Testo Application Example
Medical Thermography

Be sure. testo

Thermography and its applications in Medical & Clinical Research Field

Objective

The current method to diagnose Type-2 diabetes is invasive like checking blood-sugar levels and Hb1AC by giving blood sample for testing. Using thermal imaging camera, we introduce a non-invasive method, with which the mass screening of people can be carried out for early diagnostic of Type-2 diabetes. Similarly, fever detection by mass screening of people is also possible: It is a fast, easy, contactless method to screen persons to track the risk of elevated body temperatures, which in turn is an indicator of potential viral infections.

Introduction

All objects with a temperature above absolute zero emit enfrared radiation because of the thermal motion of their molecules. Infrared thermography (IRT) is an imaging modality that can be used to detect this radiation which is also called thermal radiation. Human skin emits infrared radiation almost like a perfect black body and thus IRT is well suited for the measurement of skin temperature. Not only that now thermography finds several applications in the medical field such as fever detection, identifying blood circulation disturbances, determining symptoms of diabetes, screening of joint inflamation and rheumatoid arthritis etc. This application note briefly describes some of the application areas where Testo Thermal Imagers have proved out to be an efficient tool to analyse medical conditions and syndromes in various test cases.

Case Study 1: All India Institutes of Medical Sciences (AIIMS), New Delhi - Testo 890

References

Anthropometric Measurement:

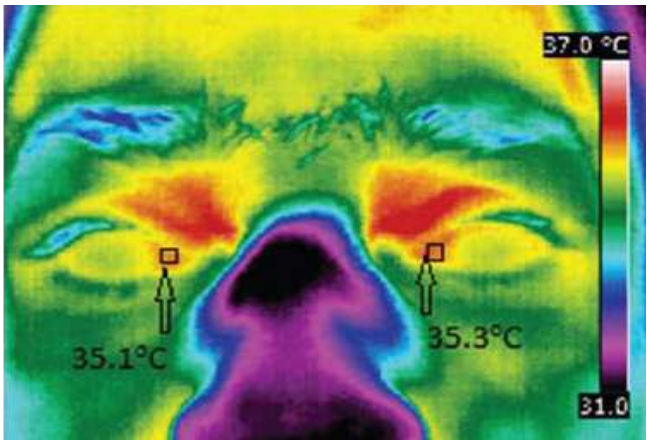
It is the systematic measurement of size, shape and composition of the human body using relevant indices to detect changes in the nutritional situations of the body.

HbA1c:

This refers to glycated haemoglobin and by measuring HbA1c, one can get an overall picture of what one's average blood sugar levels have been over a period.

Thermography as a non-invasive method for diabetes detection

A diagnostic approach for Type 2 diabetes was conducted on the subject based on Non-Contact Infrared Thermal Imaging. Control (healthy) and diabetic group differ in discriminatory performance of various risk factors and anthropometric indices as segregated by HbA1c. A significant negative correlation of the HbA1c with the core body temperature (a function of body metabolism) was obtained through this non-invasive measurement by testo 890 at the inner canthus of the eye, neuropathic foot and at the tympanic region of the ear.



Thermograph of the fascial region illustrating decreased temperature at the inner canthus of eye in a diabetic subject

Image courtesy: Article published in the Elsevier Journal, 2012-13 (DOI: 10.1016/j.mce.2012.12.017)
Research Credits: SRM Medical College Hospital & Research Centre, SRM Institute of Science and Technology, Kattankulathur and IGCAR, Kalpakkam

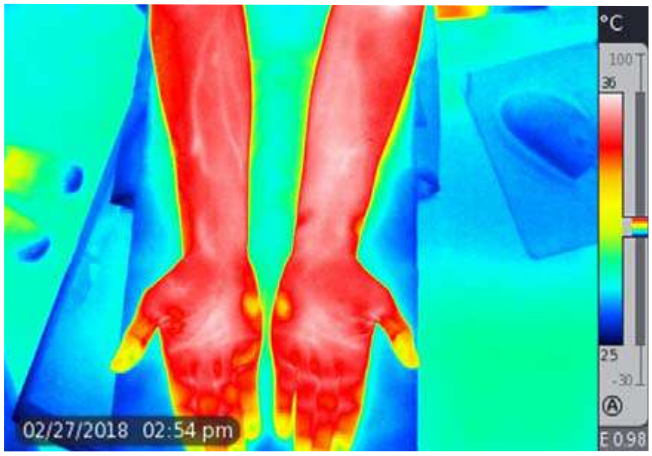
Case Study 2: Pharmaceutical Industry, R&D centre - Testo 890

References

Vasodilation: It is the widening of blood vessels in human body. It results from relaxation of smooth muscle cells within the vessel walls, particularly in the large veins called vasodilators, large arteries, and smaller arterioles.

Clinical Trials on Vasodilation

The blood vessels are monitored by thermal inspection before and after taking drugs. This is generally used in clinical trials during various phases of sports medicines and Ayurveda medicines/ drug development. To facilitate clinical trials, tests were carried out to see the effect of a test substance for peripheral vasodilation. Testo infrared thermography camera, testo 890 was used to see and indirectly measure vasodilation by means of change in peripheral temperatures.



Identifying the peripheral vasodilation in the test subject

Case Study 3: National Institute of Mental Health and Neurosciences (NIMHANS), Bengaluru

References

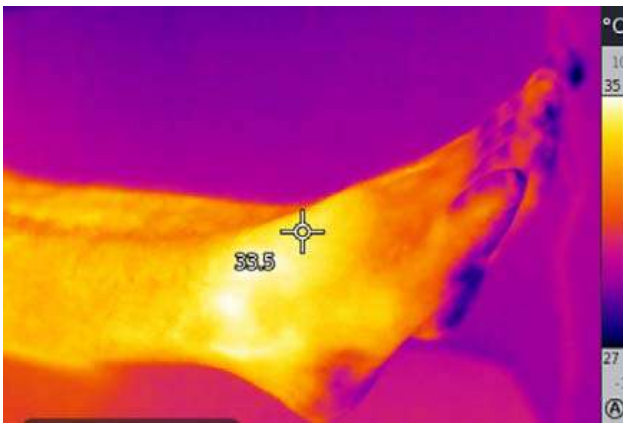
T2DM:

Diabetes mellitus type 2 (or type 2 diabetes) is a chronic condition that affects the way the body processes blood sugar and is characterized by high blood sugar, insulin resistance, and relative lack of insulin.

Analysis of Type 2 Diabetes

Infrared (IR) thermography imaging will be able to monitor progression & improvement of T2DM patients (with yoga based lifestyle therapy) as compared with invasive method of checking HbA1C, & biochemical assay of HbA1c as standard. Research is going on by using thermography camera testo 890 to detect / diagnose early diabetic condition by non-invasive method by close thermal inspection of human being eyes, ear, face, palm and foot. Also by monitoring changes in body temperature after and during yoga.

The session has been imaged using thermography which allows us to see thermal energy or radiation, more commonly referred to as heat. Thermal Infrared is found within the Infrared region on the electromagnetic spectrum. The different colours in the images represent different levels of thermal energy being emitted from the skin's surface. In this image the white, red, yellow and orange colours show a high level of thermal energy while the blue, black and purple show a lower level.



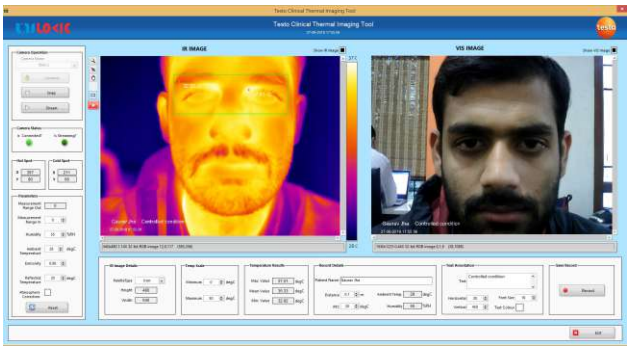
Thermography image of a diabetic foot

Monitoring of emitted energy during Yoga Therapy

Customized software for Medical / Clinical Thermography

The software generates the thermal image with Region Of Interest (ROI), pointers, date, time , distance and other parameters of importance in a text file with patient name. The data in the text file can be used by researchers in this field for analysis and R&D.

We can stream the thermal and digital video at a time in LabView which cannot be otherwise done. Patient specific report along with the image in a consolidated form is now possible. This finds applications in Medical Research Institutes and hospitals.



Software outlook with patient image & details - controlled from LabView

From the details depicted in the above case studies, it is evident that Thermal Imager testo 890 is an advantage for medical Thermography and serve various purposes.

Following advantages make testo 890 the winner for Clinical Thermography

- Image resolution of 640 X 480 IR pixel and 1280 X 960 with testo Super-Resolution
- Sequence Capturing: This helps to capture thermal images automatically with set time and number of images set. Also with respect to the temperatures set points.
- Radiometric video of the patients for monitoring purpose is easily possible.
- Thermal sensitivity of 40mK helps them in accurate temperature difference within the selected shortest possible zone.
- Fever detection feature allows you to see face of a human body to accurately monitor and detect febrile condition through a window in thermal imager screen against the set point for the temperature with emissivity automatically set to 0.98 for human skin. Anything beyond the set point temperature will show in red colour automatically.
- Customized Software for medical / clinical thermography.

Fever Detection feature with a window on the thermal image and higher temperature marked in red

testo 890

Testo India Pvt. Ltd.
Plot No. 23, Sind Society, Baner Road,
Aundh, Pune - 411007.
Tel: +91 20 2592 0000 | Fax: +91 20 2585 0080.
Email: info@testo.in