Breast Mass

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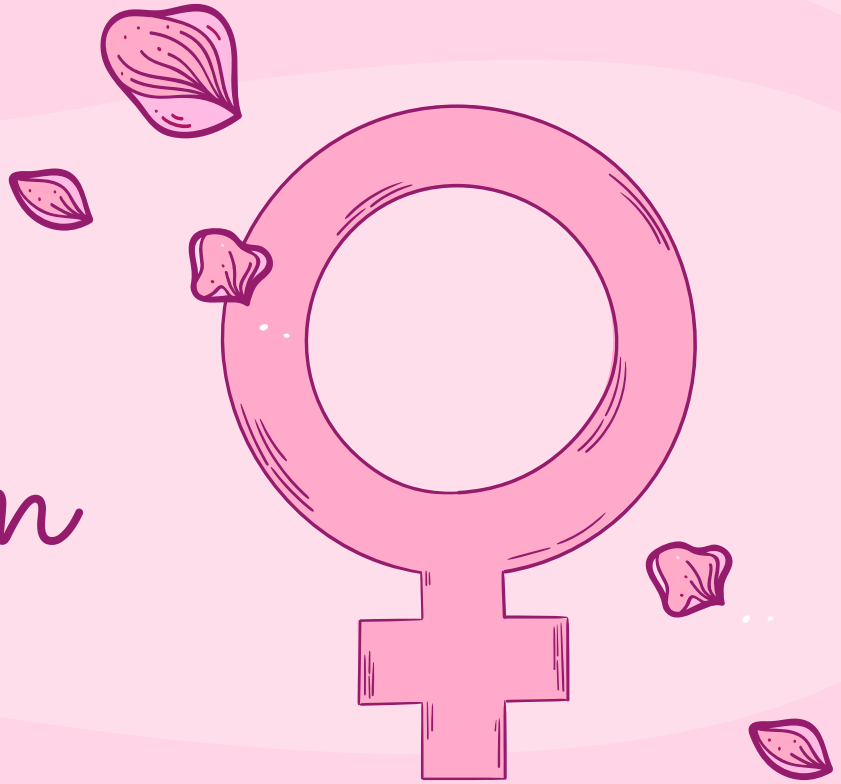
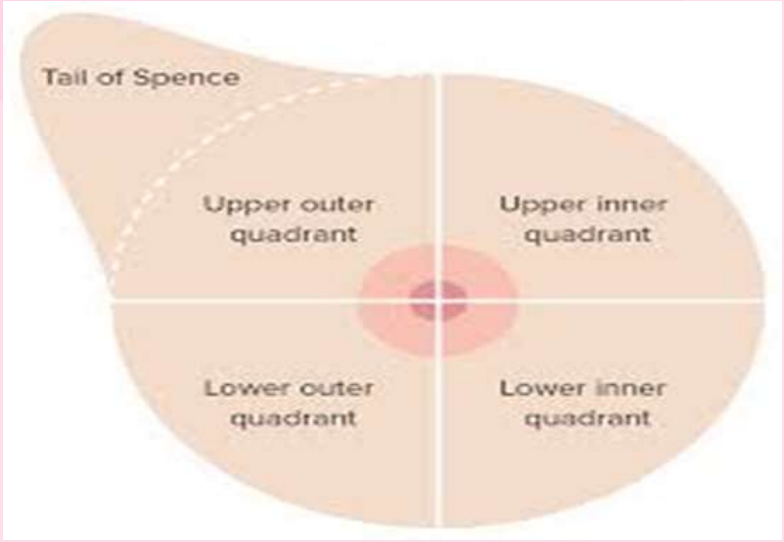


Breast Anatomy

The breast (mammary gland)

They are modified sweat glands in the superficial fascia of the pectoral region in both sexes.



. The breast is divided into 4 quadrants :
1) upper inner
2) upper outer
3) lower inner
4) lower outer

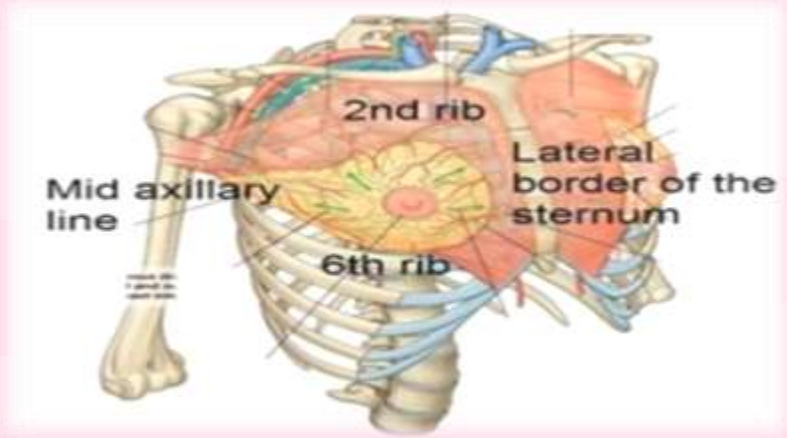
- most carcinomas of the breast develop in the upper lateral quadrant .

it extends vertically from 2nd to 6th rib (midclavicular line) and horizontally from lateral border of the sternum to the mid-axillary line “this is the extension of the breast in nulliparous female”

-the nipple lie in the 4th intercostals space in the midclavicular line : it carries 15 to 20 narrow opennings of the lactiferous ducts

- **Areola** : is a pigmented circular area surrounding the nipple

it may have an extension (axillary tail) which pierces the deep (pectoral) fascia to be present in the axilla so the axillary tail is the only part of the breast lying deep to the deep fascia

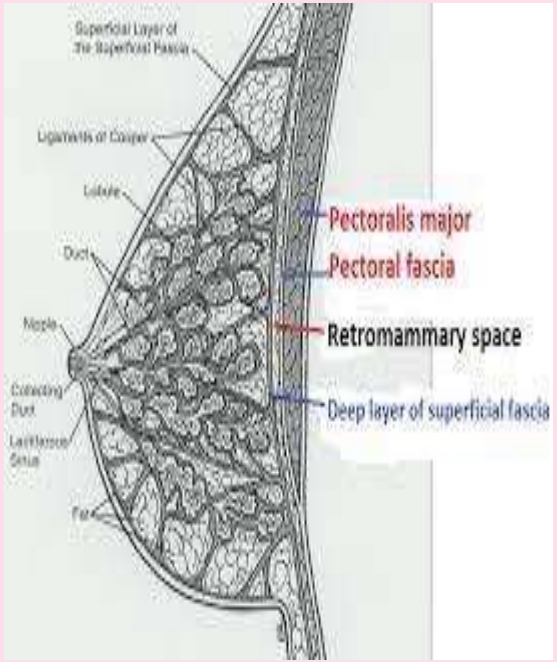


Deep relation of the breast

- 1) retro-mammary space (submammary space) it contains loose areolar tissue that allows freely mobility of the breast

  2) deep fascia

  3) muscles " the breast rests on the following muscles: "
     a) pectoralis major
     b) serratus anterior
     c) external oblique muscle



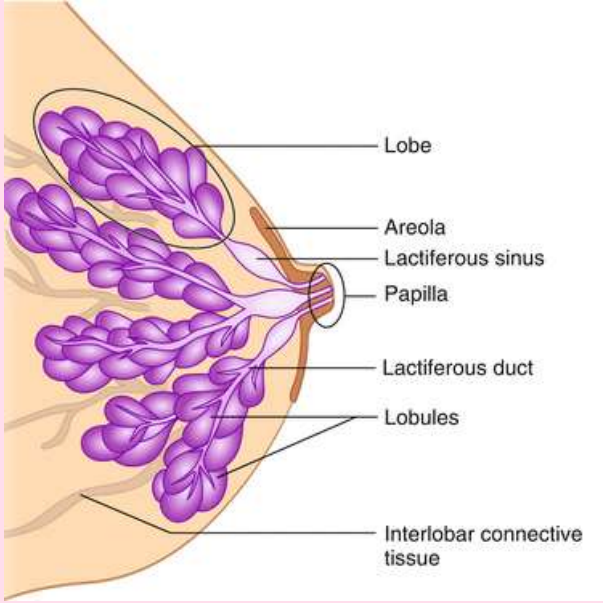
Internal structure (parenchyma of the breast)

The Glandular tissue :

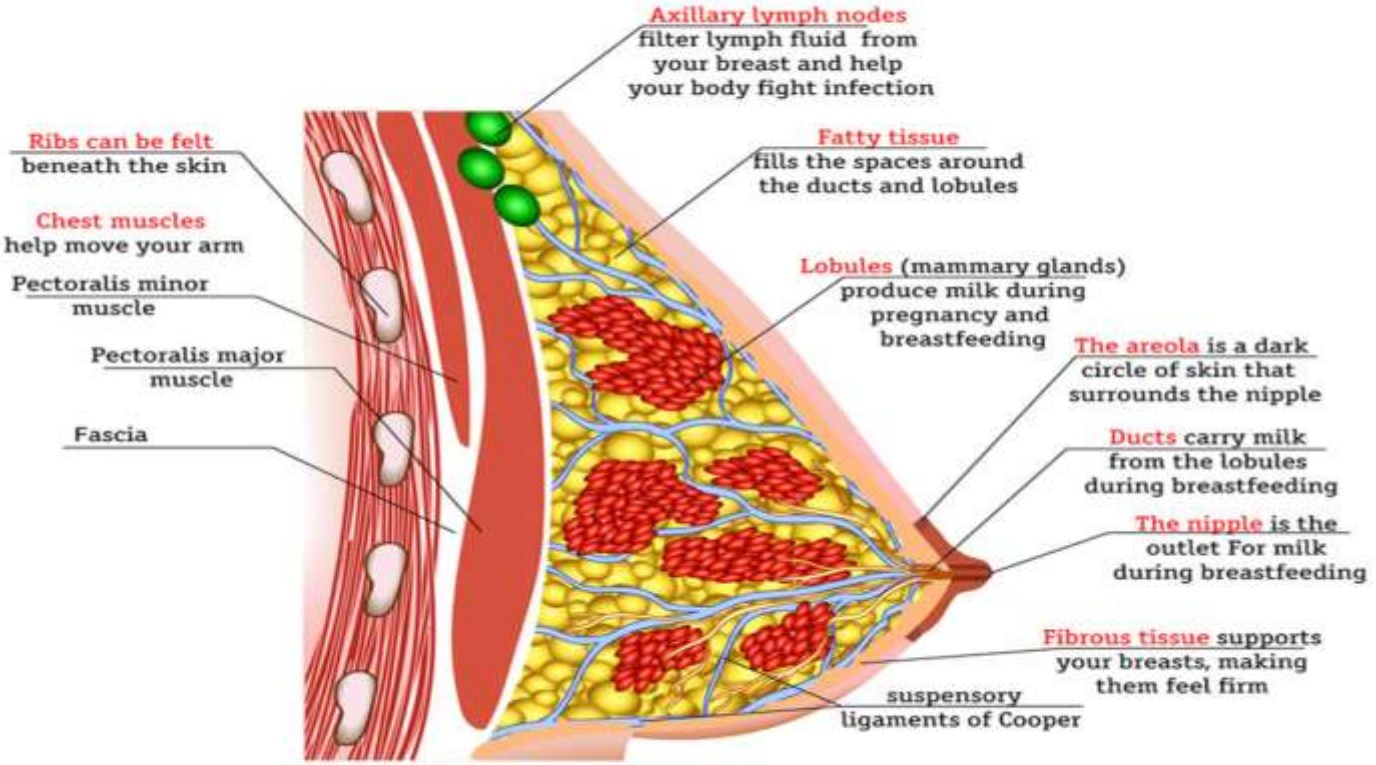
-15-20 lobes

each lobe is formed of alveoli and drained by one lactiferous duct

- each lactiferous duct forms a diltation called lactiferous sinus under the areola before it open separately into the nipple.



MEDICAL STRUCTURE OF THE FEMALE BREAST



Non glandular “supporting framework”

a) fatty tissue : forms the main bulk of the breast it is present all over the breast except nipple and sub-areolar area .

b) fibrous tissue : passing between lobes of the breast and binding the skin of the breast to the underlying pectoral fascia.

These fibrous strands called suspensory ligaments of cooper.

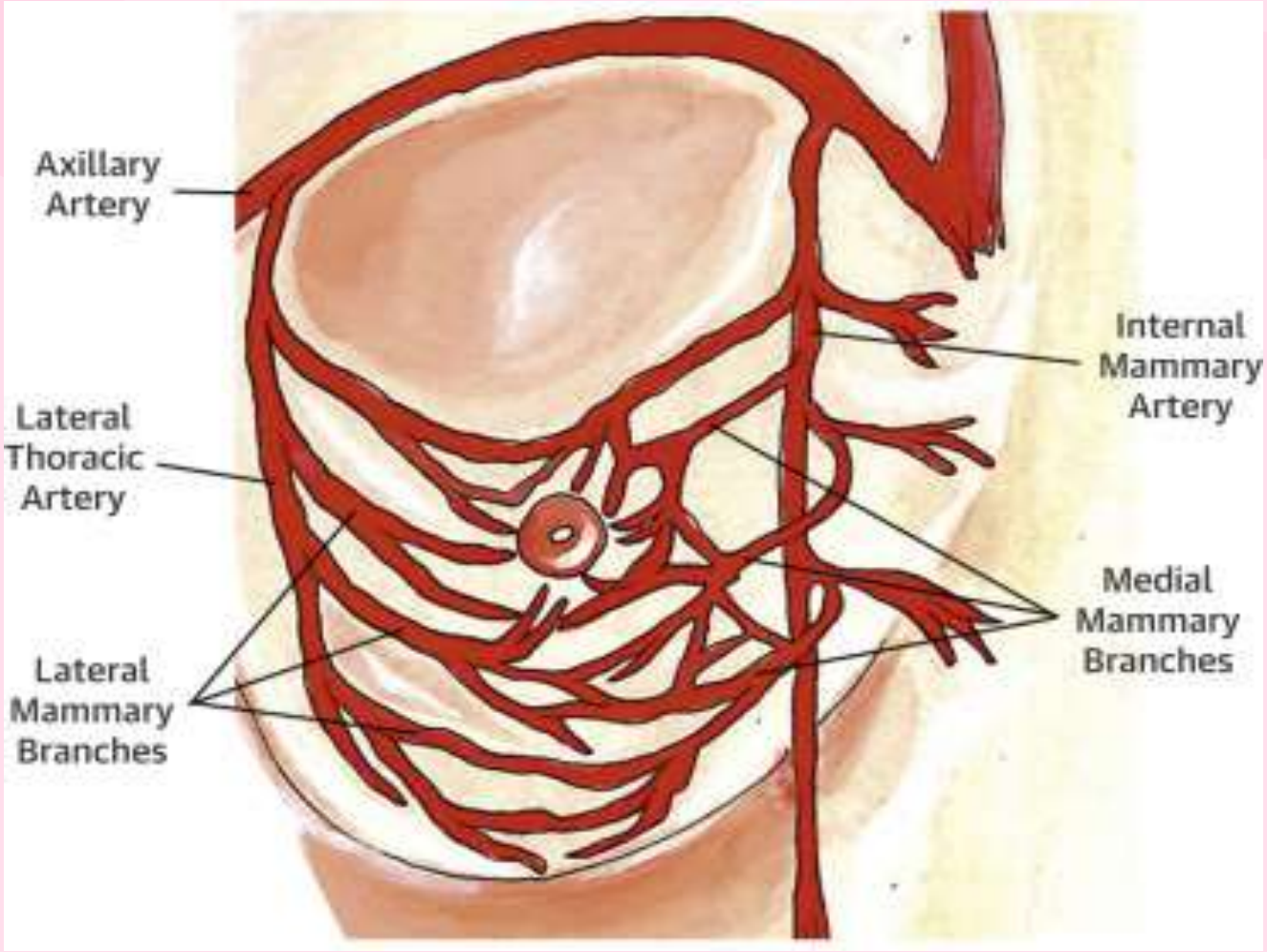
Blood supply of the breast

1) internal thoracic artery and its perforating branches : branch from the first part of the subclavian artery

2) medial mammary branches of internal thoracic artery

3) lateral mammary branches of lateral thoracic artery

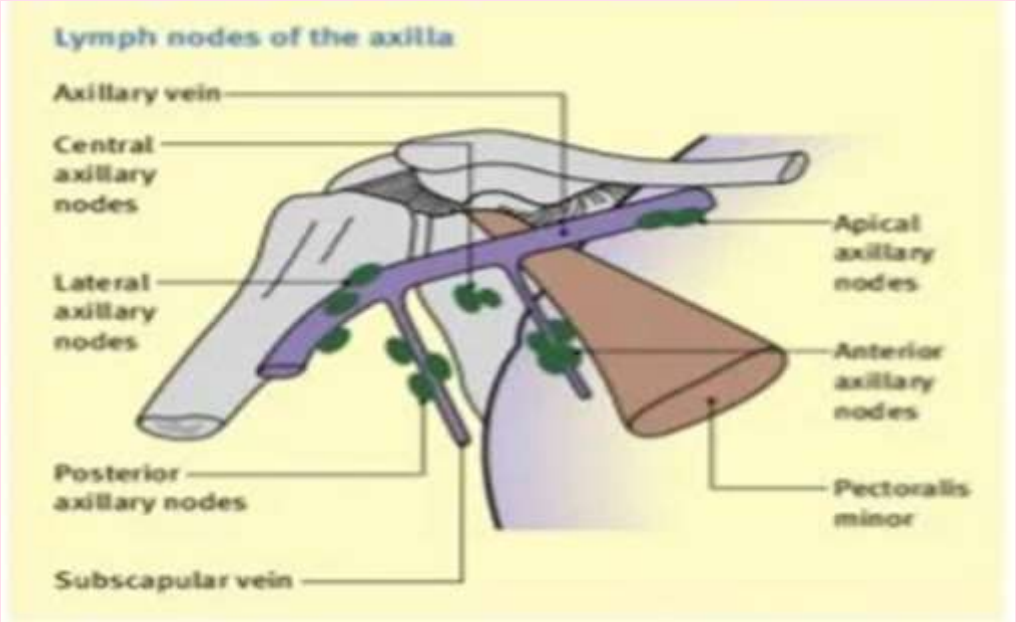
4) lateral mammary branches of anterior and posterior intercostal arteries


Axillary Artery
Internal Mammary Artery
Lateral Thoracic Artery
Medial Mammary Branches
Lateral Mammary Branches

Axillary lymph nodes

Arranged in 5 groups :

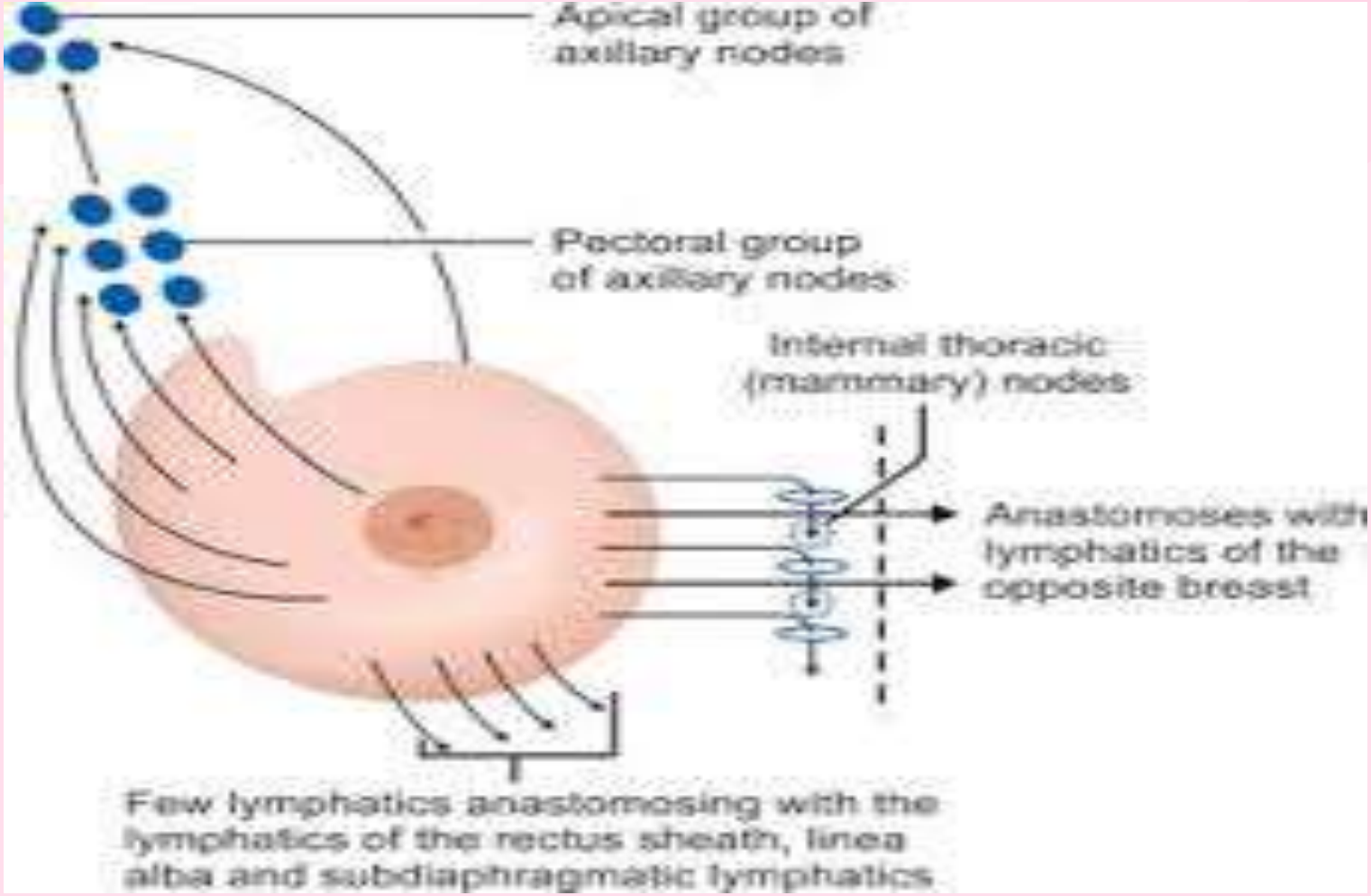
1) anterior or pectoral group
2) posterior or scapular group
3) lateral group
4) central group
5) Apical group



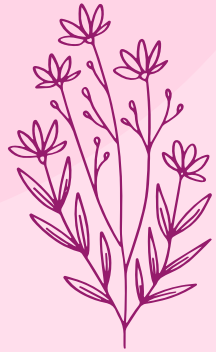
Lymphatic drainage of the breast

1) superficial lymphatic vessels drain skin without areola and nipple

2) deep lymphatic vessels drain parenchyma , nipple and areola


Apical group of
axillary nodes
Pectoral group
of axillary nodes
Internal thoracic
(mammary) nodes
Anastomoses with
lymphatics of the
opposite bresst
Few lymphatics anastomosing with the
lymphatics of the rectus sheath, linea
alba and subdiaphragmatic lymphatics

Lymphatic drainage of the breast



1) the central and the lateral part of the gland drain into the anterior group

2) the tail of the breast drain into the posterior group

3) the upper part of the gland drain into the apical group of the axillary lymph nodes and the deep cervical lymph nodes

4) the medial drains into the parasternal lymph nodes
5) inferomedial : few lymphatics anastomosing with the lymphatics of the rectus sheath , linea alba and subdiaphragmatic lymphatics

some vessels pass deeply through the falciform ligament to the liver

75% of the lymph drains into the axillary lymph node
25% of the lymph drains into the para-sternal and other lymph node

-If a tumor infiltrate the breast tissue can deform , shorten, and retract the cooper ligaments and lead to dimpling of the skin.

Tumorous infiltration and blockage of the lymphatics manifest as lymphedema and thickening of the skin , which which is known as peau d'orange because of the resemblance to orange peel .

- If the tumor infiltrate the nipple leading to its retraction

- If the tumor infiltrate the retromammary space : leading to fixation of the breast into the underlying deep fascia and pectoralis major muscle

Applied anatomy

Breast incisions : should be radial incisions to avoid cutting of the lactiferous ducts or suspensory ligaments

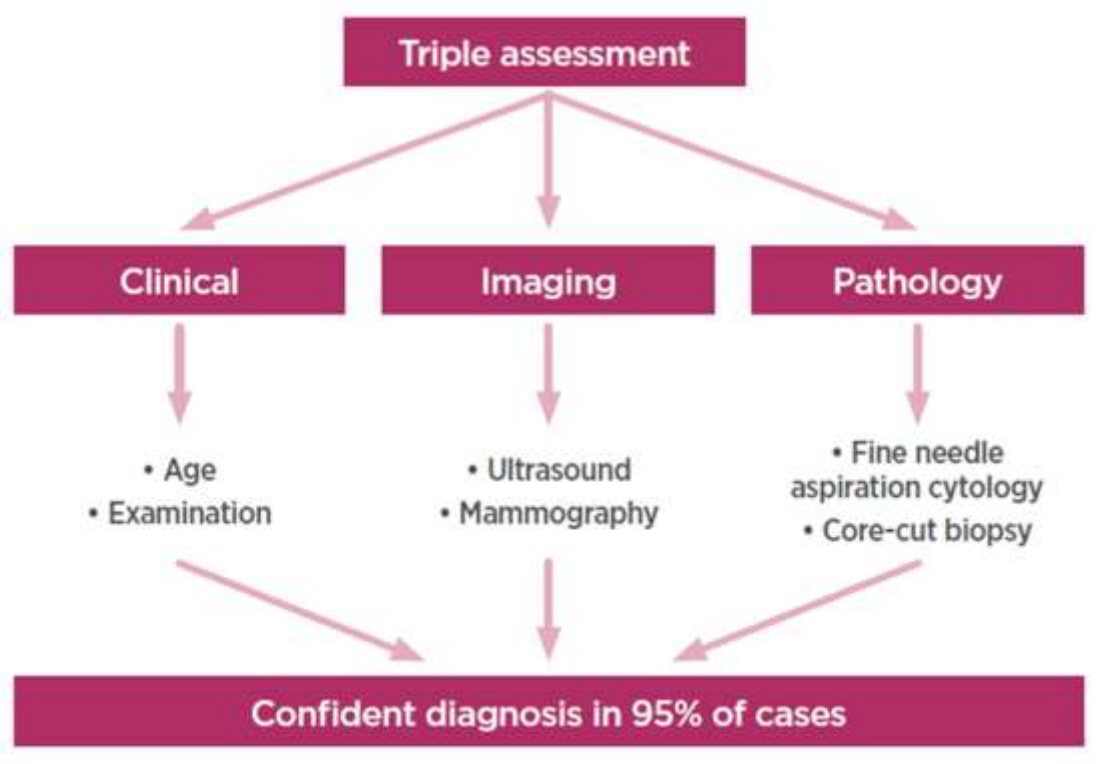
2 Investigations

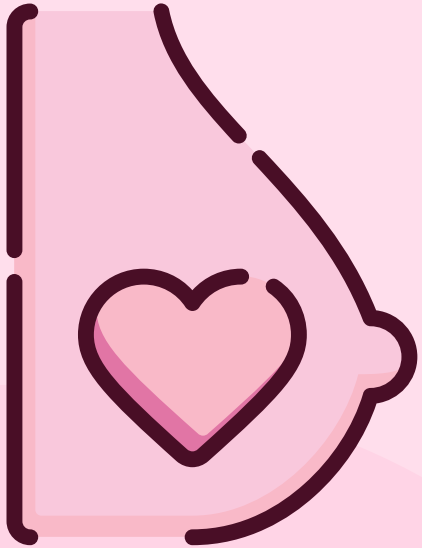
What is breast mass?

Depending on its type, breast masses exhibit great variation in characteristics such as:
size, consistency, presence of pain, nipple discharge and skin changes.

- Although breast cancer is the most feared cause, most (about 90%) breast masses are nonmalignant.

All patients presenting with a breast lump should have a clinical, radiological and pathological assessment (known as **triple assessment**) carried out during their first visit to the clinic…





History taking : The Lump

- **Onset**: when was the lump first noticed
- **Location** : which side - right or left
- **Single or multiple** : how many ?
- **Unilateral or bilateral**
- **Duration** : since when did the pt notice the lump
- **Progression** : Has it changed in size (ca)
- **Is there any pain** : type, severity (painless in ca) ,(painful : Fibroadenosis ,Mastitis & breast abscess,Malignancy(late))
- **Association with menstrual cycle**: age of menarche & menopause

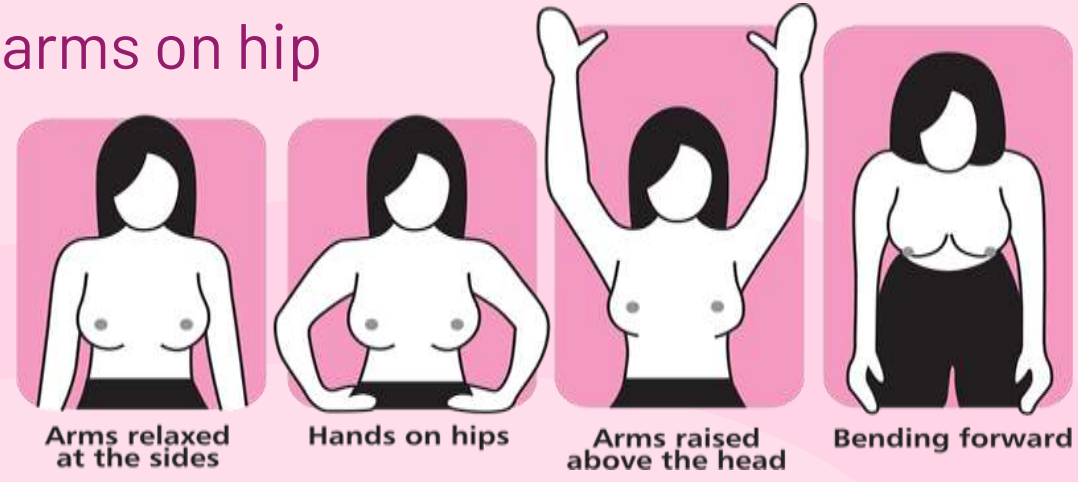
- Any injury to the breast?
- Any nipple discharge?
- Any skin changes like skin dimpling
- Have you recently been pregnant? Are you breastfeeding?
- Ask about risk factors for breast cancer:

1. Previous personal history of breast cancer
2. family history of breast or ovarian cancer and the age of those affected
3. use of hormone replacement therapy
4. Previous mantle radiotherapy for Hodgkin`s lymphoma

Initial Evaluation: Examination

1- Inspection:

Inspection positions :
1- setting erect with both arms by the side
2- setting erect with both arms raised above the head
3- bending forward with arms on hip



The breast is inspected for :

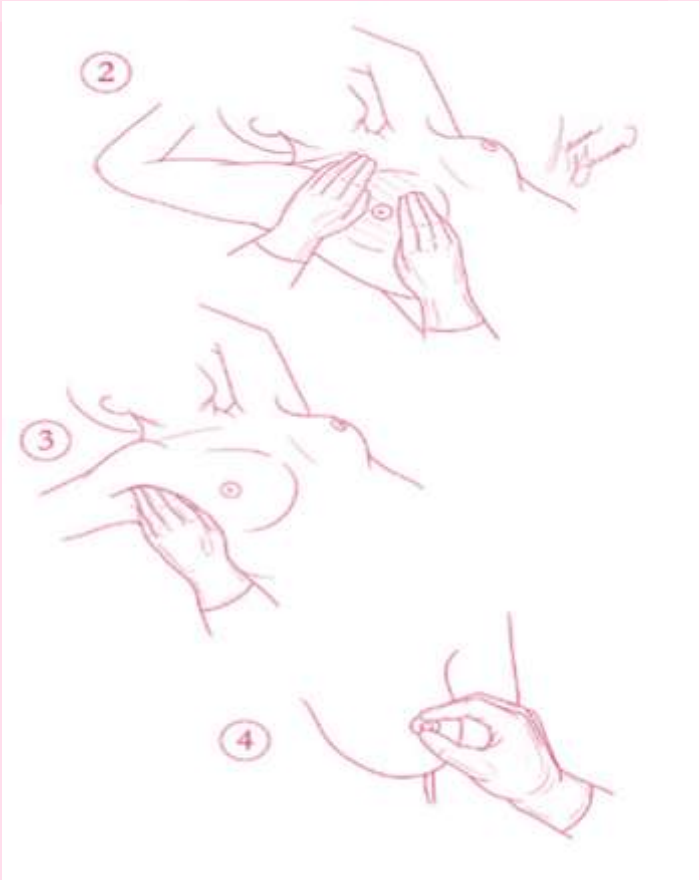
- Skin changes over the area of the mass and the areola. Skin changes :
  - erythema
  - rash (that isn't improved by steroids)
  - ulcers
  - dimpling
  - "peau d'orange" (orange peel).

- Nipple inversion (retraction), and nipple discharge (red flags include bloody discharge and spontaneous unilateral discharge).

- Inspect the arm for lymphedema.

2- Palpation:

- Palpation of breast tissue
- Lie the patient flat
- Start with normal breast
- Palpate in turn each quadrant of the breast by palm of the finger to find any lump
- Then palpate between the fingers and the thumb to note the consistency of breast tissue
- Palpate axillary tail
- Palpate the tissue beneath the areola



CONT.

- Note the temperature and tenderness
- Once the lump is identified with flat hands palpate it between fingers and the thumb to identify :

Size and of the lump
Surface – smooth/irregular
Edge – well/ill-defined
Consistency – soft, firm, hard
Fixed to surrounding structures (skin, breast tissue, pectoral muscle, chest wall)

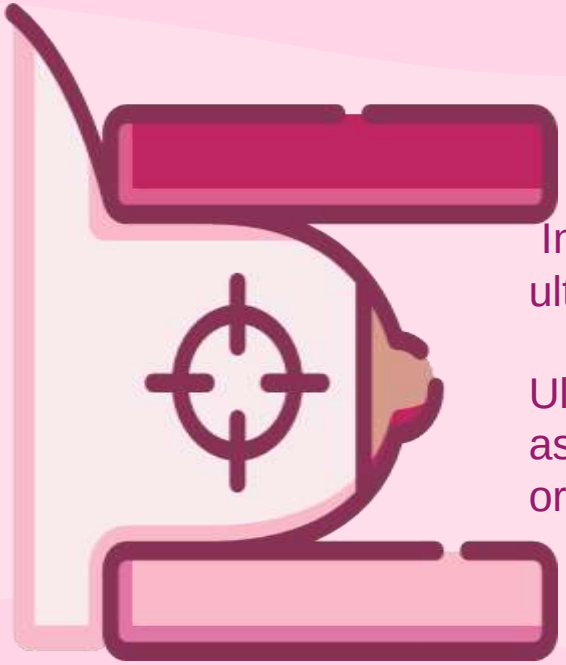
-Lymph nodes palpation (central , apical, pectoral, subscapular, brachial, infraclavicular, supraclavicular)

Radiological Assessment

Mammography

In women **over 35** mammography is usually performed (because women under 35; their dense breast tissue gives false positive results).

With mammography, benign lumps are usually very well defined whereas breast cancers are (spiky dense irregular mass) or malignant microcalcification .



Ultrasound

In women **under 35** years of age ultrasound is the preferred.

Ultrasound is particularly useful in assessing whether a lump is solid or cystic.

The Breast Imaging Reporting and Data System (BI-RADS)

Is a numerical scale ranging between 0 and 6 that is used in mammogram, breast ultrasound, and breast magnetic resonance imaging (MRI) reports. It is a standardized way to report your risk of breast cancer based on your diagnostic tests...

Pathological Assessment

Fine-needle aspiration (FNA)

allows cells to be taken from the lump. A fine needle attached to a syringe is inserted into the lump and cells are withdrawn by making several passes through the lump with negative pressure

A major advantage of this technique is that it allows drainage of a cyst (if fluid is present, then the diagnosis is invariably benign).

Biopsy

Biopsy: confirms diagnosis if imaging is inconclusive..

Other investigations

Chest x-ray

(CBC), liver function tests

measurement of serum calcium levels

carcinoembryonic antigen (CEA), cancer antigen (CA) 15-3, or CA 27-29

Bone scanning

Abdominal CT
Chest CT

MRI

Abnormalities 3

Congenital abnormalities

1-amazia :Congenital absence of the breast may occur on one or both sides. It is sometimes associated with absence of the sternal portion of the pectoralis major (Poland's syndrome). It is more common in males

2-Polymazia: Accessory breasts have been recorded in the axilla (the most frequent site), groin, buttock and thigh.

3-Mastitis of infants: is at least as common in boys as in girls. On the third or fourth day of life, infants usually present with unilateral swelling, erythema, warmth, tenderness, and induration of the breast, occasionally with purulent discharge from the nipple, and/or fluctuation suggesting breast abscess.

Inflammatory conditions

Acute Mastitis

Inflammation of the breast parenchyma. Most commonly caused by staphylococcus aureus. (particularly 2–4 weeks postpartum).

Clinical features:

x Tender, firm, swollen, erythematous breast (generally unilateral).
x Pain during breastfeeding.
x Reduced milk secretion.
x Flu-like symptoms, malaise, fever, and chills.
x In some cases, reactive lymphadenopathy.
x Purulent nipple discharge.

Fat Necrosis

It’s a nonsuppurative inflammatory lesion affecting breast adipose tissue causing necrosis of breast fat .
-Usually caused by trauma.

Present as irregularly defined and dense breast mass (generally peri areolar) causing skin retraction, erythema, or ecchymosis.
-Treatment is unnecessary.

Aberrations of normal development and involution (ANDI)

Fibrocystic changes (FCCSs) :

Benign breast tumor of fibrous and glandular tissue. It is the most common benign tumor of the breast ,Usually seen in premenopausal women

Hormonal relationship has been established; (increased estrogen, e.g., during pregnancy or before menstruation, may stimulate growth).

Duct ectasia / periductal mastitis

The characteristic pathological feature is dilatation of the mammary ducts, which are full of inspissated material containing macrophages and chronic inflammatory debris The inflammatory complications are closely related to smoking.

presenting features:

- Nipple inversion (slit –like nipple retraction)

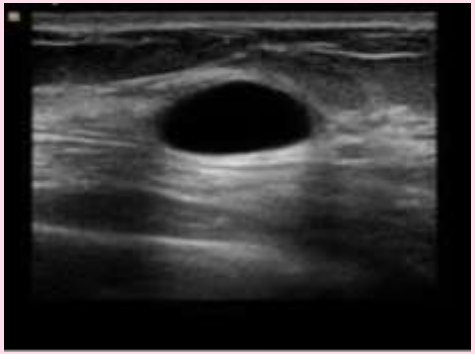
If uncomplicated and long-standing, it is usually ignored.

Breast cysts

These occur most commonly in the last decade of reproductive life(30-40) as a result of a non-integrated involution of stroma and epithelium. They are often multiple, may be bilateral and can mimic malignancy.

- Diagnosis can be confirmed by aspiration and/or ultrasound

- Treatment A solitary cyst or small collection of cysts can be aspirated. If they resolve completely, and if the fluid is not blood-stained, no further treatment is required.
- Residual lump: excision



Benign Breast Neoplasms

4

Benign Breast Neoplasms

- Fibroadenomas.
- Phyllodes tumor.
- Intraductal papilloma.

1-Fibroadenoma

Fibroadenomas : The most common, benign (non-cancerous) breast tumors made up of both glandular and stromal (connective) tissue.

- Most common in women in their reproductive age.
- Estrogen sensitive.

Clinical features:
- Mostly solid.
- Highly mobile mass.
- Well-defined.
- Firm.
- May be painful during the menstrual cycle.

Diagnosis:
-Ultrasound: well-defined mass.

-Mammogram: well-defined mass that may have popcorn-like calcification.

If imaging is inconclusive: fine-needle aspiration showing fibrous and glandular tissue.

Management:
Regular check-ups.

2-Phyllodes tumor

Phyllodes tumors: Rare breast tumors that started in the connective (stromal) tissue of the breast, not the ducts or glands (which is where most breast cancer start.) , and most common in women in their 40s .
- Most phyllodes tumors are benign and only 25% are malignant.
- Histologically similar to that of fibroadenoma.

Clinical features:
- Painless, smooth, multinodular lump in the breast.
- Average size 4–7 cm.

Diagnosis:
If a phyllodes tumor is suspected (based on clinical or imaging findings)→ core needle biopsy.

3- Intraductal papilloma.

Intraductal papilloma: benign, wart-like tumors that grow within the milk ducts of breast. They are made up of gland tissue along with fibrous tissue and blood vessels (called fibrovascular tissue).

Clinical features:
Features are related to size and location

-Central papilloma is usually a large, subareolar located lesion.
-Peripheral papilloma is usually multiple small lesions located on external areas of the breast.

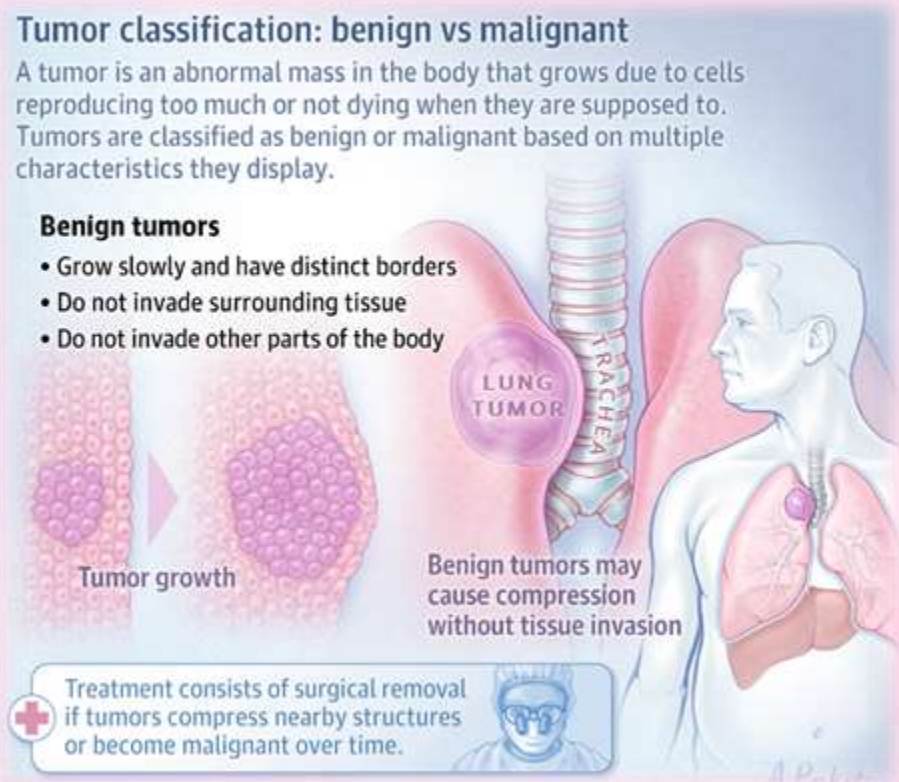
Solitary papilloma

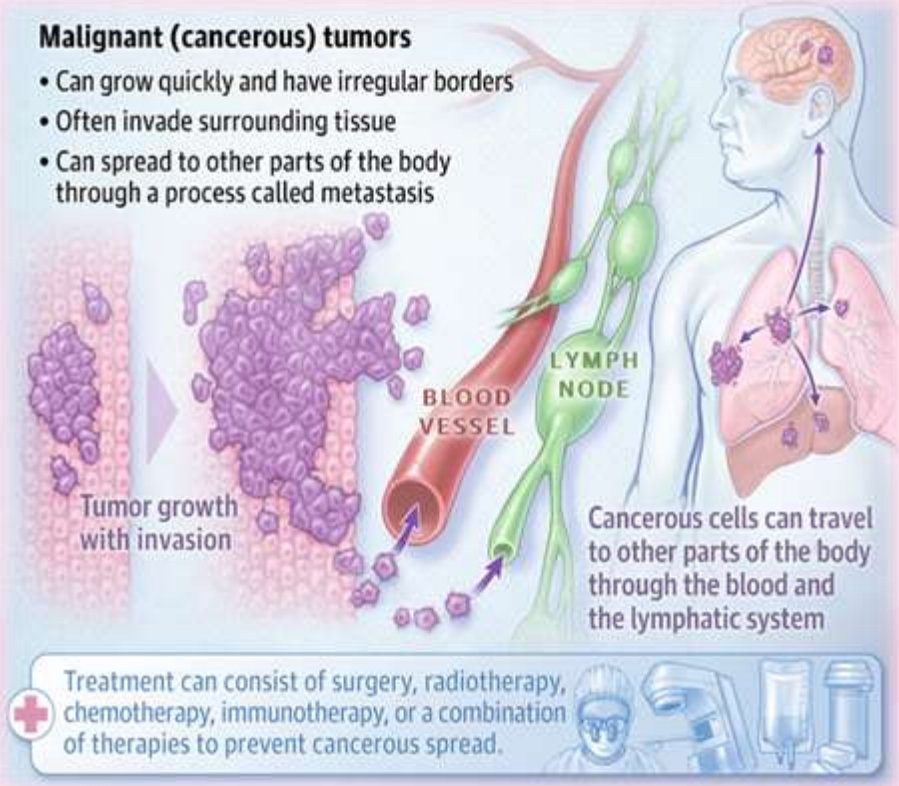
-Most common cause of bloody nipple discharge.
-Single, large, central lesion.
-Palpable breast tumor close to or behind the nipple.

Multiple papilloma

-Usually asymptomatic but may cause nipple discharge in rare cases.
-Peripheral lesions; smaller than solitary papilloma

Tumors types: Benign VS Malignant





Breast cancer risk factors:

1-Age: The strongest risk factor for breast cancer ,most breast cancers occur in women > 50.

2- Family history: Having a1st degree relative (mother, sister, daughter) with breast CA increases the risk 2 to 3 times. Having multiple cases of breast CA among more than one of 1st degree relatives might indicate up to 5 to 6 times increased risk.

3- Breast cancer gene mutations:

- 5 to 10% of women with breast cancer carry a mutation in BRCA1 or BRCA2 genes.
- If relatives of such a woman also carry the mutation, they have a 50 to 85% lifetime risk of developing breast cancer.

4- Personal history: Risk of developing cancer in the contralateral breast after mastectomy is about 0.5 to 1%/year of follow-up.

5- History breast changes: History of a lesion that required a biopsy (e.g. atypical hyperplasia) increases risk.

6- Gynecologic history: Early menarche, late menopause, or late first pregnancy increases risk. Women who have a first pregnancy after age 30 are at higher risk than those who are nulliparous.

7- Lobular carcinoma in situ (LCIS): Having LCIS increases the risk of developing invasive carcinoma in either breast by about 25 times.

8- Use of oral contraceptives.

9- Hormone therapy.

10-Dense breast tissue.

11- Radiation therapy: Exposure to radiation therapy before age 30.

12- Lifestyle factors: Smoking and alcohol may contribute to a higher risk of breast cancer.

Breast Cancer 5

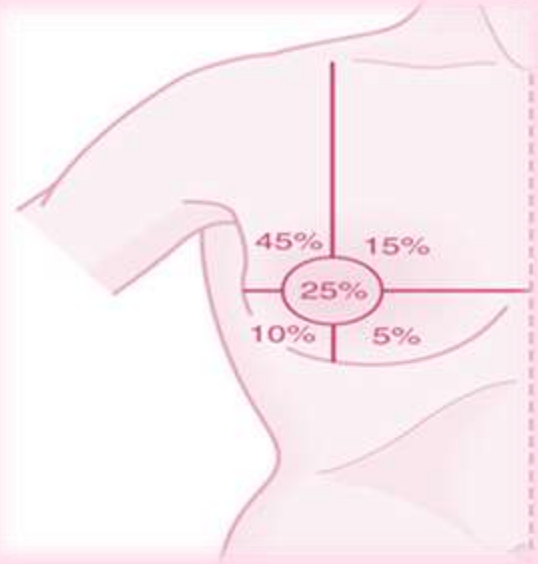
Malignant breast cancer

Is the most common malignancy in women .

- is the second leading cause of cancer death in women.
Is a disease of old age in postmenopausal women
[peak incidence~50-60 years]

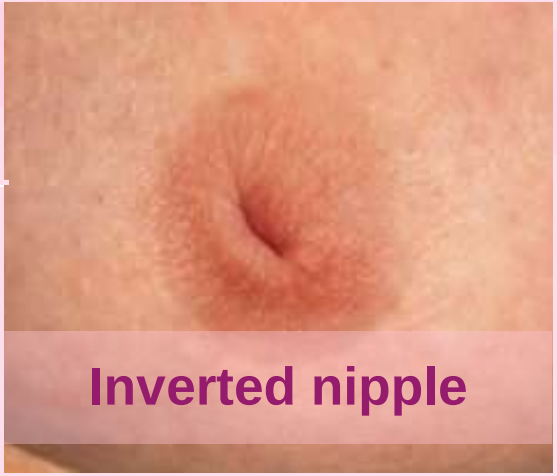
 # Frequency of breast carcinoma at various anatomic site

-bone[back]met
-liver met
-lung met
-brain met



Signs and Symptoms

- **Painless lump** in 70% of patients about 90% of the masses are discovered by the patient
- Breast pain
- Nipple discharge
- Erosion
- Retraction
- Enlargement, or itching of the nipple
- Redness, generalized hardness, enlargement, or shrinking of the breast
- Axillary mass
- Swelling of the arm



Inverted nipple

Duct milky discharge

Single duct milky discharge

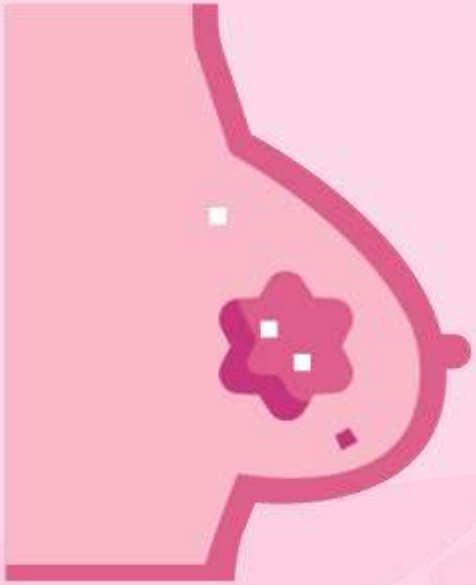
Duct bloody discharge

Single duct bloody discharge

Nipple retraction

Mass types: Malignant

1- Carcinoma in situ:
Ductal carcinoma in situ (DCIS).
Lobular carcinoma in situ (LCIS).

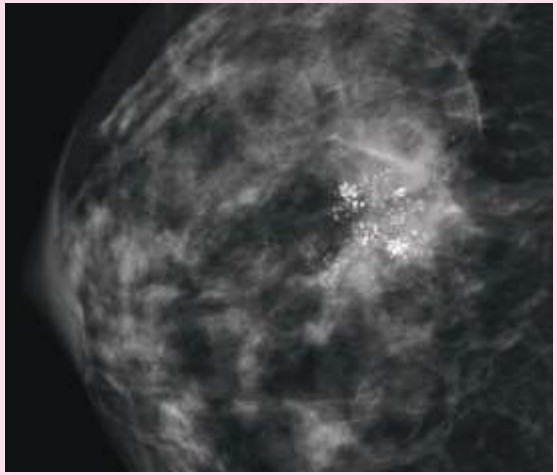


2- Invasive carcinoma:
Adenocarcinoma (ductal type) [most common type], **Infiltrating lobular**, medullary, mucinous, papillary and tubular carcinomas.

3- Inflammatory breast cancer

4- Paget disease of the nipple

1- Carcinoma in situ:



Malignant clonal proliferation of epithelial cells within the lobules & ducts.

- Both types of CIS arise from cells in **the terminal duct**
- LCIS expands involved lobules. DCIS distorts lobules into duct-like spaces
- Both "respect" the basement membrane & do not invade into stroma or lymphovascular channels.

A-Ductal carcinoma in situ (DCIS):

About 85% of carcinoma in situ are this type.
Histologic appearances; solid, comedo, cribriform, papillary, & micropapillary.
Comedo subtype: Extensive central necrosis > ass with calcifications > detected by mammography.
Excellent prognosis if treated
Management: surgery with irradiation or Tamoxifen
(anti-estrogenic agents).

B-Lobular carcinoma in situ (LCIS):

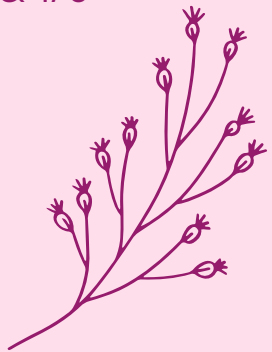
Monomorphic cells forms **loosely cohesive clusters** within the lobules > mutation in adhesion protein E-cadherin.

"lobular": because cells expand but do not distort involved spaces > so underlying lobular architecture is preserved .

-Always an incidental finding, no calcifications.

- Invasive Ca after LCIS diagnosis may arise in either breast (2/3 same breast & 1/3 contralateral breast)

- **Management** variable.

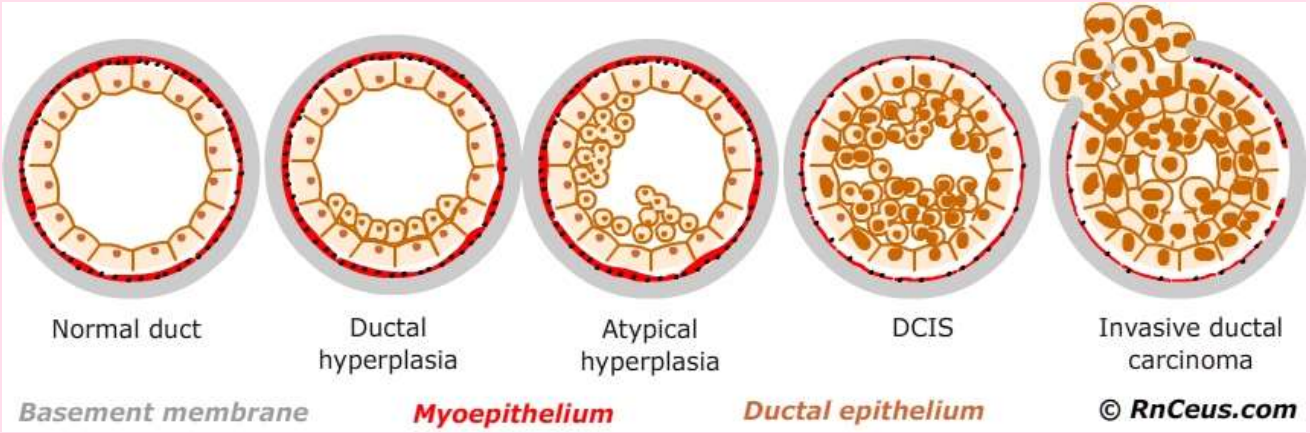


Ductal carcinoma in situ (DCIS)	Lobular carcinoma in situ (LCIS)
~ 25% of all newly diagnosed breast cancers.	1–5% of all newly diagnosed breast cancers.
Localization: unifocal.	Localization: multifocal and bilateral.
Often detected as grouped microcalcifications on mammography; DCIS does not usually produce a mass.	LCIS does not produce a mass or calcifications and is usually discovered incidentally on biopsy.
Higher risk of subsequent invasive carcinoma (ipsilateral).	LCIS is both a marker of an increased risk of carcinoma in both breasts and a direct precursor of some cancers.

2- Invasive carcinoma:

The majority (80%) of breast cancer is **Invasive ductal carcinoma**. will classically form duct-like structures.

-Usually presented as;
-unilateral
-single
-irregular
-large
-firm
-fixed
-Early metastases



is the **most common post-menopausal breast carcinoma.** A breast mass in a woman older than 50 should be considered a carcinoma until proven otherwise.
Advanced tumors may result in **dimpling of the skin or retraction of the nipple.**

Invasive lobular carcinoma:

10% of breast cancer

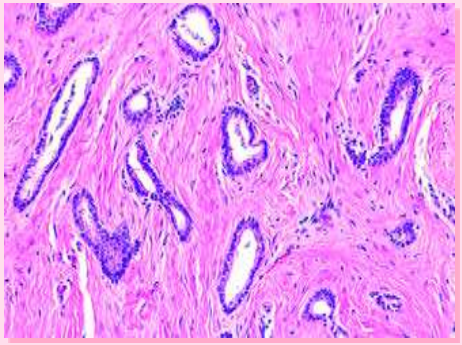
Usually presented as:
-Mainly bilateral
-Multifocal
-Less aggressive than ductal carcinoma
-Slower met

Higher incidence of multicentricity in the same breast and in the contralateral breast.

#Difficult to detect mammographically and on physical examination because of its indistinct border.

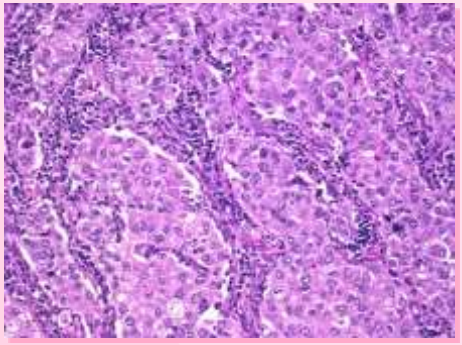
Invasive ductal carcinoma (most common)	Invasive lobular carcinoma
70–80% of all invasive breast carcinomas, usually associated with DCIS.	10–15% of all invasive breast carcinomas, two-thirds of the cases are associated with LCIS.
Unilateral localization.	Unilateral or bilateral.
Mostly unifocal tumors.	Frequently multifocal.
More aggressive, early metastases.	Less aggressive, slower metastasis.
Forms duct-like structures.	Grows in a single-file pattern (No duct formation due to lack of E-cadherin). May exhibit signet-ring morphology.

-Overview of other types of invasive breast cancer:



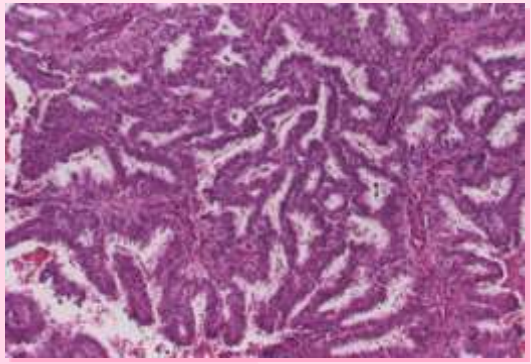
1- Tubular carcinoma:1–2% of invasive carcinomas.
x Typically occurs in women in their late 40s.
x Characterized by well-differentiated tubules that lack myoepithelial cells.
x Excellent prognosis..

2- Medullary carcinoma : x 5% of invasive carcinomas.
x characterized by large, anaplastic, high-grade cells growing in sheets with associated T lymphocytes and plasma cells
x Grows as a well-circumscribed mass that can mimic fibroadenoma on mammography.
x Increased incidence in BRCA1 carriers.
x Relatively good prognosis.



3-Mucinous carcinoma:
x < 5% of invasive carcinomas.
x More common in older women.
x Characterized by carcinoma with abundant extracellular mucin (tumor cells floating in a mucus pool).
x Relatively good prognosis

4- Papillary carcinoma: a rare type of invasive cancers usually well defined border and is made up of small finger-like projections.



3- Inflammatory breast cancer

is a fast-growing, often fatal cancer.
characterized by dermal lymphatic invasion of tumor cells mostly ductal carcinoma

- As a result, the breast appears inflamed, and the skin appears thickened, resembling orange peel (peau d'orange).
- The lymph nodes feel like hard lumps.
-NO mass is felt in the breast itself because this cancer is dispersed throughout the breast.
Unlike mastitis, no fever or leukocytosis is present.

x Treatment: chemotherapy + radiotherapy + radical mastectomy.
x Poor prognosis

4- Paget disease of the nipple

Ductal carcinoma (either in situ or invasive) that infiltrates the nipple and areola.

Clinical feature:

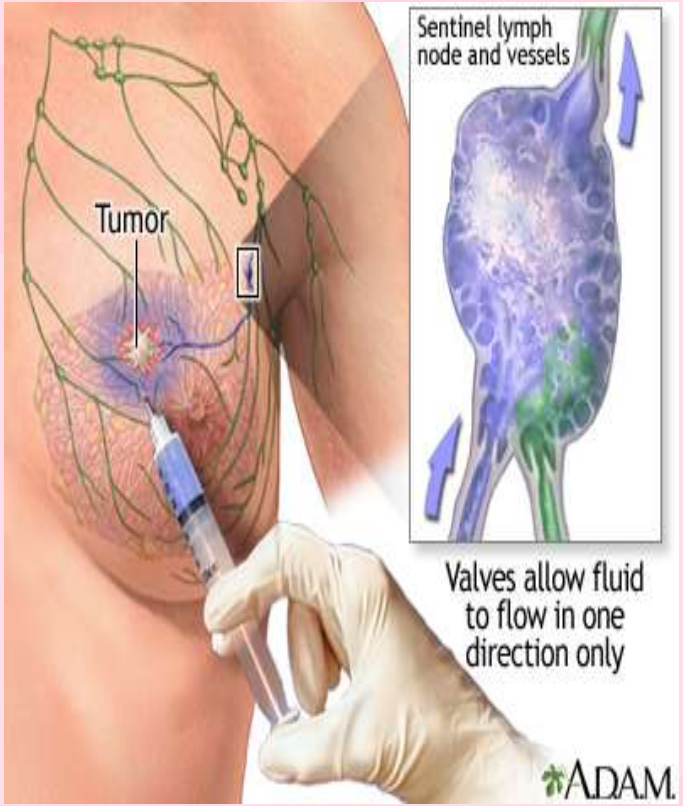
-Erythematous,
-vesicular rash affecting the nipple and areola
-Pruritus, burning sensation, nipple retraction
-The lesion eventually ulcerates → blood-tinged nipple discharge

Note that the eczematous skin lesion might resemble eczema of the nipple, however unlike the later, Paget's disease usually presents with a destroyed nipple and a skin lesion of ill demarcated edges that does not show significant response to steroidal therapy.

Prognosis

The most important prognostic factor in breast cancer is whether or not they have **metastasized to the axillary nodes**.

-A sentinel node biopsy is used to assess axillary lymph nodes



Sentinel node biopsy

-Standard of care in the management of the axilla in patients with clinically node-negative disease.
- **In** patients in whom there is no tumor involvement of the sentinel node, further axillary dissection can be avoided.

6 Treatment

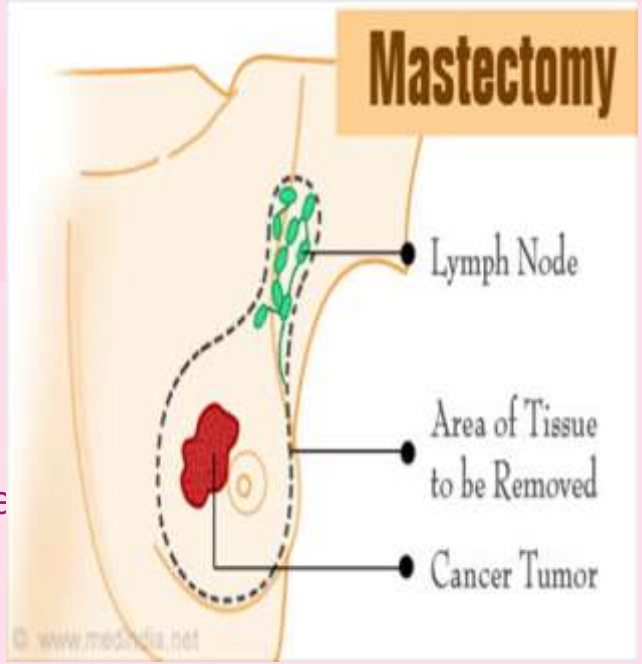
Surgical treatment

Mastectomy is indicated for large tumors

The radical mastectomy is the most commonly performed
. the whole breast; a large portion of skin, the center of which overlies the tumor but which always includes the nipple; all of the fat, fascia and lymph nodes of the axilla.

Simple mastectomy involves removal of only the breasts with no dissection of the axillary lymph nodes

Conservative breast cancer surgery This is aimed at removing the tumor plus a margin of normal breast tissue.



Thanks!