

Arch. Geschwulstforsch. 57 (1987) 6, S. 487-491
VEB Verlag Volk und Gesundheit Berlin

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- 5 NOV 1997

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Diagnostic value of infrared thermography in breast cancer, and in proliferative and non proliferative mastopathies

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Received: February 9th, 1987)
Revised: June 18th, 1987)

Summary

The authors present the results of breast examinations in 201 female patients controlled by cytology and histology. Based on their results obtained by an AGA 680 type infrared thermography, their conclusion was that the method is primarily suitable for the examination of biological thermogenesis, one of the functional characteristics of tumours. Some T1 breast cancer of the same histological type are thermographically "silent", i.e. display no pathological alterations. Thermographical signs characteristic of carcinomas are to be found only in 60-70% of the cases. It is explained by the biological heterogeneity of tumours, i.e. the amount of heat generated by the metabolic processes of the different carcinomas is not equal, as well as they are different in vascularization and as a consequence of it in their heat conduction parameters. Similar reasons explain the appearance of different thermographic patterns - negative or characteristic of cancerous alterations - in proliferative mastopathies.

Introduction

It was observed even by Hippokrates that in some pathological conditions the surface of the breast gets warm in circumscribed areas (4). The accuracy of this observation has been confirmed more than 2,000 years later by heat distribution patterns obtained by thermography. Heat generated in cancerous and other pathological processes of the breast reaches the skin partly through the adjacent tissues and partly through the blood and thus smaller or larger skin areas are warmed up. The skin surface gives off this heat either by conduction or by convection but mostly by infrared radiation (12). The rate of this radiation depends on the skin temperature. As far as emission is concerned skin can be characterized as a "black body" (8). Nowadays two kinds of thermographic technique are used in diagnostics. One of them is the so called infrared thermography working with a thermic detector placed at a certain distance from the body and visualizing the heat distribution pattern of the investigated surface according to the intensity of the emitted infrared radiation (12). The other is the plate or contact thermography detecting the heat generated by the tumour and emitted by the skin through a liquid crystal of specific optical activity which is in direct contact with the body surface (11, 12).