Thermography in screening for breast cancer

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Abstract

Study objective—The aim of the study was to determine whether thermography could be used to identify women with breast cancer or women at risk of developing the disease within five years.

Design—Women were screened for breast cancer and a documentary follow up was conducted five years later through general practitioner records.

Setting—The project involved women resident in the Bath District Health Authority area, who were invited to attend a breast screening clinic.

Subjects—10 238 women aged between 40 and 65 were screened. Of these, 4284 accepted personal letters of invitation from their general practitioners and 5954 volunteered to take part in the project in response to publicity; 9819 (96.5%) were traced after five years.

Measurements and main results—All the women had a thermographic and clinical examination of their breasts. If either examination was abnormal they were referred for mammography. Sensitivity of thermography was found to be 61% and specificity 74%. A documentary follow up of each woman was conducted five years later, when it was found that 71.6% of the women who developed breast cancer had had a normal thermogram at the time of examination, as did 73% of those who did not.

Conclusions—Thermography is not sufficiently sensitive to be used as a screening test for breast cancer, nor is it useful as an indicator of risk of developing the disease within five years.

It is now accepted that mammography is the best method for screening for breast cancer. However, before deciding on which method should be adopted for a national screening programme, the Department of Health and Social Security funded projects to test the validity of clinical examination and thermography as well as mammography. The purpose of the study reported here was to assess the specificity and sensitivity of thermography as a screening test for breast cancer and to show whether or not it could be used to identify women at high risk of developing the disease within five years.

Although it is customary, when discussing screening tests for breast cancer, to call tumours arising within 12 months of screening true negatives,1 for the purposes of this study a false negative is defined as a woman with histologically proven breast cancer, in whom the thermogram was normal. A false positive is defined as a woman in whom the thermogram was abnormal, but clinical examination and mammography showed no evidence of malignancy.

Methods

Women were recruited to the project by two methods:

(1) We identified 8235 women aged 40 to 65 through the age/sex registers of six general practices in the Bath area, who were then sent personal letters from their own doctors inviting them to take part. Of these, 4284 (52%) accepted.

(2) There were also 5954 women in the same age group who volunteered to take part after reading about the project on posters in general practitioners' waiting rooms throughout the Bath Health District, or hearing about it from friends and work mates. Within this group there were 229 symptomatic women. As pain was such a common complaint, for the purpose of this study symptoms were confined to skin tethering, a discrete lump, or nipple abnormality.

After receiving an explanation of the aims of the project and the methods employed, each woman gave a history while cooling for her thermogram. Two thermographic systems were used: a scanner developed by AWRE, Aldermaston, in conjunction with Barr and Stroud, and a system made by Rank Precision Industries. The women cooled for 10 min at an ambient temperature of 19.00 ± 1.0°C, stripped to the waist with their hands on their hips. The examination was then made with their hands on their hips, three positions being viewed, anterior and right and left obliques. The procedure has been described in detail by the Anglo-Dutch Thermographic Study Group.2 The criteria used to decide whether a thermogram was positive were (a) a localised area of increased heat emission; (b) increased heat of one areolar area; (c) generalised increase of temperature of one breast and (d) a localised increase in vascularity with more numerous, tortuous or dilated vessels. For (a)–(c), a temperature difference of more than 1.5°C was taken to be significant. The thermograms made with the AWRE/Barr and Stroud system were recorded in digital form on magnetic tape, and those from the Rank System on 35 mm black and white film.

The examining doctor assessed the thermographic data before proceeding to a clinical examination. If the thermogram was classified as positive in a premenopausal woman a further examination was made during the second week of her menstrual cycle. If significant temperature