SUDOSCAN
EARLY IDENTIFICATION AND FOLLOW-UP OF PERIPHERAL AUTONOMIC NEUROPATHIES

- Prevent and manage diabetes complications
- Identify other neurological conditions
**What we know**

The degeneration of small nerve fibers reduces sweat gland innervation and alters sudomotor function [12].

**What is the principle**

A low-voltage current (< 4 V) is applied through stainless steel sensors, attracting chloride ions from the sweat glands (which are densely concentrated on the palms and soles). The voltage extracts chloride ions which reach the sensors, passing solely via the sweat gland ducts. 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 the measurements taken correspond solely to the sweat gland function.

There is an observable electrochemical reaction between the chloride ions and the sensor plates.

**What is measured**

The device records the Electrochemical Skin Conductances (ESC) of the hands and feet generated from the current associated with the applied voltage. Loss of sweat glands or loss of their innervations results in reduced ESC [13].
Why test sweat gland function?

Sweat glands are innervated by small sympathetic C-fibers. Sudomotor (sweat) dysfunction can be one of the earliest detectable neurophysiologic abnormalities in distal small fiber neuropathies. Quantitative assessment of sweat response has been proposed as an index of the severity and distribution of autonomic failure as well as an early indicator for regeneration of small fibers [1,2,3].

Diabetes has been shown to be the most common identifiable cause of small fiber neuropathy. The American Diabetes Association (ADA) has identified sudomotor (sweat) dysfunction as one of the major clinical manifestations of diabetic autonomic neuropathy. Furthermore, the assessment of autonomic dysfunction may identify patients at high risk for cardiac autonomic neuropathy, which carries a very high rate of morbidity and mortality [4].

Peripheral autonomic neuropathy and its effect on sweat glands innervation

A need for an alternate measure

The use of skin biopsy to measure Intraepidermal Nerve Fiber Density (IENFD) or sweat gland nerve fiber density (SGNFD) is an accepted diagnostic and surrogate measure of small fiber neuropathy. While skin biopsy is generally well tolerated by patients and accepted by the medical community, it has certain limitations as: invasiveness, risk of infection, bleeding, and a limited number of labs that can process the sample [6].
SUDOSCAN is a device to quantify peripheral autonomic neuropathy

A quick sudomotor function test
SUDOSCAN is a test that provides an accurate evaluation of sweat gland function. SUDOSCAN measures the ability of the sweat glands to release chloride ions in response to an electrochemical activation on the palm of the hands and soles of the feet, areas with the highest sweat gland density [7].

Clear results
1 Simple
Detail graphics allow for visual representation of the results.

2 Quantitative
Actual numerical values of the Electrochemical Skin Conductance (ESC) on the hands and feet. The level of ESC indicates the severity of the neuropathy. This measure can be compared with later test results to assess the patient’s response to treatment or other prescribed interventions.

3 Symmetry
Measure of symmetry between right and left sides help identify the type of peripheral neuropathy.

4 Cardiac Neuropathy
Evaluation of Cardiac Autonomic Neuropathy risk.

Instant results and test report
Test reports are generated instantly after completion of the test.

Figure 3: Conductance and asymmetry of hand and feet.

Figure 4: SUDOSCAN report.
Prevent and manage diabetes complications

Diabetes is the primary identifiable cause of small fiber neuropathy. The ADA recommends including sudomotor function assessment of small fibers in the current panel of diagnostic tests for the detection of peripheral neuropathies. Early identification of these complications, which may be asymptomatic in up to 50% of diabetes patients, has the potential to reduce or delay their complications with timely preventative treatment [4].

Detect neuropathy

The sensitivity and specificity of SUDOSCAN scores to detect diabetic neuropathy were 78 and 92% [8].

Evaluate cardiac autonomic neuropathy

Cardiovascular Autonomic Neuropathy (CAN) is a common but often overlooked complication of diabetes. Studies have shown that SUDOSCAN may be used for early screening of CAN in everyday clinical practice before resorting to the more sophisticated and specific, but ultimately more time-consuming, Ewing tests [9].

Assess the treatment

In type 2 diabetes sweat function improves with insulin therapy [10].

Identify other neurological conditions

SUDOSCAN has shown to had a diagnostic performance similar to Intra Epidermal Nerve Fiber Density (IENFD) [11].

Various applications

Sudomotor dysfunction is a common finding, and one of the earliest detectable abnormalities in a number of peripheral and autonomic neuropathies.

SUDOSCAN has been tested for small fiber nerve neuropathies in several diseases and compared to guidelines reference tests:

- Diabetes
- Parkinson
- Chemotherapy induced polyneuropathy
- Familial amyloid polyneuropathy
- Fabry disease
Clinical studies

Clinical studies are currently conducted in multiple countries. For more information on our research and results, please visit our website.

www.impeto-medical.com

About Impeto Medical

Impeto Medical is a medical device company, based in Paris, France. Impeto Medical has developed a patented technology that assesses sudomotor function through sweat gland activity.