

# Preliminary results using computerized telediaphanography for investigating breast disease

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**An instrument (telediaphanograph) for examination of the female breast has been developed which is optically based and carries no risk to the patient. Malignant lesions, which are strongly light absorbing, can be visualized by dark shadows cast on the superior aspect of the breast. The discriminating ability of telediaphanography for carcinoma has been investigated in relation to 129 patients with suspected breast disease. The sensitivity was found to be 0.94 and the specificity 0.89.**

In 1929 Cutler first described transillumination of breast tissues as an aid to diagnosis. However, the advent of X-ray mammography limited interest in this optical method until recently. The small but cumulative radiation dose from repeated exposure to ionizing radiation in long-term screening programmes using mammography has led to concern (Bailar, 1976). Two studies (Breslow et al, 1977; Tabar et al, 1985) have shown a significant reduction in mortality in groups of women screened for breast cancer when compared with controls. This benefit is limited to women aged 50 and over. Strax (1980) has pointed out that an ideal imaging procedure (for screening) would be non-invasive and would avoid the use of X-rays.

A television camera with a near infrared sensitive detector has been adapted to image breast lesions. The major advantages of this method is that instant photographs or digitized printouts can be obtained and X-radiation is not required. With digitization of video signals image processing is feasible. This report documents our initial results with this instrument\*.

## Patients, methods and materials

A total of 129 patients with known or suspected breast disease were examined by telediaphanography in addition to clinical examination, X-ray mammography and fine-needle aspiration biopsy. An initial group of 49 patients were examined at the Surgical Consultation Clinic, Edinburgh Royal Infirmary (by NB). Subsequently a further group of 80 patients attending the Breast Unit, Longmore Hospital, Edinburgh, were similarly investigated (by PL). The objective of this preliminary study was to ascertain whether palpable carcinoma could be reliably

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Fig.1. An image demonstrating the presence of a 15 mm invasive ductal carcinoma. Picture obtained from the video monitor using Polaroid 667 film. The lesion was clinically impalpable.

distinguished from benign breast lesions by telediaphanography.

Breast tissues transmit a small fraction of the incident light. The intensity that emerges depends on thickness and composition. Maximum transmission is in the near infrared region at 1100 nm. The additional absorption caused by neoplastic lesions is believed to arise mainly from neovascularization at the advancing front of the tumour.

In this study a video camera, sensitive out to about 1000 nm (National Panasonic, extended red newvicon), was used. A torch was used to transilluminate the breast. The investigation was