

CANCER OF THE BREAST

Thermography 'Excellent' Screening Device to Identify High-Risk Patient

Dr. Ray N. Lawson, assistant professor of surgery at McGill University in Montreal, and consultant to the Hudson's Bay Company in the Arctic for over 25 years, developed thermography as a diagnostic aid in breast cancer. OB-GYN OBSERVER interviewed Dr. Lawson on the status of the method.

How does thermography work?

Dr. Lawson: Thermography picks up changes in skin surface temperature patterns caused by increased venous drainage from malignancies located deep within the breast. The principle is simple: metabolic and immune reactions that are involved in breast cancer give rise to increases in local temperature. Some of this excess heat is dissipated by the circulation before it reaches the skin surface, but enough remains for the camera to pick up "hot spots"—shown as white flares against the background of the darker, normal tissue. One grouping of the many thousands of spots comprising a thermographic image can serve as a control, or basis of comparison, for other areas of the same picture. Since the breasts are relatively symmetrical, any noticeable difference between them should be cause for suspicion.

Diagnosis is more difficult in the mastectomy patient with only one breast. The problem is the same as that encountered in taking a mammogram—there isn't any basis for comparison, and the physician must place greater reliance on other indicators and on his instincts.

How is the patient prepared for thermography?

Dr. Lawson: The patient is stripped to the waist, and fans are used to cool the surface of the breast for about 10 minutes. The temperature in the room should be moderate and the humidity constant. Photographs are taken of the breasts in straight and oblique view, with the patient's arms held up and out of the way with straps. The camera transforms the infra-red emission given off by the patient into electronic video signals, which are then amplified and transferred to a display unit. The final photographs may be either black and white or color, but we have found that black and white gives better visualization.

Is the amount of heat released proportional to the size of the tumor?

Dr. Lawson: Not at all. In fact, the smaller, earlier tumors seem to exhibit relatively greater heat increases than many of the larger ones. There may, however, be a correlation between the amount of temperature change and the patient's immune mechanism. In that case, with improved instrumentation and more basic studies, we ought to be able to evaluate anti-tumor agents on the basis of their ability to inhibit tumor metabolism, as revealed by measurable differences in the output of heat energy displayed on thermographic film.

Is there any question about the value of thermography and the other tools of early diagnosis in breast cancer?

Dr. Lawson: On the surface, it would appear that there isn't.

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Thermography in Breast Ca

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Everyone wants early diagnosis, but there is an economic problem involved. Although the required machinery is simple to operate and inexpensive on a day-to-day basis, it is still quite expensive to set up. The current cost of a thermography unit is close to \$30,000, although this figure is dropping steadily as the field enlarges and improvements in technology come along. But once the unit is purchased we are in a whole new branch of medicine, with specialized technicians to interpret the thermograms and diagnosticians skilled in correlating the findings with the results of the x-ray and clinical examination.

How big a need is there for so expensive a diagnostic tool?

Dr. Lawson: There will always be someone who questions the need for a new diagnostic approach. We already have mammography and, more recently, xeroradiography, but these come under the heading of destructive testing, whereas thermography emits no radiation. You could sit in front of the instrument all day long and not be affected. Even if the thermogram accounts for the discovery of only five percent of breast cancers that would otherwise be missed, I am convinced that it's worthwhile. At our present state of knowledge, there is no perfect cancer test. Mammograms run the whole spectrum from clear positives to those that are unreadable and useless, diagnostically. Even specimen radiography depends to a great degree on calcification and only about 65 percent of breast cancers show calcification.

Multiphasic testing cuts down error. If we are going to diagnose cancer that isn't palpable, cancer that is located in the clinically normal breast, then we need every test available to help us do it.

How is multiphasic testing carried out at your facility?

Dr. Lawson: At our Westmount Breast Center, we examine from 15 to 18 patients daily. Thermography is

employed in conjunction with other forms of breast assessment: a thorough patient history, two clinical examinations, and mammography with a Senograph. This apparatus, developed in France, makes use of a molybdenum anode to produce high quality mammograms rapidly and with low radiation doses, only 2 to 2.5 r per exposure. My wife, who is also a physician, generally takes the history and conducts the tests and the initial physical examination. Then I do a second physical and evaluate the results of the x-ray and thermogram.

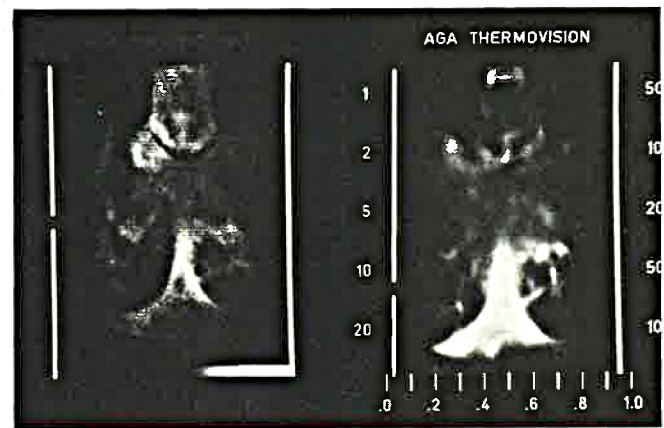
After seeing a tumor on the mammogram, we can sometimes search it out and palpate it in an otherwise normal breast. In other words, we have a retrospectroscope.

Do you feel that thermography will ever replace mammography as a means of diagnosis?

Dr. Lawson: There is no need for mammography to be replaced—only improved. Having examined over 15,000 patients with the two techniques, I firmly believe that there is room for both in effective diagnosis. Thermography has, on many occasions, located tiny, deeply situated tumors long before they appeared on the x-ray. That is why it has been impossible in my clinic—or anywhere else to the best of my knowledge—to establish the percentage of false positives and false negatives with any degree of certainty. Often, what we assume is a false positive thermogram will turn out, after several months or even a year or more, to be a true positive, and the patient will need surgery. Thermography is an excellent screening device—a fast, non-destructive means of identifying the high-risk patient, who can then be watched closely for signs of developing malignancy.

Has thermography any advantage over mammography?

Dr. Lawson: It may be the deciding influence in a final decision to biopsy in the face of an illegible mammogram. This is a great advantage to the patient, because it saves unnecessary surgery. Most lumps are not cancer—they are simple cysts, and require only aspiration for removal. Such cysts do not show up on the



Thermogram on left shows normal situation. On right, taken one year later, the same patient shows increased heat in left breast, but clinically there is no palpable lump. Biopsy proved very early cancer.

thermogram; they do not generate the kind of heat a developing cancer does. But they may show up on the mammogram, and the surgeon may decide to biopsy when biopsy is really unnecessary.

On the other hand, you cannot operate on the basis of a positive thermogram alone. It may be a false positive, or it may still be a pre-cancerous condition that cannot be pinpointed with enough accuracy to permit surgery. If it doesn't appear on the mammogram, if there is no thickening or other structural change apparent, you simply have to follow the patient carefully, and wait. Occasionally, the Senograph will pick up a cancer that thermographic visualization has missed. There have even been cases of clinically palpable tumors that have not shown up at all on the thermogram. That's why you really need all three; a good physical examination, mammogram, and thermogram. Together, they give us something to work with in the detection of breast carcinoma in its early stages—when detection can mean the saving of a life.

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