



ACRODeck

Ductal Carcinoma in Situ

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Introduction to ACRODeck



ACRODeck

- The goal of ACRODeck is to introduce standard treatments of oncologic malignancies for early radiation oncology residents
- Please note that there is often considerable variation in standard treatment recommendations
- Moreover, the landscape of oncology is ever-changing; for practice changing landmark studies and feedback, please email: resident@acro.org

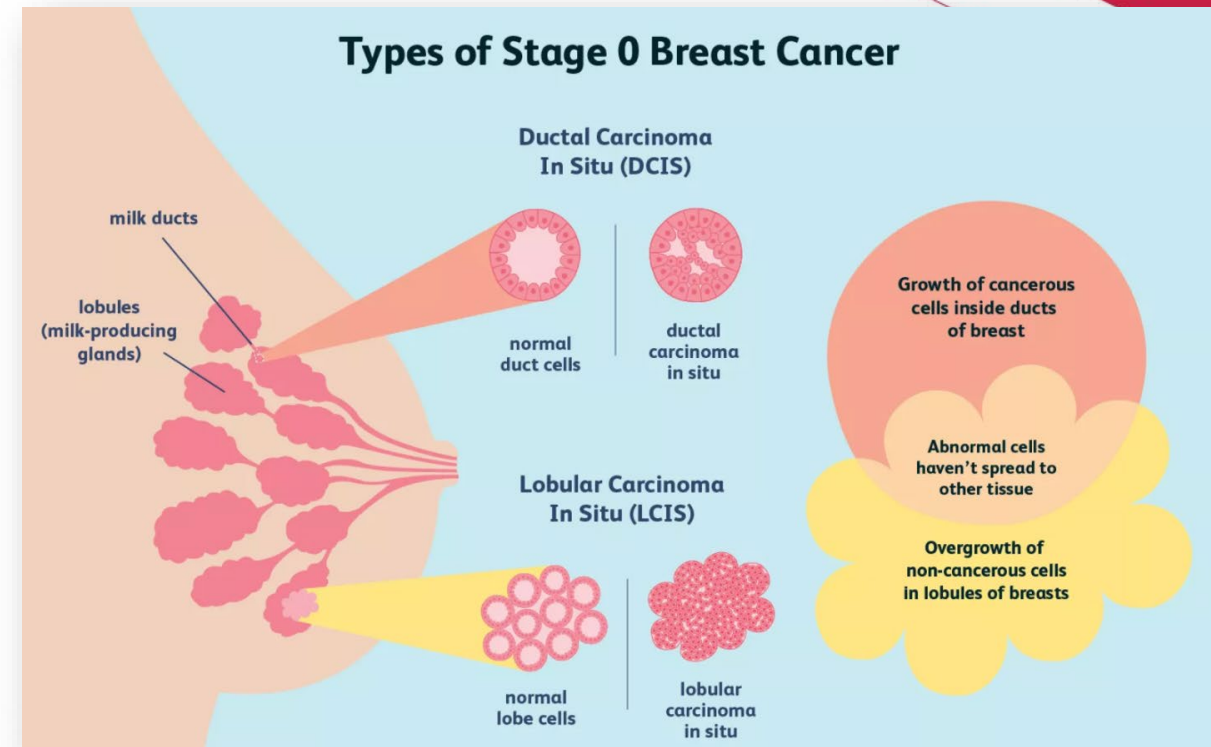
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Clinical Presentation and Differential Diagnosis

- DCIS is defined as clonal proliferations of cells that are confined to the ductal lumens, do not breach the epithelial basement membrane, and do not show evidence of invasion
- It classically presents asymptotically as microcalcifications on a screening mammogram
- Differential Diagnosis:
 - Usual and atypical ductal hyperplasia (UDH and ADH)
 - Lobular carcinoma in situ (LCIS)
 - Microinvasive carcinoma
 - Invasive breast cancer

Microcalcifications occur in the vast majority of DCIS

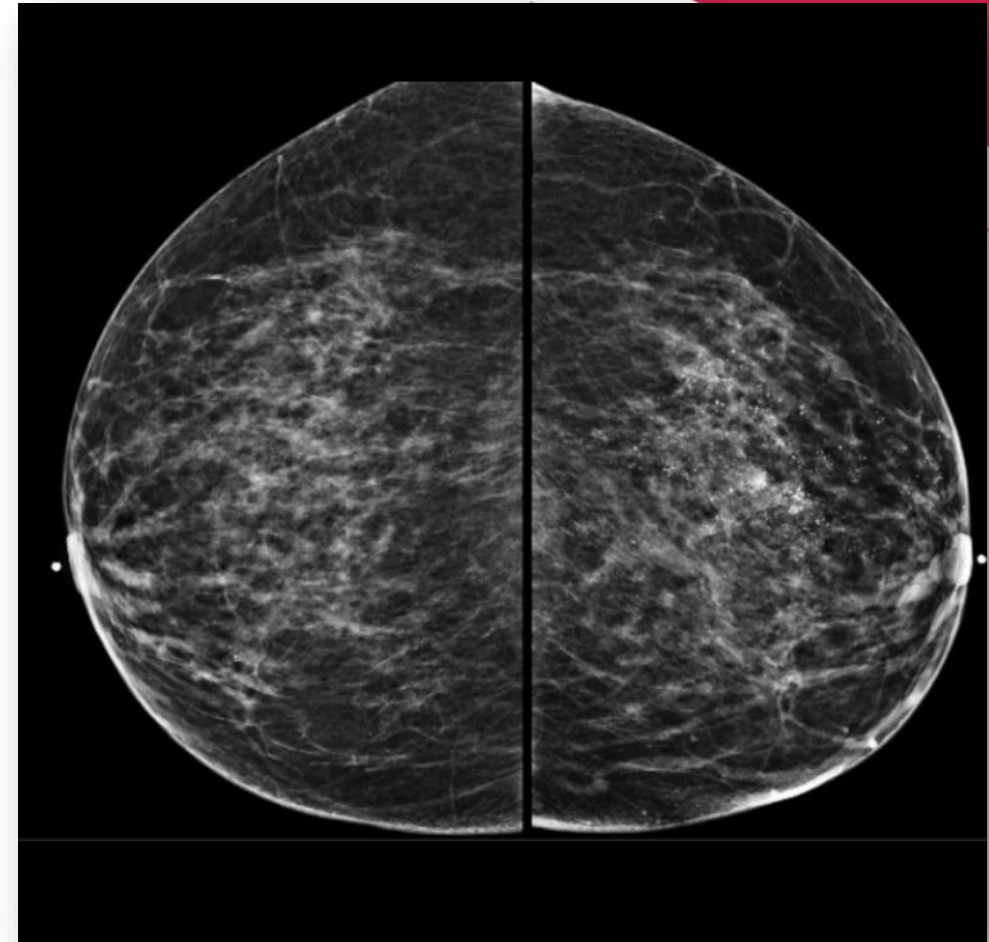


Verywell / Gary Ferster

Initial Workup

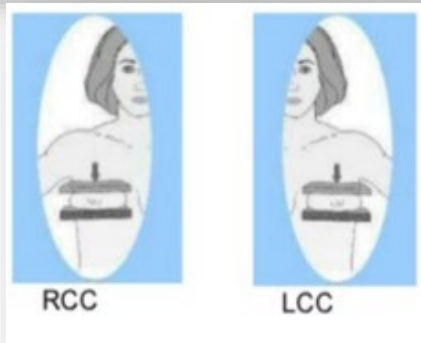
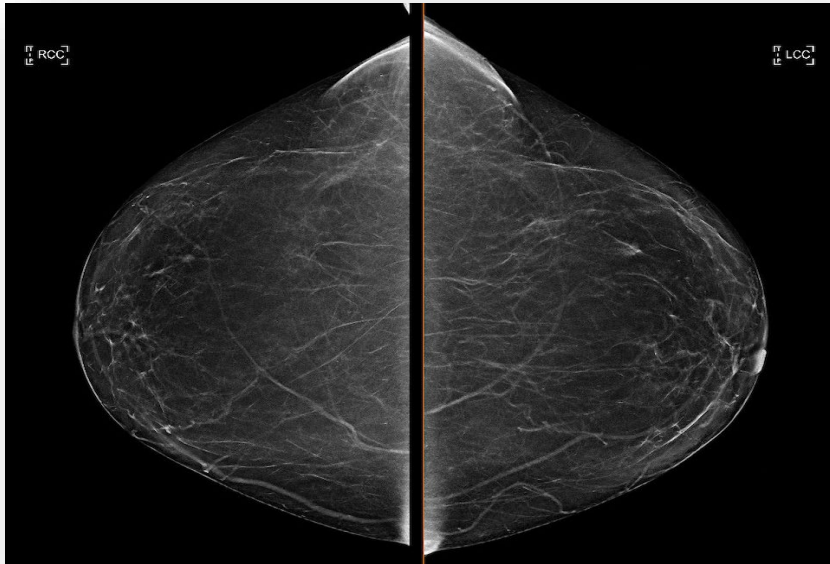
- H&P
 - Breast and lymph node examination
 - DCIS is not typically associated with a palpable mass
 - Attention to the nipple to evaluate for Paget's disease
- Diagnostic bilateral mammogram
 - Calcifications is the classic finding of DCIS
 - Ultrasound may assist in biopsy guidance
- Core needle biopsy
 - Determination of hormone receptor status
 - HER2 is classically not tested on DCIS specimens
- Breast MRI may be considered if there are extensive calcifications (to evaluate for breast conservation candidacy)

NSABP B-43 showed no IBTR benefit for adjuvant trastuzumab in HER2+ DCIS



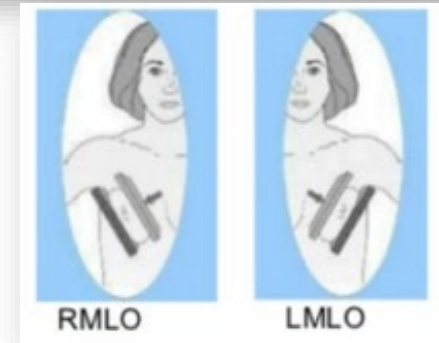
Calcifications are seen in the left breast (Radiopaedia)

Mammograms



- Two basic views are:
 - ← Craniocaudal (CC)
 - Mediolateral Oblique (MLO) →
- Magnification is a technique used to evaluate calcifications
- Spot compression is a technique used to evaluate suspicious masses

Linear calcifications are associated with comedo-type DCIS

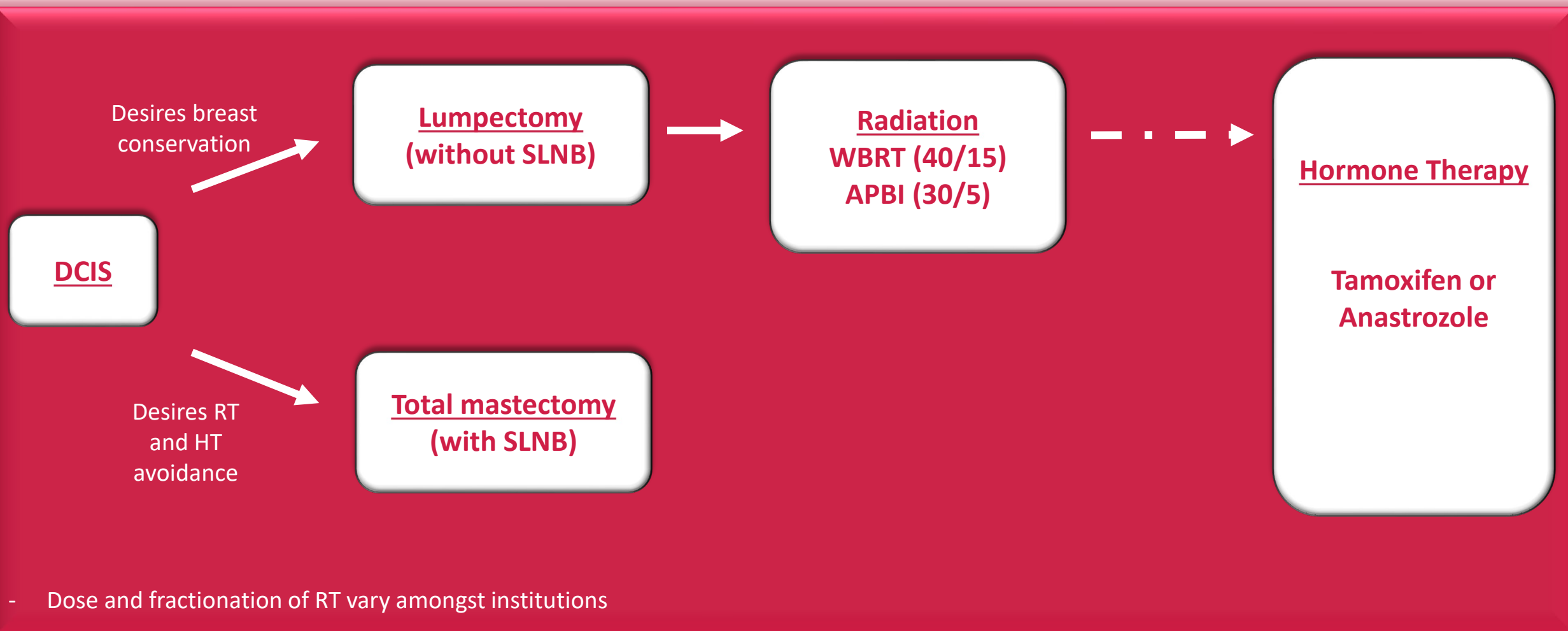


Tis = Tumor in Situ

Staging and Pathology

- DCIS is staged as Stage 0, Tis
- There are several histological subtypes of DCIS
 - Micropapillary
 - Papillary
 - Cribriform
 - Solid
 - Comedo (worst prognosis)
 - Rarer ones include: apocrine, neuroendocrine, signet ring-cell cystic, hypersecretory carcinomas, and clinging DCIS

Treatment Summary

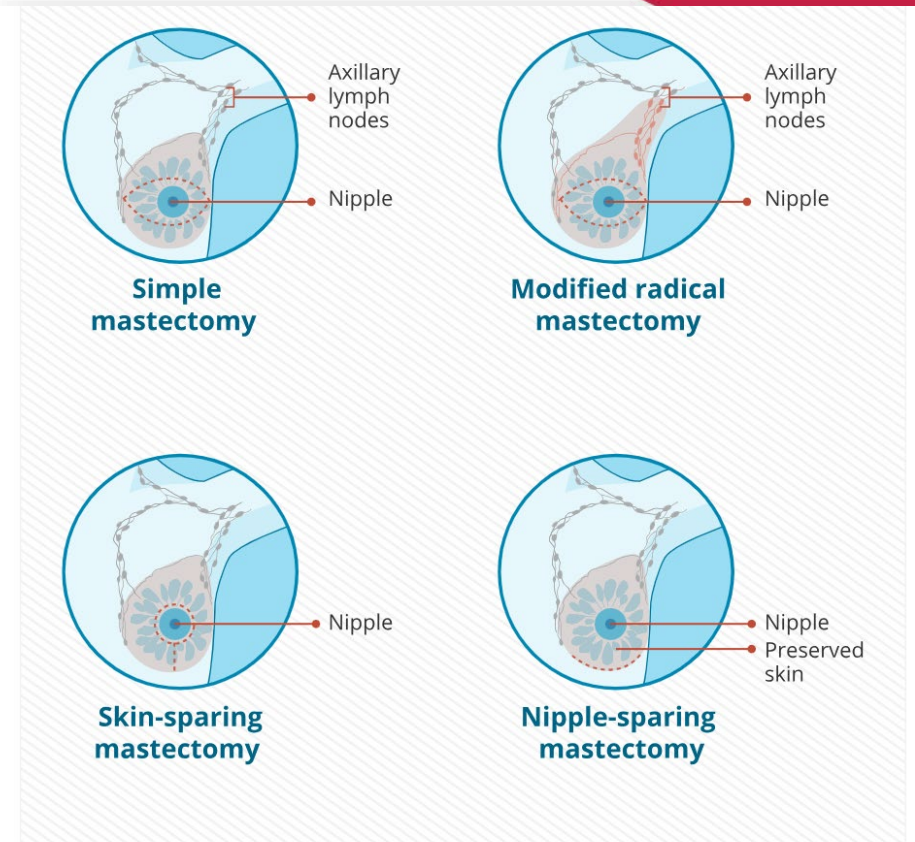


Surgery

Surgical options include:

- Lumpectomy (without a SLNB)
 - SLNB can be considered in the setting of microinvasion or tumors larger than 4 cm
- Simple / Total mastectomy with a SLNB

Margins of 2 mm are considered adequate for DCIS;
re-resection, if feasible, is recommended for
close/positive margins



The two main types of mastectomy are:

- A simple (or total) mastectomy, which involves surgically removing the entire breast, including the skin, nipple and areola
- A modified radical mastectomy, which removes the entire breast and axillary lymph nodes under the arm

Surgery

The utilization of RT after mastectomy is of some debate
(it is sometimes used in the setting of positive margins)

- If local recurrence occurs, 30-50% of patients will present with invasive cancer
- Adjuvant RT after a lumpectomy results in an approximately 50% relative risk reduction in local recurrence

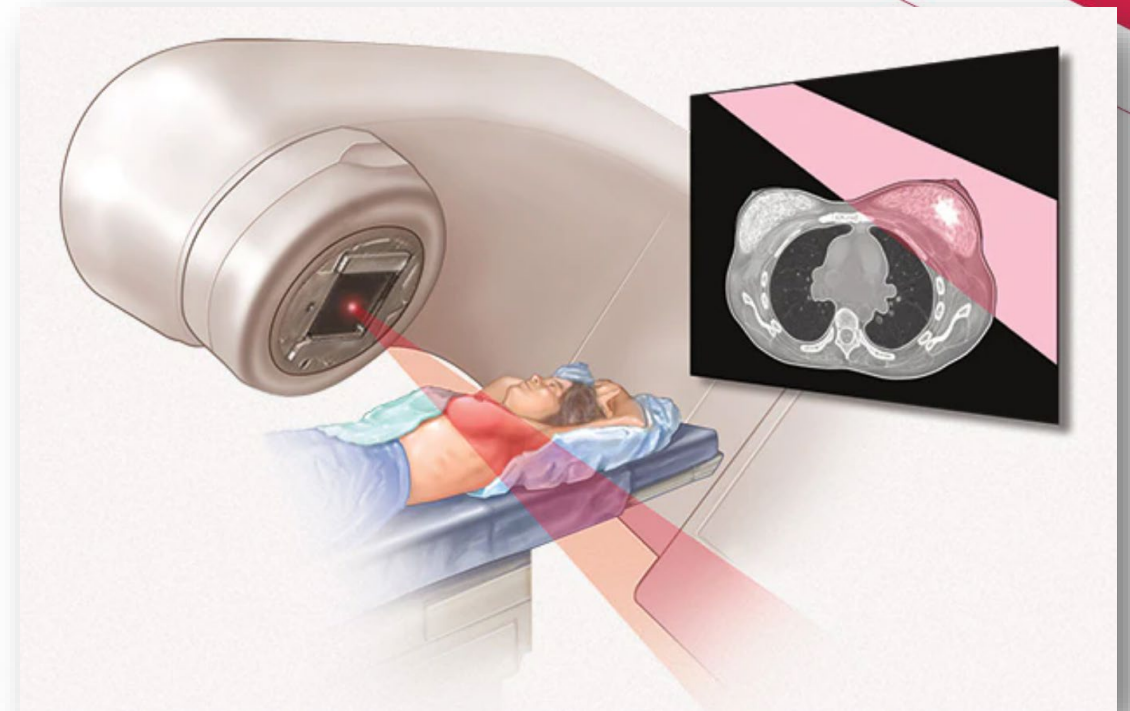
Radiation

The rate of recurrence for DCIS is often quoted as 1%/year for low-risk and 2%/year for high-risk

- Adjuvant radiation following breast conservation surgery has consistently demonstrated significant reduction in the relative risk of recurrence, regardless of risk group
 - Low risk DCIS (defined by RTOG 9804 as grades 1-2, size < 2.5 cm, margins $\geq$ 3 mm) had a 7.1% risk of ipsilateral recurrence with RT at 15 years, versus 15.1% with observation
 - High-risk DCIS patients are those who do not meet the above criteria
- EBRT may be delivered via:
 - Whole Breast Irradiation
 - (Accelerated) Partial Breast Irradiation

Radiation - WBI

- Whole breast irradiation has classically been the adjuvant treatment of DCIS (and invasive breast disease) for many decades
- Common fractionation regimens include:
 - 42.56 Gy / 16 fx
 - 40.05 Gy / 15 fx
- A tumor bed boost may be considered in select patients; common regimens include
 - 10 Gy / 4-5 fx
- Per the 2018 ASTRO Guidelines, a boost may be omitted in DCIS patients who are older than 50 and meet the following criteria:
 - Screen detected
 - Size ≤ 2.5 cm
 - Low to intermediate nuclear grade
 - With widely negative surgical margins (≥ 3 mm)



Mayo Clinic Foundation

Radiation – PBI/APBI

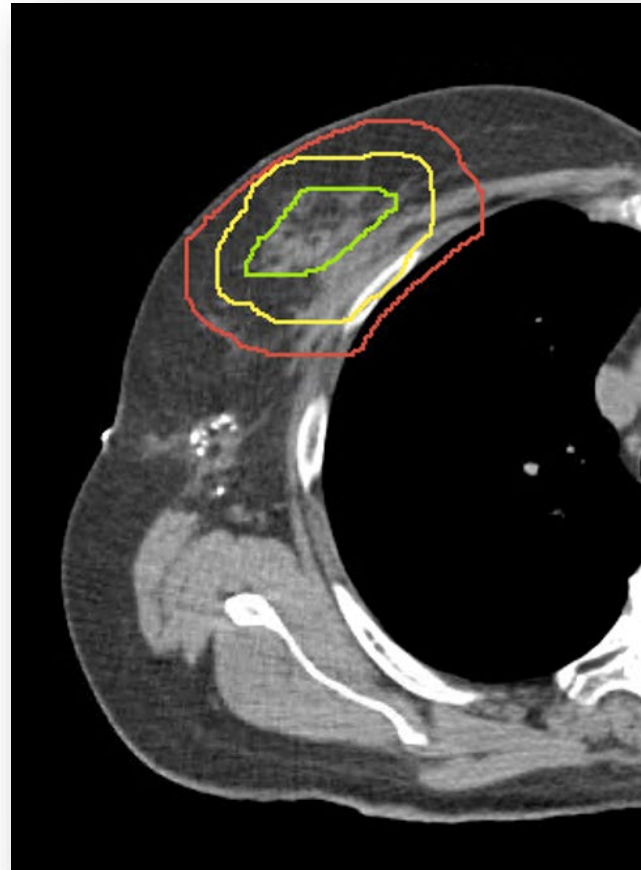
While many fractionations are available, 30 Gy in 5 fx (every other day) is a commonly utilized regimen (PMID: 32840419)

- (Accelerated) Partial Breast Irradiation is another method to deliver radiation in DCIS patients
- The 2024 ASTRO Guidelines (PMID 37977261) define the following population as suitable to receive APBI:

DCIS

5. PBI is recommended for patients with DCIS with all of the following factors:
- Low-to-intermediate grade
 - Age ≥ 40 years
 - Size ≤ 2 cm

Sample APBI Contours (per FLORENCE)



Tumor bed

CTV = 1 cm

- Limited to 3 mm from the skin surface

PTV = 1 cm

- Limited to 3 mm from the skin surface
- Allowed to extend 4 mm inside the ipsilateral lung

Simulation

- CT (no contrast)
- Supine
 - Prone positioning can be utilized as well
- Breast board
- Arms above head

In stark contrast to the majority of modern radiotherapy, breast planning is often forward-planned (via field-in-field techniques or electronic compensation)



Klarity Breastboard

Dose Constraints - WBI

Dosimetric constraints vary widely per institution and patient habitus, and the principles of ALARA are often utilized

OAR	Constraint
Breast	Max < 107-110%
Contralateral Breast	Max < 3 Gy
Ipsilateral Lung	V15 _{Gy} < 15%
Contralateral Lung	V5 _{Gy} < 10%
Heart	Mean < 1 Gy

Dose Constraints - ABPI

Per the FLORENCE trial

OAR	Constraint
Breast	Max < 105%
Ipsilateral Breast	V15 _{Gy} < 50%
Contralateral Breast	Max < 1 Gy
Ipsilateral Lung	V10 _{Gy} < 20%
Contralateral Lung	V5 _{Gy} < 10%
Heart	V3 _{Gy} < 10%

Radiation Toxicities

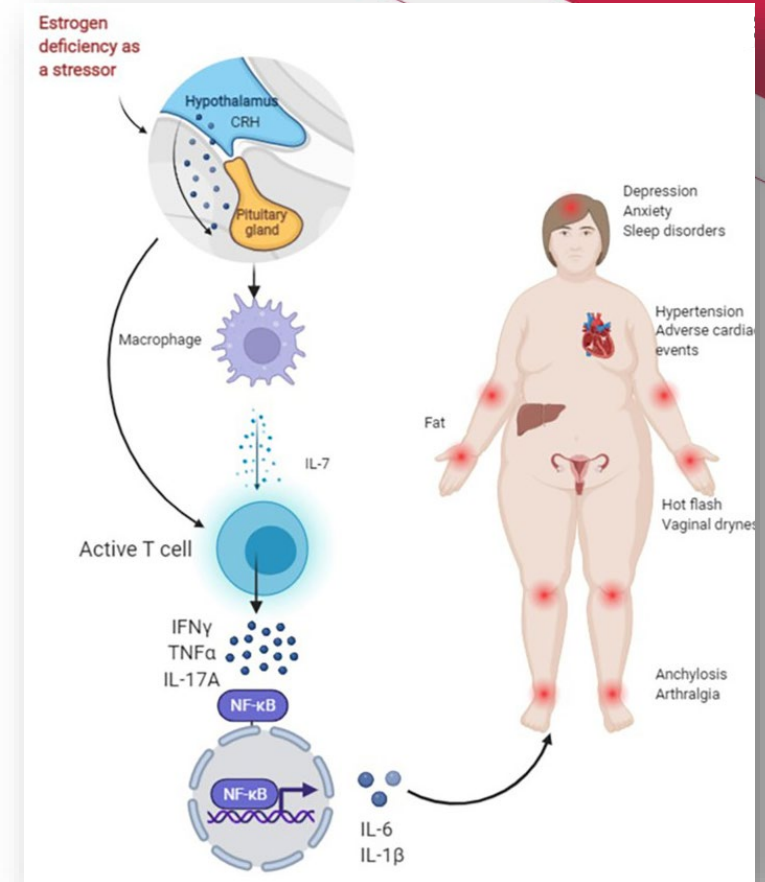
Prophylactic use of Aquaphor and mometasone helps reduce acute RT toxicity

- Acute effects:
 - Erythema, pruritis, tenderness, desquamation
- Late effects:
 - Altered pigmentation, volume loss, fibrosis, rib fractures, lymph edema, pulmonary fibrosis, cardiac toxicity, secondary malignancy

Systemic Therapy

Tamoxifen blocks estrogen receptors on cancer cells, while anastrozole prevents the aromatase enzyme from converting other hormones into estrogen

- Adjuvant hormone therapy is often indicated for 5 years for HR+ patients – who opt for breast conservation
 - Options include tamoxifen and aromatase inhibitors (AIs such as anastrozole)
 - Tamoxifen is often given to premenopausal patients, while anastrozole is prescribed for those who are postmenopausal
- Side effects
 - Common to both:
 - Hot flashes and sexual dysfunction
 - Specific to tamoxifen:
 - DVT, PE, stroke
 - Endometrial cancer
 - Modifying CV risk factors is important in this population
 - Specific to AIs:
 - Osteoporosis, arthralgia, joint stiffness, bone pain
 - Cardiovascular disease, and hypercholesterolemia
 - Treatment includes exercise, NSAIDs, duloxetine



PMID: 36578931

Prognosis

Neither mastectomy nor RT prevented death from breast cancer (PMID 26291673)

- 20-year breast cancer specific mortality after a diagnosis of DCIS is 3.3%
 - With the overall indolent nature of this disease, no therapy has been shown to provide an OS benefit in DCIS



Review

Review #1: Benefit of RT in DCIS

What is the benefit of RT in DCIS showed on RTOG 9804?

- (A) No benefit
- (B) Local control improvement
- (C) Mastectomy-free survival improvement
- (D) Overall survival

Review #2: DCIS Characteristics

RTOG 9804 characterized low-risk DCIS as grade 1-2, size < 2.5 cm, screen detected, with margins $\geq$ 3 mm

What feature is associated with an elevated risk of in-breast recurrence in the DCIS patient?

- (A) Clinical detection
- (B) Mammographic detection
- (C) Low grade
- (D) Surgical margin of 3 mm

Review #3: Margins

Surgical margin for invasive breast cancer = no tumor on ink

What is considered an adequate margin for DCIS?

- (A) No tumor on ink
- (B) 1 mm
- (C) 2 mm

Review #4: Recurrence Rates

What were the 15-year rates of ipsilateral breast recurrence at 15 years per RTOG 9804, without and with RT?

- (A) 30% vs. 17%
- (B) 15% vs. 7%
- (C) 5% vs. 1%

Review #5: Follow-up

Following lumpectomy and adjuvant RT/hormone therapy for DCIS, how often should mammograms be performed?

- (A) Every 3 months
- (B) Every 6 months
- (C) Annually
- (D) No screening mammograms are necessary following treatment for DCIS

Answer Key

1. B
2. A
3. C
4. B
5. C

The COMET trial is a phase III RCT
exploring SOC vs AS for low-risk DCIS