

Thermography as a Predictor of Prognosis in Cancer of the Breast

Ernest E. Sterns MD, FRCSC, FACS, and Benny Zee, PhD

Although thermography is generally considered to lack sufficient sensitivity to be a useful in diagnosis of cancer of the breast, the association of a thermal abnormality with some breast cancers cannot be discounted. Breast cancers demonstrating such a thermographic abnormality have been reported to be associated with decreased survival when compared with patients with no such change. In a study of 214 patients confirmed to have breast cancer without distant metastases, 121 were found to have a thermographic abnormality. Patients whose tumors were thermographically abnormal had significantly larger primary lesions and a higher proportion of metastatic axillary lymph nodes. However, both the 5-year survival and the 5-year disease-free survival were not significantly different from patients who had no thermographic abnormality. *Cancer* 67:1678-1680, 1991.

ALTHOUGH THERMOGRAPHY is an inexpensive, noninvasive investigational tool it has not proven sufficiently specific or sensitive for the diagnosis of breast cancer.¹ Two other uses for thermography have been suggested: to predict risk of breast cancer development, and to predict survival.

In our experience, 56% of women with breast cancer have a thermal abnormality. The thermal change can be detected by infrared sensors or by plates impregnated with cholesteric crystals (liquid crystal thermography) which change color within a specific temperature range and can map surface temperature of the breast. The results obtained from the two methods are comparable.¹

The fact that some cancers are associated with increased surface heat cannot be dismissed and the abnormality has been associated with decreased survival. Recently Isard *et al.*² reported that patients with abnormal thermograms had a significantly lower survival at 5 and 10 years than patients with minimal or no thermographic abnormality. Our prospective study fails to confirm this association.

From the Department of Surgery, Queens University, and the Kingston General Hospital, Kingston, Ontario, Canada.

Supported by a grant from the Samuel Robinson Foundation, the Clare Nelson Bequest of the Kingston General Hospital, and Physicians Services Inc. Foundation of Ontario.

Address for reprints: Ernest E. Sterns MD, FRCSC, Department of Surgery, Kingston General Hospital, 102 Stuart Street, Kingston, Ontario, Canada K7L3N6.

Accepted for publication August 23, 1990.

Methods

Between September 1976 and December 1989 women attending the breast clinic at the Kingston General Hospital (Kingston, Ontario, Canada) underwent liquid crystal thermography as part of their evaluation. Of the 3768 patients, 214 were found to have cancer of the breast without distant metastases (Stage 0 to III).

Thermograms were performed under controlled conditions. They were interpreted by a single investigator without knowledge of the clinical or mammographic findings, or of the diagnosis of previous thermograms if they had been performed.

Thermograms were interpreted as normal, equivocal, or abnormal. A normal thermogram was avascular or the vascularity was minimal and uniformly distributed throughout both breasts. There were no areas of increased heat. Equivocal thermograms had a localized vascular abnormality or an area of increased heat 2°C above baseline. Abnormal thermograms had a significantly abnormal localized vascular pattern and a localized temperature elevation 3°C above baseline. The criteria were similar to those reported by Isard *et al.*² and correspond to his diagnoses PF I to PF III.

Statistical Methods

Survival and disease-free survival experiences among the three thermographic groups were compared using log-