BREAST DISEASE 101

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BREAST ONCOLOGY FOR SCIENTISTS
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OBJECTIVES

- History and Physical
- Screening Guidelines
- Risk Factors
- High Risk Screening
- Workup of a Mass
- Treatment of Breast Cancer
- Special Considerations

INCIDENCE

- Breast cancer remains the most common cancer diagnosed in women
  - 1 in 8 women will be diagnosed with breast cancer in North America
- Most common cancer in females
- Second leading cause of cancer-related deaths in this group
- Significant advances in the treatment of breast cancer and in the ability to screen for the disease mean that it is also one of the most curable forms of cancer

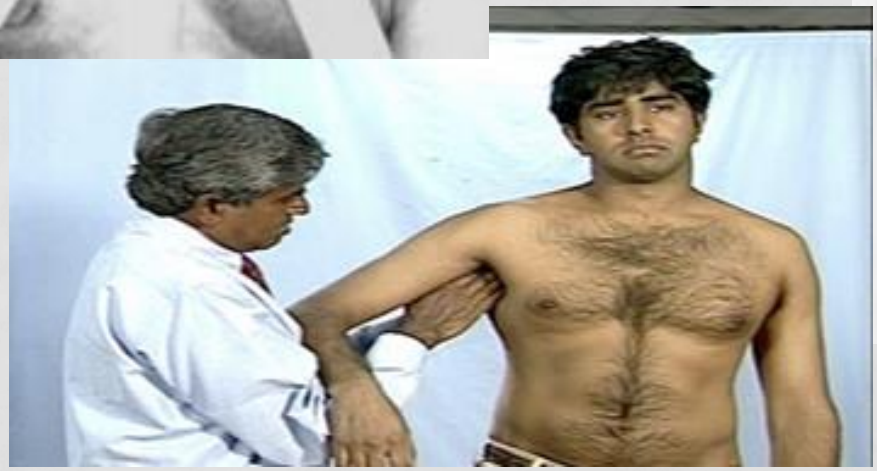
HISTORY AND PHYSICAL

HISTORY & PHYSICAL

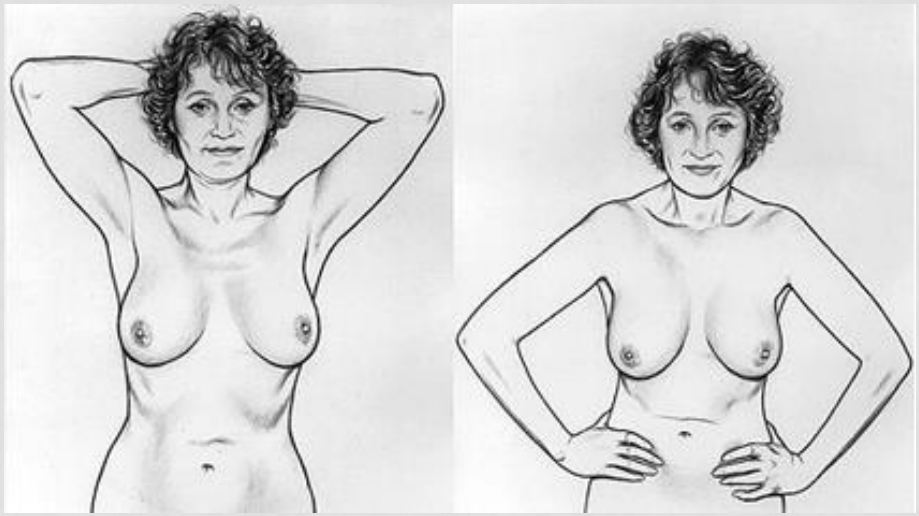
- HPI
- Prior screening and history of abnormal imaging
- Prior breast complaints/biopsies
- Family history (breast, ovarian, other)
- Menstrual history
- Other cancer treatments
- Review of systems (unintentional weight loss, new pains)
- Radiation and surgery history

PHYSICAL EXAM – LYMPH NODES

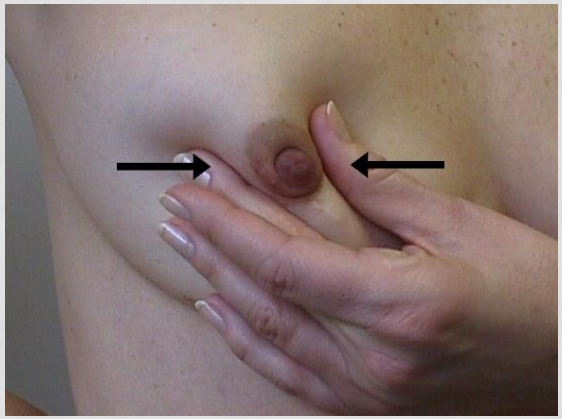
- Lymph nodes – cervical, supraclavicular, infraclavicular, axillary basins



PHYSICAL EXAM



upright

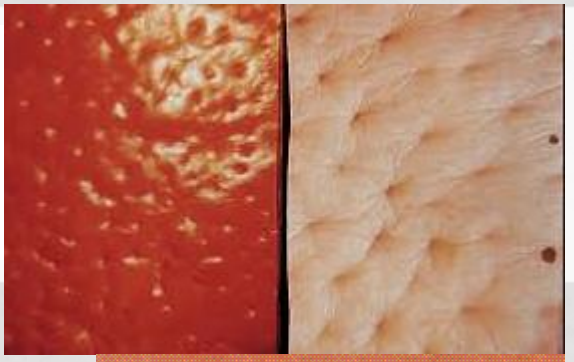


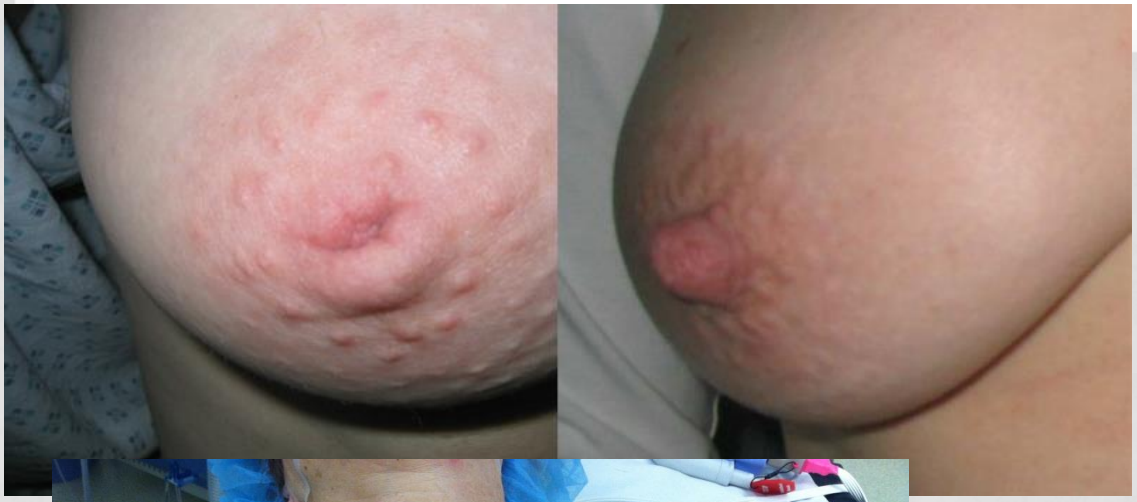
supine

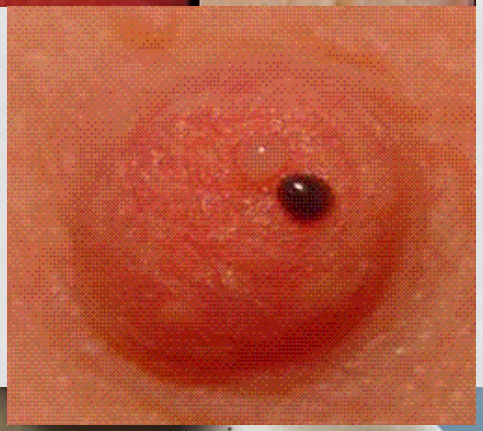
BREAST EXAM

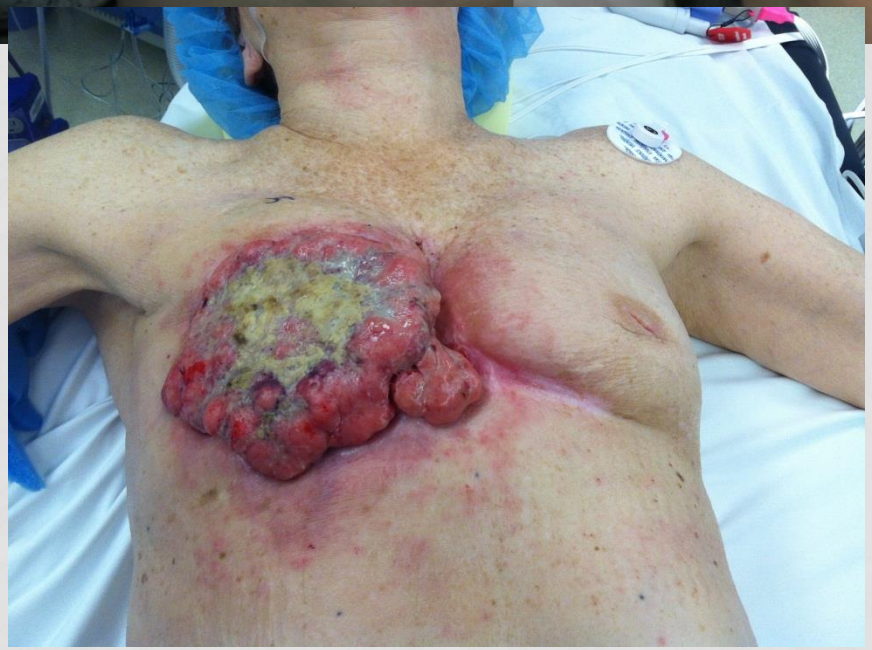
- Size and symmetry
- Contour - flattening, dimpling
- Skin appearance - erythema, peau d'orange, edema
- Nipples – retraction, inversion, ulcerations
- Nodules – note location, size, mobility, tenderness
- Axilla – nodes, infections, pigmentation
- Nipple discharge – colour, consistency, duct location, uni vs bilaterality, number of ducts

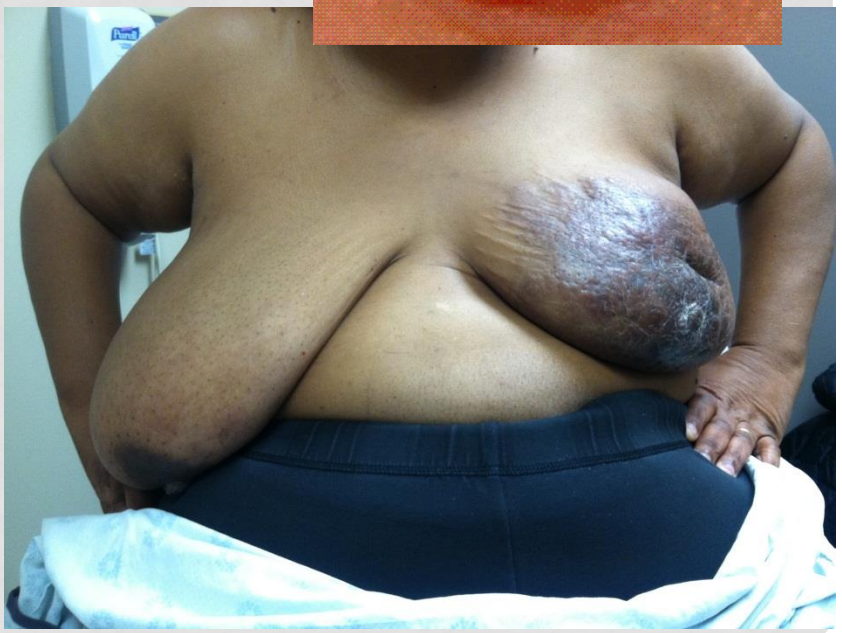
ABNORMAL FINDINGS











SCREENING GUIDELINES

WHEN SHOULD AN AVERAGE RISK WOMAN START SCREENING?

SCREENING TACTICS

Table 6. Screening Guidelines for the Early Detection of Breast Cancer in Average-risk, Asymptomatic Women Aged 20 Years and Older

Breast self-examination

Beginning in their early 20s, women should be told about the benefits and limitations of breast self-examination (BSE). The importance of prompt reporting of any new breast symptoms to a health professional should be emphasized. Women who choose to do BSE should receive instruction and have their technique reviewed on the occasion of a periodic health examination. It is acceptable for women to choose not to do BSE or to do BSE irregularly.

Clinical breast examination

For women in their 20s and 30s, it is recommended that clinical breast examination (CBE) be part of a periodic health examination, preferably at least every three years. Asymptomatic women aged 40 and over should continue to receive a clinical breast examination as part of a periodic health examination, preferably annually and prior to mammography.

Mammography

Begin annual mammography at age 40.

www.cancer.org. ACS Breast Cancer 2009-2010 & Figures

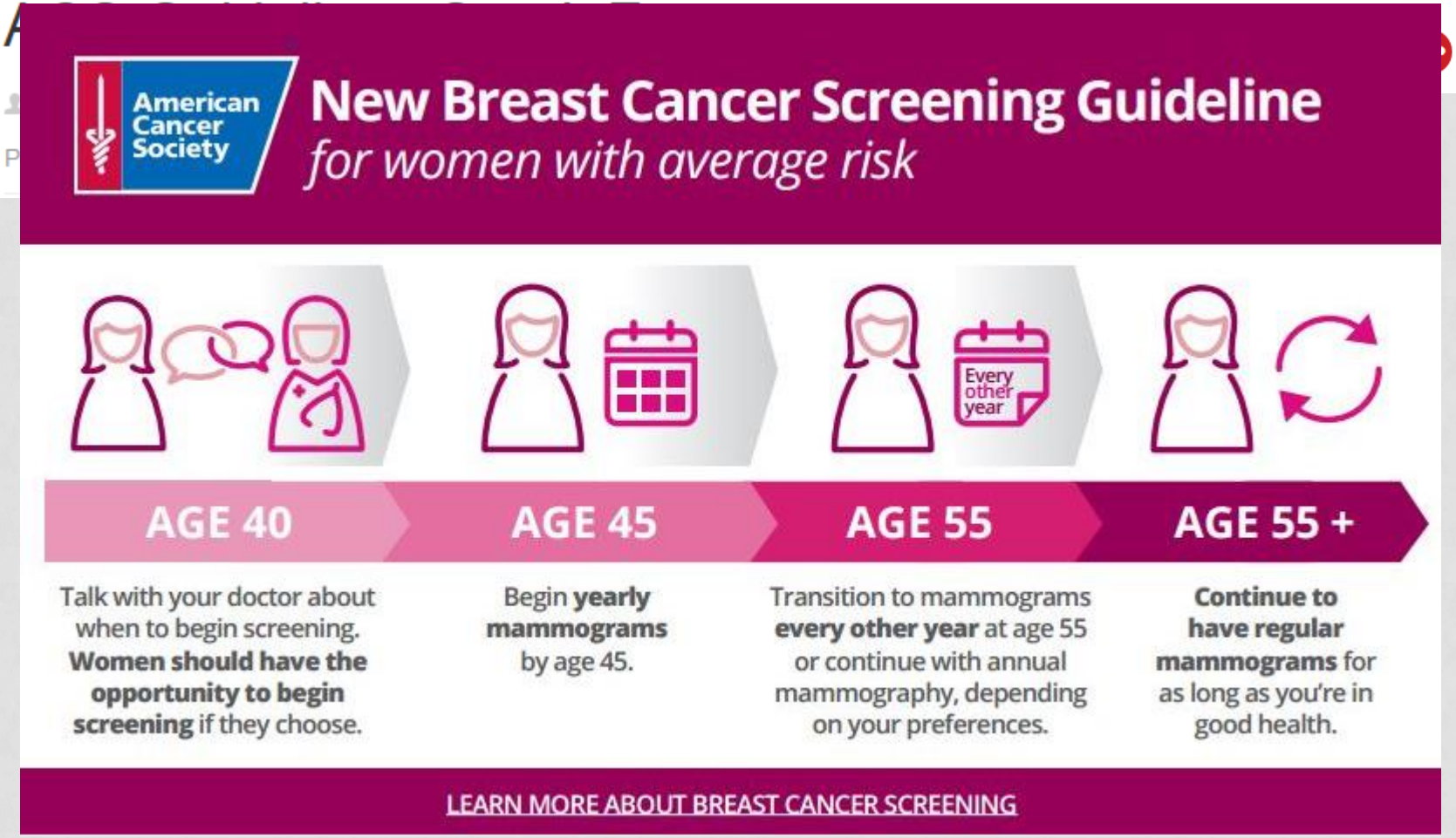
HEALTH

American Cancer Society, in a Shift, Recommends Fewer Mammograms

By DE

New breast cancer guidelines: screen

Breast Cancer Awareness Month Controversy: New

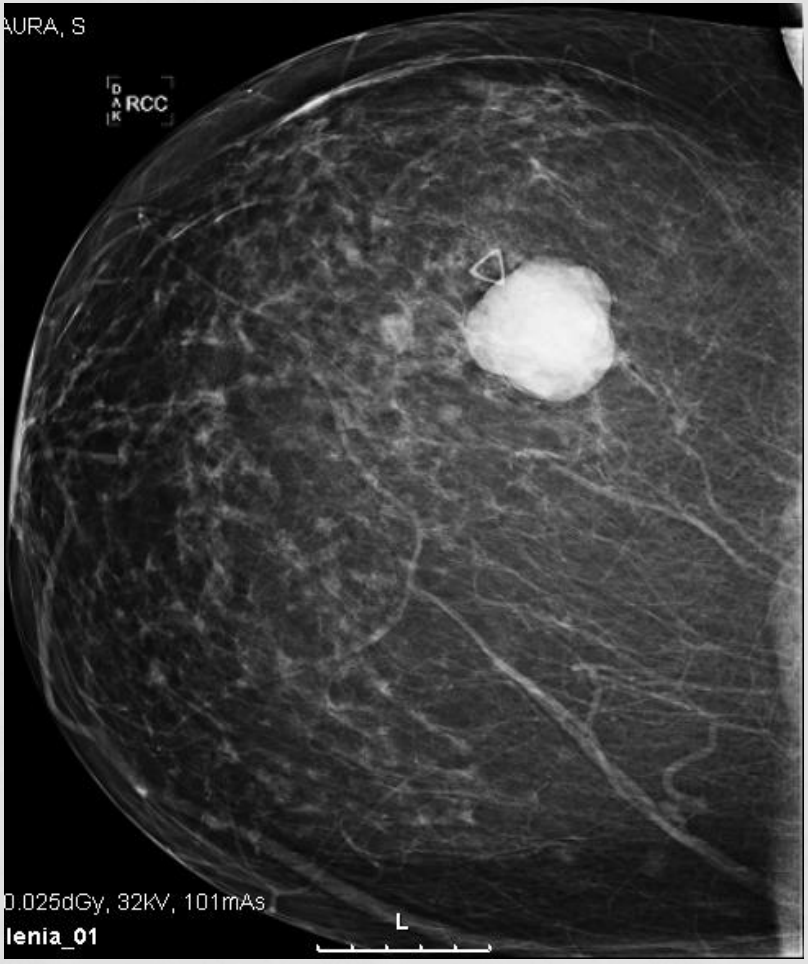


SCREENING

- For every 1000 women who have a screening mammogram:
  - 100 are recalled to get more mammography or ultrasound images
  - 20 are recommended to have a needle biopsy
  - 5 are diagnosed with breast cancer
- Mammography has helped reduce breast cancer mortality in the US by nearly 1/3 since 1990

adapted from
www.mammogramssavelives.org

SCREENING MAMMO SHOWS SOMETHING?



BIRADS SCORING SYSTEM

BIRADS Category	Description	Likelihood of Malignancy	Recommendation
0	Need more information	2-10%	Further imaging studies
1	Normal	0.05-0.1%	Routine screening mammography
2	Benign	0.05-0.1%	Routine screening mammography
3	Probably benign	0.3-1.8%	Short-term follow-up (6 months)
4	Highly suspicious	10-55%	Biopsy
5	Malignant	60-100%	Biopsy
6	Known cancer	100%	Treat malignancy

Breast Imaging Reporting and Data System (BIRADS) criteria
Courtesy of Dr Anees Chagpar, University of Louisville

A WORD ABOUT DENSE BREASTS …

- In January 2013, NY state passed a law stating that every mammogram report given to a patient with dense breast tissue must inform the patient their dense breasts in layman's terms

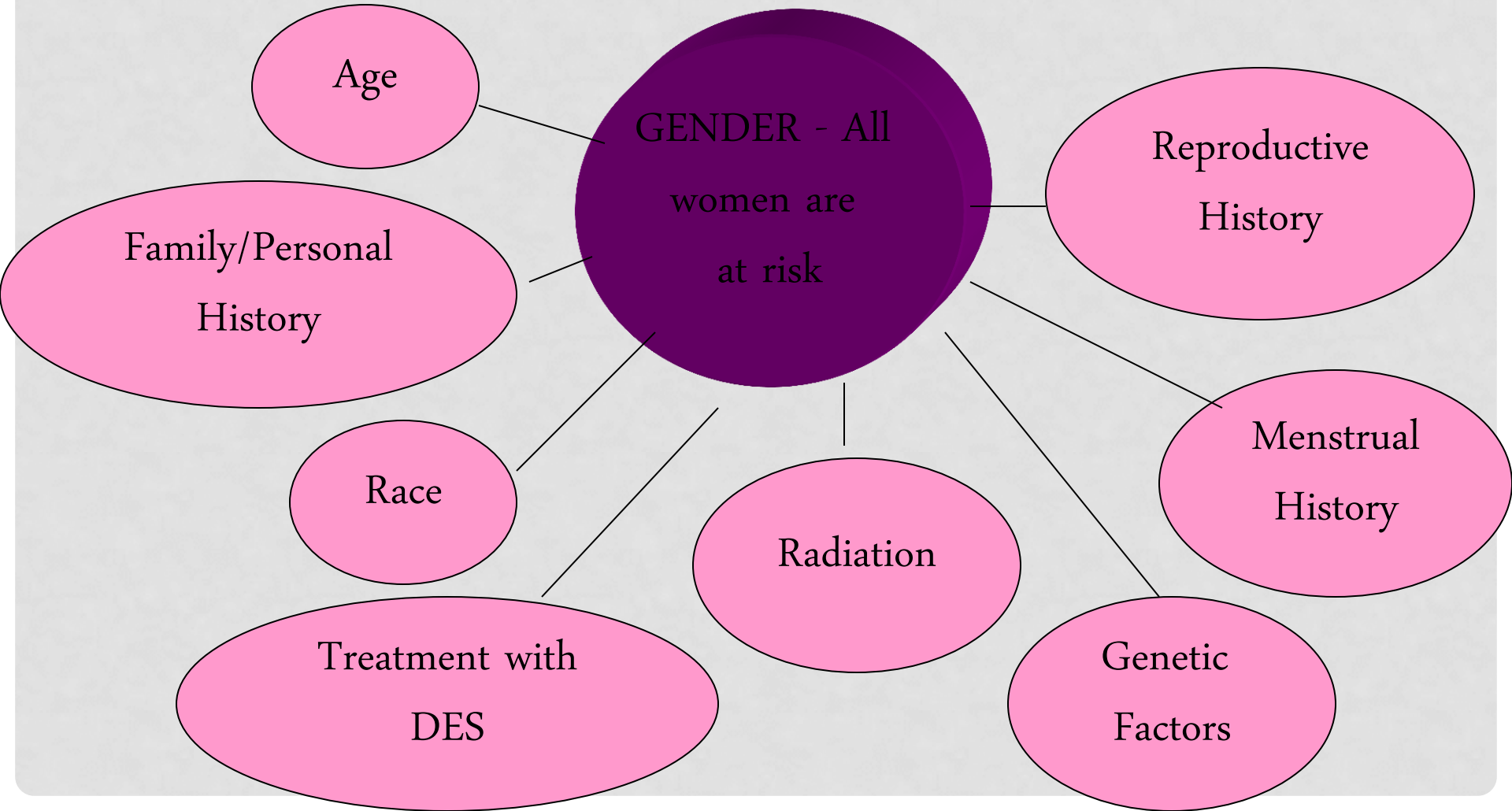
- Screening ultrasound, MRI or tomosynthesis can be offered if appropriate

RISK FACTORS

WHAT FACTORS INCREASE A WOMAN'S RISK OF BREAST CANCER?

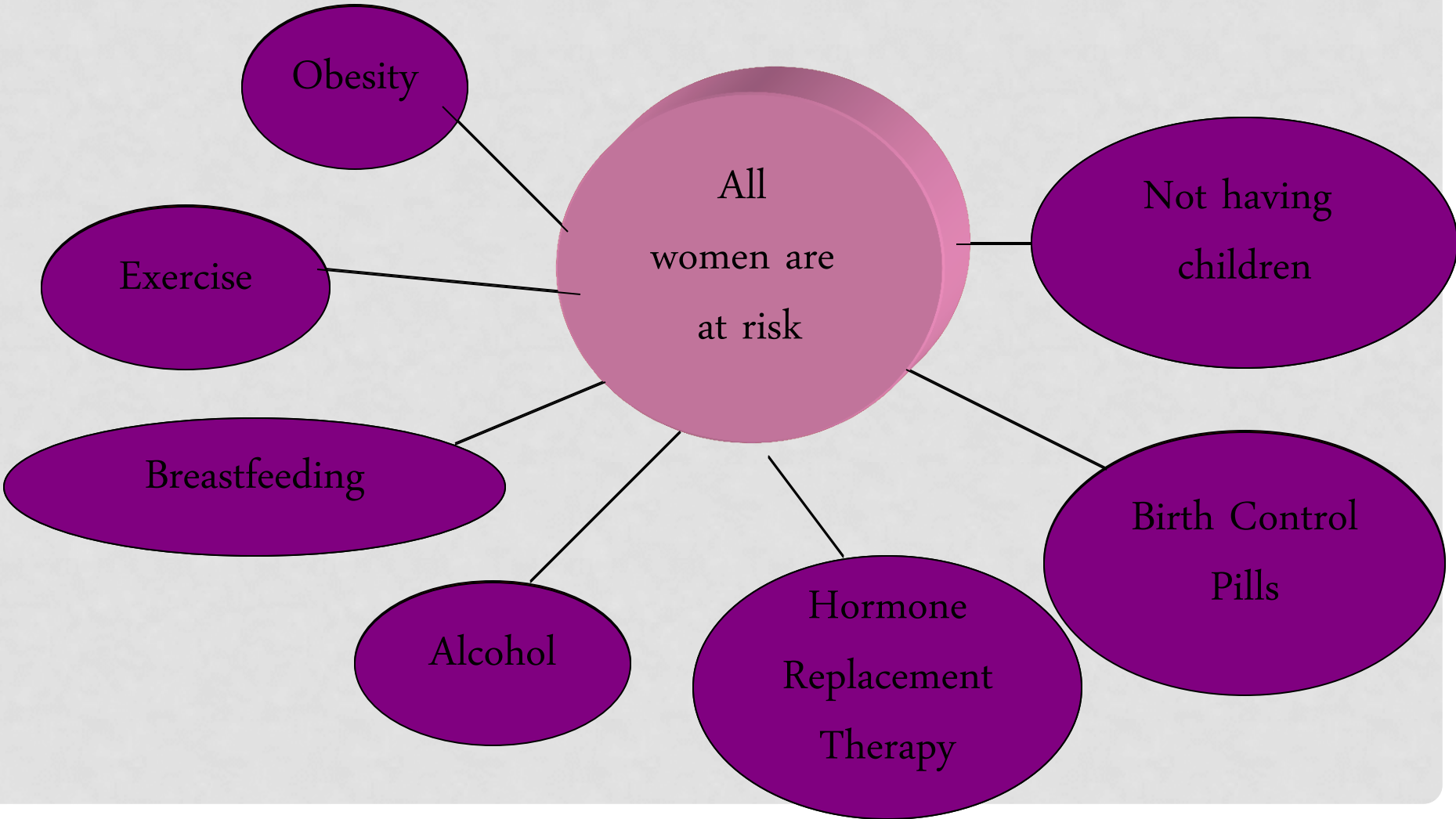
Breast Cancer Risk Factors

that *cannot* be changed



Breast Cancer Risk Factors

that *can be* controlled

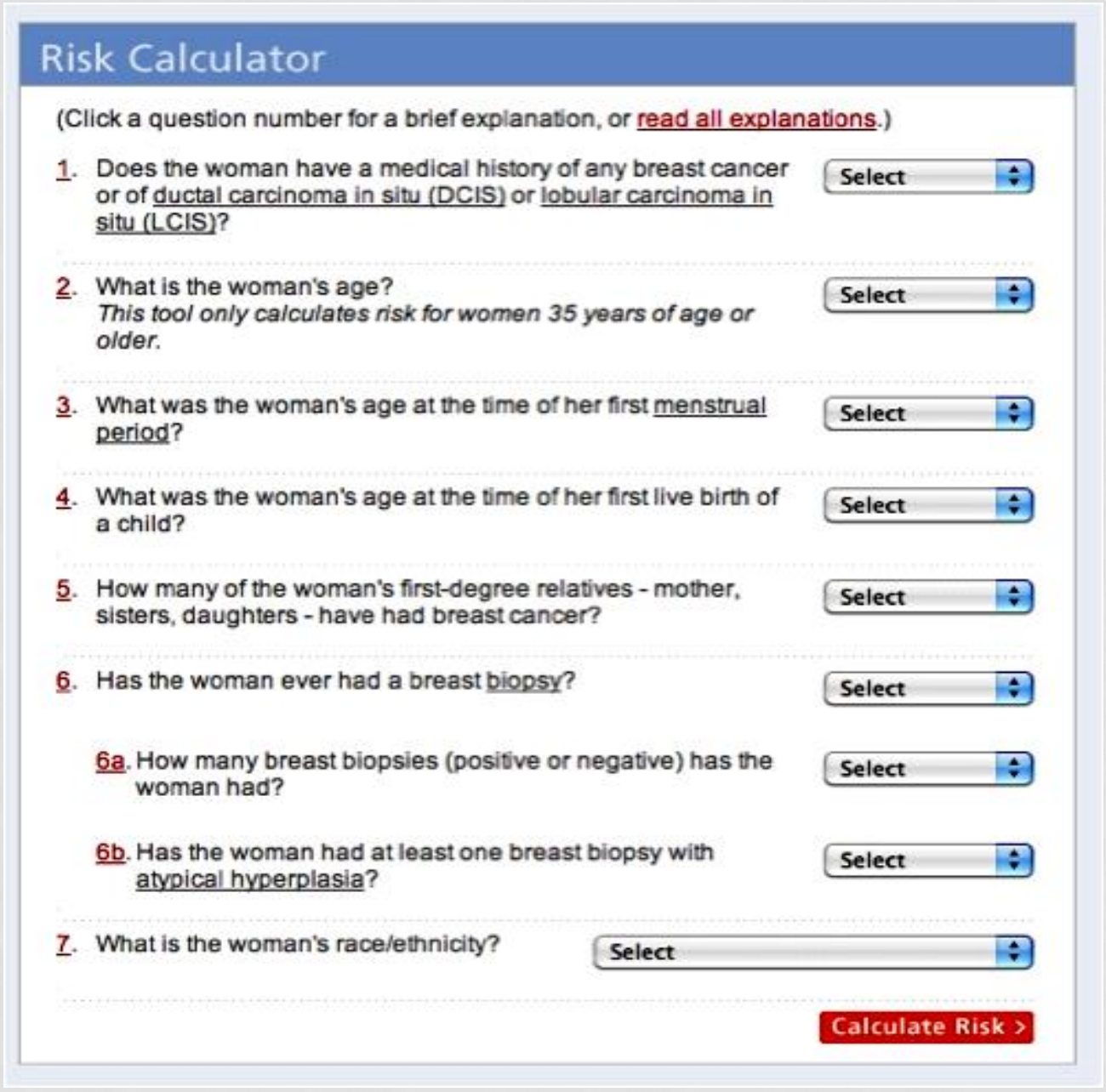


Relative Risk of Risk Factors

Risk factor	Relative Risk
Age >65	5.8
Early Menarche	1.3
Late Menopause	1.2-1.5
Nulliparity	1.7-1.9
Atypia	5.3
Family history-pre-menopausal	3.3
Breast biopsy	1.9
Gene mutations	200
Breast density	4
Hormone Replacement Therapy	2.7 (e+p) 1.96 (e)
Alcohol	1.3

RISK ASSESSMENT MODELS

- Gail model (NCI Risk Assessment Model)
  - Age
  - Menarche
  - age at first birth (parity)
  - Family history in first degree relatives
  - Number of past breast biopsies
  - Number of atypical biopsies
  - Race/ethnicity
- Not used in women <35 yo, history of DCIS/LCIS, BRCA
- Does not incorporate second degree family history, age at cancer diagnoses, other cancer history
- Other models are available, emphasize family history more (second degree relatives etc), HRT use, BMI, etc



http://www.cancer.gov/bcriskto

PERSONALIZED QUANTIFICATION OF RISK

- Approx 5 year risk of the general population
  - <1.5%
- Approx lifetime risk of the general population
  - One in eight = 13%
- Your personal risk quantification

BREAST CANCER DIAGNOSIS AND PATHOLOGY

HOW DOES BREAST CANCER PRESENT?

- Usually asymptomatic – abnormal imaging – mass, calcifications, asymmetry, density
- Palpable mass
- Pain
- Nipple discharge
- Erythema
- Nipple changes
- Axillary masses
- Ulcerations

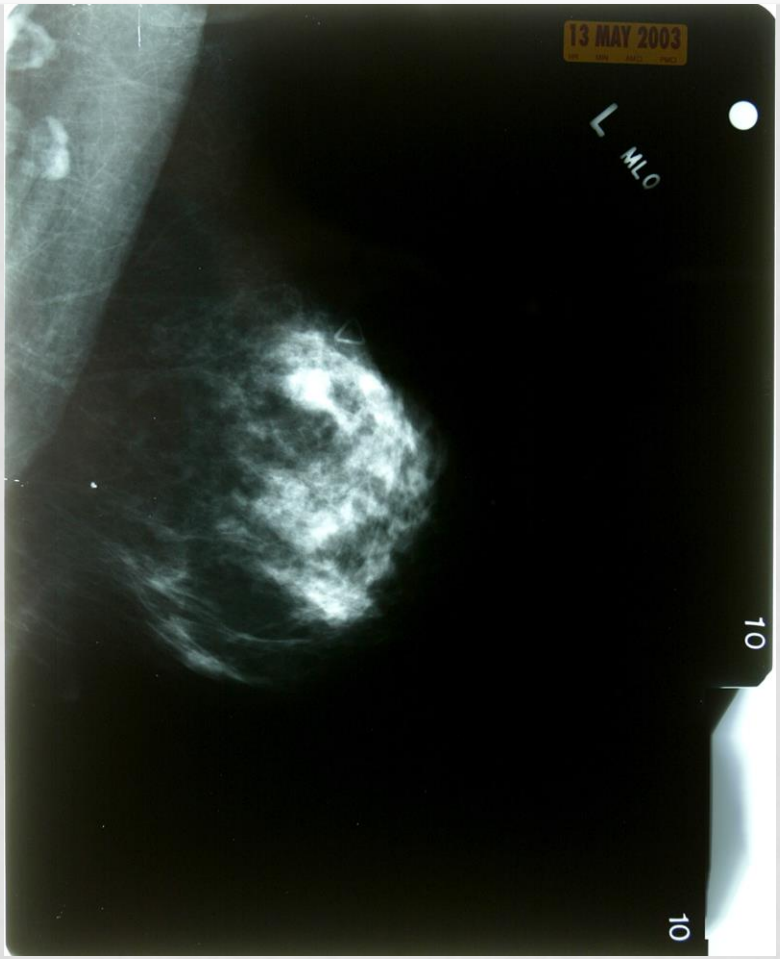
WHAT DO YOU DO AFTER H&P?

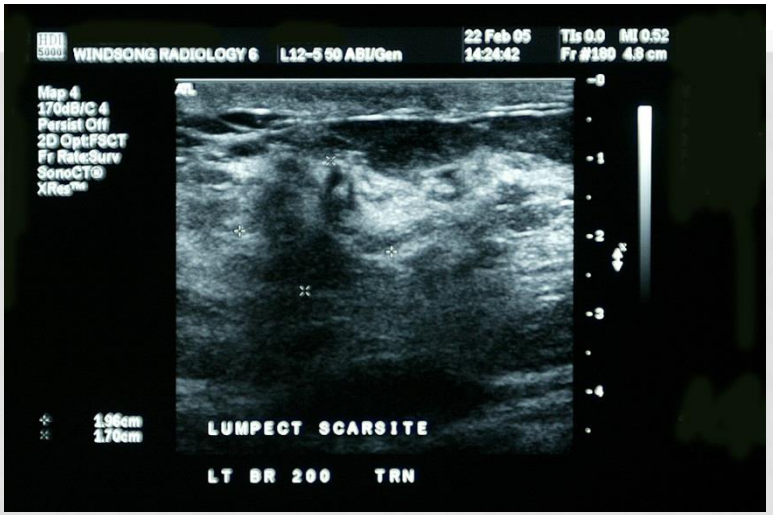
- Diagnostics:
  - Mammography
  - Ultrasound
  - MRI
  - CTs
  - PET/CT
  - Bone scan
  - Tomosynthesis (3D mammograms)
  - Labs
  - Punch/Core biopsies of lesions

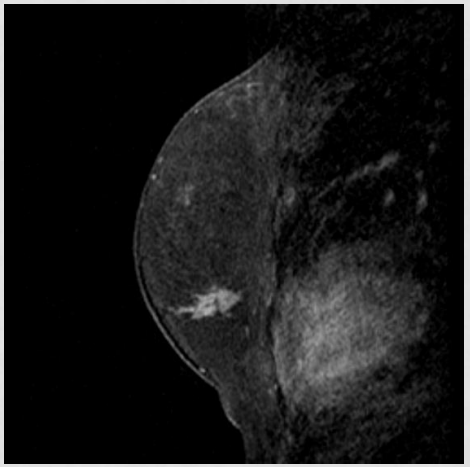
DIAGNOSTIC IMAGING

- Mammography
  - Good sensitivity and specificity, inexpensive
- Ultrasound
  - Best for palpable masses, dense breasts, user-dependent
- MRI
  - Best for dense breasts, further evaluation of abnormalities, high risk screening, expensive, requires contrast

BREAST IMAGING





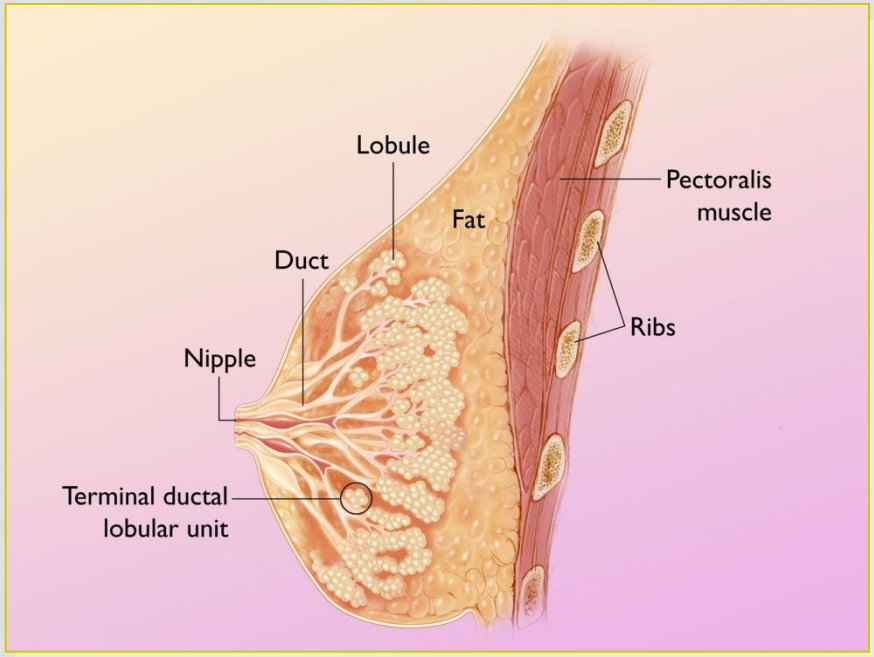


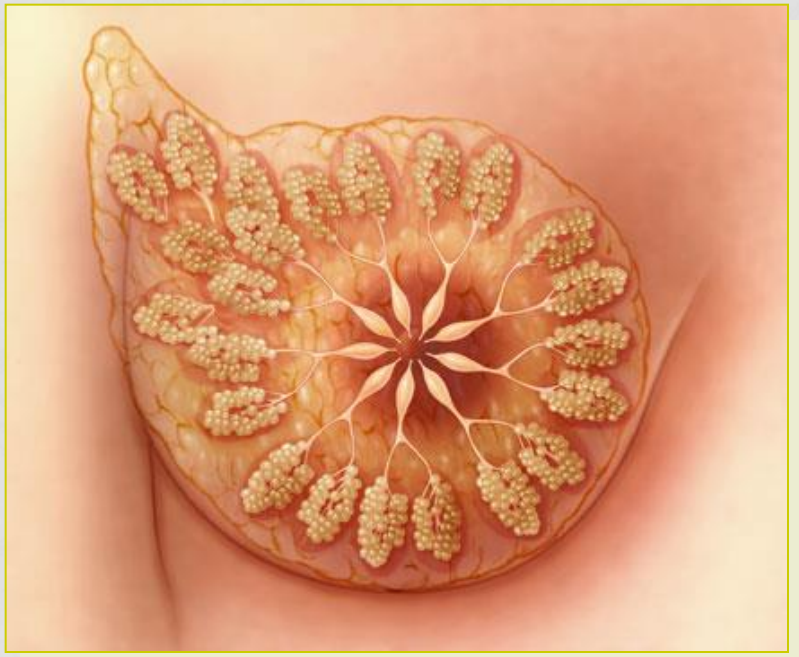
BIOPSY

- FNA – small gauge needle can show malignancy but not cellular morphology
- Core Biopsy – large gauge needle, invasive
  - Stereotactic Core biopsy uses mammography imaging, usually for calcifications
  - Ultrasound Guided Core Biopsy for masses
  - MRI guided biopsy for lesions only seen on MRI
- Surgical Biopsy
  - Only when the above have failed!

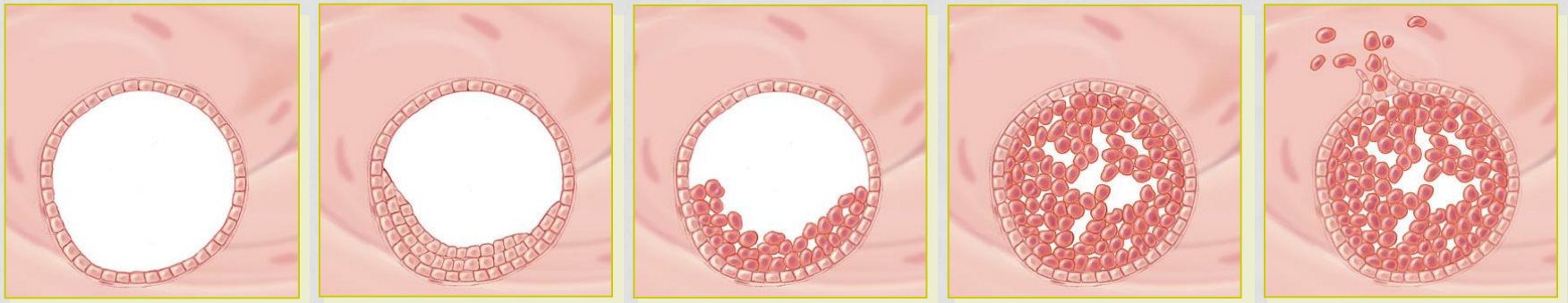
BIOPSY

THE BREAST DUCTAL-LOBULAR SYSTEM





PROGRESSION TO MALIGNANCY: PRESENCE OF ATYPIA AS RISK FACTOR



Normal Duct | Intraductal Hyperplasia | Atypical Ductal Hyperplasia | Ductal Carcinoma *In Situ* | Invasive Ductal Carcinoma

Predict and Prevent

Detect and Treat

BREAST CANCER DEVELOPMENT

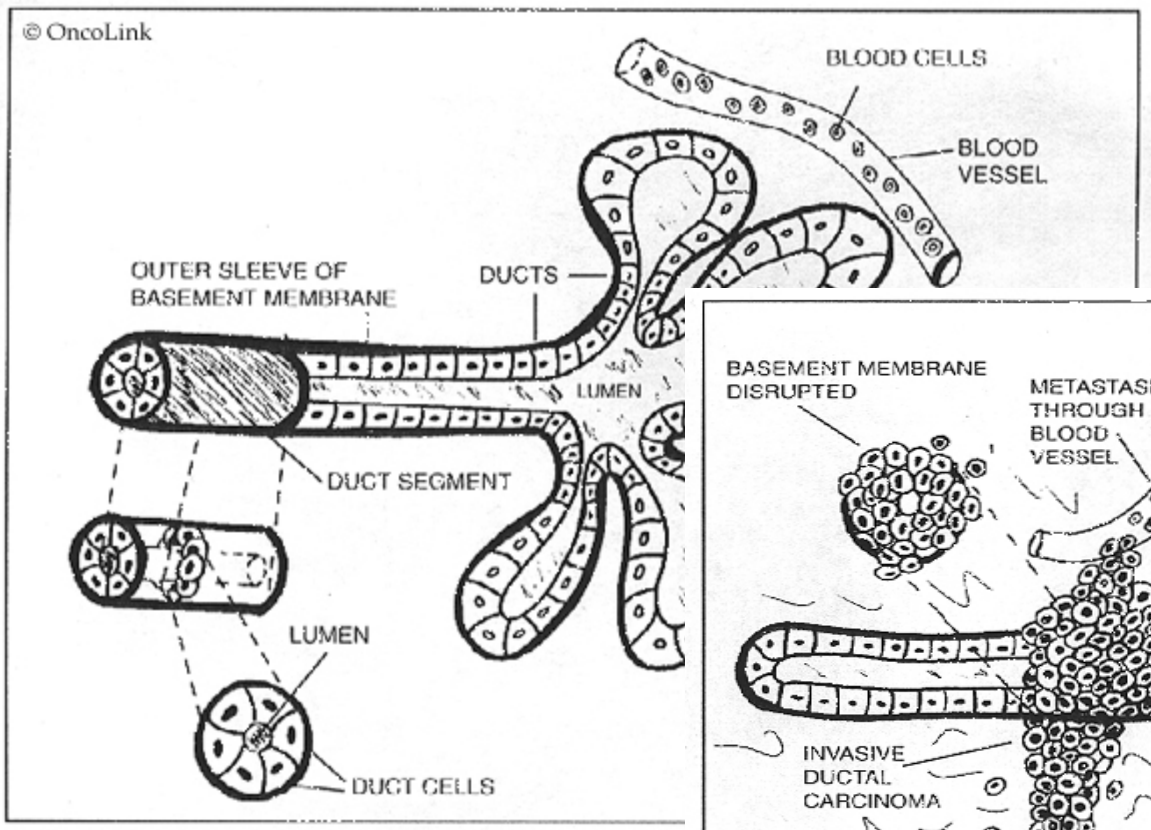


Figure 2: A normal lobule and duct, with close-up inser

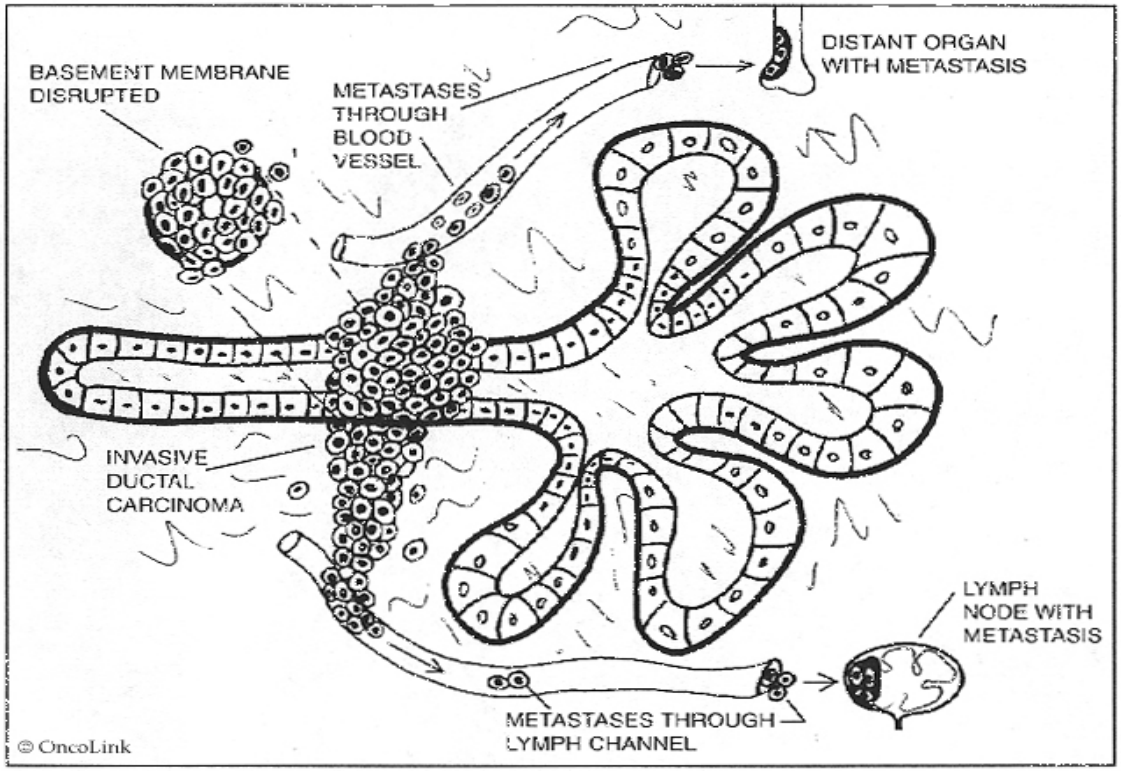
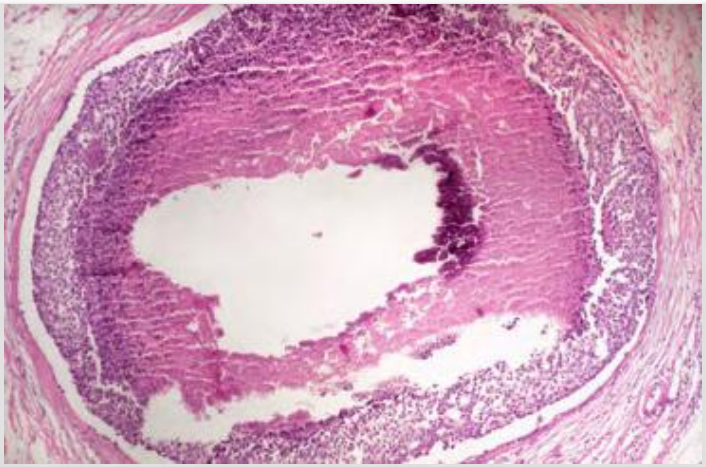


Figure 5: Infiltrating ductal carcinoma with duct cross section and metastases through blood and lymph systems

PATHOLOGY

- Ductal carcinoma in-situ (DCIS)
  - Non-invasive carcinoma
  - Incidence increasing with more screening mammography
  - Excellent prognosis
- Infiltrating Ductal Carcinoma
- Infiltrating Lobular Carcinoma
- Tubular, mucinous, medullary



DCIS with central necrosis

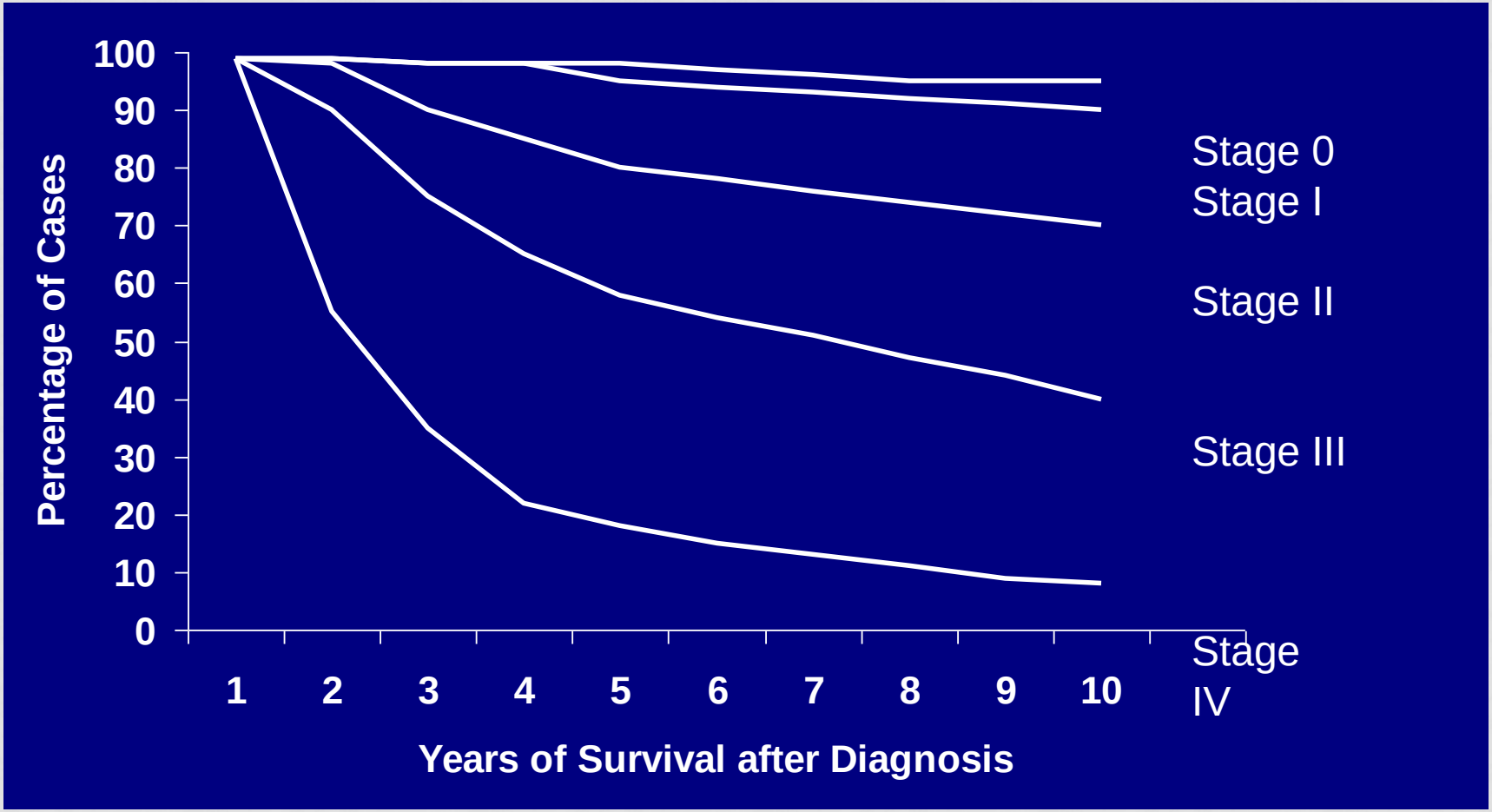
STAGING - TMN

- Tumor
  - Tis
  - T1 (<2cm)
  - T2 (2-5 cm)
  - T3 (>5 cm)
  - T4 (chest wall or skin involvement)
- Nodes
  - Ipsilateral, matted, suprclavicular, infraclavicular, internal mammary
- Metastasis

TRADITIONAL PROGNOSTIC FACTORS

- Number of positive lymph nodes
  - Single most powerful prognostic factor in PBC
- Size
  - Second most important factor
- Grade
  - Scarff-Bloom-Richardson (SBR) classification
    - Differentiation (1-3)
    - Pleomorphism (nuclear)
    - Mitotic Index (per high power field)-proliferation

BREAST CANCER SURVIVAL BY AJCC STAGE GROUP



BIOMARKERS

- Estrogen
- Progesterone
- Her2 (human epidermal growth factor)

- Ki67
- CD1 (Cyclin)
- Cyclin E

WHERE DOES BREAST CANCER METASTASIZE TO?

- Lung
- Liver
- Brain
- Bones

- Stage patients with scans starting at stage 3 or stage 2 with aggressive features

BREAST CANCER TREATMENT - A MULTIMODALITY APPROACH

MULTIMODALITY TREATMENT

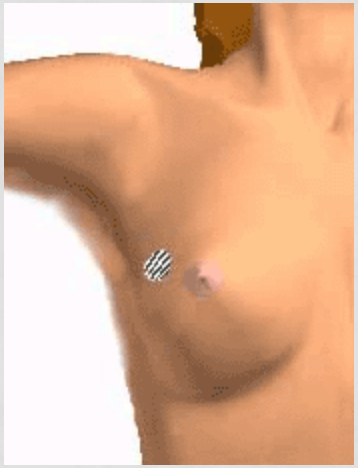
- Local
  - Surgery
  - Radiation
- Systemic
  - Chemotherapy
  - Endocrine therapy

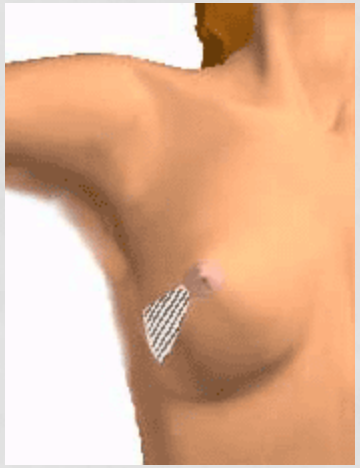
SURGERY

- Lumpectomy vs mastectomy
  - Lumpectomy has higher recurrence rates but preserves the breast
  - Mastectomy has lowest recurrence rates but very disfiguring, large surgery
- Sentinel lymph node biopsy
  - Use isosulfan blue dye, radioactive isotope
- Axillary lymph node dissection
  - 20-25% lymphedma rate
- Reconstruction if mastectomy
  - Implant vs autologous tissue

BREAST SURGERY – LOCAL THERAPY

Breast Conserving: Lumpectomy

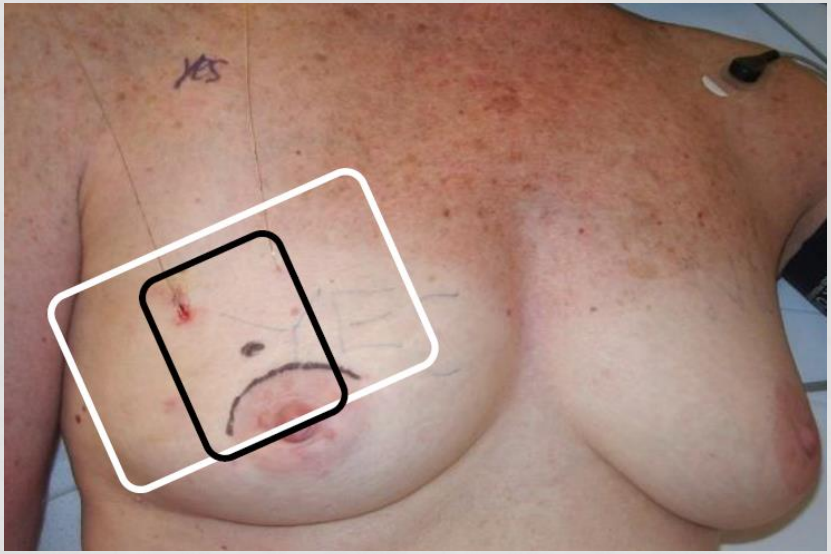




Removal of Breast: Mastectomy

INDICATIONS FOR MASTECTOMY

- Extensive DCIS
- Multicentric carcinoma
- Large tumor to size ratio
- Inability to receive radiation therapy
  - Pregnancy
  - Distance to center
  - Prior radiation
  - Relative: collagen vascular disease, p53 mutation
- Patient preference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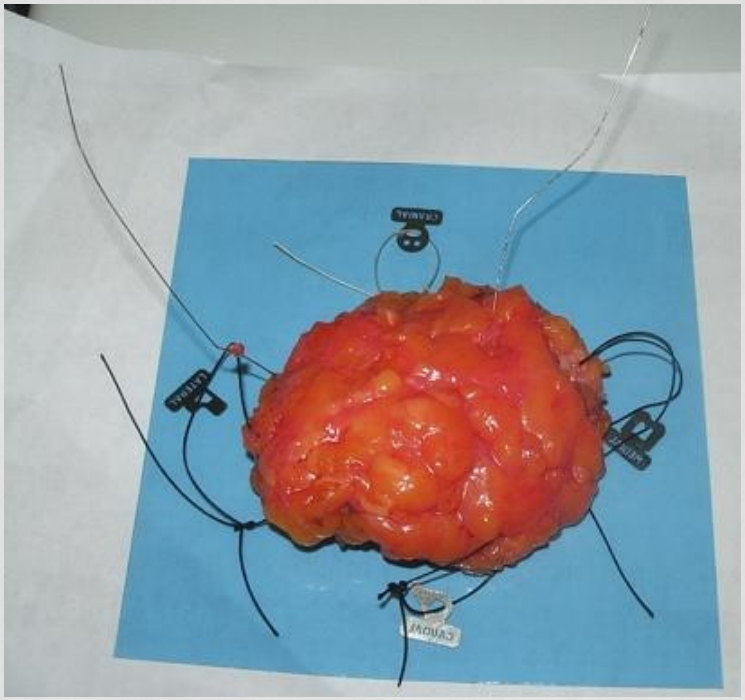
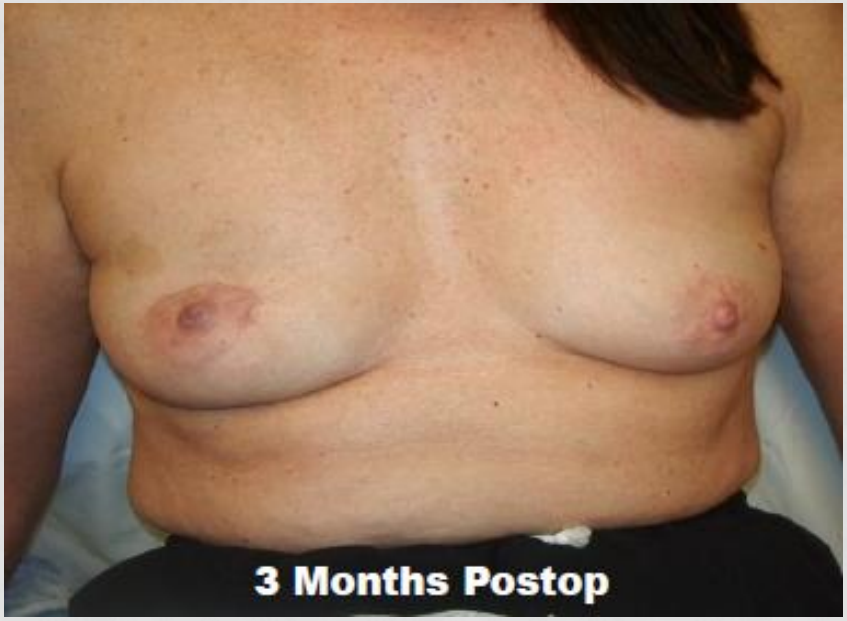
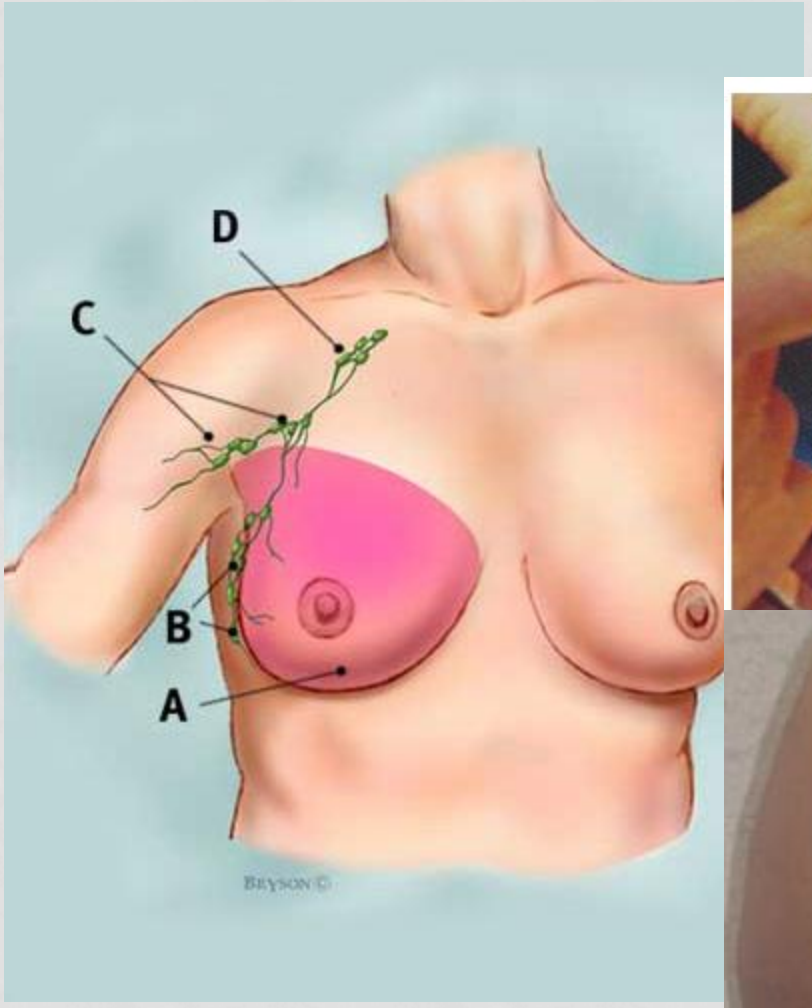



3 Months Postop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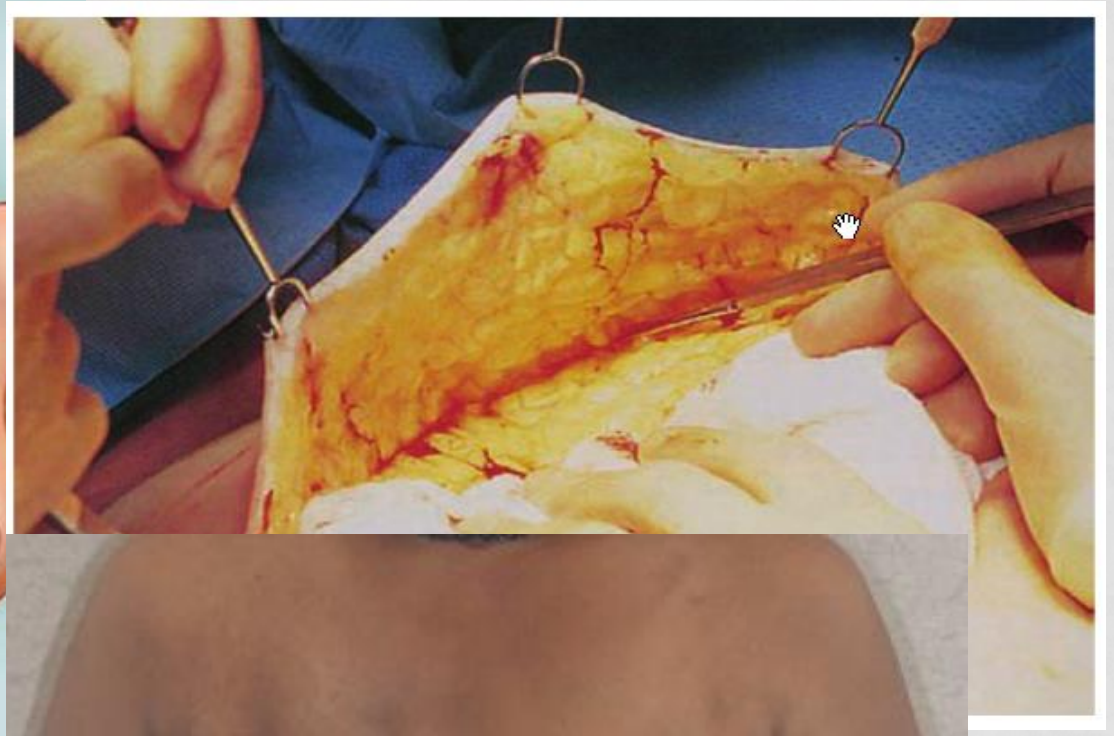

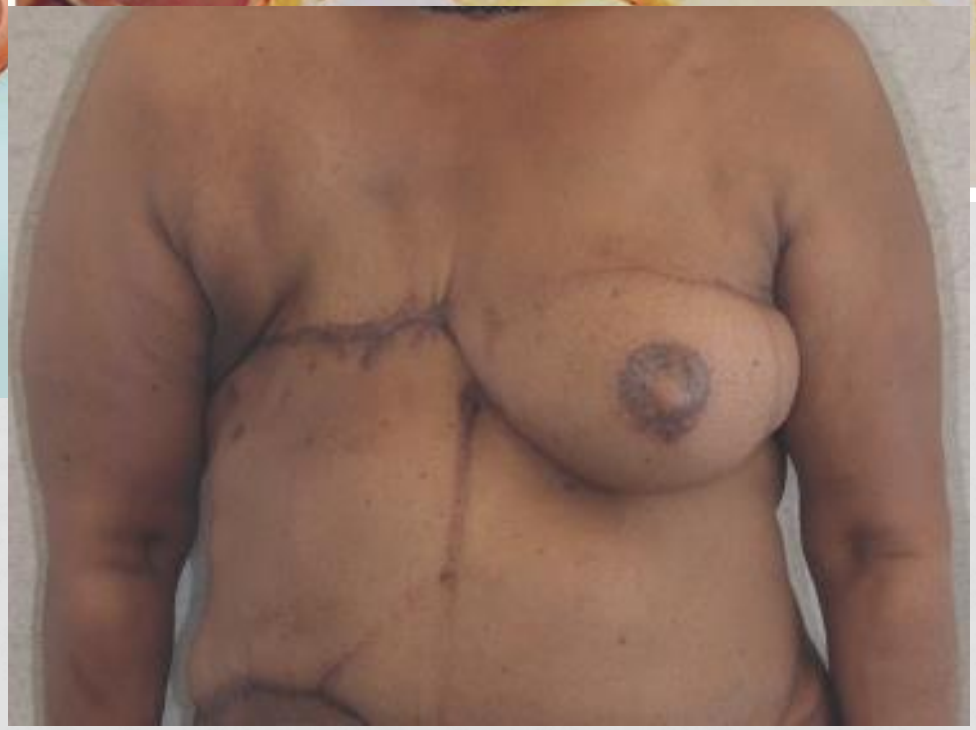

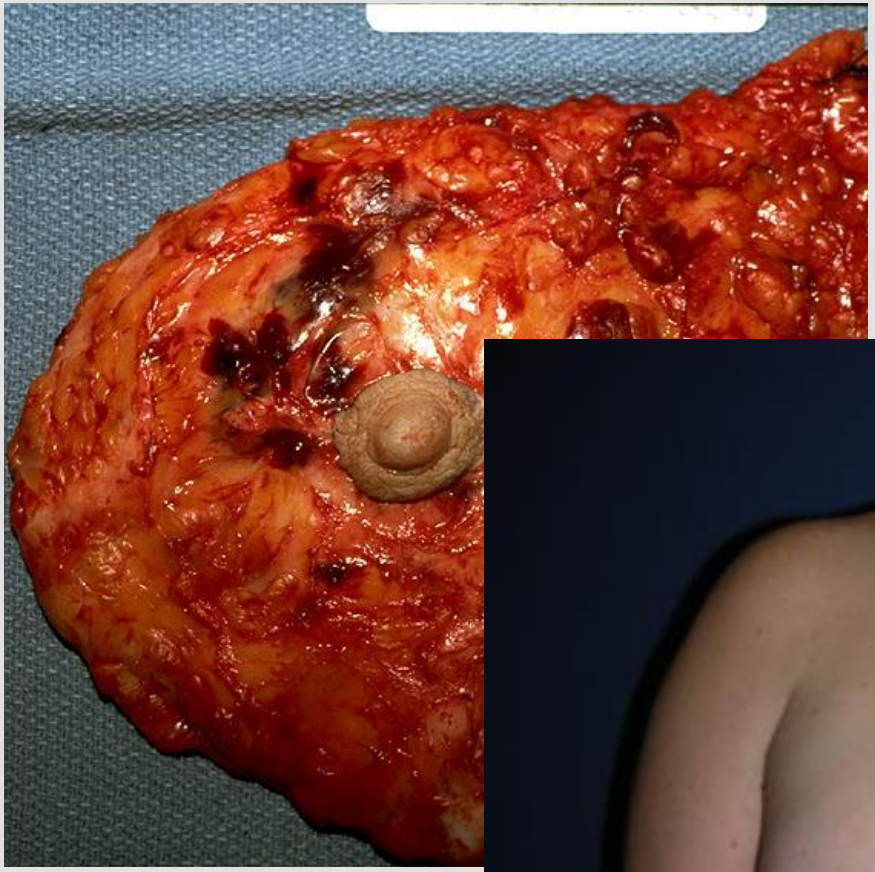

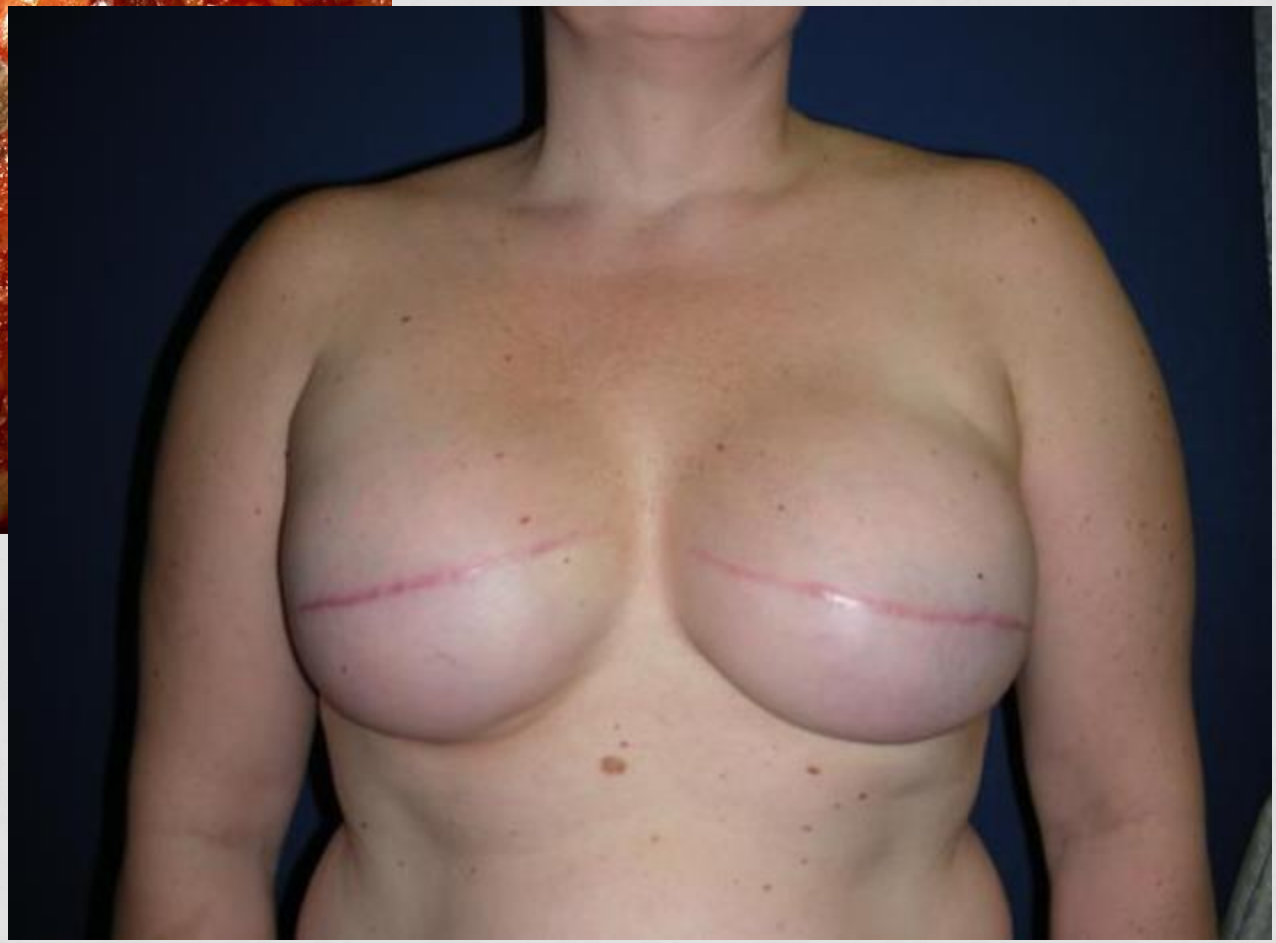

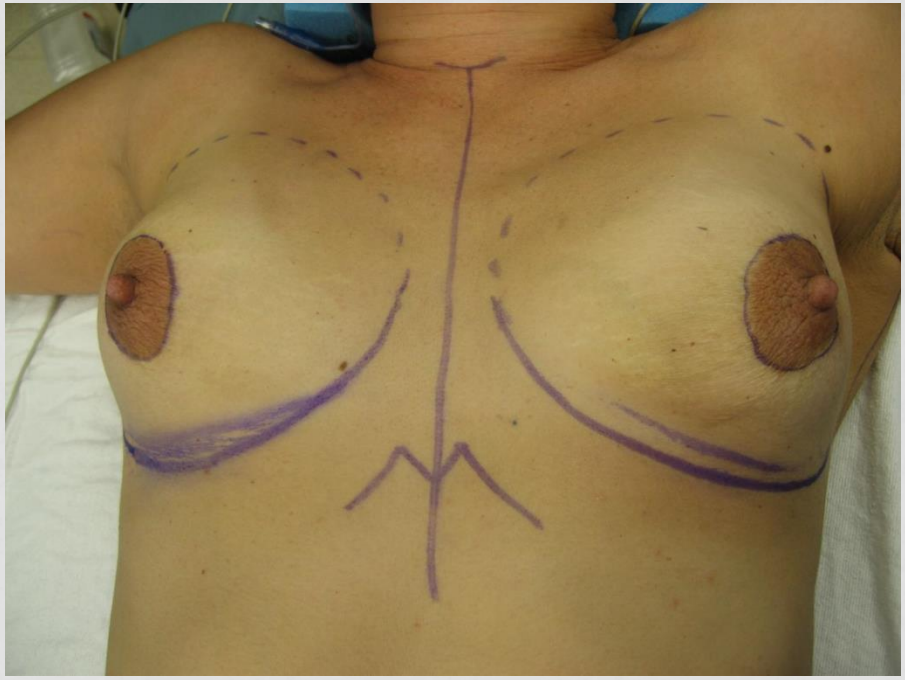

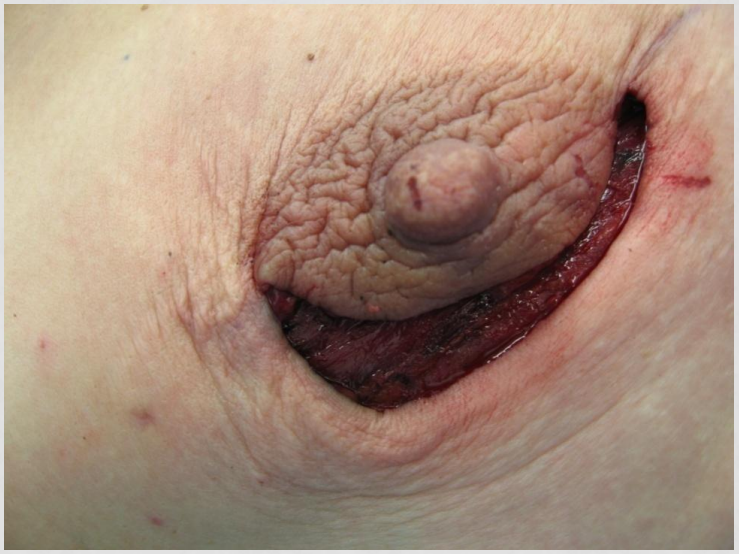

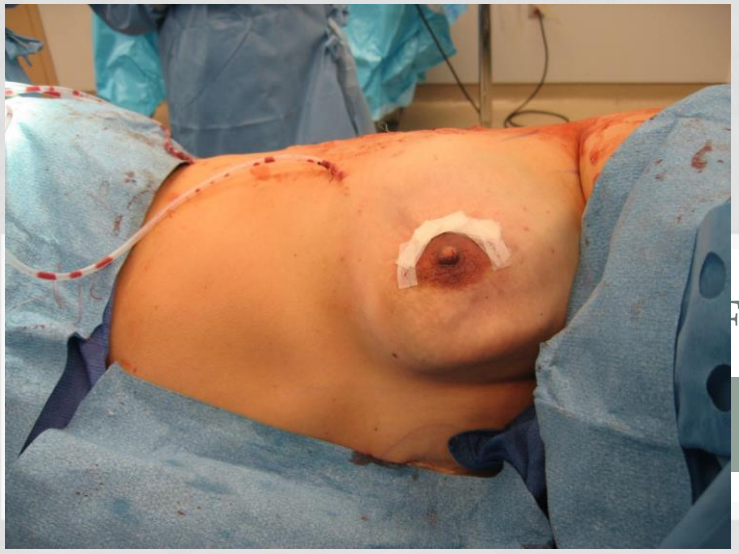

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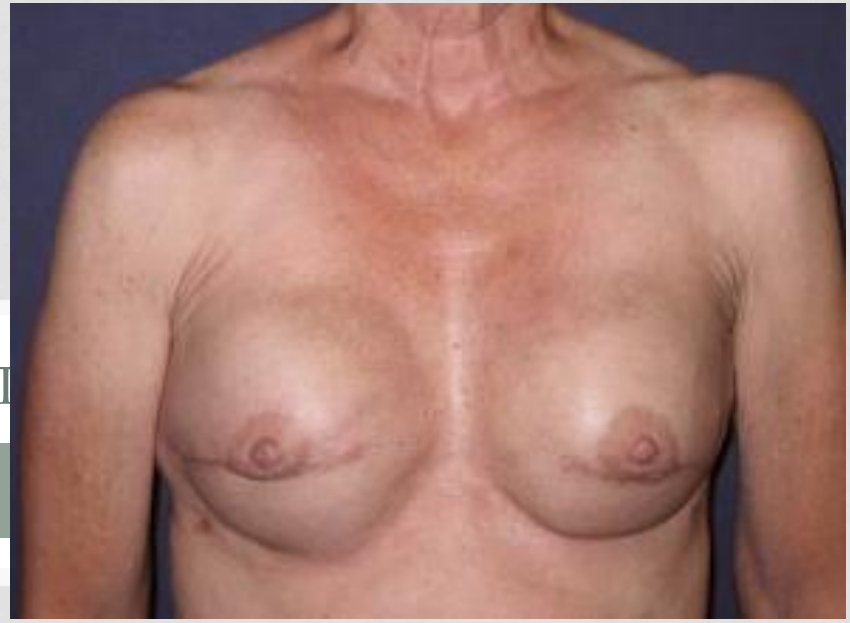
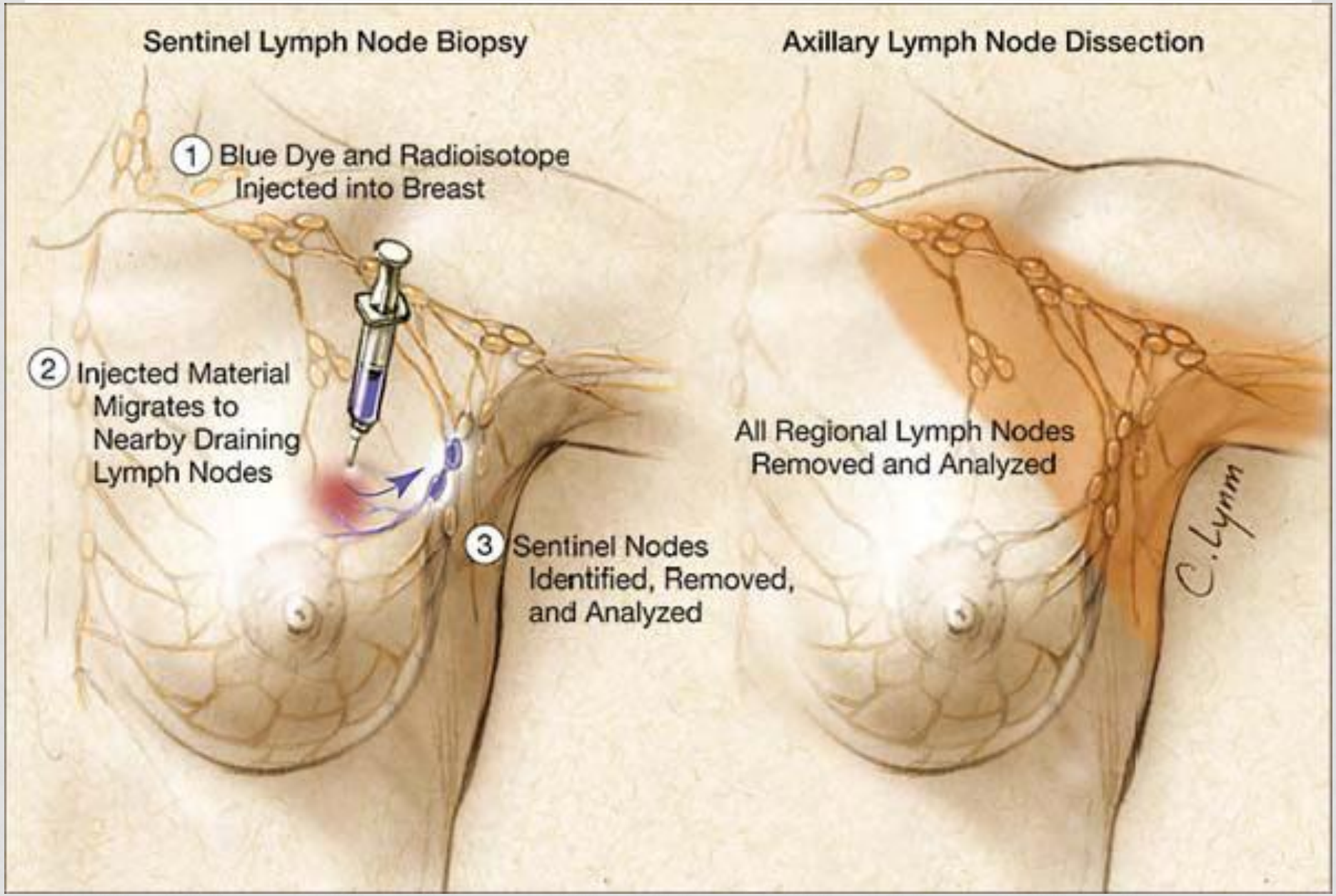



Sentinel Lymph Node Biopsy
Axillary Lymph Node Dissection
1 Blue Dye and Radioisotope Injected into Breast
2 Injected Material Migrates to Nearby Draining Lymph Nodes
3 Sentinel Nodes Identified, Removed, and Analyzed
All Regional Lymph Nodes Removed and Analyzed
C. Lynn

RADIATION

- Painless, well-tolerated
- 1-2 min/day, 5 days/wk for 3-6 weeks
- Decreases local recurrence rate by 50%
- Standard of care in lumpectomy
- Only needed after mastectomy if >5 cm mass, >3 LN+, involvement of chest wall or skin

CHEMOTHERAPY

- To treat micrometastasis
- Can be used before surgery (neoadjuvant) to shrink the cancer down
- For node(+) pts, Her2(+), triple-negative, locally advanced
- Oncotype DX newer test for ER/PR(+) patients to determine benefit of chemo
- Herceptin (monoclonal antibody) for pts who are Her2(+)

CHEMOTHERAPY

- Standard Regimen
- Given every two weeks (Dose Dense)
  - Anthracycline Based Regimens
    - Adriamycin
    - Cytoxan
    - Taxane

ENDOCRINE THERAPY

- Only for patients who are ER/PR(+)
- Tamoxifen/Raloxifene (Selective estrogen receptor modulators)
  - Premenopausal/postmenopausal
  - ↑ risk of DVT/PE, endometrial CA, cataracts, especially in postmenopausal females
  - 5 years is optimal duration
  - 47% reduction in risk of recurrence; 26% reduction in risk of mortality
  - Contralateral breast cancer was reduced by 47%
- Aromatase Inhibitors
  - Only in postmenopausal
  - Decreases bone density

HER-2/NEU

- Transmembrane tyrosine kinase growth factor receptor similar to EGFR
- Genomic amplification or overexpression occurs in 10-34% of breast cancers
- Strong predictive factor for response to Herceptin (monoclonal antibody) with increased DFS/OS
- Suggestion that HER-2/neu positivity is associated with poorer prognosis and resistance to CMF and Tamoxifen therapy but enhanced response to anthracycline based therapy

LOCAL RECURRENCE

- Local, regional, distant
- Mostly local, most common within first 2 years, then 5 years from 1st cancer
- Abnormal mammogram, skin recurrences, nodularities on exam
- RESTAGE them before proceeding with treatment

Z11 (IN A NUTSHELL)

- Traditionally, if sentinel nodes have been positive, a full axillary dissection is mandated
- Z11 showed that if sentinel nodes were positive, recurrence was not higher if patients got radiation, rather than dissection
- Only for patients receiving lumpectomy + radiation, not for mastectomy patients
- Decreases lymphedema rate

HIGH RISK SCREENING

WHAT CAN WE DO FOR THOSE AT HIGHER RISK?

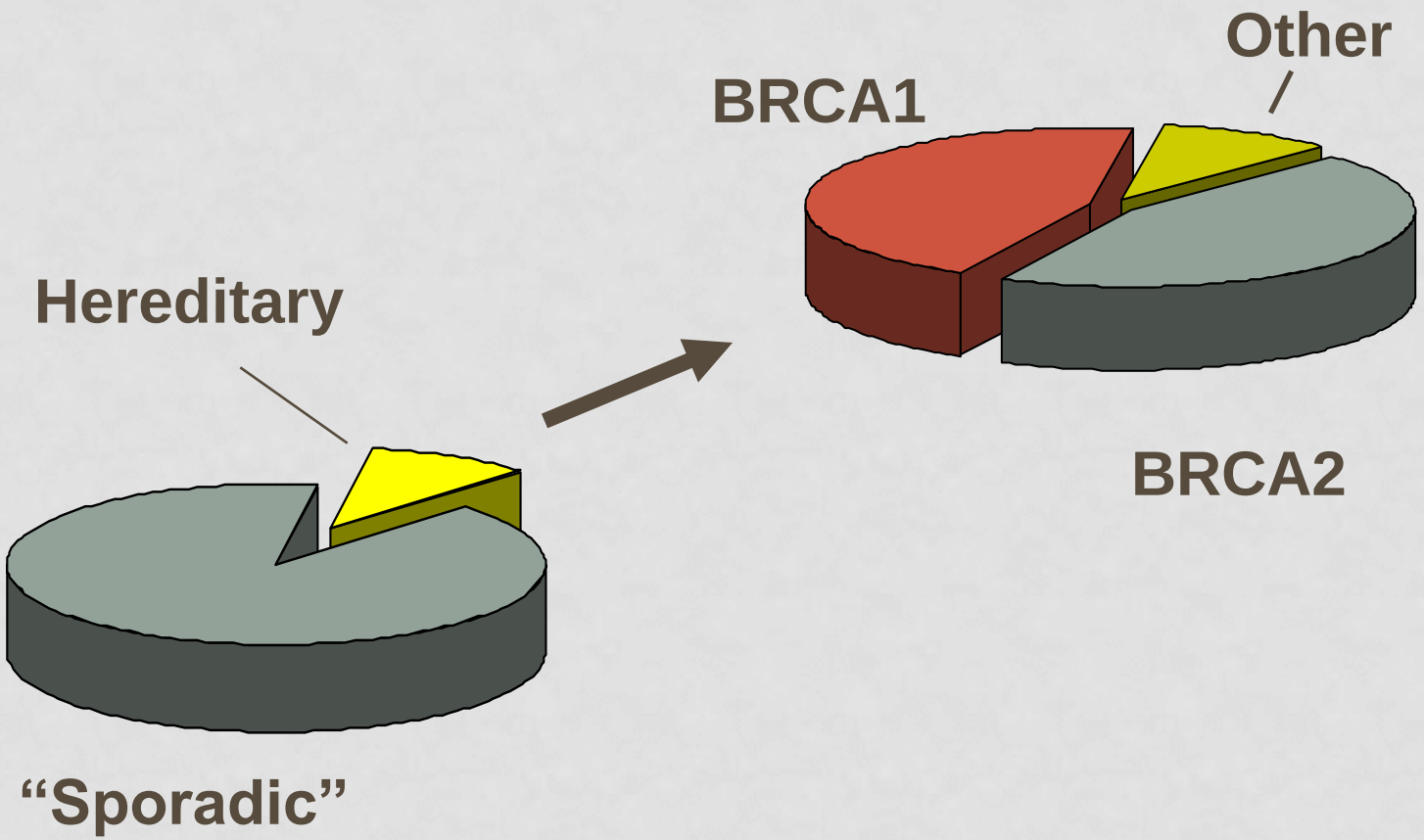
HIGH RISK ASSESSMENT

- Genetics Counselling and Testing
- Enhanced Surveillance
- Lifestyle Modification
- Chemoprevention Drugs
- Prophylactic Surgery

RISK OF BREAST CANCER

	% of Population	% of all Breast Cancer Cases	Average risk of Breast Cancer to age 70
Family History	**10**	**15-20**	**10-13%**
BRCA mutation	**0.1**	**5-6**	**50-85%**
General population without risk factors	**90**	**80-85**	**7%**

HEREDITARY BREAST CANCER



GENETIC TESTING

- <10% of breast cancers and <15% of ovarian cancers are associated with inherited genetic mutations
- The majority of breast and ovarian cancers that are associated with mutations are from two genes – breast cancer type 1 and 2 susceptibility genes
- Other inherited gene mutations include TP53 (Li-Fraumeni) and PTEN (Cowden), though these are much less common
- BRCA 1 and 2 are tumor suppressor genes, helping to maintain the genomic integrity and repair DNA damage
- Mutations of these genes cause increases in genomic instability and tumorigenesis

SCREENING CRITERIA

- Family with known BRCA mutation
- Family history of ovarian cancer (including fallopian tube, primary peritoneal)
- Family history of male breast cancer
- Family history of relative with 2 breast cancer primaries
- Personal History of Breast Cancer with:
  - Diagnosed ≤45 yo
  - Diagnosed ≤50 yo with family history of breast, ovarian, peritoneal cancer
  - Diagnosed ≤50 yo with triple-negative breast cancer
  - Diagnosed, with family members with breast/ovarian/peritoneal cancer ≤50 yo
  - Diagnosed with relatives with pancreatic or aggressive prostate cancer (Gleason score >7), sarcoma, endometrial cancer
  - High-risk populations, such as Ashkenazi Jewish

www.nccn.org

BRCA

- >1000 different mutations in BRCA1 and BRCA2 have been reported
- Higher prevalence in Ashkenazi Jewish populations, and populations from the Netherlands, Sweden, Hungary, Iceland, and French Canada
- Inherited in an autosomal dominant fashion, highly penetrant
- Development of cancer and age of onset is variable
- Strong association with triple-negative breast cancer, especially with BRCA1 mutations

BRCA

	Lifetime risk of Breast Cancer	Lifetime risk of Ovarian Cancer
BRCA1	**36-87%**	**27-45%**
BRCA2	**45-84%**	**10-20%**

- Increased risk of bilateral breast cancers, second ipsilateral breast primary cancers
- Risk of other cancers including pancreatic, fallopian tube, stomach, uterine, cervical, colon, testicular, prostate, gallbladder, melanoma, and male breast cancer

BRCA ENHANCED SCREENING

- Yearly MRI+MMGs starting at age 25-30
- Consider prophylactic mastectomies
- Prophylactic BSO by age 35y or when done with childbearing
  - Oophorectomy reduces risk of ovary, fallopian tube and peritoneal cancer by 95% plus
  - Can reduce BCa risk by 50%
- q6mo transvaginal u/s + CA-125
- Single-site testing for first-degree relatives > 18 yo

Eisen A et al J Clin Oncol 2005;23:7491

CHEMOPREVENTION IN BRCA

- Breast:
  - Tamoxifen
    - Reduces short-term risk overall
    - Probably reduces risk in BRCA 1 / 2 carriers
  - Oophorectomy
- Ovary:
  - Oral contraceptives
    - Reduces risk of ovary cancer overall
    - Minimal data on women with BRCA1/2
    - May increase breast cancer risk

OTHER GENETIC MUTATIONS

- TP53 (Li-Fraumeni)
  - Women have almost 100% lifetime cancer risk
  - Premenopausal breast cancer risk about 50% by age 60, mean onset 35 yo
- STK11 (Peutz-Jeghers)
  - 55% lifetime breast cancer risk, usually younger (mean 37 yo)
- PTEN (Cowden)
  - 85.2% lifetime risk of breast cancer, usually premenopausal
  - Also increased risk of benign breast changes
  - Increased endometrial lesions or cancers
- CDH1 (hereditary diffuse gastric cancer syndrome)
  - 60% lifetime breast risk, increased ILC risk
- MMR (Lynch)
  - Most studies suggest increased breast cancer risk, possibly 4x gen population

ENHANCED SURVEILLANCE

- MMG + MRI yearly (if >20% lifetime risk)
- Baseline MMG screening 10 years prior to age of first diagnosis of disease within the family
  - MRIs start at age 25
  - Mammograms start at age 30

LIFESTYLE MODIFICATION

- Only found to be effective in postmenopausal women
- Maintaining ideal BMI, decreasing weight gain after menopause
- Alcohol intake – dose-response relationship (starts as low as 3-6 drinks per week)
  - About 10% increase in risk with each 10g per day of alcohol intake (vs abstainers)
  - Also linearly correlated with cumulative lifetime intake
- Tobacco Cessation

CHEMOPREVENTION

- TAM decreases breast cancer incidence by 38%, ER(+) by 48%; increased rates of clot formation, endometrial cancer, cataracts (mostly in postmenopausal)
  - Indicated in
    - women >35 yo with >1.66% 5 year risk
    - LCIS/ADH/ALH
    - BRCA 1/2 (+) though efficacy not proven, esp in BRCA1
    - Women >60 yo with >5% 5-year probability
  - Contraindications for TAM
    - History of DVT, PE, use of warfarin, history of cataracts, HRT/BCP use, pregnancy

CHEMOPREVENTION

- Raloxifene
  - 59% reduction in breast cancer, 66% in ER+
  - Decreased risk of fracture, decreases cholesterol, increased risk of hot flashes, leg cramps, peripheral edema, thromboembolic events, does NOT increase endometrial cancer
- STAR trial (TAM vs RAL)
  - Raloxifene and Tamoxifen are equally effective
  - fewer incidences of LCIS and DCIS in tamoxifen arm
  - Fewer thromboembolic events, cataracts in raloxifene arm

CHEMOPREVENTION - AI

- Aromatase Inhibitors
  - Anastrazole and exemestane have been evaluated
  - 50% reduction in IBC with anastrazole, but more musculoskeletal side effects, HTN
  - Decreases bone density, but does not increase thromboembolic events, endometrial CA or cataracts
  - AIs NOT FDA approved for chemoprevention – exemestane most widely studied

PROPHYLACTIC SURGERY

- Usually only recommended for those at highest risk (mutation carriers)
- Can have mastectomy, skin-sparing mastectomy, nipple-sparing mastectomy
- +/- reconstruction (implant vs autologous tissue)
- BSO will decrease the incidence of breast cancer

ROSWELL PARK CANCER INSTITUTE

Breast Cancer Risk Assessment & Prevention Program at ROSWELL PARK CANCER INSTITUTE

The Breast Cancer Risk Assessment and Prevention Program is for women who are at above-average risk of breast cancer. The program provides these women with: a comprehensive breast cancer risk assessment; regular clinical breast exams; breast imaging; and, when appropriate, genetic counseling and testing. In addition, they are counseled on options for reducing breast cancer risk and on available clinical research studies in risk evaluation and cancer prevention.

Risk factors for breast cancer include:

- **A history of breast and/or ovarian cancer among your mother, father, brother or sister, or at least two other close relatives**
- **A known mutation in one of the breast cancer-related genes in you or your family**
- **A personal history of abnormal breast biopsy**
- **Prior radiation treatment to the chest**

Women deemed eligible for the program are seen by a specially trained Nurse Practitioner, in coordination with their personal physician and a breast cancer physician at Roswell Park. Appointments for the program are on Mondays. Women concerned about their risk of developing breast cancer should call 1-877-**ASK-RPCI** (1-877-275-7724) for a risk evaluation to determine their eligibility for the program.

The Breast Cancer Risk Assessment and Prevention Program at RPCI was initiated with a generous endowment from the Buffalo Sabres Alumni Association.

ROSWELL PARK CANCER INSTITUTE

Multi… Center | Roswell Park Cancer Institute
Elm &… | Buffalo, NY 14263
1-877-…-275-7724) | www.roswellpark.org

BUFFALO SABRES ALUMNI ASSOCIATION

2513B (2/12)

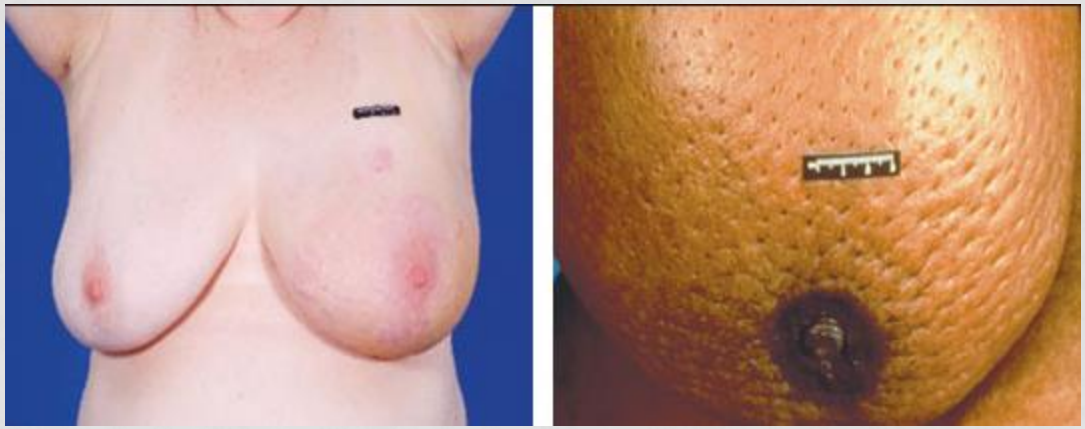
SPECIAL CONSIDERATIONS

SPECIAL SCENARIOS

- Inflammatory Breast Cancer
- Paget's Disease
- Hormone Replacement Therapy
- Pregnancy and Breast Cancer
- Nipple Discharge

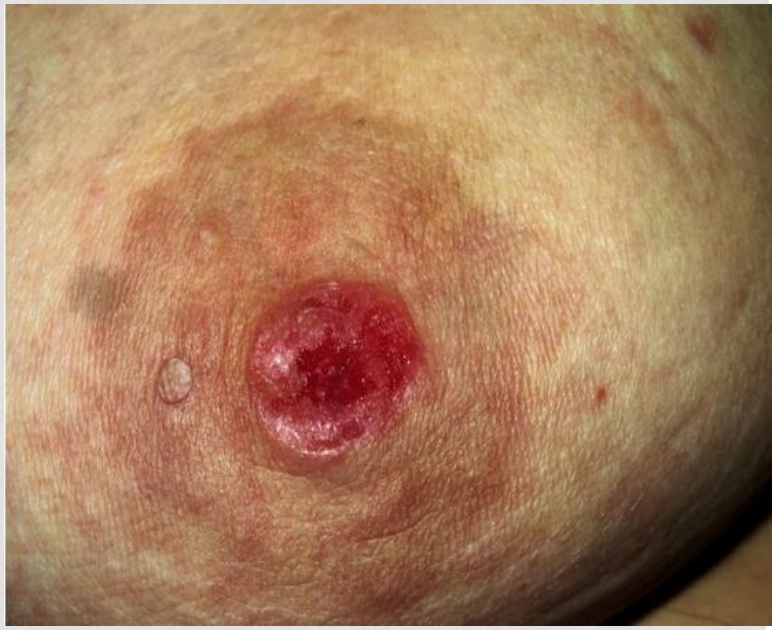
INFLAMMATORY BREAST CANCER

- Clinically diagnosed, often mistaken for infection
- Rare 0.5-2%
- aggressive
- Rapid onset of breast erythema/edema/ peau d'orange
- Treat with chemo FIRST, then modified radical mastectomy, then radiation
- Always STAGE patient before starting treatment



PAGET'S DISEASE

- Scaly, raw ulcerated lesion on nipple and areola
- Malignant intraepithelial adenocarcinoma within epidemis of nipple
- May not have underlying mass



HRT AND BCA

- Increased risk of Bca with use of estrogen or estrogen-progestin therapy
- From the large WHI study comparing placebo to HRT:
  - For each year of use, risk can increase 2.3%
  - Rapid decline in BCa incidence after discontinuation of use
  - Use of estrogen only HRT may decrease the risk of invasive BCa slightly (?)
  - Use of HRT may increase mammographic density and abnormal mammograms
- Should not be used in pts with history of BCa

PREGNANCY

- 20% of women <30 yo with BCa are pregnant
- more diagnosed postpartum than during pregnancy
- incidence may be increasing as women delay childbearing
- Pregnancy-associated Breast Cancer (PABC) = during pregnancy, first postpartum year, or any time during lactation
- Most cancers are invasive ductal, but more poorly differentiated, associated with LVI, advanced stage, ER/PR(-), larger tumour size, higher nodal incidence, 40% Her2+
- No specific risk factors known, but should be referred for genetic counselling (as they are young)

PREGNANCY WORKUP

- Usually presents as a mass, may be seen when a baby refuses milk ("milk rejection sign")
- Ultrasound – usually first test, non-ionising, sensitive and specific
- Mammogram – use abdominal shielding, sensitivity may be lowered due to breast changes
- MRI – may be challenging to interpret, would avoid in first trimester; some gadolinium based contrast agents can pass through the placental barrier; approved contrast agents for MRI include gadobenate dimeglumine (Europe and US) and gadoterate meglumine (Europe only)
- Biopsy - Milk fistulas rare, use core biopsy not FNA (due to breast changes)

PREGNANCY - SURGERY

- Surgery is possible in all trimesters
- Can use fetal heart-rate monitoring during surgery to detect for fetal distress but "take care of the baby by taking care of mom" (<24 weeks?)
- Delay autologous reconstruction until after delivery
- SLNB – OK to use technetium 99m-labelled sulfur colloid, NO blue dye d/t anaphylactic maternal reaction risk
- Mastectomy – eliminates need for RT, delay reconstruction until after delivery; can be used if no RT/chemo warranted, and diagnosed early in pregnancy
- BCT – can be used as RT not given until after chemotherapy

PREGNANCY - CHEMO

- CHEMO after 14 weeks
- 10 days to 8 weeks out – can cause organogenesis and congenital malformations
- 2nd and 3rd trimesters – fetal growth and maturation, no real fetal anomalies with chemo, but can have growth restrictution, neonatal death, prematurity, haemopoietic suppression
- Should leave 3 weeks between last cycle of chemo and delivery date to avoid problems with haemopoietic suppression
- Examine the placenta of all pregnant patients with cancer for metastases
- Can use flurorouracil and epirubicin OR doxorubicin+cyclophosphamide OR epi or doxo +cyclo and taxanes
- Should avoid breastfeeding on chemo
- Can use anthracyclines, but taxanes still unknown though appears safe
- NO **trastuzumab**, **tamoxifen,** lapatinib, methotrexate, cisplatin, AIs, LHRH

PREGNANCY

- RT contraindicated during pregnancy due to fetal radiation exposure – may have pregnancy loss, malformation, disturbances in development/growth, mutagenic and carcinogenic effects – with RT, in first trimester, fetal dose about 0.04 to 0.15 Gy, in 3rd trimester about 2 Gy (limit about 0.1-0.2 Gy under 16 weeks, 0.5-0.7 Gy after 16 weeks)

- Breastfeeding after treatment should be ok, from affected side, may have less milk, increased risk of mastitis
- Pregnancy Termination has not been shown to improve outcomes, may worsen outcomes?
- Issues: fetal harm, prognosis and ability to care for offspring, future fertility

NIPPLE DISCHARGE CHARACTERISTICS

- Benign
  - Bilateral
  - Multiductal
  - Inducible
  - Clear, milky, white
  - <40 yo
- Suspicious
  - Unilateral
  - Single duct
  - Spontaneous
  - Bloody
  - > 40 yo
- Most common cause of bloody nipple discharge is an intraductal papilloma
- Malignancy found in 5-15%, likely DCIS
- Mammogram, ultrasound, ductogram (if possible), MRI for evaluation

QUESTIONS?