Telethermography and breast cancer

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SUMMARY. From our study we can state that in the absence of palpable tumour,. we did not find a malignant lesion when thermography was normal and mammography showed no signs of malignancy. We were thus able to select patients for biopsy and to prevent an unnecessary examination. This selection could be supported by fine needle biopsy.

Suspicious thermograms without other suspicious signs in diagnostic procedure alerts a follow-up examination. Thus, we should be able to find changes in the thermogram and possibly detect carcinomas earlier by combining the diagnostic procedures of thermography, clinical examination, mammography and fine needle aspiration.

We consider that thermography is a valuable complementary method in the detection of breast cancer. In early detection, thermography and mammography combined will bring the best results.

Key words: breast cancer, telethermography, mammography, diagnosis, early detection.

Breast cancer is the most frequent cancer of women in the western hemisphere.

In Western Germany about 15 to 20.000 new cases are reported every year, 5.000 women with breast cancer die in a year.

Today we cannot expect a better survival rate by surgical and radiological treatment or by chemotherapy with hormones and anticancer drugs.

We can expect a better result only by an early diagnosis, which means the detection of breast cancer at an early stage.

Thus, medicine is concerned with methods of detection of breast diseases. One of these. methods in the diagnostic procedure is thermography.

In this paper the results obtained by thermographical examinations in the detection of breast cancer in our Centre is presented.

In addition, the value of thermography in early detection of breast cancer is discussed.

In our Centre the conditions for dynamic thermography consist of: 1) Aga-Thermovision 680 apparatus 2) constant ambient temperature of 20 to 21 °C in the investigating room and in a special waiting room 3) cooling the patient in the special waiting room, unclothed to the waist and arms raised for 7 to 10 minutes 4) the examination in 3 views, one frontal, one right and one left oblique view 5) no examination after the 18th day of the menstrual cycle.

It has been recognized by several investigators that the following criteria must be considered suspicious:
a localized hot spot, hyperthermia of the whole breast, and asymmetrical vascularization.

These criteria we used in our first investigations.

In a first group we studied 42 women with breast cancer.

The cancer had been confirmed by methods other than thermography.

One third of the whole group, that is 14 out of 42 women, had an increase in temperature of only 1.7 °C or less, 5 women had an increase of only 1.4 or 1.3 °C. One cancer was cold.

As a result we decided that an increase of only 1.3 °C must be defined as a hot spot.

In our first analysis we considered these 3 parameters based on the assumption that an increase in temperature of 1.3 °C was suspicious.

We then examined 3923 women by clinical examination, thermography and mammography (not all mammograms were made with a molybdenum anode). 3348 women had no

symptoms, had normal thermograms and no sign of malignancy in the mammograms. Therefore only 575 cases were confirmed by biopsy and histological examination.

The histological findings of 575 biopsies are taken on the basis of suspicious thermograms or mammograms or clinical findings.

The results of thermography and mammography were compared with histology.

In group 1 thermography and mammography were normal. We found benign lesions only. When both methods were suspicious - group 2 - we found 111 carcinomas and 4 benign lesions. Group 3 was as important as group 4. We had normal mammograms in group 3, but suspicious thermograms aided the detection of 44 carcinomas in a total group of 81.

In group 4 thermography was normal, but mammography was suspicious.

7 carcinomas were confirmed.

In group 5 doubtful mammograms led to a biopsy.

20 carcinomas were found histologically. These carcinomas had not been detected by thermography.

In group 6 in a total of 124 cases thermography was suspicious and mammography doubtful. 58 carcinomas were confirmed by histology. In conclusion these results showed 1.) thermography failed in the detection of 27 carcinomas derived from groups 4 and 5, that is false-negative thermograms in 12%. 2.) The rate of false-positive thermograms was 107 out of 335, especially groups 2, 3 and 6, that is 32%. 3.) 44 carcinomas were only detected by thermography in group 3.4.) In nearly all cases the histology corresponded with diagnostic procedure, when both - thermography and mammography were normal or suspicious, in group 1 and 2.

After reanalysing our results we combined them with the results of other investigators. We then defined the following parameters as suspicious or positive.

1. a localized hot spot, with an increase in temperature of 1.3 °C or more
2. an asymmetrical hypervascularization especially of an anarchic type
3. hyperthermia of the whole breast of 1.5 °C or more
4. an edge sign
5. a unilateral increase in temperature of the areolar area.

In our second series we examined 2456 women by clinical examination, thermography and mammography, using the Siemens-Mammomat with a molybdenum anode. Where there was a palpable tumour, we completed the diagnostic procedure by aspiration or a fine needle biopsy for cytological examination.

In this series the findings were proven microscopically in 438 cases. We found 241 benign lesions and 197 carcinomas.

We verified the reliability of thermography in the same way as in the first series.

The following observation should be noted:

1. As observed in the first series, there was no malignant lesion shown when thermography and mammography were both normal; only one benign lesion out of 111 occurred when both were suspicious, groups 1 and 2.
2. Using a molybdenum anode in group 3 - where thermography was suspicious and mammography normal - only 6 carcinomas were detected by thermography alone (in the first series these were 44). The false-negative rate in group 4 - thermography normal mammography suspicious - increased from 7 in series 1 to 38. Suspicious mammography led to 66 cases for biopsy whereas in our first series there were no benign lesions in this group.

   In all these cases mammography showed microcalcifications. The histological result was 38 small preclinical carcinomas and 66 benign lesions of a proliferating type as e. g. adenosis and sclerosing adenosis.
3. We were only able to decrease the large percentage of false-positive thermograms from 32 to 29, but the rate of false-negative thermograms increased from 12 to 25%.

If we want to define the value of thermography in the detection of breast cancer, we have to prove the results in the different stages of carcinoma. In order to get results which are comparable with other investigators, we classified the carcinomas after surgery removal according to the T-categories of the International Union Against Cancer.

From a collection of 437 carcinomas from both series the following results were obtained.

In stage 1 we found pathological thermo-

grams in 41 out of 81 cases, that is 50% compared with Amalric who found a higher result of 67%.

Analysing this rate of false-negative thermograms we did find a great number of microcalcifications in the mammograms. Thermography fails in these preclinical cancers. We therefore consider that thermography alone cannot help in the early detection of breast cancer.

In the other stages we obteined similar results to Amalric:
T2 90%, T3 94%, T4 98%. For this evaluations thermography is acceptable.

We therefore conclude that:
thermography failed as a screening methods as in cytology of the cervix. Nevertheless we consider it is a valuable complementary method in the detection of breast cancer. The findings that some carcinomas were only detected by thermography was significant.

In early detection thermography and mammography combined will bring the best results.

In our opinion there are still two other important findings.

1. With palpable tumours we did not find a malignant lesion when both thermography and mammography showed no signs of malignancy. Thus, we were able to select patients for biopsy and prevent an unnecessary examinations. This selection was conformed by fine needle biopsy.

2. Suspicious thermograms without other suspicious signs in diagnostic procedure should alert a follow-up-examination. We should thus be able to detect changes in the thermograms and possibly detect carcinomas earlier with the combined diagnostic procedure of thermography, clinical examination, mammography and fine needle aspiration.