

this quite sensitive diagnostic tool. The new protocol did not really change this phenomenon. Only exclusion of patients suffering from generally cold fingers ($<30^{\circ}\text{C}$ in *rest position*) increased the specificity. Of the different gradients we calculated, only "abduction minus hyperabduction" showed significant difference between patients and healthy controls. The normal values for these gradients still have to be defined. However, the new protocol needs only seven instead of eight images, and provides a picture of the hands in a position which is accepted as not being stressful for the peripheral circulation.

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THE ROLE OF ITI IN DIAGNOSIS AND MANAGEMENT OF COMPLEX REGIONAL PAIN SYNDROME (CRPS)

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Background: The clinical application of ITI in diagnosis of Complex regional pain syndrome (CRPS) has been controversial. One factor is lack of proper clinical correlation with test results.

Aim of Study: To evaluate the role of ITI in diagnosis and management of CRPS, and to correlate the thermal imaging with the patient's clinical picture.

Methods: ITI was performed to accurately localize areas of nerve damage or dysfunction in 824 patients clinically diagnosed as CRPS by utilizing the four minimal criteria of:

1. Allodynic, hyperpathic, or causalgic pain;
2. Vasomotor and somatomotor disturbances, flexor spasm, or tremor;
3. neuroinflammation; and
4. Limbic system dysfunction in form of insomnia, agitation, depression, and poor memory (1,2).

A Bales Scientific Infrared Thermal Processor and an Agema (Flir) Infrared Thermal Processor were utilized in this study. The patients were cooled down in a $20-21^{\circ}\text{C}$ steady state room for 30 minutes of equilibration without clothing. No prior smoking for 90 minutes. A standard sensitivity of $24-34^{\circ}\text{C}$ was done. If the areas were not properly visualized, the physician would adjust the sensitivity accordingly. Two identically reproducible images recorded on laser disc were required.

Results: ITI is instrumental in early diagnosis of Complex Regional Pain Syndrome (CRPS) (3), leading to a higher therapeutic success, and higher chance of recovery (4-7). ITI is mainly helpful to obtain information regarding the nature and extent

of the disease, guiding the clinician to proper management of CRPS (4). ITI provides a comprehensive picture of the entire body temperature, leading to a more accurate diagnosis of CRPS (8). Asymmetrical atrophy and edema can be identified on ITI. In acute stage, the epicenter of the damaged area is usually hyperthermic (4,9). After a few weeks, the hyperthermic area shrinks. In some cases (9) the hyperthermia persists due to permanent damage to sympathetic nerve fibers (10). This points to a poor prognosis. The hypothermic area surrounding the hyperthermic epicenter of the damaged nerve reflects up-regulation and supersensitivity of sensory nerves to norepinephrine (11-14).

ITI provides clues to differentiate CRPS from fibromyalgia. In fibromyalgia there is no temperature asymmetry between the extremities, no deviation from normal, no focal temperature differences, no blotching (neurovascular instability), no edema, or atrophy.

ITI spares the patients from additional surgical damage to the hyperthermic traumatic focus of nerve damage of the original lesion with a surgical procedure or nerve block.

Conclusion: ITI is essential in providing the "big picture" of the body, more accurately focalizing areas of nerve damage, hence preventing further iatrogenic trauma of needle insertion, or surgery. Bone scan (25-55% accuracy) (15,16), EMG, NCV, CT or MRI cannot provide such indispensable information obtained by ITI.

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OBJECTIVE DETECTION OF BREAST CANCER BY DAT – AN UPDATE

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The feasibility of breast cancer detection using dynamic computerized infrared imaging has been demonstrated in a preliminary clinical study of 100 patients including 34 cases of pathologically established breast cancer and 66 with benign breast lesions found by pathology. Several alternative parameters and combinations of these have been tested for their effectiveness in separating cancerous breasts from benign ones. Also the separation between DCIS and invasive cancer in breasts has been explored. This report, which updates the findings published in this journal in 1999 on a much smaller number of cases and with less elaborate analysis, confirms the adequacy of DAT as an objective test method that can detect cancer in human breasts with a >98% sensitivity and >98% specificity.

MAMMOVISION™ - APPLIED INFRARED REGULATION IMAGING WITH PREDICTIVE VALUE FOR BREAST HEALTH AND DISEASES

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venting breast cancer. Conventional regulation thermography using only few recordings on every breast is not sufficient. On the other hand, simple thermal imaging without a standardised regulation test may miss important information.

Combining both the regulation test and the detailed infrared imaging leads to a very productive result. Each breast is subdivided into 25 areas of interest. The average temperature, the min-max range, and the standard deviation can be plotted in a graphic display similar to conventional regulation thermography. By this means MammoVision™ provides much more than just a survey. In addition to the thermal pattern of each breast before and after cooling (6 images), MammoVision™ creates a graphic printout showing T₀ (black rows), T₁ (red rows) and delta-T in all 50 areas of interest.

MONITORING OF VASODILATING TREATMENT BY THERMAL IMAGING

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The results of treatment in patients with peripheral ischaemia of lower limbs are frequently difficult to assess objectively. The aim of our study was to determine usefulness of thermal imaging for monitoring the treatment with vasodilator drugs.

Material and Methods: 25 patients (54 - 68 years old, 19 females and 6 males) were examined before and after drug treatment. The studies were performed with an Inframetrics ThermoCAM SC-1000 camera. The following quantitative parameters of the thermogram have been measured in all patients: maximum, minimum, and mean temperature of regions of interest on the lower limbs.

Results: In all patients asymmetric or symmetric hypothermia of lower limbs was found at the first investigation. After treatment for 6 weeks with vasodilator drugs in 15/25 (64%) patients presented with clinical improvement. In these patients the mean temperature after treatment was higher by 0,7°C to 4,2°C than baseline readings, and correlated with clinical symptoms. In patients without clinical improvement the mean temperature was about 3,2°C lower than the temperature before treatment.

Conclusion: Thermal imaging is a useful and none invasive method for monitoring of vasodilation treatment.

REPRODUCIBILITY OF THE RESPONSE TO THE COLD WATER CHALLENGE

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Cold water challenge is a well accepted provocation test for the thermographically assisted diagnosis of Raynauds's phenomenon. However, data on