AIN SHAMS UNIVERSITY

Faculty of Medicine

# EARLY DIAGNOSIS OF CANCER BREAST

## THESIS

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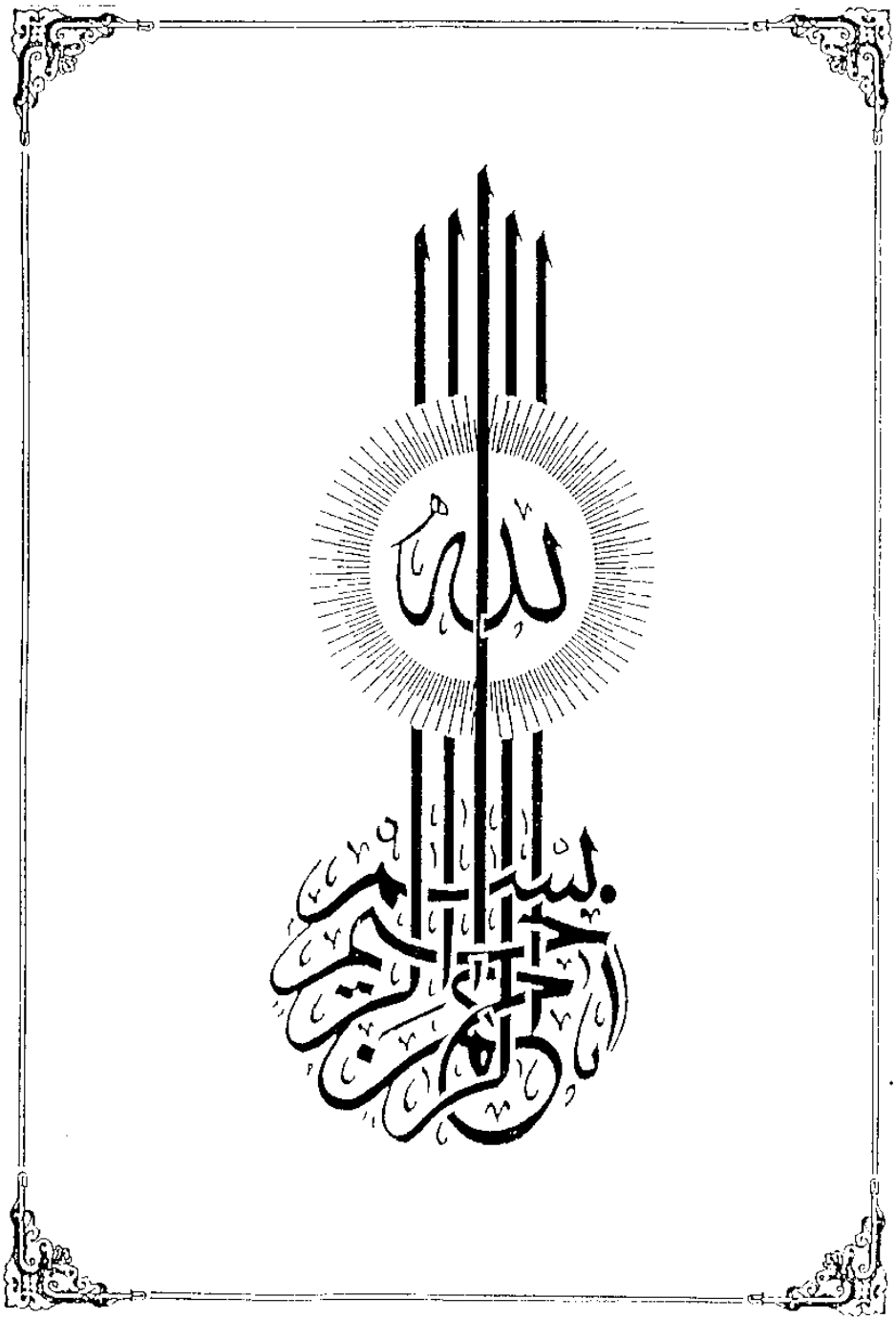

C O N T E N T S

# REVIEW OF LITERATURE

## ANATOMY

The breast, in most simplified terms is a modified sweat gland lying on the pectoral fascia and the musculature of the chestwall over the upper anterior rib cage. In the nulliparous young adults they are usually hemispherical in shape. The two breasts are seldom exactly equal in size (Hamilton 1975), the superficial surface of the gland is convex while the deep surface is slightly concave and overlies the pectoralis major muscle and to a lesser degree the serratus anterior and the external oblique muscles.

The protuberant part of the breast extends from the second or third rib to the sixth or seventh rib vertically, and horizontally from the sternal border to near the midaxillary line. Actually the breast tissue has a wide superficial extent beyond these limits, it spreads out as a thin layer which reaches the clavicle above, the eight rib below, the midline medially and the lateral edge of the latissimus dorsi muscle laterally. The upper-outer quadrant is prolonged over the lateral border of the pectoralis major muscle towards the axilla where it pierces the deep fascia through the foramin of Spence forming the axillary tail of the breast.

A little below and lateral to the centre of the gland there is the nipple which is surrounded by dark pigmented region named the areola which contains contractile smooth muscle fibres to facilitate nipple contraction.

The breast is located between the superficial and deep layers of the superficial fascia between the superficial layer of fascia and the skin is subcutaneous adipose tissue. The area of the nipple and areola is devoid of fat (Grant, 1965).

The epithelial parenchyma with its supporting fascial elements containing the blood vessels, nerves and lymphatics are embedded in a varying amounts of fat, this layer of fat allows for movement of the breast over the pectoral muscle (Ackerman, 1977).

Fibrous septa run from the fascia around the breast lobules, through the overlying fat to the superficial fascia and dermal layer of the skin, these suspensory ligaments (Cooper ligaments) of the breast permit considerable mobility of the breast itself.

Each mammary gland consist of from twelve to twenty glandular lobes, each one with a ramified duct. A lobe consists of multiple lobules each of which is made up of ten to one hundred acini grouped around a collecting duct. The acini are lined by cuboidal

like cells which under hormonal influence discharge their apocrine secretion into the collecting ducts. Each lactifirous duct runs towards the nipple, each duct has an ampullary dilatation beyond which it branches before opening into the surface of the nipple. Although it appears that each duct is lined by a simple single layer of columnar cells, there is actually a second flat layer of cells. This "reserve layer" reproduces the lining cells and can proliferate in various pathological conditions, such as cystic hyperplasia and duct carcinoma.

The upper outer quadrant is thicker than the remainder of the breast. It contains the greater bulk of the mammary parenchyma which may account for the fact that both benign and malignant tumours are more frequent in that site (Haagensen, 1971). Sixty percent of breast cancers arise in that quadrant (Baily, 1977).

Lymph drainage of the female breast:

The breast is drained by two sets of lymphatics (Ackerman, 1970), the lymphatics of the skin over the breast and the lymphatics of the parenchyma of the breast. Those from the skin form a dense network under the areola. This is continuous with the lymphatics of the skin of the surrounding regions, forming an uninterrupted network over the entire surface of the chest,

neck and abdomen. Thus the lymphatics of the skin of one breast communicate with the lymphatics of the skin of the oppose breast (Ackerman, 1970).

Lymphatics of the parenchyma arise from the interlobular of perilobular spaces. Some follow the ducts and end in the subareolar network of lymphatics of the skin, but the majority originate in the deep part of the breast and travel towards the axillary lymph nodes. Others end in the internal mammary chain.

Turner-Warwick (1959) after injection of radio-active gold into the breast, observed that:

a) The vessels arising in the lobules pass directly outwards in the substance of the breast through the axillary tail to the axilla. At no time do these vessels run on the deep fascia.

b) Lymphatics from the deep surface of the breast pass through the pectoralis major muscle to the axillary or internal mammary nodes.

Lymph nodes

a) Axillary lymph nodes:

Hugh Auchincloss (1963) described four groups of axillary nodes:

1) The highest nodes include the subclavicular or higher axillary vein group at apex of the axilla,

where the vein passes behind the clavicle, down to the lower border of the pectoralis major muscle.

2) The interpectoral nodes or those lying between the pectoralis major and minor muscles.

3) The lower axillary vein group from the border of the pectoralis major muscle extends laterally to the subscapular artery.

4) The central group (the largest) which lies on the floor of the axilla. A single lymph node is occasionally found lying in the subcutaneous tissue or in the breast high up in its quadrant, it is called by Haagensen (1971) the prepectoral lymph node as it is not an axillary node group component.

b) Internal mammary lymph nodes:

Cutler (1961) called them the substernal lymph nodes and they receive lymphatics from the inner aspect of the breast. These vessels follow the perforating vessels through the pectoralis major muscle to empty into the internal mammary chain of nodes situated at the sternal border of the intercostal spaces.

The internal mammary lymphatic trunk can drain into thoracic duct, into the supraclavicular group or into the great veins at the jugulsupclavian vein confluence (Fletcher, 1973).

A small amount of lymphatics may pass to the posterior intercostal glands lying near the heads of ribs (Turner-Warwick, 1959). This was confirmed by Handley (1969) who drew attention to the occasional operative involvement of lymphatics in association with lateral perforating vessels in the upper intercostal spaces.

## PHYSIOLOGY

The breast at birth is rudimentary organ consisting only of ducts. At puberty, under the influence of oestrogen and progestron in the ovary and trophic pituitary hormones, active budding of the ducts with acinar formation begins.

### Cyclic changes of the breast:

Beginning about the eigth day of the menstrual cycle the female breast gradually increase in size, the volume often increases by fifty percent by the immediate premenstrual period. At this period the breast is tense and may be tender. Part of the increase in size is due to interlobular oedema and congestion. Some say that there is also a proliferation of the parenchyma, with the appearance of new lobules. These lobules then regress and fibrose during menstruation. Congestion and oedema subside, and the breast again reaches its smallest size on about the eight day of the onset of menstruation. (Benjamin and Rush, 1974).

### Pregnancy and Lactation:

Implantation of the ovum initiates a profound change in the gross and histological structure of the

breast. Grossly: There is a pronounced enlargement of the breast progressing through pregnancy. The normal size may be increased as much as two or three times. The nipple and areola become more pigmented and prominent. The veins are engorged.

Histologically: The epithelium of the lobular ducts and alveolar ducts proliferate and new ducts are generated. The total number of lobules increase gradually. By the end of the sixth month, the acini produce small amounts of secretion, colostrum, which increase towards the end of pregnancy.

Two or three days after delivery, globules appear in the acinar cells. The acini become distended with milk, which is propelled to the nipple during nursing.

When lactation ends, the extralobular tissue involutes, and the breast gradually returns to the resting state but never return to the nulliparaous form (Benjamine and Rush, 1974).

Menstrual changes:

Following menopause, the mammary gland gradually involutes. This change is gradual and progressive with gradual disappearance of lobules. Some lobules always exist, but they are scattered and small. The

parenchyma and stromal fibrous tissue gradually blend together into a homogenous mass, and the original lobular structure is almost completely lost. (Benjamine and Rush, 1974).

The role of individual hormones:

1 - Ostrogen: Stimulates development of the ducts.

2 - Progestrone: If combined with oestrogen leads to the development of the acini.

3 - The growth hormone: If combined with oestrogen it promotes the growth of the ducts.

4 - Prolactine: It is concerned with the normal growth of the breast and also the onset of lactation. It produces its effect by:

   a - Stimulating progrestrone production by the corpus lutium.

   b - Stimulating the alveoli by direct effect on their metabolic process (Jamieron Kay, 1965).

5 - Oxytocin: It causes contraction of myoepithelium by reflex action of suckling. It also maintains and augments milk secretion.

6 - Adrenal hormones: Act synergetically with other hormones promoting the development of the breast.

7 - Thyroid Hormone: Has no effect on growth of the breast but they influence milk secretion when lactation is established.

## PATHOLOGY

In 1977 Sabiston stated that the role of a pathologic classification of breast carcinoma is to provide standardization for therapy of operable breast cancer and to offer a method of determining prognosis.

Many attempts have been made to establish a practical classification of the breast cancer on morpholotic criteria (Haagensen, 1971). The classification presented by Foote and Stewart in 1946, and recently adopted with slight modification by World Health Organization, has the attributes of simplicity, diagnostic accuracy and general acceptability, and provides the clinician with an appreciation of the biologic activity of the carcinoma. Foote and Stewart have stressed the fact than cancer of the breast can arise from either the lobules, the ducts, or the nipple with the tumor arising from ductal epithelium in the majority of cases. They also identified two major biologic properties of the breast cancer, either the carcinoma has the ability to infilterate diffusely or it tends to remain localized. Their list is: