The importance of thermography in the prognostic evaluation of breast cancers

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SUMMARY. After having set up an index card, we have reviewed the breast cancers registered at « Fondation Bergonié » from 1960 to 1974 inclusive.

2019 records have been retained and treated with 541 « first hand » tumours treated exclusively at Foundation Bergonie. In 209 cases (years 1973-1.974), the pretherapeutic assessment includes a thermogram which is classified on an index card as normal, doubtful or pathological. The possible existence of important vascular anomalies or huge hyperthermal areas are also mentioned.

Seven physicians, most of them not very familiar with thermography, bave fill out these cards based exclusively on the written-case history. In any case, interpretation could not be modified retrospectively in terms of the question asked.

Information processing of cards has allowed us to study the variations of 6 main prognostic factors related to the initial thermographic pattern. It concerns three clinical criteria (size of tumour, evolutive appearance, clinical state of axillary lymph nodes) and three histological criteria (axillary lymph nodes invasion, capsular breaking down, vascular clot blood).

It shows in a statistically significant way that pronounced thermographic anomalies may cause prejudgement of a particularly lymphophile evolution. Indeed, the clinically detectable affection of axillary lymph nodes in 71 patients correspond to a doubtful or pathological thermogram in 64 cases and in 7 cases only to a normal thermogram. 73 patients presenting with axillary histological invasion bad a doubtful or pathological thermogram in 61 cases and a normal thermogram in 12 cases, still did it involve always a very partial invasion.

The analisis of surviver from non corrected curves, is significant: 97% at 3 years for normal thermograms; 73% at 3 years for doubtful thermograms; 58% at 3 years for pathological thermograms.

The presence of major thermographic signs (importance of the thermal difference, extended hot area, important vascular anomalies) have a very clear effect on prognosis.

Finally, thermography appears to provide a highly significant fastor of prognosis and should be part of the pretherapeutic assessment of a breast cancer. However the prognostic criterion for therapy remains on the histological invasion of the axillary lymph nodes.

Key words: thermography - lymphophilia - breast cancers - prognostic assessment.

Long term prognosis of mammary carcinoma remains preoccupying and little improvement has been made by advances in surgery, radiotherapy and their associated. The regular decrease in the survival curves is linked to a metastatic incidence which cannot be forestalled even with excellent local treatment.

The indication of a general complementary treatment may be discussed in terms of this metastatic risk; since this type of treatment is seldom inoffensive, and the long term effects have not been clearly established, it seems logical to reserve it only for patients with very poor prognosis.

A retrospective study of all breast cancers from 1960 to 1974 at the Foundation Bergonie was undertaken in order to determine the prognostic value of various clinical or para-clinical data.

Out of 2.000 indexed cases; 541 were retained; these patients were treated by our Centre from the onset of their disease; they did not have initial metastases and were

followed up for at least three years, which is altogether insufficient to judge survival time but does allow a valuable statistical appreciation of metastatic incidence. In 209 cases (years 1973-1974) the list of examinations prior to therapy included thermography.

Seventeen factors for prognosis were selected for computer analysis: II clinical factors and 6 para-clinical factors, which included thermography (Table I).

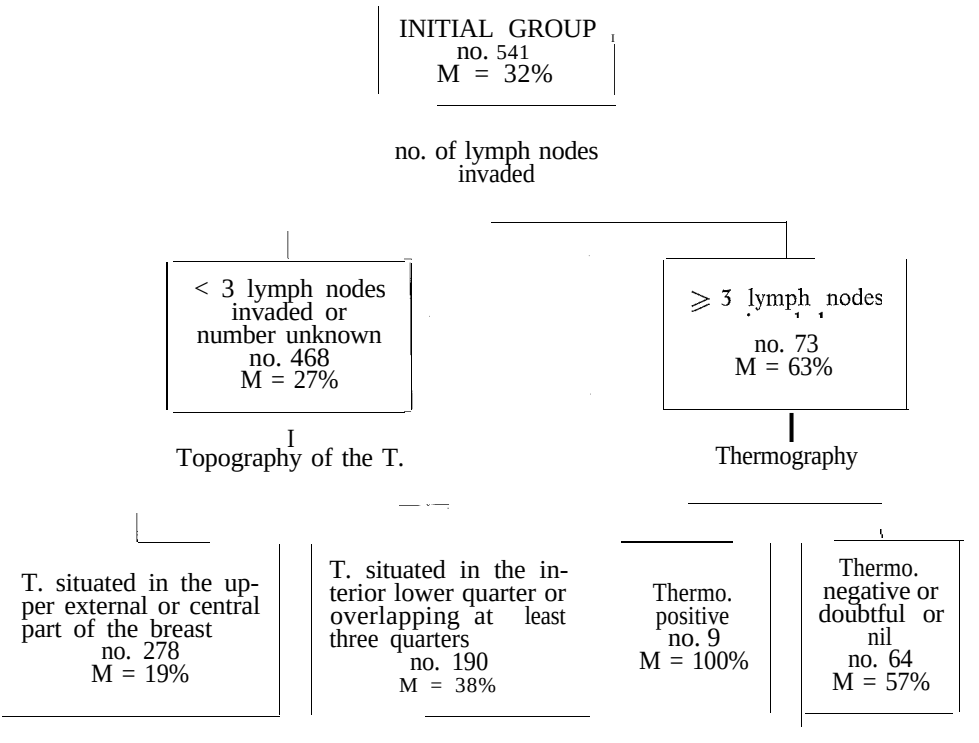
On average each factor has 5 possible variations with differences from 2 to 14. Thermography is defined by 4 values: nil, normal, doubtful, pathological.

Seven doctors of the Foundation Bergonie staff, most of them not very familiar with

Tab. I. List of 17 prognostis factors.

Clinical	*Paraclinical*
1 - Age. 2 - Genital state. 3 - Evolutive aspect. 4 - Topography of the T. 5 - Clinical size of the T. 6 - Inflammatory signs of the T. 7 - State of the skin facing the T. 8 -- State of the skin above the T. 9 - Relation of the T. to the wall of the diaphragm. 10 - Clinical state of the axillary lymph nodes. 11 - Clinical state 01 the subclavian lymph nodes.	12 - Mammo = aspect of the T. 13 - Mammo = absence or presence of 14 - Mammo = state of the skin. 15 - Thermography. 16 - Histology of the T. I7 - Number of lymph nodes histologically L .

Tab. II. Multiple analysis by dichotomous division results of the 1st and 2nd analysis.



thermography, filled out the information forms exclusively on the basis of documented case histories. Thus the interpretation could not have been influenced retrospectively by the questions.

We employed multiple analysis methods, a dichotomous division. Unlike single analysis, this had the advantage of simultaneously treating all the factors.

in the second division, giving a subgroup in which the prognosis is constantly and rapidly unfavourable (Table II).

The initial group has thus been divided as far as possible giving subgroups with very poor prognosis, and inversely populations with favourable prognosis; in this latter subgroup local treatment is sufficient. The thermographic factor plays a role in the 5th division giving,

Tab. III. Thermographic aspect depending on the clinical state of the lymph nodes.

Lymph nodes	*Thermography*		
	normal	*doubtful*	*pathologic*
Clinically non detectable	33	25	63
Clinically detectable benign	1	4	7
Doubtful	3	5	11
Malignant mobile	4	6	31
Malignant non mobile	0	0	11

Tab. IV. Thermographic aspect depending on the invasion of axillary lymph nodes.

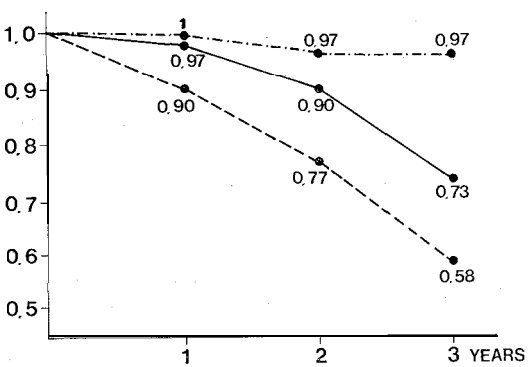
State Of the lymph nodes	*Thermography*		
	normal	*doubtful*	*pathologic*
Non invaded	-30	31	72
Partial invasion	12	9	48
Massive invasion	0	0	4

The initial group is split into various functional subgroups in all the possible combinations and utilising all the values of the selected data. The dichotomous split selected by computer produces two groups for which the rate of metastases is disparate.

The first split selected histological invasion of at least 3 axillary lymph nodes as the first unfavorable criteria with a very definite incidence on the rate of metastatic dissemination (Table II).

For groups with less than 3 lymph nodes invaded, the criteria << topography of the tumour » is selected in the second division.

On the other hand, for patients with more than 3 axillary lymph nodes invaded, the ordinator selects the criteria for thermography



Graph 1. Survival curves in relation to thermographic date: (— · —) Normal thermography (42 patients); (——) Doubtful or non specific thermography (41 patients); (- - - - -) Pathologic thermography (126 patients).

among the patients with limited lymphatic invasion, a subgroup with only 5% of metastases.

The prognostic value of the thermography, suspected from the onset of our study (thesis of Pabot Du Chatelard, 1973), seems to be demonstrated by this multiple analysis. However, the prognostic value is closely related to lymphophilia. We have, therefore, completed this study by correlating thermographic data in relation to clinical (Table III) and histological (Table IV) invasion of axillary lymph nodes.

The results show agreement. It is interesting to notice that when the node is not clinically detectable, the thermography is pathological only in one out of every two cases. When there was massive lymph node invasion we did not observe false negatives in thermography.

Lastly, the study of the actual survival curves in relation to thermographic data is clearly shown in Graph 1.

The constancy of thermography in individual appreciation of metastatic risk seems to more than compensate its diagnostic insufficiences and justifies its importance as an element in the list of examinations prior to therapy in all diagnosed breast cancers.