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DIAPHANOGRAPHY

Mechanism responsible for the images

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CUTLER (1929) was the first to show how transillumination of the female breast could be of value in defining the position of a lesion, particularly in cases of the bleeding nipple. He did point out the limitations of the technique notably the inability of the method at that stage to distinguish benign from malignant disease. The subsequent development of mammary radiography and its ability to localise microcalcification appears to have inhibited any further developments of diaphanography until a commercial company (Sinus Medical Equipment AB., Stockholm, Sweden) introduced an equipment some 3 years ago. The limitations of mammary radiography in the case of the young dense breast and increasing concern over the smallest radiation dose (MOLE 1978) has led to a reawakening of interest in diaphanography as a diagnostic supplement and in its own right in relation to the screening of 'well' women (STRAX 1980) by virtue of the fact that it utilises non-ionising radiation in the visible and near-infrared region of the spectrum. The method has two aspects. First is a visual inspection in a darkened room of the superior aspect of the breast with a light torch applied to the skin of the inferior surface. The objective is to locate any areas where there is a circumscribed shadow (neoplasm) or area of increased brightness (cyst). The second part of the examination is to make a colour infrared photographic record (Kodak Echtochrome infrared E4 process) using a 35 mm camera synchronsised to a xenon flash tube in the torch. OHLSSON et coll. (1980) point out that not only neoplasms and cystic lesions may be recognised by this technique but also areas of fibroadenosis by their characteristic intense cherryred colour.

Recently, ISARD (1980), OHLSSON et coll. and HUSSEY et coll. (1981) have encouraged the view that diaphanography has a valuable role as a supplement to mammary radiography. The colour images cover the range, yellow, orange, brown and black but hitherto there has been no adequate explanation of the mechanism(s) giving rise to the colour variations or of the association of a particular colour with each pathologic condition.

The present investigation set out to measure the transmission coefficient of slabs of material removed from the female breast at operation with the expectation that different lesions would transmit light to an extent dependent on the type of disease process. Large variations from sample to sample taken from the same lesion and the fact that there was no clear distinction between transmission characteristics of neoplastic and benign lesions showed that it was not the properties of the tissues and lesions themselves which were being imaged. The spectro-photometric traces in every case demonstrated the absorption bands of oxyhaemoglobin, a fact which led to a consideration whether in fact the number of red cells (erythrocytes) per unit volume was the factor leading to the characteristic colour-

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