [19][20].

Figure 7: Sweat glands
Top: normal innervation of sweat glands, healthy patient
Bottom: reduced innervation of sweat glands, patient with sweat dysfunction
Reproduced with permission from Lauria et al.[18]
Clinical Studies
Clinical studies involving EZSCAN technology are currently conducted in several countries around the world. To learn more about ongoing clinical research and results, please visit our website.

About Impeto Medical
Impeto Medical is a privately held medical instrumentation company headquartered in Paris, France.

References