Breast Diseases: Part 2

Objectives:

1- To know the common benign breast disease (signs & symptoms & diagnosis & treatment)
2- Breast cancer:
   a-types
   b- clinical presentation
   c- diagnosis
   d- staging
   e- surgical treatment
   f-roles of Radiation therapy, Chemotherapy , hormonal and biological therapy
3- Nipple discharge,and nipple abnormalities
4- Breast infection and treatment
5- Breast pain causes and management

Resources:

- Davidson's (Chapter 19 pg 326).
- 436 doctors slides.
- 435's teamwork.
- Surgical Recall.

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Color Index:

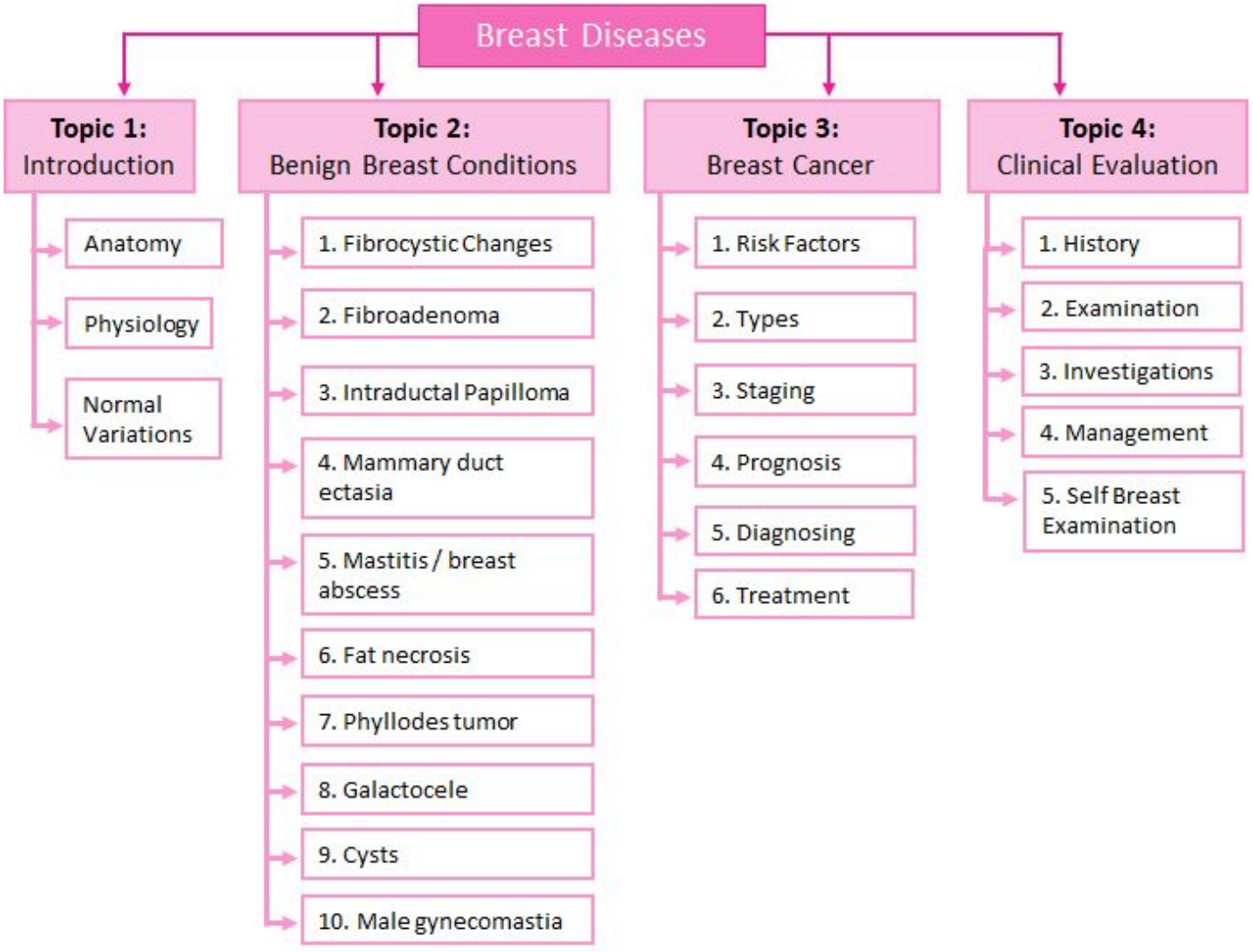
Notes , Important , Extra , Davidson's

Editing File

Feedback

Outline

Important note: To make things easier (because this is a long lecture), we divided it into **4 topics**:
1- Introductory part (Anatomy, Physiology, Normal variations).
2- Benign breast conditions.
3- Breast cancer.
4- Clinical Evaluation (History, Examination, Investigations, Management, Self Breast Examination)
Topics 1 and 2 will be covered in the Part 1.



We recommend you study the summary (click here) first (it contains all the key points according to the objectives) then go through the lecture (which will help you with the OSCE).

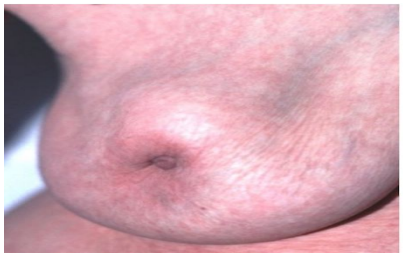
المحاضرة طويلة وفيها كلام كثير أهم شيء انكم تفهمون الفكرة ولا تحوسون في التفاصيل لأن الدكاتره ما ركزوا عليها ولا شرحوها.

Topic 3: Breast Cancer Video (11:06)

Fast facts:

- **Killer of women**, USA 1:8, KSA? 1:15
- 187000 cases of cancer breast in one year (USA).
- 45000 deaths due to it in one year (USA).
- Breast cancer is the most common cause of death from cancer in western women.
- Every day in Australia, over 30 women discover they have breast cancer.
- In Australia 11,400 people (11,314 women and 86 men) were diagnosed with breast cancer in 2000.
- 9 out of 10 women who get breast cancer do **not** have a family history of the disease.
- **Age is the biggest risk factor** in developing breast cancer – over 70% of cases occur in women over 50 years.
- Women aged 50–69 who have a breast screen every two years can reduce their chance of dying from breast cancer by at least 30%.
- Breast cancer is the most common cancer in women aged over 35 years - 25% of all cancers diagnosed.
- The average age of diagnosis of breast cancer in women is 45 - 55 years.
- During the period 1994 to 1998, the five year survival rate for women diagnosed with breast cancer was 85 %
- Although we know of many factors that contribute to the risk of women getting breast cancer, the cause remains unknown.

This is the progress of breast cancer. 1st pic is the typical presentation of advanced **mass and inverted nipple**, then the cancer starts eating the skin (2nd picture) then if it is ignored it will proceed to be like the third picture which we call it **fungating** breast cancer (may be complicated with superimposed infection).



Risk Factors:

- Being a **female** and over **45** years of age.
- 90% are sporadic!! And only 10 are genetically predisposed.

Genetics: (the doctor did not explain these)

- Early age of onset
- 2 breast primaries or breast & ovarian CA
- Clustering of breast CA with:
  - Male breast CA
  - Thyroid CA
  - Sarcoma
  - Adrenocortical CA
  - Pancreatic CA
  - Leukemia/Lymphoma on same side of family
- Family member with BRCA gene
- Male breast CA
- Ovarian CA

Table 19.4 Established and probable risk factors for breast cancer

Factor	Relative risk	High-risk group
Age	> 10	Elderly
Geographical location	5	Developed country
Age at first full pregnancy	3	First child in early 40s
Previous benign disease	4–5	Atypical hyperplasia
Cancer in other breast	> 4	Women treated for breast cancer
Socioeconomic group	2	Social classes I and II
Diet	1.5	High intake of saturated fat
Exposure to ionizing radiation	3	Abnormal exposure in young females after age 10
Taking exogenous hormones		
Oral contraceptives	1.24	Current use
Combined hormone replacement therapy	2.3	Use for ≥ 10 years
Family history	≥ 2	Breast cancer in first-degree relative

BRCA (BRCA → **BR**EAST **CA**NCER):

- Account for 25% of early-onset breast cancers
- 36 - 85% lifetime risk of breast cancer
- 16 – 60% lifetime risk of ovarian cancer

Management

- Monthly BSE – 18 y.o
- 6 month CBE & annual mammo – 25 y.o
- Discuss risk reducing options
- Prophylactic Mastectomies
- Salpingo-oophorectomy upon completion of child bearing
- 6 month transvaginal US & CA125 – 35. y.o

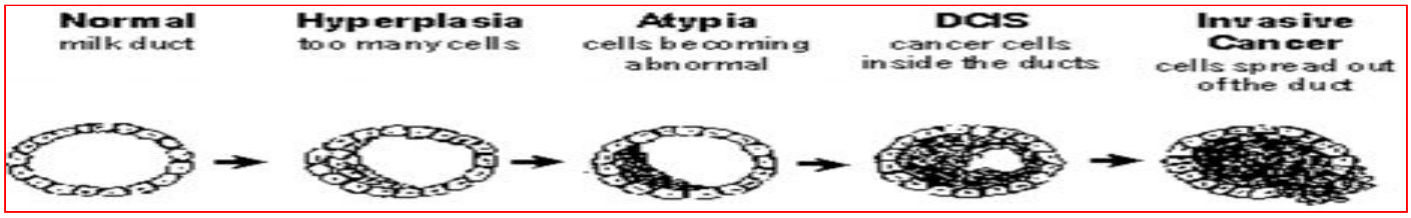
Table 1: Lifetime breast cancer risk

	Lifetime breast cancer risk	Median age of breast cancer onset (y)
General population	11%	61
BRCA1	65%	43
BRCA2	45%	41

Histological Types: (the lines of treatment are the same but the prognosis is different)

Generally we divide breast cancer into:

- invasive or non-invasive[1] (pre-malignant "in-situ")
- ductal or lobular.



Infiltrating (or invasive) Ductal Carcinoma (IDC)	**Starting in**: A milk passage, or **duct**, of the breast, this cancer breaks through the wall of the duct and invades the **breast's fatty tissue**.	**80%** of all breast cancers. **Most common type**. Usually found on mammogram.	**Metastasis:** through the **lymphatic system** and through the **bloodstream**
Infiltrating (or invasive) Lobular Carcinoma (ILC)	**Starting in**: Milk-producing glands.	**10-15%** of invasive breast cancers are **invasive lobular carcinomas**. RARE 2nd most common	These are **multi-centeric**, and they can appear in the other breast as well (**bilateral**).
Medullary Carcinoma	Has a relatively **well-defined distinct boundary** between tumor tissue and normal breast tissue.	**5%** of all breast cancers.	**Prognosis better** than that for invasive lobular or invasive ductal cancer
Colloid Carcinoma	Also called **mucinous carcinoma**, is formed by mucus-producing cancer cells.	**Rare** type of invasive disease.	**Prognosis better** than for invasive lobular or invasive ductal cancer.
Tubular Carcinoma	Tubular carcinomas are a special type of invasive breast carcinoma.	**2%** of all breast cancers	**Better** prognosis than invasive ductal or lobular carcinomas and are often detected through breast screening.

[1] If cancer confined to duct = in situ / if moved beyond duct invasive or infiltrating

Adenoid Cystic Carcinoma	it is more usually found in the salivary glands.	This type of cancer **rarely develops** in the breast;	**Better** prognosis than invasive lobular or ductal carcinoma.
Pagets disease of nipple	Paget's disease: When there is skin ulceration, excoriation of nipple or non responding to initial treatment; → rule out Paget's disease. Do biopsy, if you find **pagetoid lesion** than it's Paget's disease which indicate → invasive ductal carcinoma. Paget's disease presentation commonly mistaken as eczema[2]. If we diagnose paget's we go for mastectomy.		
Sarcoma	Malignant tumors of the connective tissues. For sarcoma we only do surgery, we don't need to excise the lymph nodes because it spreads by the blood. We manage it like sarcoma.		

Treatment of DCIS: SURGERY!

- Depends on the degree of DCIS the options of treatment are
  - Total mastectomy
  - Lumpectomy
  - Lumpectomy and radiation therapy
- DCIS does **not** spread to the axillary lymph nodes so these are usually not removed.

Five year survival rate for women with breast cancer:

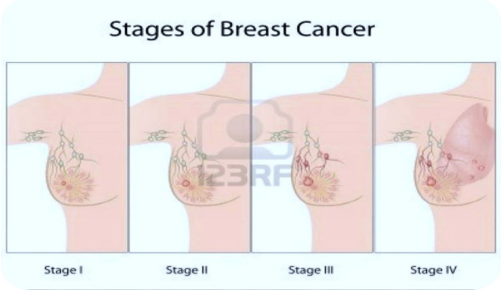
Stage at diagnosis	Survival rates (%)
Localized (may be advance but still local ما طلع)	96.8[3]
Regional (if in **axilla**)	75.9
Distant metastasis (stage **4**)	20.6

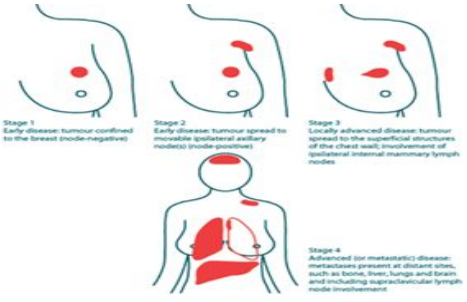
Staging and classification: very important (note: stage 1 & 2 are early and stage 3 & 4 are late)

Stage 0	Stage 1	Stage 2	Stage 3	Stage 4
Neither palpable tumor	Tumor < 2 cm	2 cm - 5 cm	Tumor > 5 cm	Tumor of any size. Distant metastases (such as bone, liver, lung, brain)
Nor axillary lymph nodes	No lymph node involvement	1 ipsilateral axillary node involvement (moveable)	Skin involvement or lymph node either mobile or fixation	Supraclavicular node involvement

TNM STAGING

- **T** → tumor size and spread
- **N** → cancer spread to lymph nodes
- **M** → spread to distant organs & metastasis





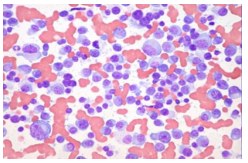
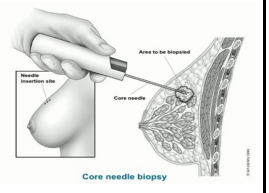
[2] Paget's disease always affects the nipple and only involves the areola as a secondary event, whereas eczema primarily involves the areola and only secondarily affects the nipple

[3] High survival rate so it is CRUCIAL to catch cancer in the early stages

PROGNOSTIC FACTORS:

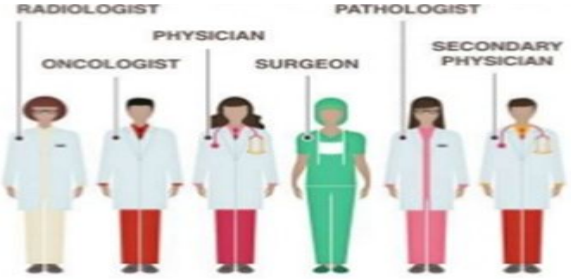
- Size of tumor
- Grade of tumor
- Lymph nodes involvement → the single most important prognostic factor is the **number of axillary lymph nodes involved**.

Investigations

Fine needle aspiration	Cytology	• Fast, inexpensive • 96% accuracy • Institution dependent • Unable to differentiate between in-situ vs CA	
Core biopsy	Image guided	CORE NEEDLE BIOPSY • 14 – 18 gauge spring loaded needle • Tissue • Multiple LARGE CORE BIOPSY • 6 – 14 gauge core • Large Samples • Single insertion	
	Stereotactic	• Suspicious mammographic abnormalities • Patients lay prone • It's a biopsy in mammogram, done when there is microcalcification with NO palpable mass.	
Excisional biopsy	Needle localization	• Atypical lesions • LCIS • Radial scar • Atypical papillary lesions • Phyllodes • Inadequate tissue	

Management of Breast Cancer Summary of management by Dr. Amal:

Management: Staging+Breast examination+US+Mammograms+CT CAP → to rule out metastases,
If stage 3 → Bone scanning.
1- Conservative management is lumpectomy and sentinel[4] lymph node in combination with Radiation therapy[5]
2- If we do mastectomy → No radiation therapy
- All pt have to go for Chemotherapy according to different criteria.
- **Stage 1&2** → goes with Conservative management.
- **Stage 3** → Neoadjuvant chemo for any tumor >5 mm with skin changes or lymph node, to downstage the tumor to 1 or 2, if respond goes with conservative, if not then goes with mastectomy and sentinel lymph node.
- In axillary dissection you have to safe:
1- Long thoracic nerve "which supply serratus anterior" to prevent winging of scapula.
2- Intercostobrachial nerve "which supply latissimus dorsi" give weak adduction.
Stage 4: no surgery just chemotherapy and refer to onco.
Keep in mind that many doctors involved in the treatment of the patient → multidisciplinary approach (See image) -------->



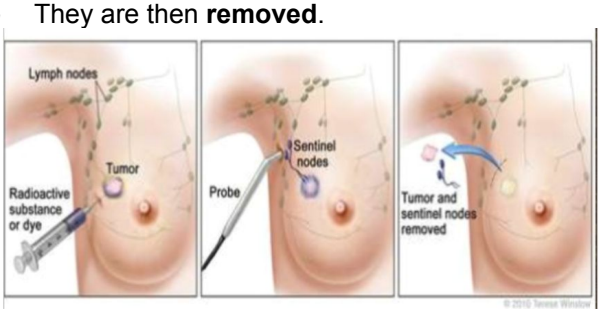
[4] Inject a contrast or radioactive materia to detect if there is positive or negative lymph node. If + dissect the Axilla, if - don't touch the axilla. The aim is to prevent lymphedema.
[5] Never do Lumpectomy alone without radiation therapy, because there is a risk of recurrence if you don't give radiation.

Lines of treatment:

1- Surgery: Video(03:16)

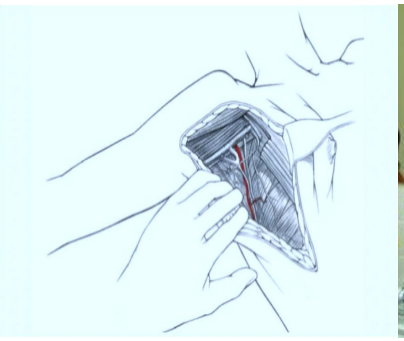
Basically you have two options for the breast: total mastectomy (the whole breast) or lumpectomy/wide local excision (only the tumor). And you have two options for the axillary lymph nodes: dissection (all nodes) or sentinel LN biopsy.

For Stage I, II either **WLE** (wide local excision) or **mastectomy** + **axillary nodes**.

Breast	Lymph nodes
You don't have to know the details. 1. Total (simple) mastectomy 2. Total mastectomy with axillary clearance 3. Modified radical mastectomy (MRM) a. Patey's operation b. Scanlon's operation c. Auchincloss' MRM 4. Radical mastectomy of halsted 5. Conservative breast surgeries a. Wide local excision (WLE) / partial mastectomy → removal of unicenteric tumor with 1 cm clearance margin incision over tumor + axillary dissection + RT b. Lumpectomy c. Quadrantectomy → Removal of entire quadrant with ductal system with 2 - 3 cm normal breast tissue clearance (part of quart therapy not advocated now. d. Toilet mastectomy e. skin-sparing/keyhole mastectomy	• Axillary lymph node dissection: about 10 to 40 lymph nodes are removed. • Usually done at the same time as the mastectomy or breast conserving surgery. • **Sentinel lymph node[6] biopsy is used to determine if cancer has spread to the lymph nodes under the arm without removing many of them.** • A blue dye/radioactive substance is injected in order to identify the **sentinel lymph nodes which drains lymph from the tumor.** • They are then **removed**. 

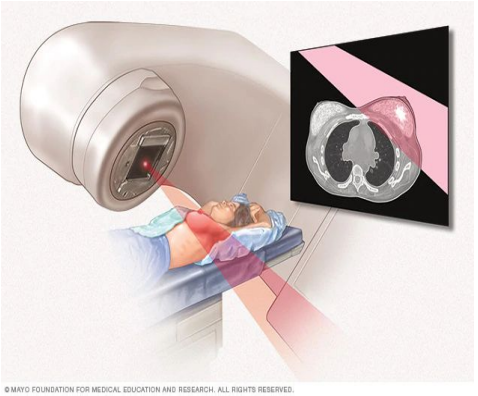
Complications of mastectomy:

- Injury / thrombosis of axillary vein
- Seroma
- Shoulder dysfunction
- Pain and numbness
- Flap necrosis and infection
- **Lymphoedema** and its problems
- Axillary hyperaesthesia
- **Winged scapula**



2- Radiotherapy:

- **Indications**:
  1. **Conservative breast surgery adjuvant**[7] (we **always** give radiotherapy when we want to **conserve** breast tissue)
  2. Total mastectomy (axilla).
  3. High risk of relapse group:
     a) invasive carcinoma b) extensive in-situ carcinoma
     c) age < 35 years d) multifocal disease
  4. Bone secondaries (palliative).
  5. Atrophic scirrhous carcinoma (curative)
  6. **Preoperatively (reduce tumor size and downgrade).**
  7. >4 +'ve axillary LM, pectoral involvement, positive surgical margins, extranodal spread.



[6] The first lymph node that drains the tumour is called the sentinel node and is most commonly a level I axillary node.

[7] Adjuvant therapy for cancer refers to surgery followed by chemo- /radiotherapy to help decrease the risk of the cancer recurrence.

- **What are the side effects?**

During course of treatment:	After course of treatment:
Common:	
Skin reddening – Fatigue – Loss of hair – Sore throat	Discomfort and sensitivity – Increased firmness – Swelling of the treated breast / area
Rare:	
Skin blistering – Nausea – Rib fractures (Less than 1:100 experiences fracture in the treated area)	Pneumonitis & scarring (2:100 experience it between 6 weeks and 6 months after therapy has finished)

Lymphoedema → What is it?

- Lymphoedema is long-term swelling of the arm **after axillary surgery or radiotherapy to the axilla.**
- Lymphedema is due to lymphatic system damage or a blockage, which causes the lymph to build up in the soft tissue beneath your skin.
- Symptoms include a general heaviness of the arm, a swelling of the fingers or sometimes difficulty putting on a long sleeve.
- The earlier treatment is started the easier it is to achieve good results.
- Less than 1 in 10 women who have had either lymph glands removed or radiation to the armpit will develop noticeable lymphoedema. This risk increases to 1 in 3 if the pt. had both of these treatments.

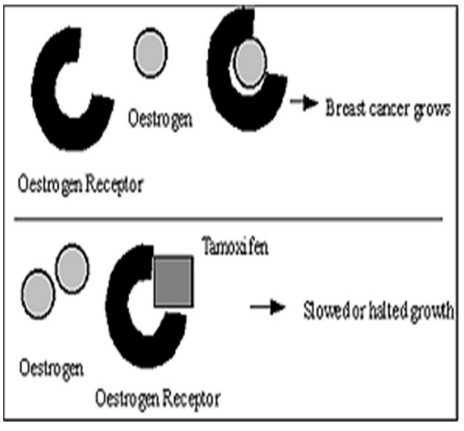
When can Lymphoedema happen?

- Secondary lymphoedema can occur any time after the operation, even up to ten or even 20 years.

3- Chemotherapy:

- We give neoadjuvant chemo (i.e before the surgery) to shrink the tumor **before** breast conserving surgery.
- Usually given in cycles every 3 or 4 weeks.
- **The common schedules include**:
  - CMF (cyclophosphamide, Methotrexate and 5-fluorouracil)
  - AC (Adriamycin, cyclophosphamide)
  - Taxol or Taxotere.
- **Side effects:** Fatigue, anorexia, Nausea and vomiting, **Hair loss**, Effects on blood, Mouth Problems, skin problems, Fertility, Bowel problems**, neutropenia.**

4- Hormonal therapy: Tamoxifen



- a drug that has been used for the treatment of breast cancer (only given to **estrogen receptor[8] positive** breast cancer).
- It can (1) increase survival for some women with breast cancer and (2) significantly **reduce their risk of developing cancer in the opposite breast** (those who have cancer in one breast have 7% chance of getting it in the other breast)**.**
- Tamoxifen is sometimes used for patients whose breast cancer recurs.
- It is also being tested to see if it can prevent the development of breast cancer in unaffected women who are at an increased risk because of a strong family history of the disease.

[8] Remember we can classify breast cancer according to which receptors are present: estrogen or progesterone (ER / PR), HER-2, or if none of them are present = triple negative (worst prognosis).

How it is given?

- Tamoxifen is taken by mouth. Tablets are either 10 mg or 20 mg. The usual dose is 20 mg **daily**. It is usually started after surgery or after the completion of radiation treatment.
- Tamoxifen should take it at the same time each day.

How long is the treatment?

Currently the recommended length of Tamoxifen therapy is five years, now we give it for 10 years.

What are the side effects? Most significant: **endometrial cancer and DVT.**

Common side effects:	Uncommon side effects:
– Hot flushes or sweats – Irregular menstrual periods (in women who have not gone through the menopause) – Vaginal irritation, including vaginal dryness or discharge – Fluid retention and weight gain	– Lightheadedness, dizziness, headache or tiredness – Rash – Nausea

5- Ovarian ablation.

6- Post Operative Breast Reconstruction:

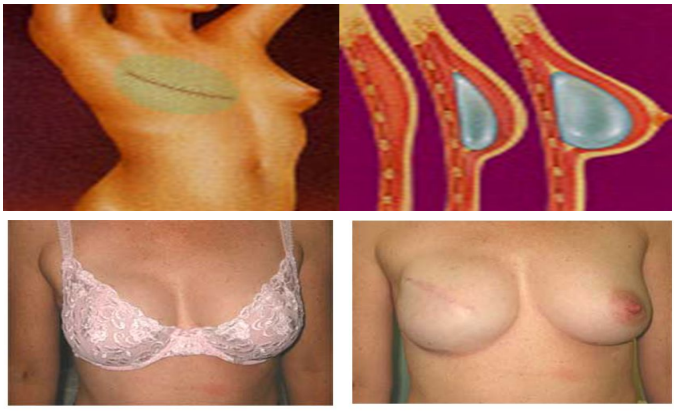
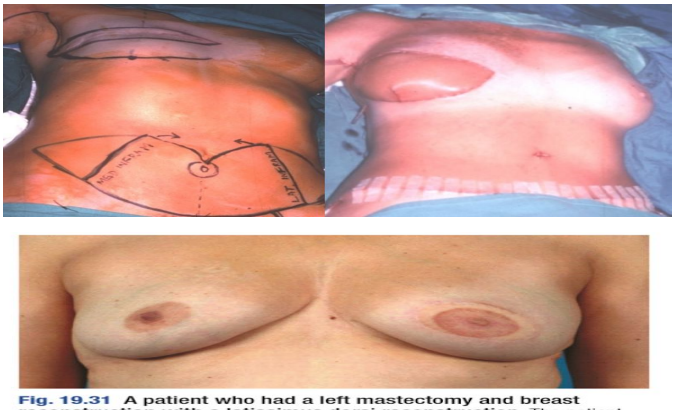
You always have to discuss this with patients, even if you think they are too old, they have to know their options!

The aim of breast reconstruction: is to rebuild the breast shape and, if desired, the nipple and the surrounding darker skin (areola).

What are the benefits? Reconstruction usually does not restrict any later treatments that may be necessary, nor does it usually interfere with radiotherapy, chemotherapy or hormone therapy.
The patient will not need to wear an external prosthesis.
Follow-up after the operation is no more difficult and any recurrence of cancer in the area can still be detected.
Some women feel more self-confident and feminine when they have a permanent prosthesis or reconstruction.

What are the choices?

There are two main types of breast reconstruction:

Tissue or skin expander with breast implant	Flap reconstruction
A tissue expander is inserted after the mastectomy to prepare for reconstruction. The expander is gradually filled with saline to stretch the skin enough to accept an implant beneath the chest muscle. This procedure is simpler but has 75% satisfaction rate.	TRAM (transverse rectus abdominis myocutaneous) flap, and latissimus dorsi techniques. This procedure is more complex but gives good result because we move the fat and its supply, and this is living tissue and it grows with the patient.
 A patient with a tissue expander following a mastectomy.	 **Fig. 19.31** **A patient who had a left mastectomy and breast reconstruction with a latissimus dorsi reconstruction.** The patient also had a nipple reconstruction with tattooing.

Another option is a **external breast prosthesis** - specially designed padding available in different sizes, shapes and colours. ---------->

Topic 4: Clinical Approach

Women come to see a breast surgeon because of one of the followings:

1. Breast lump (painful or painless) 60%
2. Breast pain without lump 10%
3. Nipple discharge 5%
4. Change in breast contour 2%
5. Nipple – areolar complex disorder 1%
6. Axillary mass[9] 1%
7. Screen detected lesion 1%
8. Anxiety 20%

Clinical Approach:

- History .
- Clinical (Physical) examination.
- Investigations: imaging, cytology & tissue diagnosis.
- Management

I. History:

- Full and complete history should be taken, particular attention should be paid to:
  - Breast development starting from childhood to present.
  - Endocrine status of patient mainly menstruation and OCP.
  - Size of lump in relation to menses.

HPI	• Pattern of pain in relation to **menses** (is it cyclic or non-cyclic). • Nipple discharge (there are 9 to 10 types, but only **bloody discharge** is clinically significant). • Married or not
Menstrual	• How regular the cycle is and quantity of blood. • Number of pregnancies and number of children. • Changes in breast during previous pregnancies e.g. abscess, nipple discharge, retraction of nipple. • Breast feeding (more than or less than 6 months) • Abnormalities which took place during previous lactation period e.g. abscesses, nipple retraction, milk retention. • Age at menarch, Age at 1st birth, L.M.P. (last menstrual period) • For past menopausal women: H.R.T.[10] (hormone replacement therapy) & Date of menopause.
Family	• **Family history of breast diseases especially cancer** (breast and ovarian because they are connected by similar genes) **and particularly in near relatives** (if yes who? Are they a close relative or not? How old[11] were they when they were diagnosed?)**.**
Past	• History of infection (mastitis or breast abscess),instrumentation, biopsy, surgery (whether therapeutic or cosmetic)

II. Examination:

- **Exposure**: Disrobed from waist and above (this is the **ideal** exposure so that when we examine we can compare: first hand by hand, then arm by arm, axilla by axilla, breast by breast, supraclavicular by supraclavicular, then abdomen and back).

[9] Very low percentage of breast cancer present with axillary mass **without obvious breast mass**.
[10] prolonged use is associated with higher risk of breast cancer. Usually women are advised to use it for 2 years then take a break for 6 months.
[11] It is more significant if they are **young**! More likely to be **genetic**!

- **Position**: sitting and supine position and 45° position.

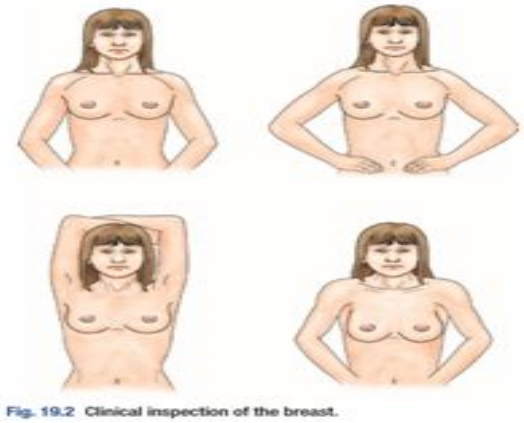


Fig. 19.2 Clinical inspection of the breast.

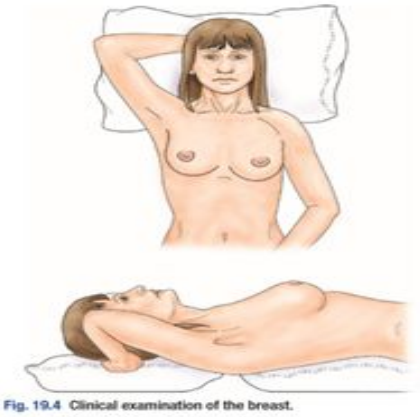


Fig. 19.4 Clinical examination of the breast.

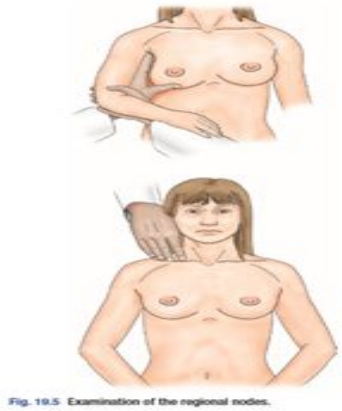


Fig. 19.5 Examination of the regional nodes.

1. **Inspection** (with arms by the side and above head):
   - Size, symmetry, skin changes, nipple complex.
   - Mass, contour.
   - Examine normal side first.
   - Examine axilla, arm, SCF (supraclavicular fossa).
   - Examine abdomen → ascites & organomegaly.
   - Examine the back → bony tenderness.

2. **Palpation:**
   - Gland
   - Axilla, Supraclavicular spaces[12]
   - Nipple-areola complex

➔ Examples of findings:


Dimpling due to Carcinoma


Change in contour due to carcinoma


Skin Dimpling Breast Infection


Skin Dimpling Previous Breast Surgery


Inverted Nipple Since Puberty


Skin Dimpling Both Breasts Involution Due to Aging

- Features of malignancy: Lump, skin changes, bloody nipple discharge, change in the symmetry or contour.
- By Inspection, you have to check for symmetry, contour and skin changes like dimpling, very important to rule out malignancy.
- Skin Dimpling indicate malignancy or infection "mastitis", so malignancy or infection may present the same.

For the full breast examination (OSCE) click here: checklist 1, checklist 2, Video(05:49)

III. Investigations:

TRIPLE ASSESSMENT[13]: H&P + Imaging: Mammogram (99%) + biopsy: F.N.A.

Techniques available for investigations:

- Clinical examination.
- Cytology of discharge.
- Mammography and ductography.
- Ultrasound.
- Imaging-guided percutaneous biopsy.
- M.R.I.
- Nuclear medicine (include PET).

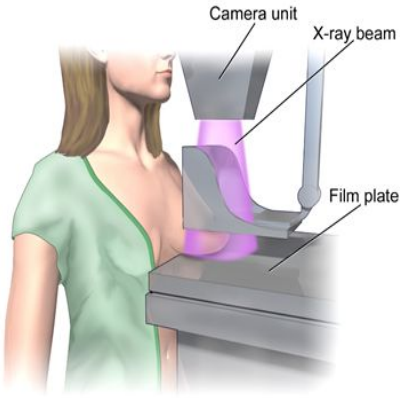
[12] Clinical assessment of axillary nodes is not always accurate. Palpable nodes can be identified in up to 30% of patients with no clinically significant breast disease, while up to 25% of patients with breast cancer who have no palpable nodes on examination will be found histologically to have metastatic disease in the axillary nodes. Ultrasound is better at assessing axillary nodes than clinical examination.

[13] apply it on any lump in the breast and you will reach the diagnosis in 99%

When to image?

- Investigation of a palpable lump or nipple discharge.
- Screening in appropriate groups.
- Metastatic adenocarcinoma, unknown primary.

1) Mammogram Video(02:06)



Mammogram

- We do mammogram for 2 different reasons: screening OR diagnosing:
  - Diagnostic → for someone who **has** a complaint
  - Screening → **NO** complaint but above 40 years
- **Screening tool** at age of **40** (those younger than 40 have dense breast tissue so it is not useful).
- Estimated **reduction in mortality** 15 – 25%
- Who to screen?
  - Prior breast cancer or atypia → **Annual** mammography
  - Family Hx → **10 years younger** than relative's diagnosis
  - BRCA → 25 y.o, **annual** mammography
- It will show: densities and/or **calcification.**
- FEATURES OF MALIGNANCY:
  - Spiculated mass.
  - Architectural distortion without mass.
  - Micro-calcifications with casting or irregularity.
  - Circumscribed density with indistinct margins.
  - Asymmetric density.

Calcifications:

- 60% of localisation **biopsies** are for calcifications, but only 25% of these calcifications yield (turn out to be) malignancy.
- If we find a calcification we should describe the following:
  - Distribution (casting, linear, segmental, clustered).
  - Morphology (pleomorphism).
  - Relationship to parenchyma.
- Calcifications can be divided into 2 categories:

Macrocalcifications	**Microcalcifications**
• Large white dots • Almost always non-cancerous and require no further follow-up Macrocalcification → Not significant they are **BENIGN**!	• Very fine white specks • Usually non-cancerous but can sometimes be a sign of cancer • Size, shape and pattern Microcalcification → Associated with malignancy

Basically why do we do mammograms? And why do we use them for screening? We want to detect **microcalcifications**. Why? Because DCIS appear as microcalcification and we want to catch patients in this stage! DCIS is premalignant and if we treat it there is almost 99% cure rate. But keep in mind NOT all micorcalcification is malignant, majority is benign.

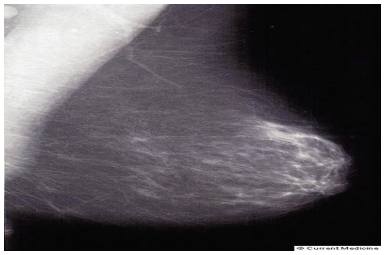
How else can DCIS appear? IMAGING FEATURES WHICH CAN BE ASSOCIATED WITH D.C.I.S.

- **Microcalcifications** (75-90%).
- Circumscribed mass.
- Ill-defined mass.
- Prominent duct or nodule.
- Architectural distortion.
- Asymmetry.
- Sub-areolar mass.

BI-RADS[14] Classification	Features
0	Need additional imaging
1	Negative - routine in 1 year
2	Benign finding - routine in 1 year
3	Probably benign - 6 month follow up
4	Suspicious abnormality - biopsy recommended
5	Highly suggestive of malignancy - appropriate action must be taken.

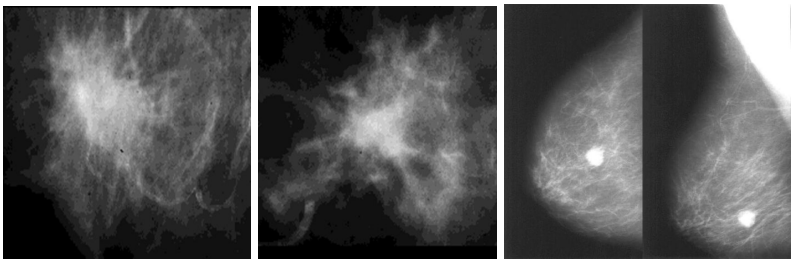
IMAGES: **(you're not supposed to know all the images just get an idea**, doctor went through them very quickly)

I. Normal mammogram:



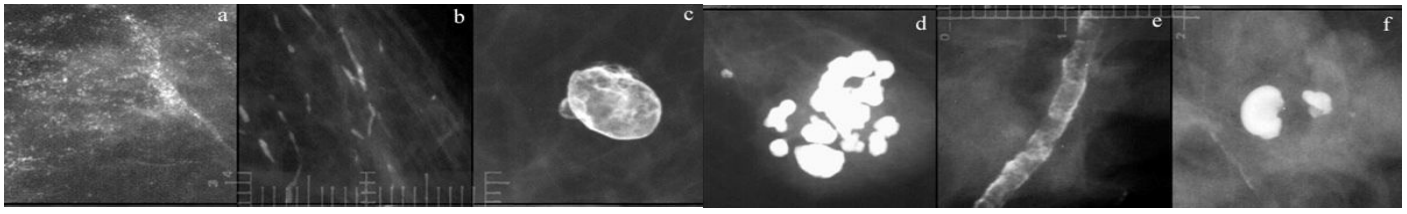
Normal unilateral mammogram with two standard views. This normal mammogram is an example of a fibrofatty pattern (as a lady grows older breast tissue is replaced with fat).

II. Spiculated margins/mass



Suggestive of malignancy, **biopsy should be considered** (spiculated and indistinct (irregular) margin in a small infiltrating lobular carcinoma)

III. Benign Calcifications



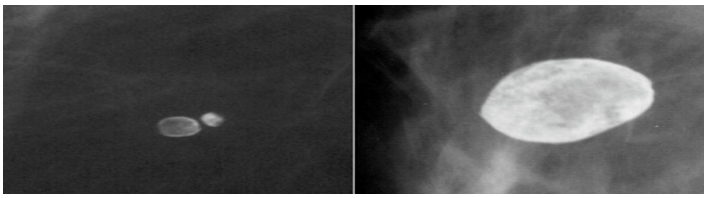
a-punctate b-linear c-spherical d-popcorn e-vasclar f-smoothly dense

You have to know that the body throws calcium in different parts of the body like the thyroid and the kidney and gallbladder and the breast. But mostly it's MACROCALCIFICATION and its BENIGN. Even the micro most of it is benign (only 15% will be malignant) FIBROADENOMA is a **benign** disease and if left for a long time it can calcify and appear like this POPCORN.

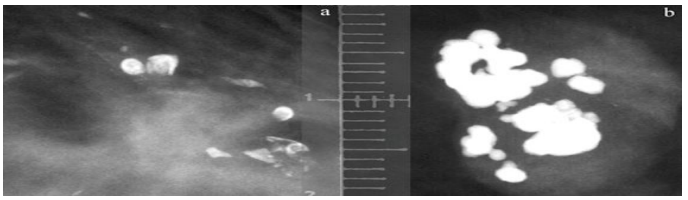
Artifacts on mammographic images can be misinterpreted as originating from the affected breast. They can often pose as clinical and technical troubleshooting difficulties for the interpreting radiologist. They can arise from the patient in the form of hair, deodorant, or body parts (such as a nose or arm projected onto the film). The mammography x-ray unit, film, cassette, or screen can also contribute to possible artifacts [13], [14]. This mediolateral oblique view from a screening examination demonstrates static. This film artifact is caused by improper humidity conditions.

[14] Breast Imaging Reporting and Data System → a widely accepted risk assessment and quality assurance tool in mammography, ultrasound or MRI. Part of the initial implementation was to make the reporting of mammograms more standardized and comprehensible to the non-radiologist reading the report.

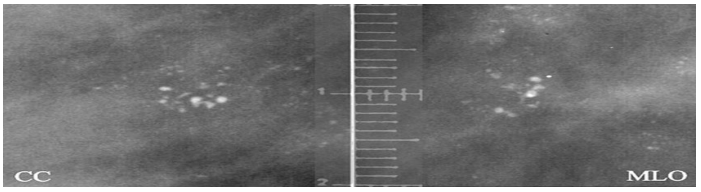
The following are types of calcium distribution:



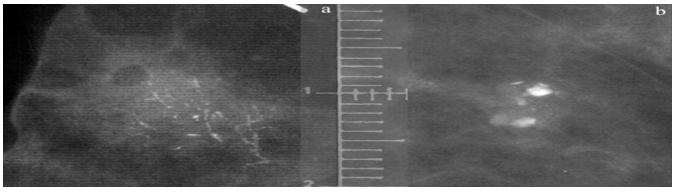
Spherical or lucent centered calcifications: There are benign calcifications that range form under 1 mm to over a centimeter. These deposits have smooth surfaces, are round or oval, and tend to have a lucent center. The wall is thicker than "eggshell" forms. They arise from areas of fat necrosis, calcified duct debris, and occasional fibroadenoma.



Round Calcifications: When multiple, they may vary in size. They are usually considered benign and when small (under 1 mm), the term **punctate** may be used. They are smooth, dense and round.

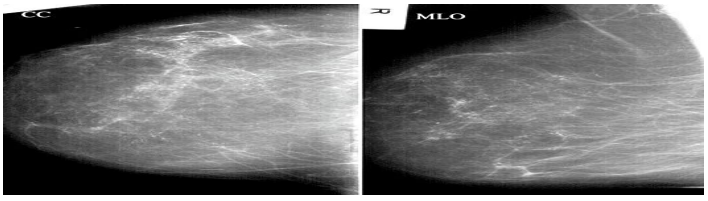


Grouped or Clustered: (Historically, the term clustered has can noted suspicion, the term shall now be used as a neutral distribution modifier and may reflect benign or malignant processes): The term is used when multiple small calcifications occupy a small volume of tissue (less than two cc.).

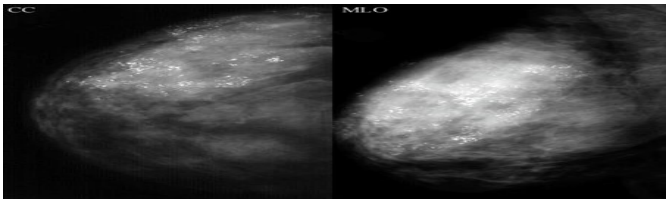


a-DCIS b- fibroadenoma

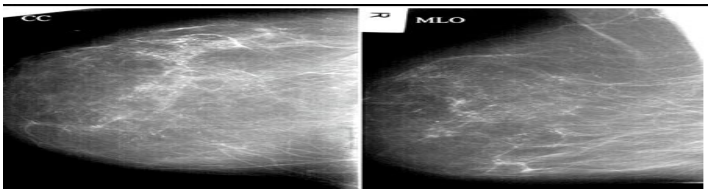
Linear: Calcifications arrayed in a line that may have branch points majority of patients present like this and if left untreated they may develop cancer and present as a mass.



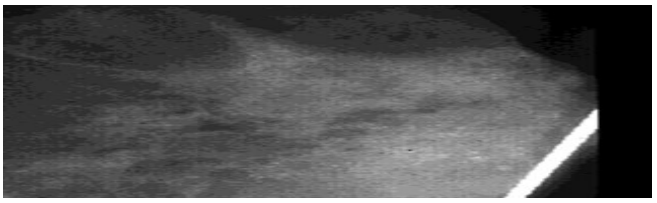
Segmental: These are worrisome in that their distribution suggests deposits in a duct and its branches raising the possiblity of multifocal breast cancer in a lobe or segment of the breast. Although benign causes of segmental calcifications exist such as "secreatory disease: this distribution is of greater concern when the morphology of the calcifications is not specifically benign.



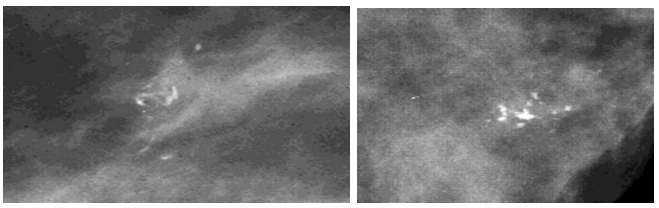
Diffuse/Scattered:
These are calcifications that are distributed randomly throughout the breast.



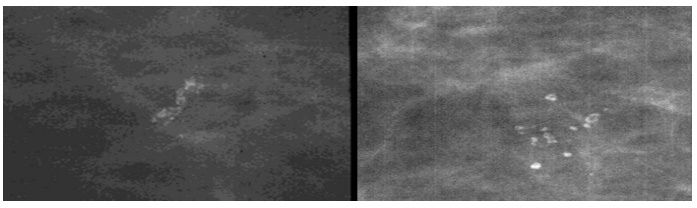
Multiple groups may be indicated when there is more than one group of calcifications that are similar in morphology and distribution widespread distribution, even over an entire breast is worrisome if unilateral, while bilateral changes are suggestive of a benign processes.



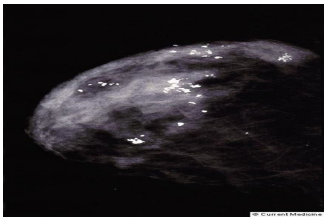
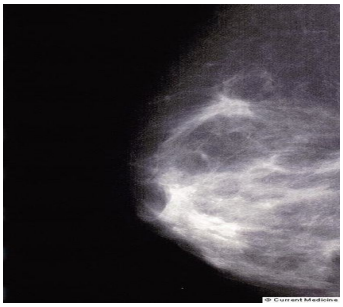
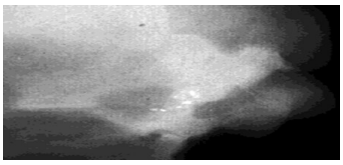
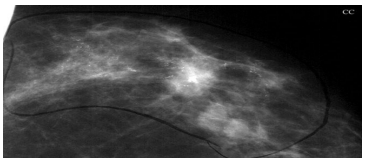
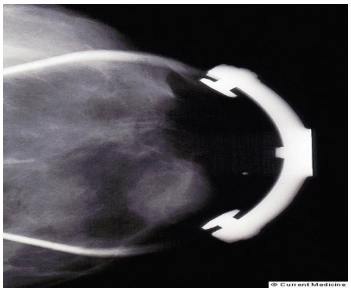
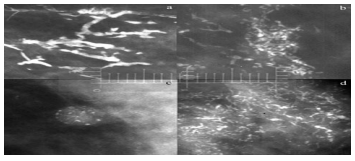
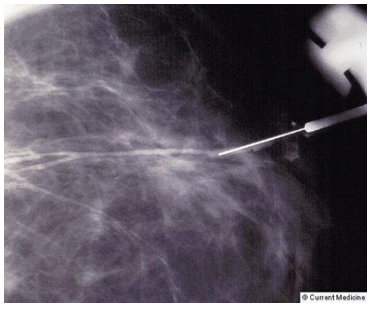
Intermediate concern calcifications: group of poorly defined calcifications, some round, others irregular with a clustered distribution. These particular calcifications were benign related to sclerosing adenosis, however similar appearances are common enough in small cancers to merit biopsy.



Pleomophic (granular):
First picture: grouped irregular calcifications were found to be benign (fibroadenoma).
Second picture: irregular calcifications were associated with ductal carcinoma (cancer).



Skin calc, Benign calcification: Typical skin calcifications, dense, smooth, with a donut like lucent center when viewed with magnification

OTHERS			
	Benign microcalcifications. A, Hyalinizing fibroadenoma, craniocaudal view. There are multiple scattered dense, large, coarse popcorn-like calcifications associated with a dense fibronodular pattern. When these calcifications begin to form, they may be suspicious in appearance, prompting biopsy. The calcifications may be too small to characterize, toothlike in configuration, and of varying densities. Hyalinizing fibroadenomas occur more commonly in older women. B, Secretory calcifications, mediolateral view. Rod-shaped, smoothly marginated, dense, coarse calcifications in a pattern directed toward the nipple. These calcifications are commonly associated with ductal ectasia and periductal mastitis [2].		
	Malignant mass. Intraductal and invasive ductal carcinoma not otherwise specified (NOS), nuclear grade 3. Invasive ductal carcinoma (NOS) is the most common type of breast cancer and represents 65% of the breast cancer in the United States [5]. When the histologic pattern does not fit a specific subtype, it is labeled NOS. These cancers can present as a palpable mass or a spiculated mass on mammography. Malignant-type calcifications can be seen and are usually associated with an intraductal component. Ultrasound usually demonstrates a hypoechoic spiculated mass that may be taller than wide. A, Mediolateral oblique view demonstrates a dense, spiculated mass with associated architectural distortion within the superior aspect of the breast. There are associated malignant-type calcifications. B, Directed ultrasound of the breast demonstrates a spiculated hypoechoic mass corresponding to the mammographic lesion. Ultrasound-guided core biopsy revealed invasive ductal carcinoma.		
	Close up (magnified) view of heterogeneous granular calcifications of infiltrating ductal carcinoma.		Segmental distribution of microcalcifications is almost always suspicious
	Benign mass: fibroadenoma. The fibroadenoma is a benign breast mass with no increased malignant potential. Because histologically it contains epithelial cells, a cancer could theoretically arise from within it [4]. Although they are typically found in younger premenopausal women, fibroadenomas are discovered in postmenopausal women as well. Owing to their sensitivity to hormones, increasing numbers of older patients on exogenous hormone replacement therapy have demonstrated the presence of benign fibroadenomas. A, Craniocaudal spot compression view demonstrates a slightly obscured ovoid mass within the medial aspect of the left breast. B, Directed ultrasound of the medial left breast demonstrates a smooth, marginated, well-defined ovoid homogeneously hypoechoic mass with increased through transmission corresponding to the mammographic mass. Ultrasound core-needle biopsy confirmed a benign fibroadenoma.		
	Malignant microcalcifications. Ductal carcinoma in situ (DCIS), comedo type, magnification view. Before the advent of improved mammographic screening, the diagnosis of DCIS was made infrequently. Note the fine, linear, heterogeneous calcifications arranged in a cluster. There is also an associated ill-defined mass lesion. Although the hallmark imaging feature for DCIS is the presence of microcalcifications, DCIS can also present less frequently mammographically as a mass without associated microcalcifications		
	Fine and/or branching (casting) calcifications: These are thin, irregular calcifications that appear linear, but are discontinuous and under 0.5 mm. in width. Their appearance suggests filling of the lumen of ducts . A,b,d branching c:cyst wall		
	**Ductography.** NO ONE DOES THIS ANYMORE **For further evaluation of spontaneous nipple discharge,** a painless ductogram can be performed. Using aseptic technique, a 30-gauge sialography catheter is used to cannulate the effected single ductal orifice. Approximately 0.2 to 0.4 mL of radiographic contrast is injected through the catheter. Magnification views in the true lateral and craniocaudal projections are then obtained. Ductography is useful in detecting the location of the lesion (or lesions) within the ducts and the extent of involvement. This information can be extremely helpful in presurgical planning. A. Normal ductogram. Magnification view demonstrates a normal contrast-opacified duct. There is no dilatation or filling defect. B. Abnormal ductogram. Magnification view demonstrates a single lobulated filling defect in the cannulated duct with associated ductal ectasia. Before surgery, a preoperative ductogram was performed with injection of a combination of radiographic contrast and methylene blue to localize the specific duct. The patient was found to have a solitary papilloma.		

2) Ultrasound (US)

Mammogram is painful and expensive, while US is painless and cheap and no radiation BUT it is only directed toward defining a mass! NOT AS A SCREENING only the mammogram is used from screening. Also US is used for patients **under** age of 40.

Role of Ultrasound

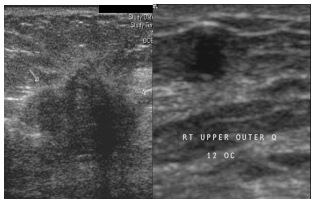
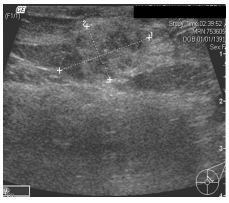
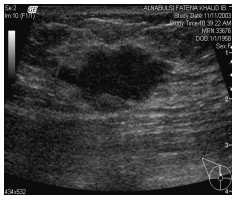
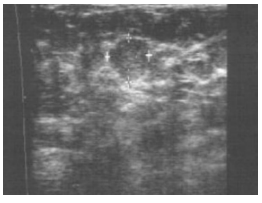
- Characterise a mammographic abnormality.
- Characterise a mammographically occult clinical abnormality (US is extension of palpation)
- Axillary lymph node masses are best assessed with ultrasound.
- Initial examination in the younger woman.
- Imaging guided biopsies,
- Some utility in distinguishing benign from malignant lesions.
- Still no role on screening, even in the mammographically dense breast.
- ? Developing role in monitoring neo-adjuvant therapy.

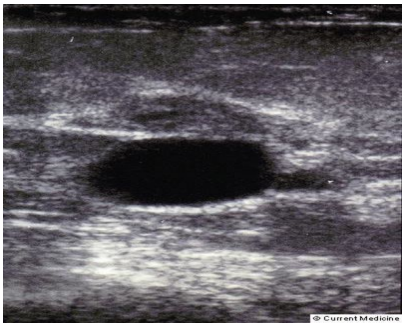
Advantages	Disadvantages
➔ Painless. ➔ Does not use ionising radiation. ➔ Very good at detecting cysts. ➔ Can “see through” mammographically dense breasts.	➔ Not good for screening the breast. ➔ Cannot always characterise lesions precisely. ➔ More operator-dependent than mammography.

What does US look for?

- Location of lesion.
- Solid or cystic?
- Margins.
- Surrounding structures.

Cysts	Benign Mass	Malignant Mass
• Contain no or few echoes. • Have smooth margins. • Are often compressible with the ID. • Have posterior enhancement (increased echoes = whiter).	• Pure hyperechoic • Elliptical shape (wider than tall) • Lobulated • Complete tine capsule • Have smooth margins. • Have relatively uniform internal appearance. • Don’t disturb surrounding tissues.	• Hypoechoic, spiculated • Taller than wider or rounded (special types) • Duct extension • Microlobulation • Have irregular or indistinct margins. • Have heterogeneous internal appearance. • Often cut across surrounding tissue planes.

Examples				
Irregular shape	Ill-defined margins	Spiculated Margins		
				

	**Benign** mass: simple cyst. This patient presented with a new generally well-defined mass on her screening mammogram. Ultrasound demonstrates a well-defined, smoothly marginated anechoic ovoid mass with increased through transmission consistent with a benign simple cyst. Because this finding indicates a benign lesion, the patient was told to return to annual screening follow-up. Cysts can present as a palpable mass or a focal tender area within the breast. A majority of cysts are found in asymptomatic women on their screening mammogram. On mammography, they appear as a mass and may have associated benign rim or eggshell microcalcifications. Ultrasound is the confirmatory diagnostic test demonstrating a well-defined mass devoid of internal echotexture. If any internal echoes are demonstrated, ultrasound-guided needle aspiration is recommended to fully exclude malignancy.
	Phyllodes tumor. The phyllodes tumor or cystosarcoma is believed to be related to the fibroadenoma. The malignant form of this lesion (about 10%) can metastasize hematogenously most commonly to the lungs and not to the axillary lymph nodes. Most of these tumors are benign, but approximately 25% recur locally if they are incompletely excised. Lesions larger than 3 cm are more likely to be malignant. By both mammography and ultrasound, these lesions present as well-defined masses that are very similar in appearance to a benign fibroadenoma. On sonographic evaluation, the malignant forms are more likely to have cystic spaces [8]. This craniocaudal view demonstrating a large, well-circumscribed, dense, palpable mass within the lateral aspect of the breast. According to the patient's history, this mass had rapidly increased in size. Ultrasound core biopsy revealed phyllodes tumor.

Ultrasound / clinical correlation is as important as Ultrasound / mammographic Correlation!
U/S as an extension of palpation.

Challenges for Ultrasound correlation:	Fundamental - MAMMO/US:
• Small lesions in larger breasts. • Small lesions deep within echogenic parenchyma. • Dense parenchyma interspersed with fatty lobules. • Surgically scarred breasts. • Multiple mammographic lesions. • Complicated cysts. • Cellular malignancies.	• Correlate lesion location. • Correlate lesion size. • Correlate lesion margin. • Don't assume that previous imaging assessment was correct (pull out all the films if necessary). • Take account of both mammographic and U/S appearances.

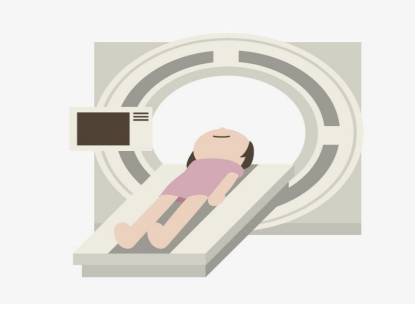
Most probably benign lesions are benign. Of 543 probably benign lesions in 5514 screening mammograms, Only 1 was malignant (0.2%) & 21% regressed or disappeared.

Key points:

- Meticulous imaging technique.
- Careful correlation of mammo with U/S, and imaging with clinical findings.
- Clear communication reduces errors.

3) MRI

- Has a role but is not diagnostic tool OR screening.
- We do it if a patient has a prosthetic breast.
- High risk patients:
  - History of breast cancer
  - LCIS, atypia
  - 1st degree relative with breast cancer
  - Very dense breast
- High sensitivity



4) Biopsy

- Biopsy can be FNA (cells or cytology) or CORE biopsy(failure rate → 15-20 in fna and 1% in core):
- BOTH are done under local anaesthesia with clinical or US or mamo guidance
- FNAB (Fine Needle Aspiration Biopsy):
  - Description of procedure: a thin needle is inserted into the mass for sampling of cells that are later on examined under a microscope.
  - Clinical, U/S guided, mammotomes Sensitivity 80-98%
  - False negative 2-10%
  - Scoring of result Code 0 → Code 5 (as the code increases the suspicion increases)
- Core biopsy:
  - Tissue diagnosis, Painful, Costy, Receptor status
- Open biopsy

IV. Management:

- Definitive treatment which is either:
  - Observation
  - Excision
  - If malignant, along the lines of cancer cases.

In summary you will approach a patient with a lump by:

- History
- Examination
- Ultrasound
- Mammogram if above 35 yrs
- FNAC or Core biopsy or Excision biopsy
- Definitive treatment

Breast Self Examination (BSE) Video(03:40)

When and why BSE should be done?

- Once a month, preferably just after a period. (If the women has no longer have a period, she may choose a day that she will remember each month.)
- To be most effective, BSE should be done regularly and carefully.

Step 1 - Look at your breasts

- changes in the size and shape of your breast
- any dimpling, puckering or skin changes
- anything different about your nipples

Step 2 - Feel your breasts (right hand examine left and vice versa)

- You may find it easy to examine your breasts in the shower. You may also like to check your breasts lying down with a pillow under your shoulder. In either position raise your arm above your head. Use the flat part of your fingers to feel each part of your breast. Move the skin over the underlying tissue in a gentle rotating movement
- Cover the entire breast area in a circular movement, finishing at your nipple
- Check from the collar bone .
- Check into your armpit .
- Check both breasts.
- Look for:
  - Lumps (even if painless) / Discharge / Thickening / Any other changes

Recall: (EXTRA)

What is the incidence of breast cancer?
12% lifetime risk.
What are the major breast cancer susceptibility genes?
BRCA1 and BRCA2
What are the history risk factors for breast cancer?
Nulliparity, age at menarche (<13 years), age at menopause (>55 years), cancer of the breast (in self or family), pregnancy with first child (>30 years).
Why does skin retraction occur?
Tumor involvement of Cooper's ligaments and subsequent traction on ligaments pull skin inward.
What are the screening recommendations for breast cancer?
Breast examination? self-exam of breasts monthly / age 2- to 40: breast exam every 2 to 3 years by a physician / >40 years: annual breast exam by physician/
Mammograms? Every year or every other year after the age 40.
When is the best time for breast self-exam?
1 week after menstrual period.
Why is mammography a more useful tool diagnostic tool in older women than in younger?
Breast tissue undergoes fatty replacement with age, making masses more visible; younger women have more fibrous tissue, which makes mammograms harder to interpret.
What is the classic picture of breast cancer on mammogram?
Spiculated mass.
Which option is the best initial test to evaluate a breast mass in a woman <30 years?
Breast ultrasound.
What are the methods for obtaining tissue for pathologic examination?
Fine-needle aspiration (FNA), core biopsy (large needle core sample), mammotome stereotactic biopsy, and open biopsy, which can be incisional (cutting a piece of the mass) or excisional (cutting out the entire mass).
What is the "work up" for a breast mass?
1. Clinical breast exam 2. Mammogram or breast ultrasound 3. Fine needle aspiration, core biopsy, or open biopsy.
If the fluid from a breast cyst sent for cytology?
Not routinely; bloody fluid should be sent for cytology.
What are the major treatments of breast cancer?
Modified radical mastectomy / lumpectomy and radiation + sentinel LN dissection (both treatments either +/- postop chemotherapy/tamoxifen).
What is a sentinel node biopsy?
Instead of removing all axillary LNs, the primary draining or "sentinel" LN is removed.
How is the sentinel LN found?
Inject blue dye and/or technetium labeled sulfur colloid (best result with both).
What follows a positive sentinel node biopsy?
Removal of the rest of the axillary LNs.
What are common options for breast reconstruction?
TRAM flap, implant, latissimus dorsi flap.
What are the side effects of tamoxifen?
Endometrial cancer (2.5x relative risk), DVT, pulmonary embolus, cataracts, hot flashes, mood swings.

Summary

Risk Factors:

- **being a female & age > 45**

Pathology:

Infiltrating (or invasive) Ductal Carcinoma (IDC)	invades the **breast's fatty tissue**.	**Colloid Carcinoma**	formed by mucus-producing cancer cells.
Infiltrating (or invasive) Lobular Carcinoma (ILC)	**Starting in**: Milk-producing glands.	**Tubular Carcinoma**	special type of invasive breast carcinoma.
Medullary Carcinoma	**well-defined distinct boundary**	**Adenoid Cystic Carcinoma**	more usually found in the salivary glands.

Staging and classification: very important

Stage 0	Stage 1	Stage 2	Stage 3	Stage 4
Neither palpable tumor	Tumor < 2 cm	2 cm - 5 cm	Tumor > 5 cm	Tumor of any size. Distant metastases (such as bone, liver, lung, brain)
Nor axillary lymph nodes	No lymph node involvement	1 ipsilateral axillary node involvement (moveable)	Skin involvement or lymph node either mobile or fixation	Supraclavicular node involvement

SCREENING:

I. Mammogram: Macrocalcifications(reassure), Microcalcifications -> biopsy
II. Ultrasound (US): Benign(Pure hyperechoic)**, Malignant (**Hypoechoic, spiculated)
III. MRI

DIAGNOSIS:

1. **Fine needle aspiration:**Unable to differentiate between in-situ vs CA (Fast, inexpensive)
2. **Core biopsy: 1- image guided 2- stereotactic**
3. **Excisional biopsy**

Management

1. **Surgery:** Total mastectomy, Total mastectomy with axillary clearance, Modified radical mastectomy, Radical mastectomy of halsted, Conservative breast surgeries
2. **Radiotherapy**
3. **Chemotherapy**
4. **Hormonal therapy: Estrogen specific (Tamoxifen)**
5. **Ovarian ablation**
6. **Reconstruction**

Clinical Approach:

- History .
- Clinical (Physical) examination.
- Investigations: imaging, cytology & tissue diagnosis.
- Management
- Breast self examination

Questions

1- What is the most common type of breast cancer ?
A. Infiltrating Ductal Carcinoma (IDC)
B. Infiltrating Lobular Carcinoma (ILC)
C. Medullary Carcinoma
D. Colloid Carcinoma

2- Which of the following stages is the poorest prognosis of breast cancer?
A. Stage I
B. Stage II
C. Stage III
D. Stage IV

3- A 45-year-old lady complaining of lump in right breast and right axilla no distant metastasis. She was diagnosed with breast cancer Which stage of the following is she in ?
A. Stage I
B. Stage II
C. Stage III
D. Stage IV

4- A 55-year-old lady with 3 cm right breast mass and palpable right axillary lymph node. Her biopsy showed ductal carcinoma. Which of the following is the single most important prognostic factor for her condition?
A. Histological type
B. Tumor size
C. Hormone receptor content
D. Number of involved axillary lymph nodes

5- A 60-year-old lady with left breast mass and palpable left axillary lymph node later she was diagnosed with breast cancer, lap test shows her oestrogen receptor is negative, progesterone receptor is negative , HER2 receptors is negative (Triple negative) . Which of the following best treatment ?
A. Chemotherapy
B. Radiotherapy
C. Hormonal therapy
D. Tamoxifen

Answers: 1:A 2:D 3:C 4:D 5:A