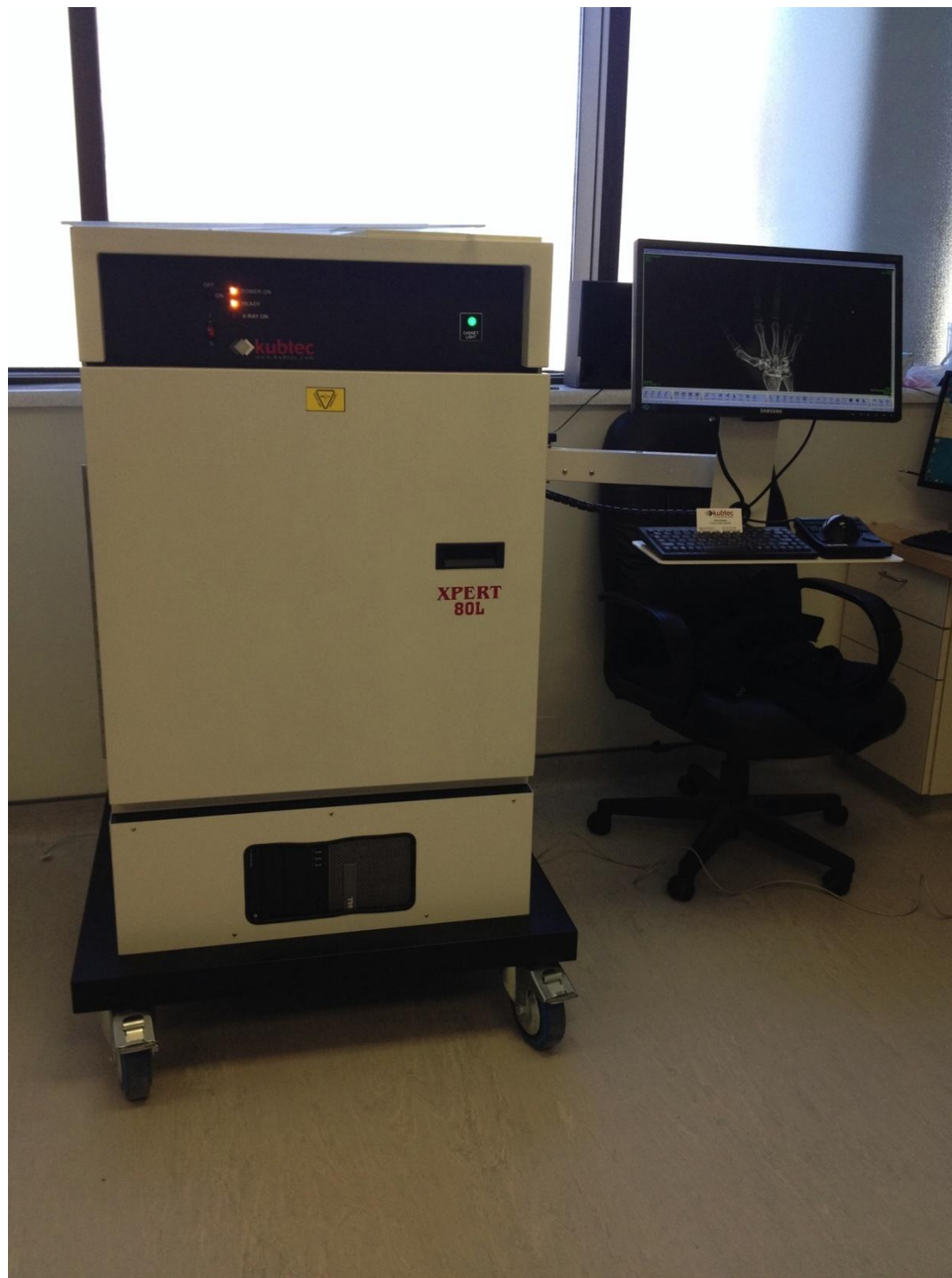


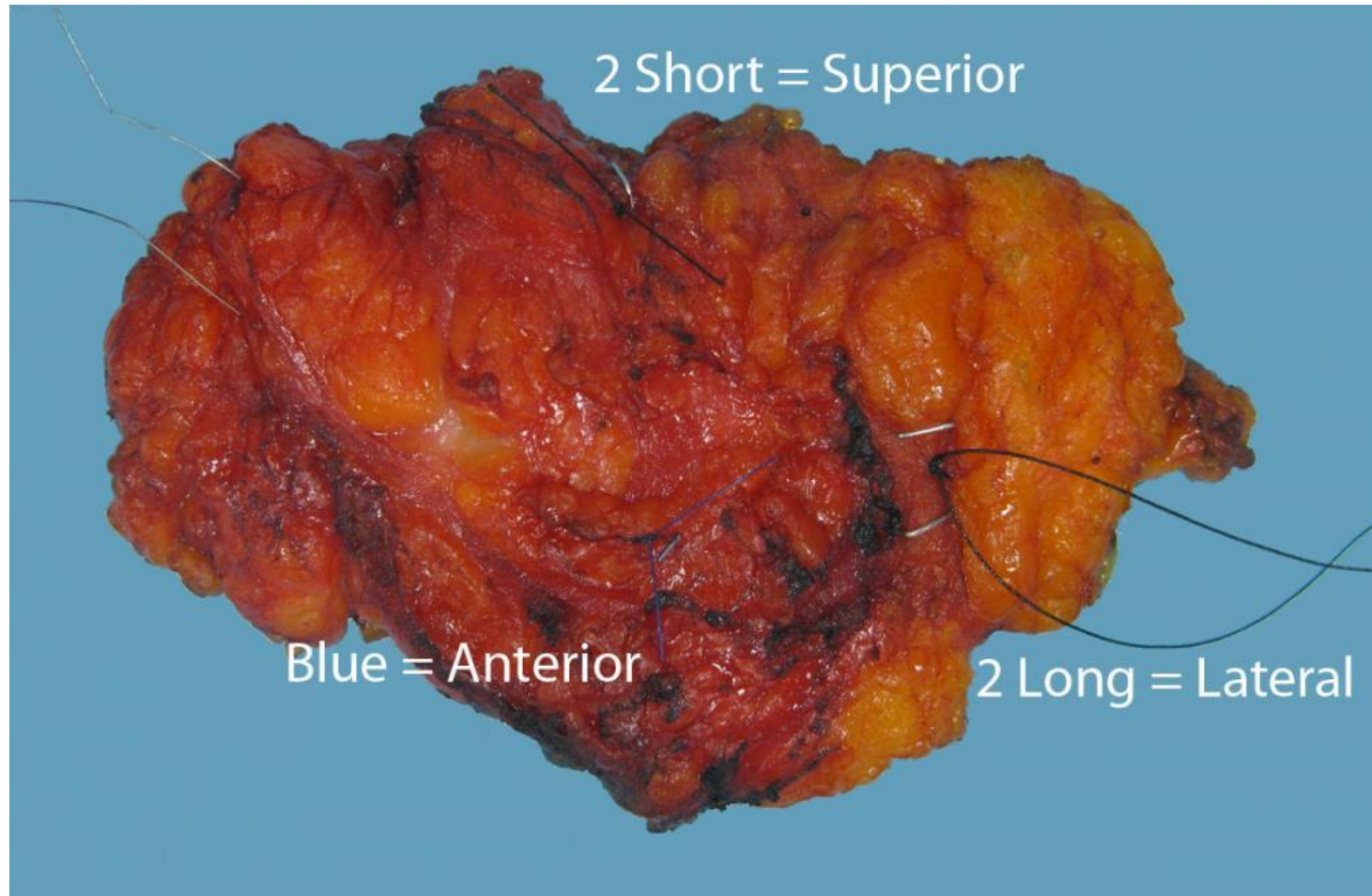
# Grossing breast specimens: New machines and old techniques

Gillian Bethune

April 21, 2015



# But first.....



# Outline

- Grossing breast specimens – focus on margin evaluation
- A ‘tour’ of a wire localization excision through the system – our current approach.
- How might things change with the specimen radiography?

# Types of large breast specimens

1. Mastectomy +/- axillary contents
2. Breast conserving surgery (60-70% of all cases)
  - Lumpectomy, segmental resection
    - Lesion palpable by surgeon
  - Wire localization excision\*\*
    - Non palpable tumors (invasive and DCIS)
    - Calcifications for ADH, FEA
    - Radial scars, papillary lesions

# Breast conserving surgery

- More difficult and time consuming to gross than mastectomy
- Often requires more sections
- Margin assessment crucial

# Breast conserving surgery

- Most patients have radiation post surgery
- Selected patients may be spared radiation
- Small proportion have local recurrences
  - Young age
  - Extent of excision and rads/chemo
  - Multifocal disease
  - EIC positive
  - Molecular subtype
  - Margins

# Margin evaluation

- Margin evaluation is an exercise in probabilities (not absolutes)
- Patients with positive margins are *more likely* to have residual disease at or near the primary site than those with negative margins
  - A positive margin does not guarantee residual disease
  - A negative margin does not preclude extensive residual disease

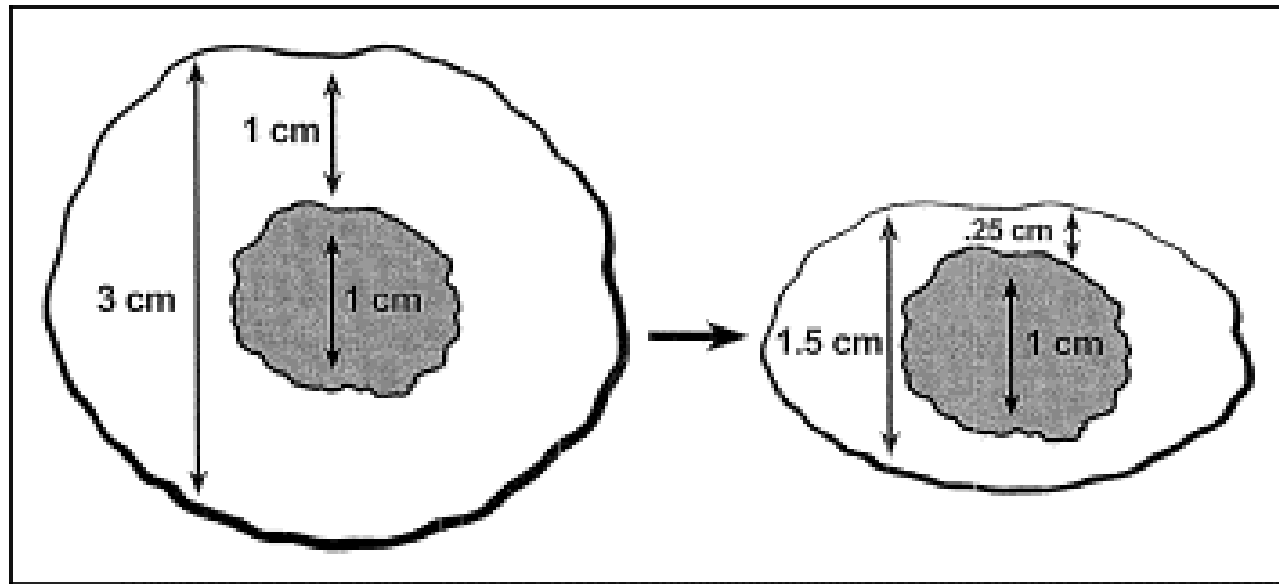


# Limitation of margin assessment

- Technical and methodological
- Definition and interpretation
- Distribution of tumor in the breast
- Breast cancer biology
- Impact of systemic therapy

# Technical and methodological

- Pancake phenomenon

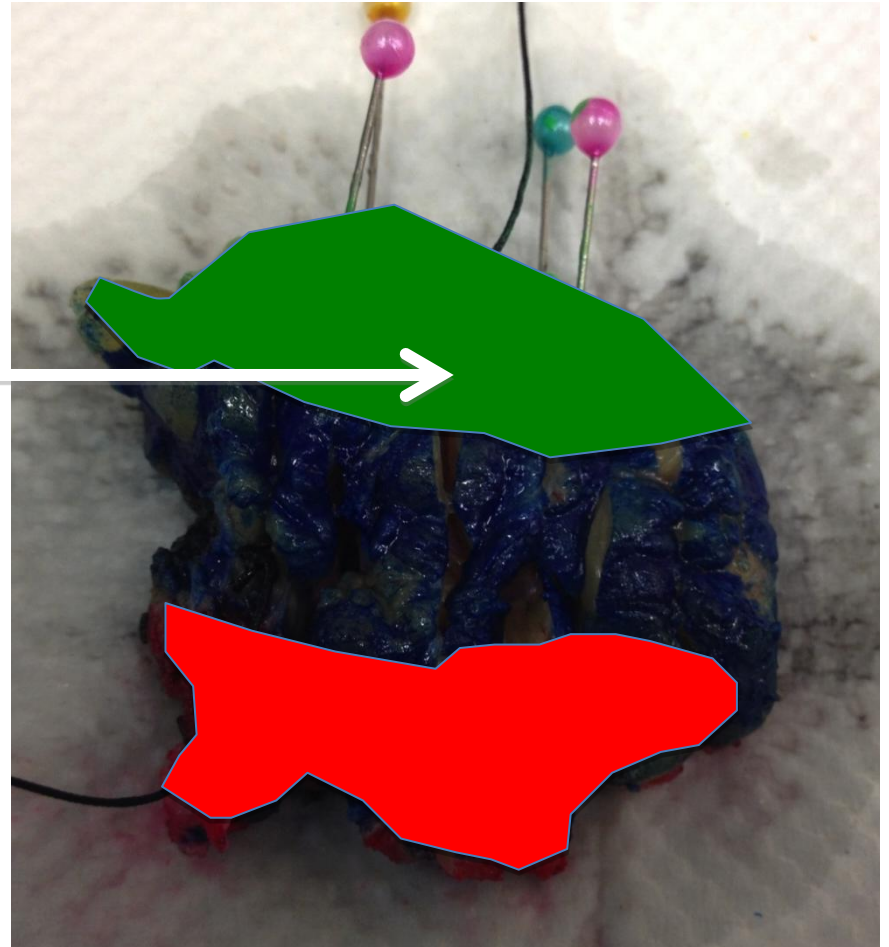
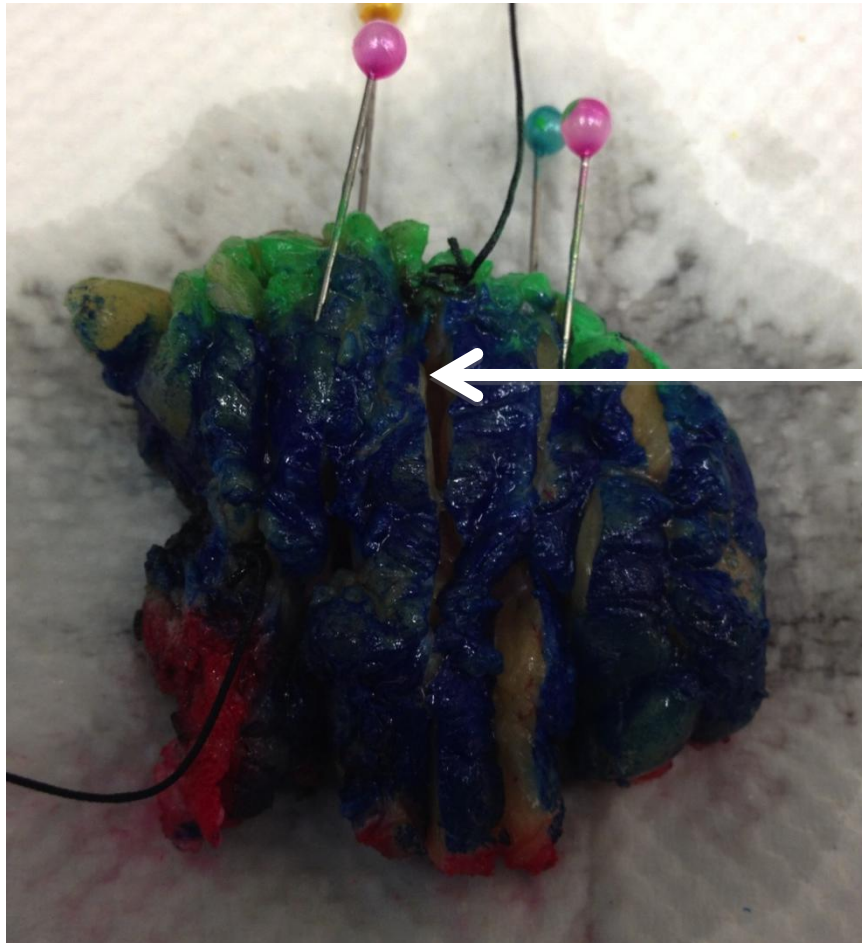


Graham R, et al. The pancake phenomenon contributes to the inaccuracy of margin assessment in patients with breast cancer. *Am J Surg* 2002; 184: 89-93.

# Technical and methodological

- Specimen orientation and inking
  - Unoriented – all black
  - Poor orientation by surgeon – sutures (LSD)
  - Poor localization of margins by pathology - inking
    - Up to 31% disagreement between surgeon and pathologist in one study.

Arrow is pointing to which margin?



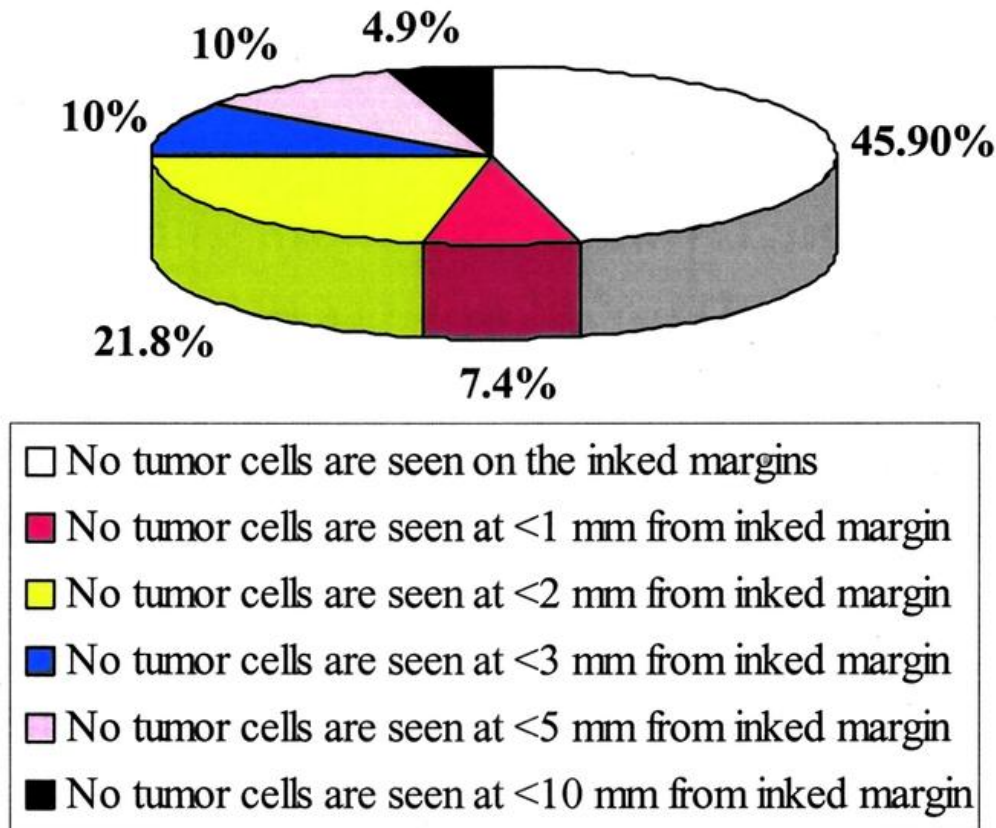
# Technical and methodological

- No uniform sampling method
  - Ranges from limited sampling to total sequential embedding
  - Depends on size of specimens which depends on surgeon and institution and demographic

# Definition and interpretation

- No consensus agreement among surgeons and oncologists as to what constitutes a 'negative margin'
  - No tumor on ink
  - $\geq 1\text{mm}$
  - $\geq 2\text{ mm}$
  - $\geq 5\text{ mm}$

## How do you define negative margins after local excision?: North America



# Definition and Interpretation

- Meta analysis with 14,571 patients from 21 studies
- No significant difference in LR rates associated with threshold margin widths of 1mm, 2mm or >5mm when adjusted for use of radiation boost or endocrine therapy
- “Therefore, based on our meta-analysis, it may be reasonable to define a minimum distance of 1 mm for negative margins in BCT of invasive breast cancer.”



# SSO-ASTRO Consensus on margins in invasive breast cancer

VOLUME 32 • NUMBER 14 • MAY 10 2014

JOURNAL OF CLINICAL ONCOLOGY

SPECIAL ARTICLE

## Society of Surgical Oncology–American Society for Radiation Oncology Consensus Guideline on Margins for Breast-Conserving Surgery With Whole-Breast Irradiation in Stages I and II Invasive Breast Cancer

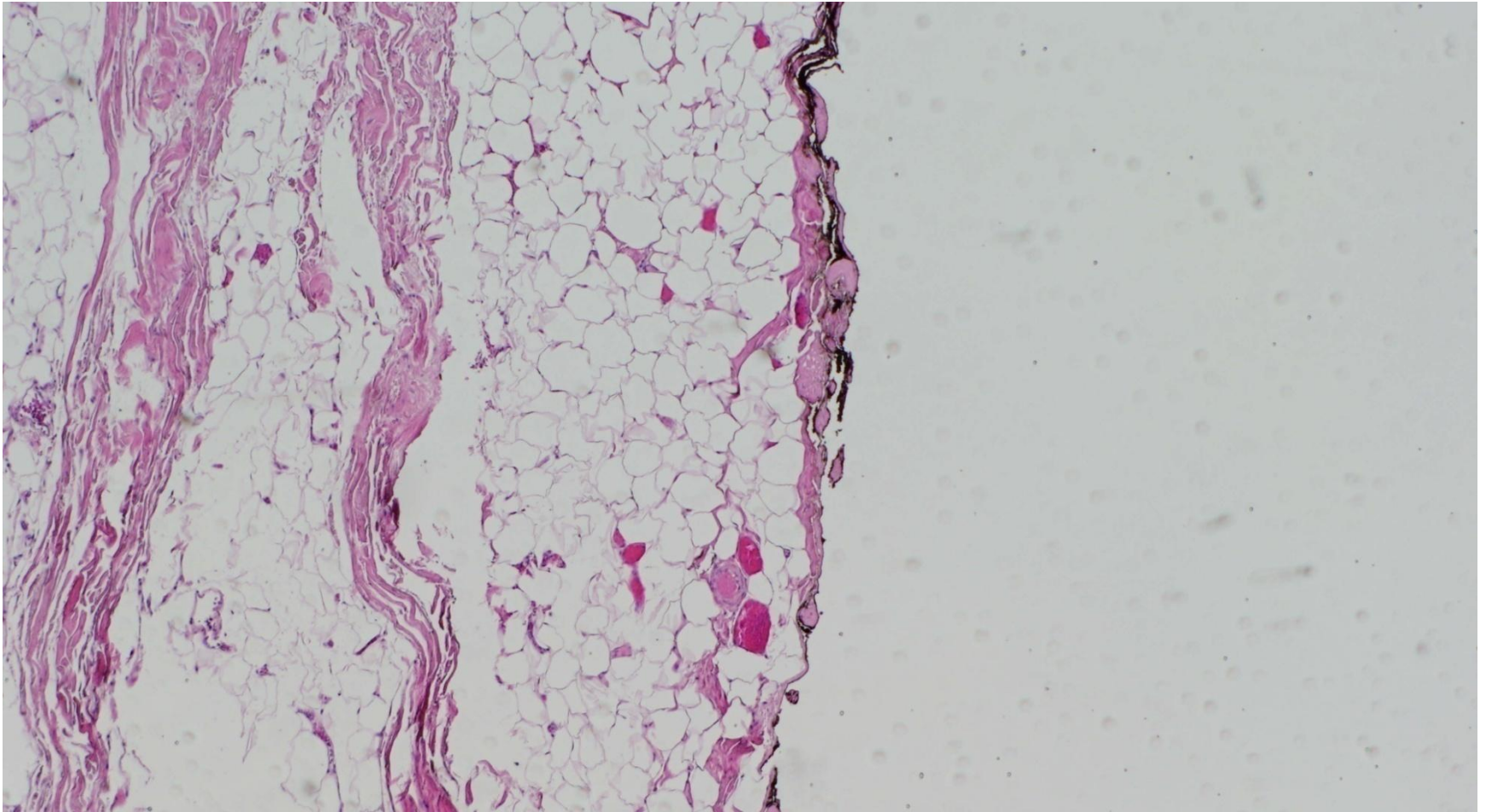
*Meena S. Moran, Stuart J. Schnitt, Armando E. Giuliano, Jay R. Harris, Seema A. Khan, Janet Horton,  
Suzanne Klimberg, Mariana Chavez-MacGregor, Gary Freedman, Nehmat Houssami, Peggy L. Johnson,  
and Monica Morrow*

- Up to ¼ of all breast conserving surgeries undergo re-excision, often for wider margins.
- No clear evidence
- Meta-analysis of 33 studies – 28,000 patients

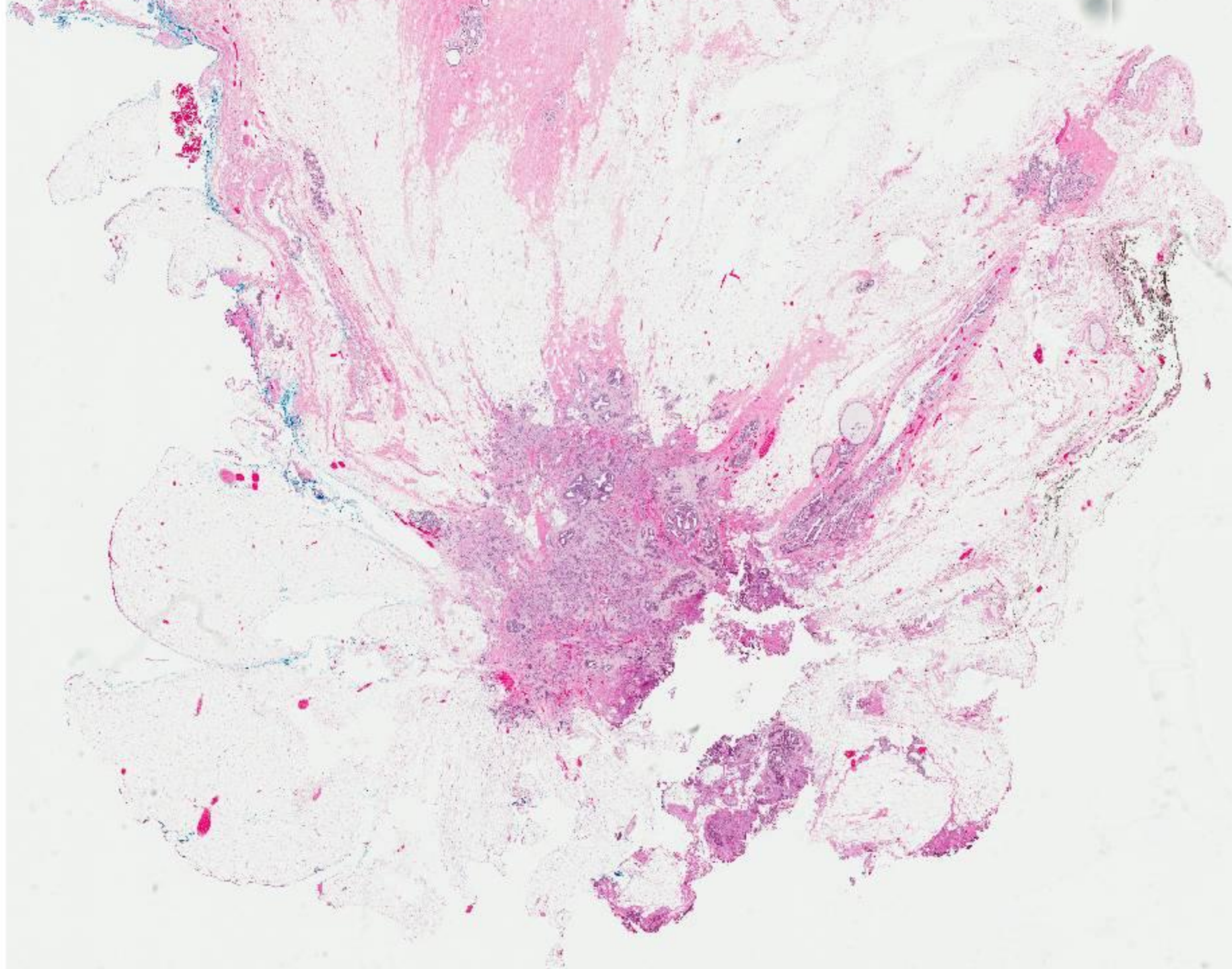
# The Bottom Line

- A positive margin, defined as ink on invasive cancer or DCIS, is associated with at least a 2-fold increase in local recurrence
- This increased risk is not nullified by delivery of a boost dose of radiation, delivery of systemic therapy, or favorable biology
- Negative margins (no ink on tumor) reduces risk of local recurrence – wider margin does not significantly lower this risk.
- *The routine practice of obtaining margins more widely clear than no ink on tumor is not indicated*

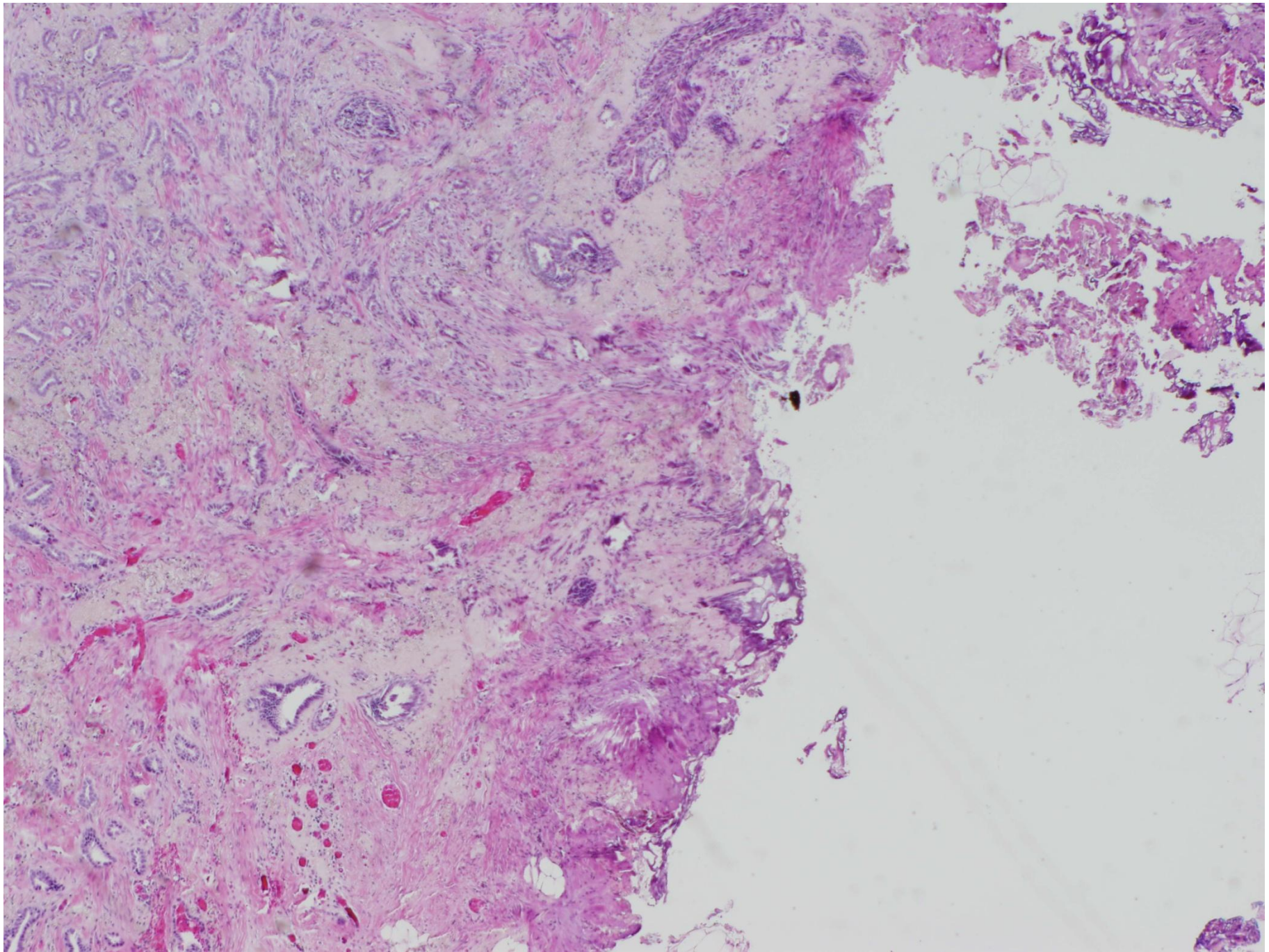
# Definition and interpretation



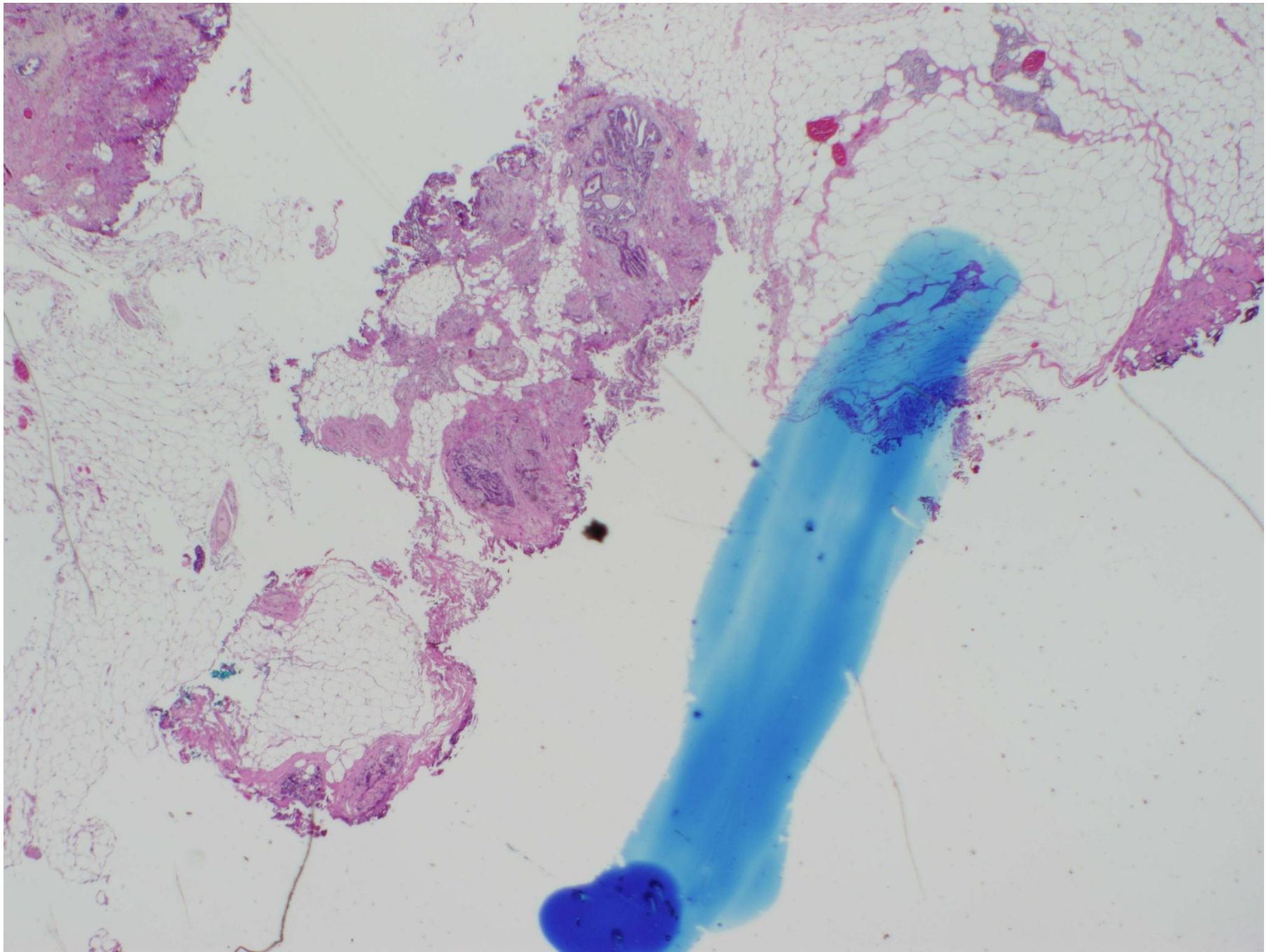






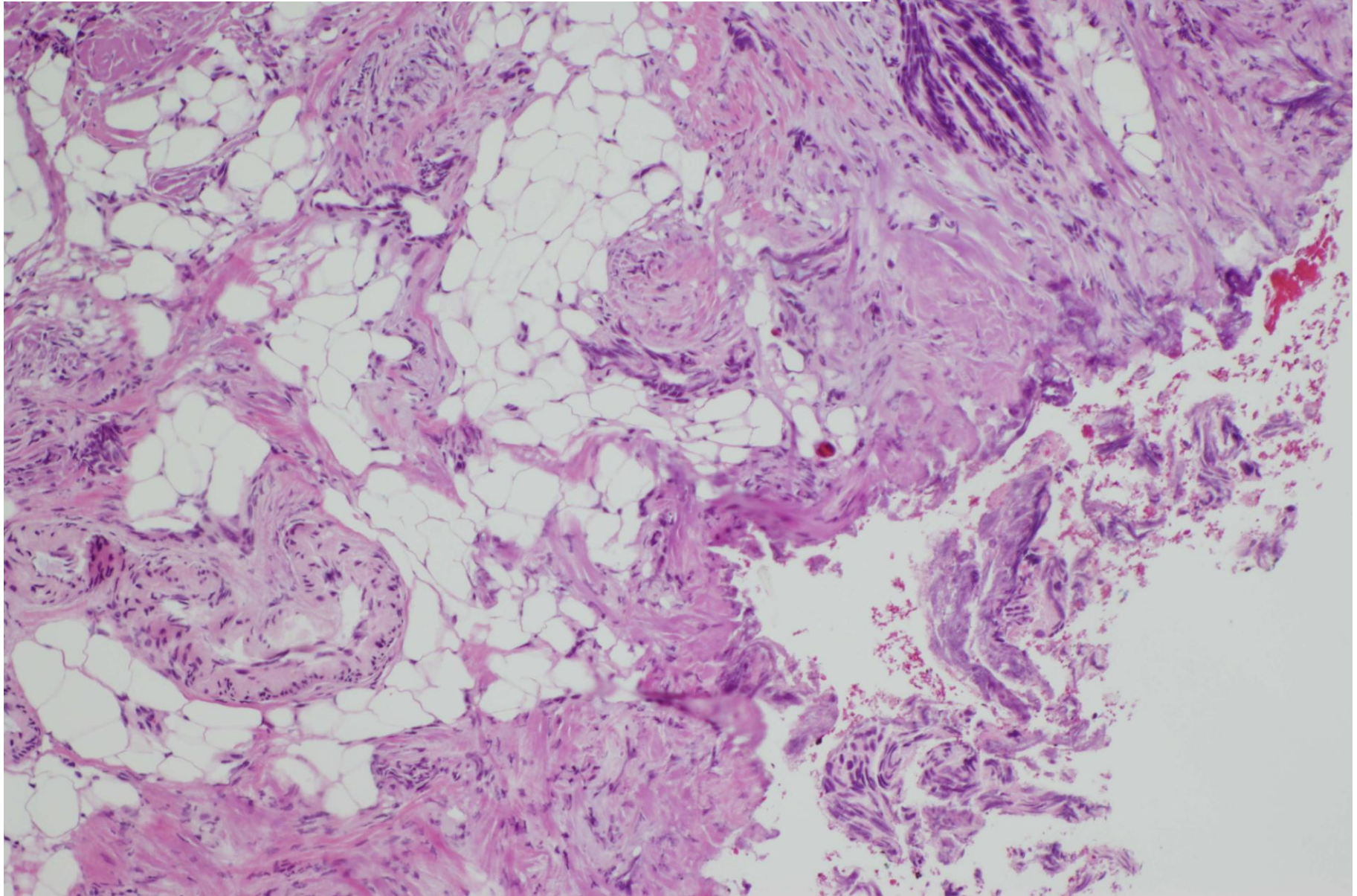








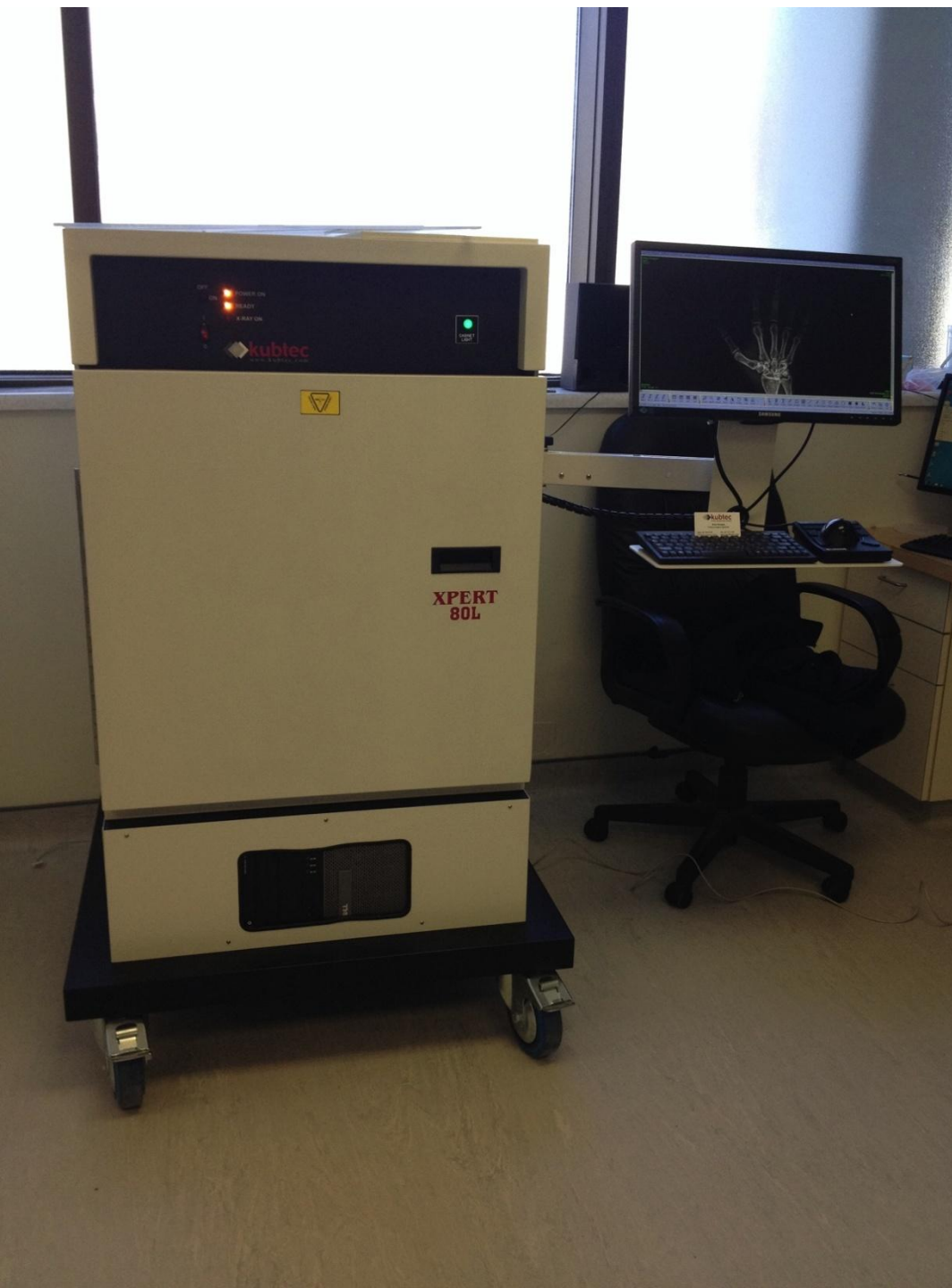
The tumor is located at the inferior edge of the specimen, where there is marked cautery artifact and disruption of the tissue. While no definitive tumor cells are present on the inked surface, they are present within 0.1 cm of this margin.



# Reporting margins

- Do the best you can, considering limitations.
- State any difficulties and explain interpretations in *Comments* or synoptic.
- From a pathologic standpoint, nothing has changed:
  - Positive = tumor on ink
  - Negative = anything less
    - Give distance (e.g. less than 0.1 cm, 0.2 cm, etc)





KUBTEC Specimen  
Radiography  
machine

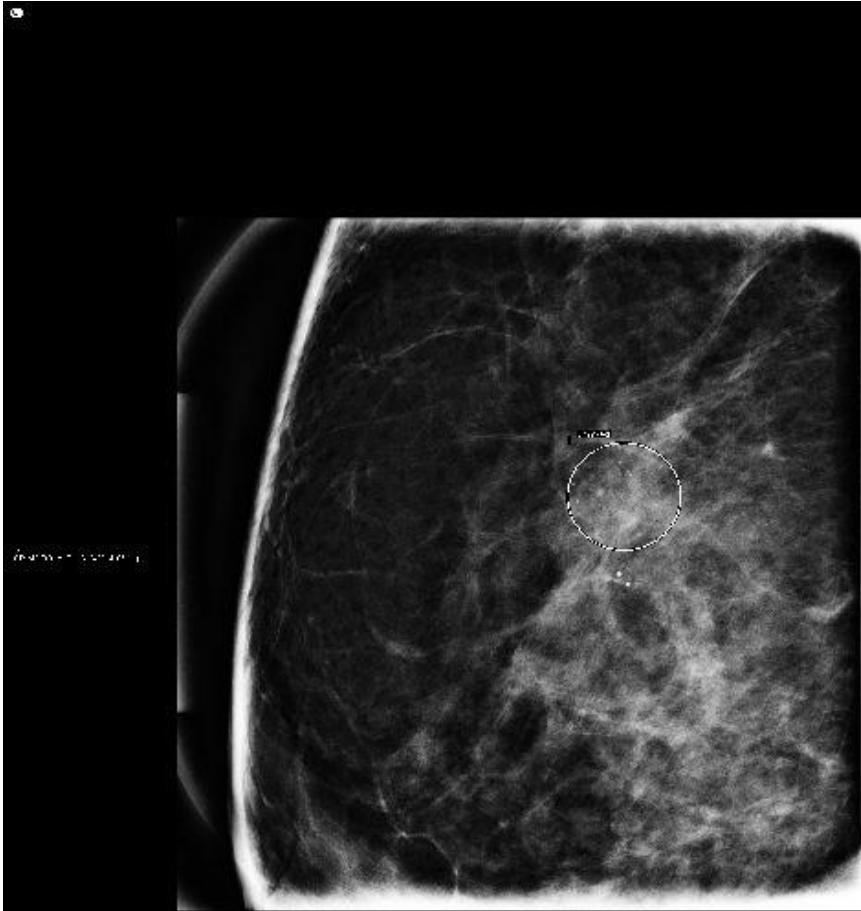
Let's follow a recent case....

Wire localization excision

# Screening mammogram (or skip if palpable mass)

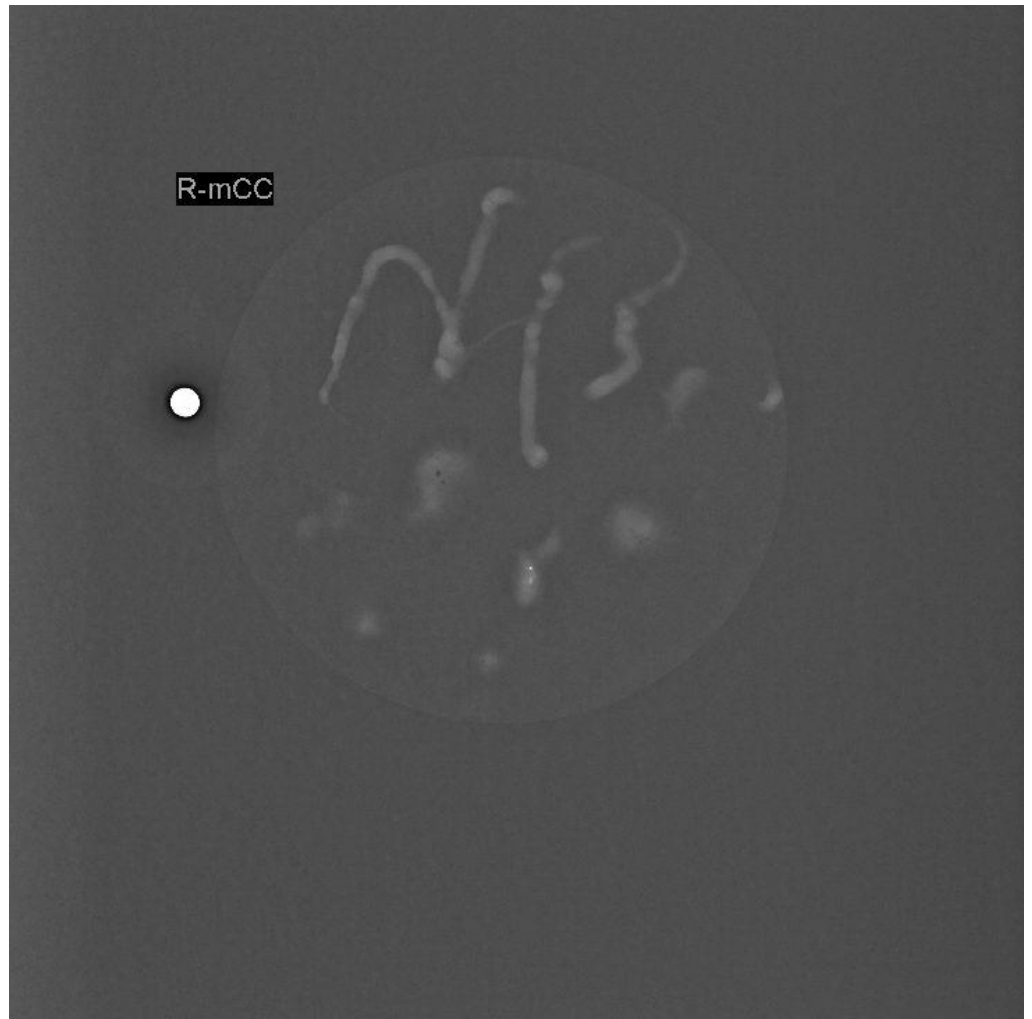
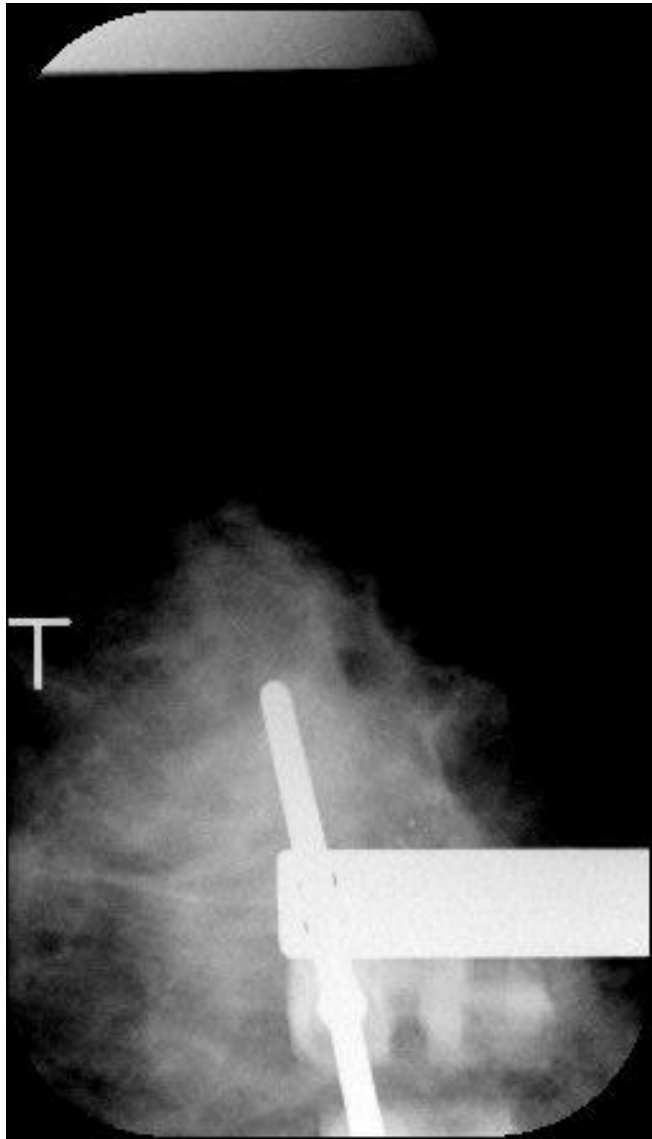


# Diagnostic mammogram or tomosynthesis

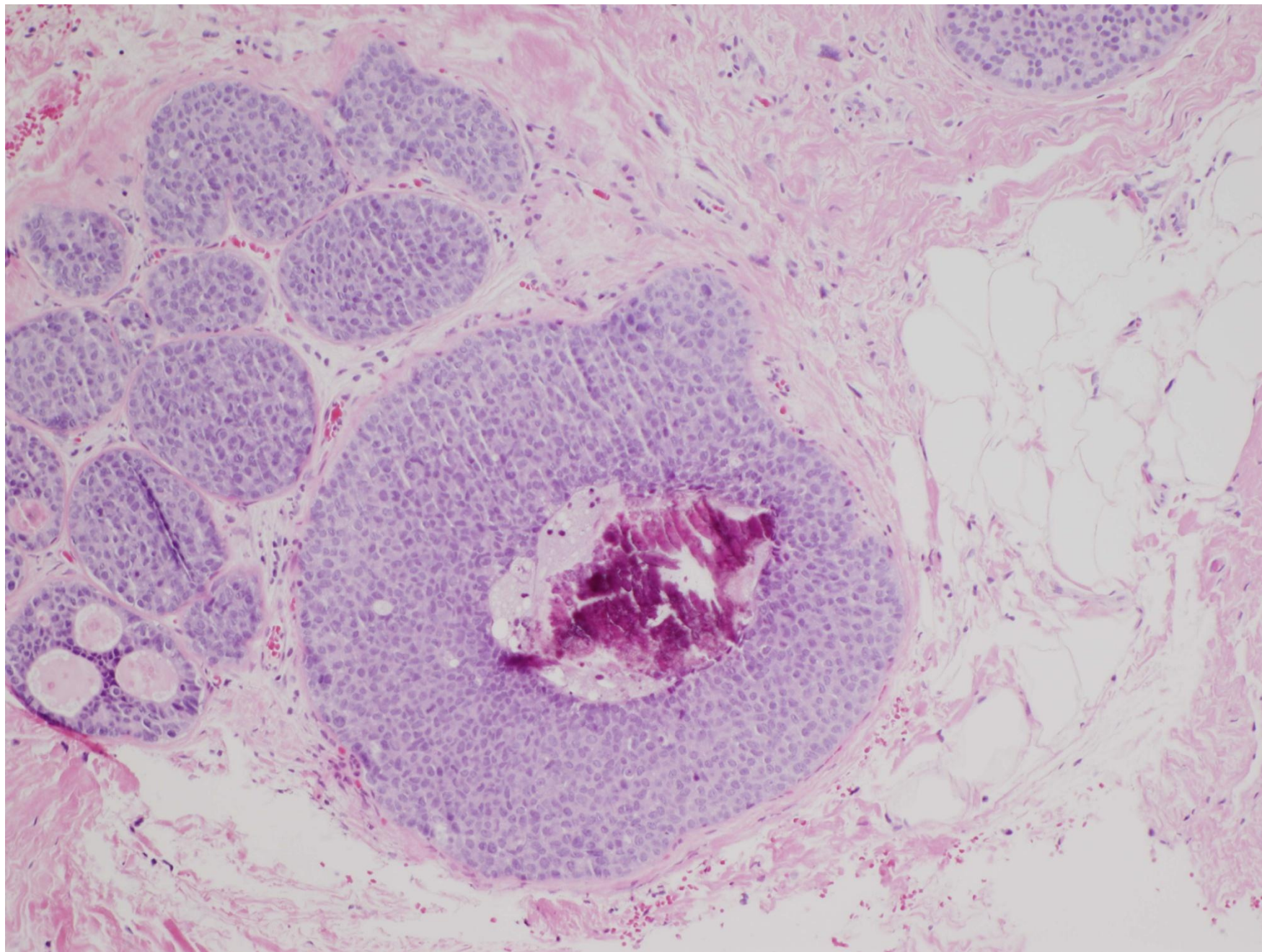


- “Amorphous-type calcifications are present posteriorly in the upper-outer quadrant of the right breast and have a scattered distribution. Dimension over which calcifications are distributed is **20 mm**. The noted finding has a low degree of suspicion for malignancy (**BI-RADS Category 4A**). A benign report is expected. Benign-appearing calcifications are also present.”
- “Impression: There has been an increase in the calcifications since the previous examination.”

# Core biopsy

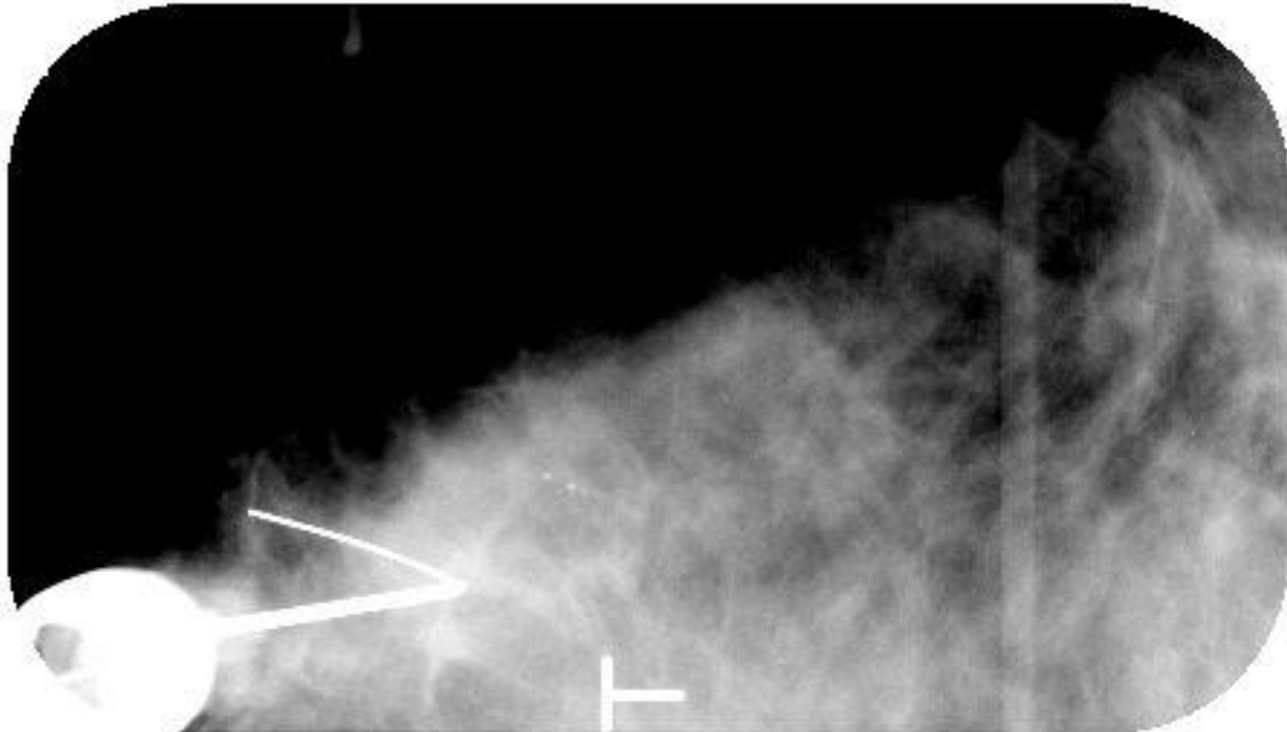






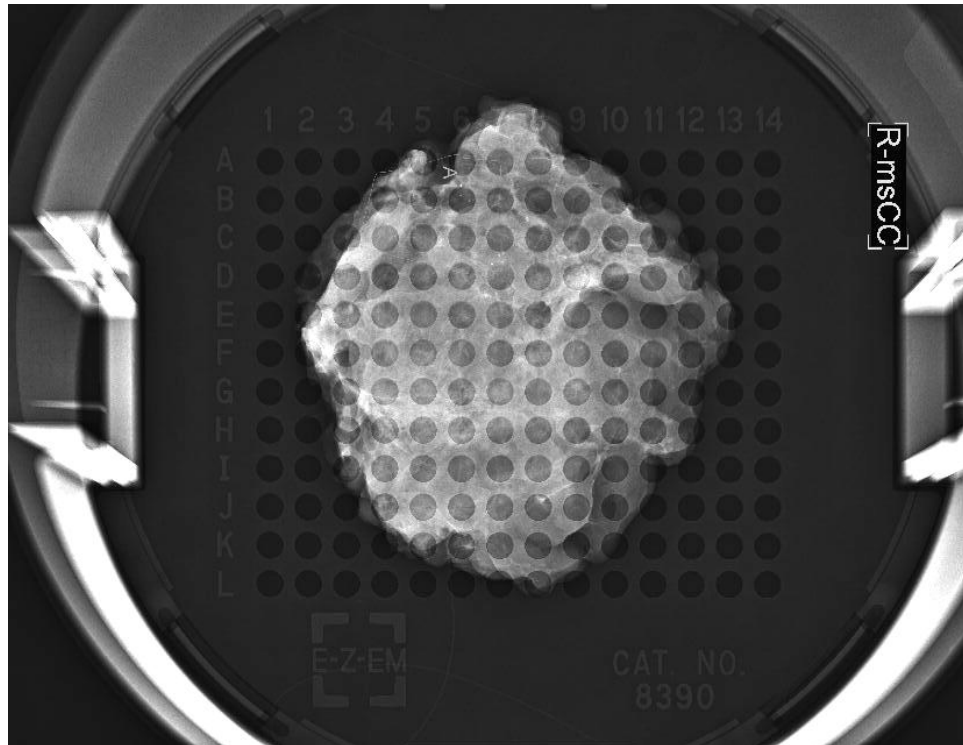
# Day of surgery

1. Patient to DI for wire localization procedure



# Day of surgery

2. Surgery – time recorded
3. Specimen fresh to DI – Confirm presence of lesion and localization with pins



Report: "The surgical specimen was radiographed. The localized abnormality is present in the specimen."

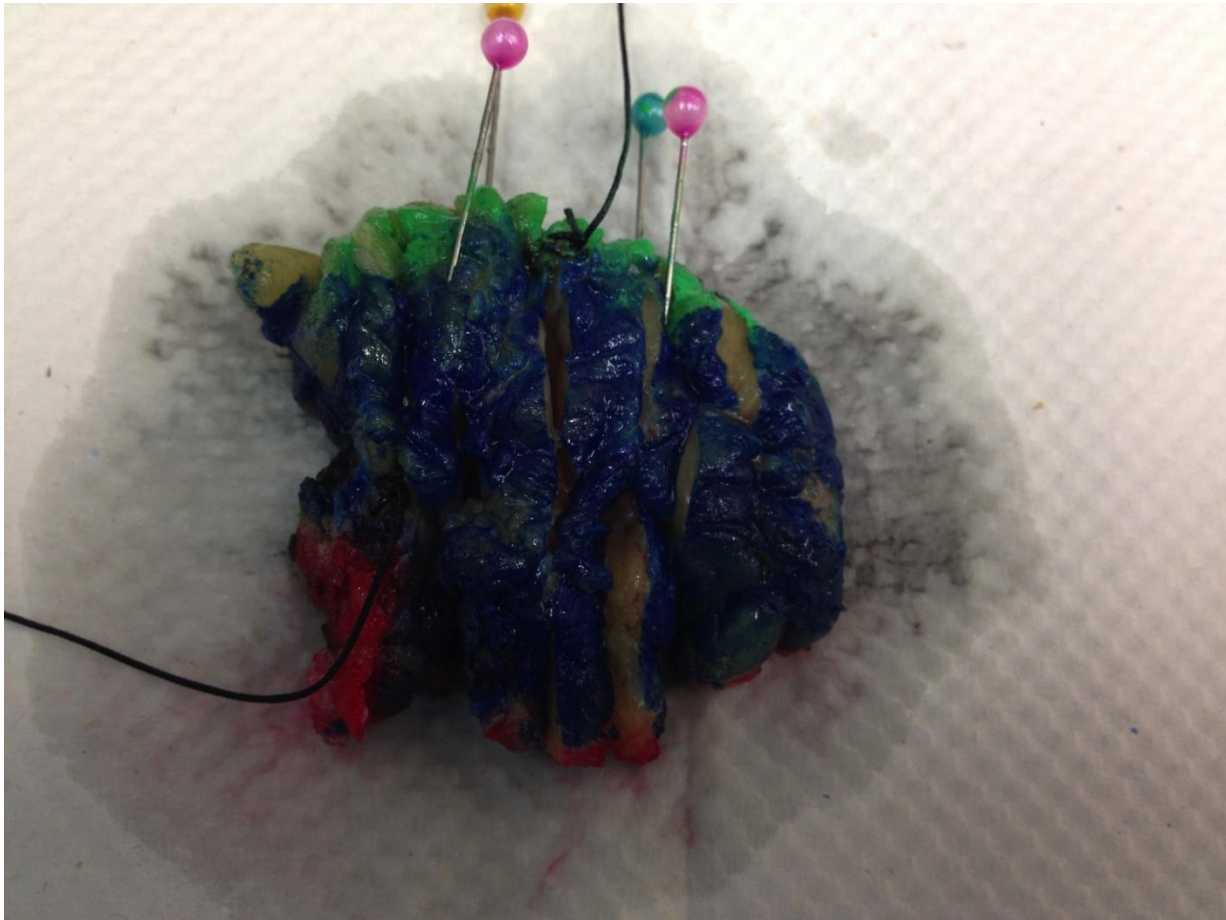


# Day of surgery

4. Specimen into formalin and transported down the street to Mackenzie Building.
5. Inked and sliced. Time recorded – this is the true ischemic time.

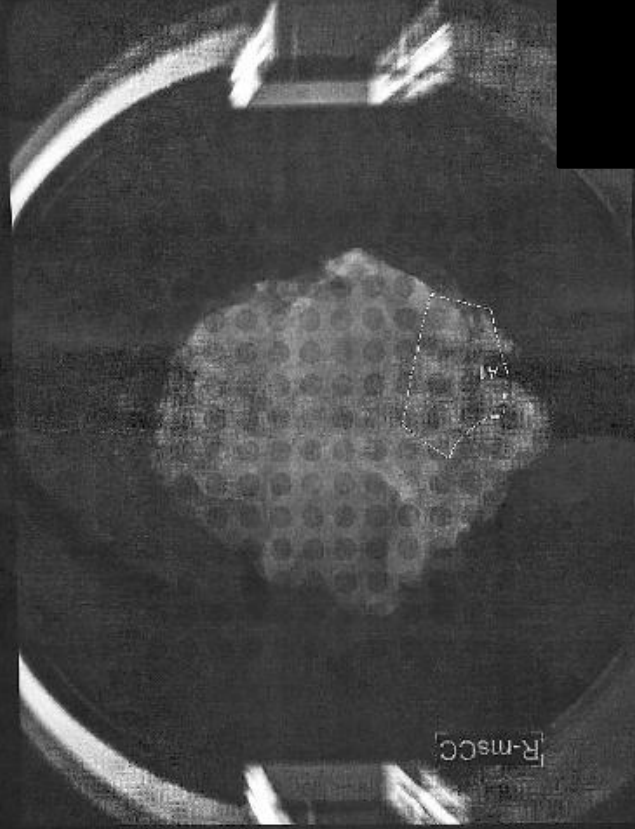
# The next day

- Specimen is grossed.



Fax NS B3K 6R8 CA

CENTRE



R-mscc

Scale 100% o.p.

R-mscc

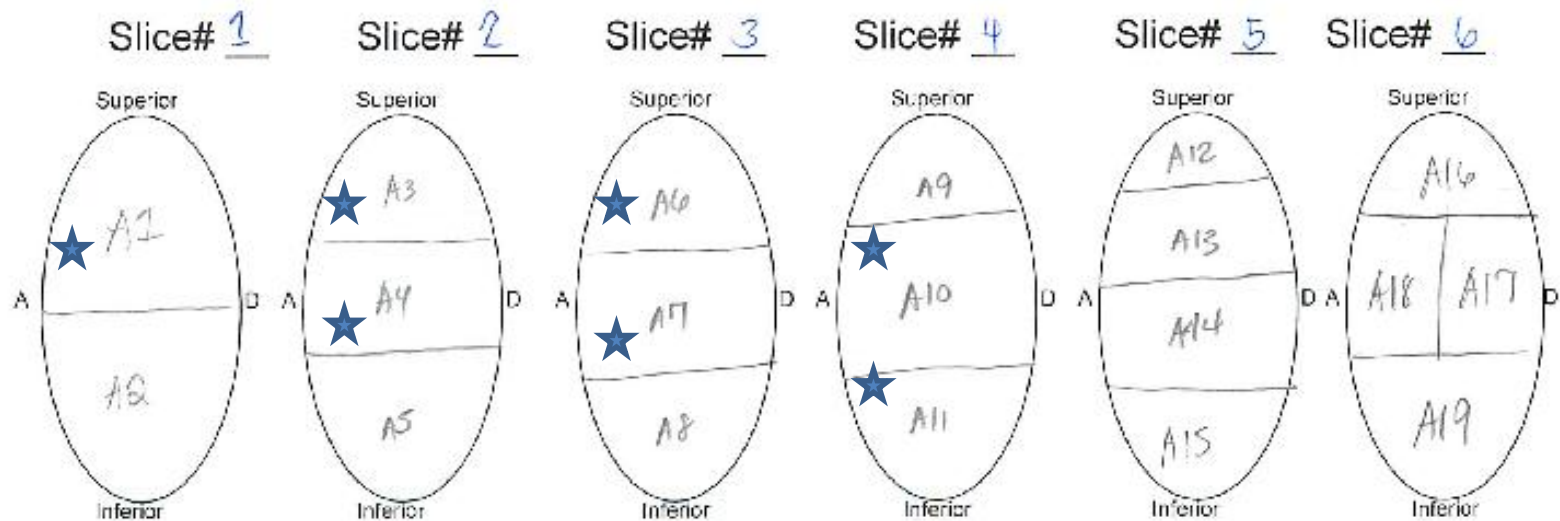
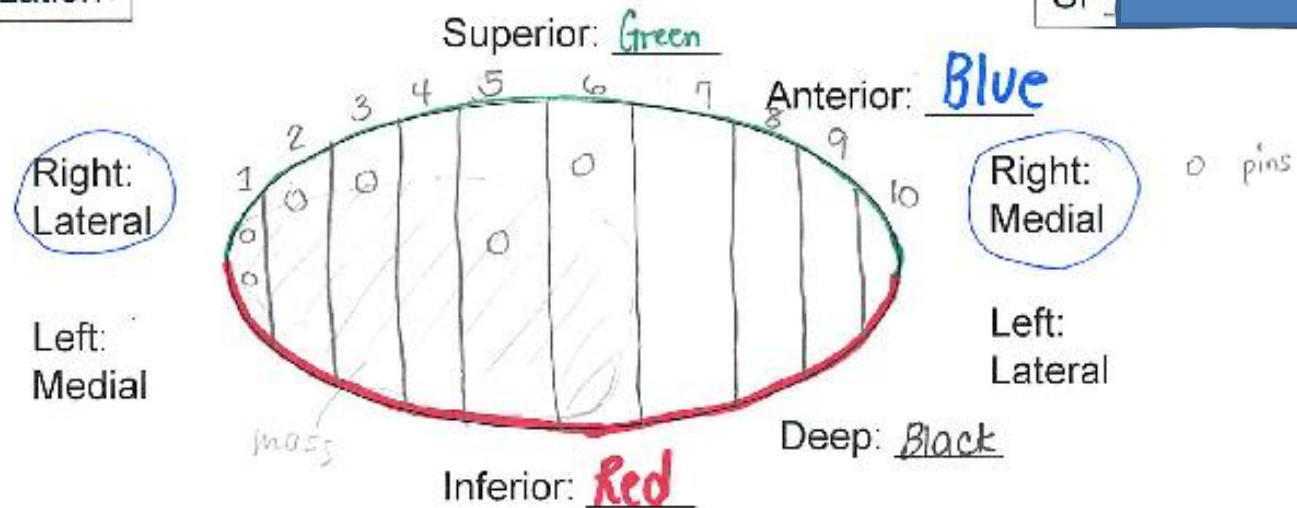
2043

C 2048

W 4096

~~Wire localization~~

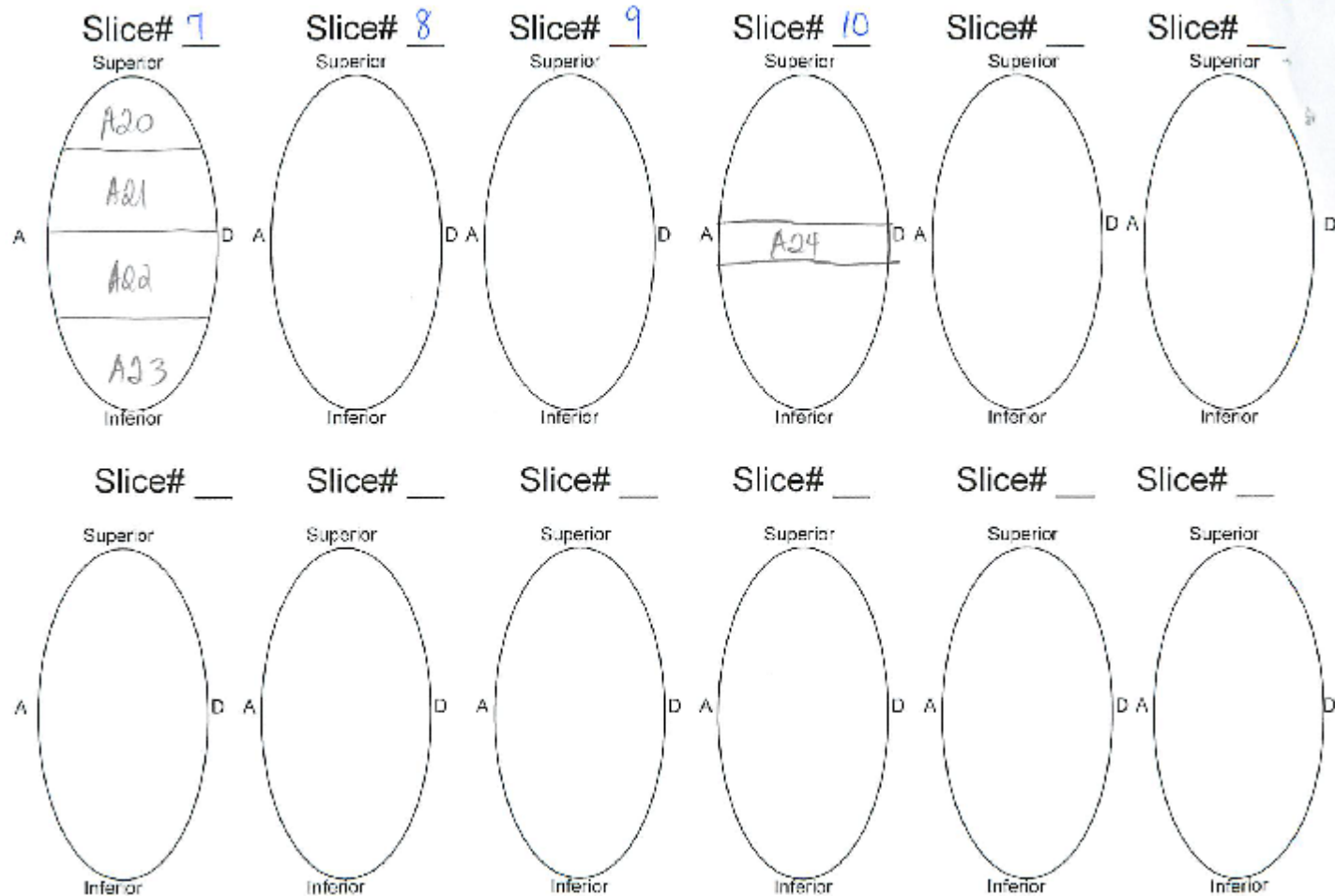
SP



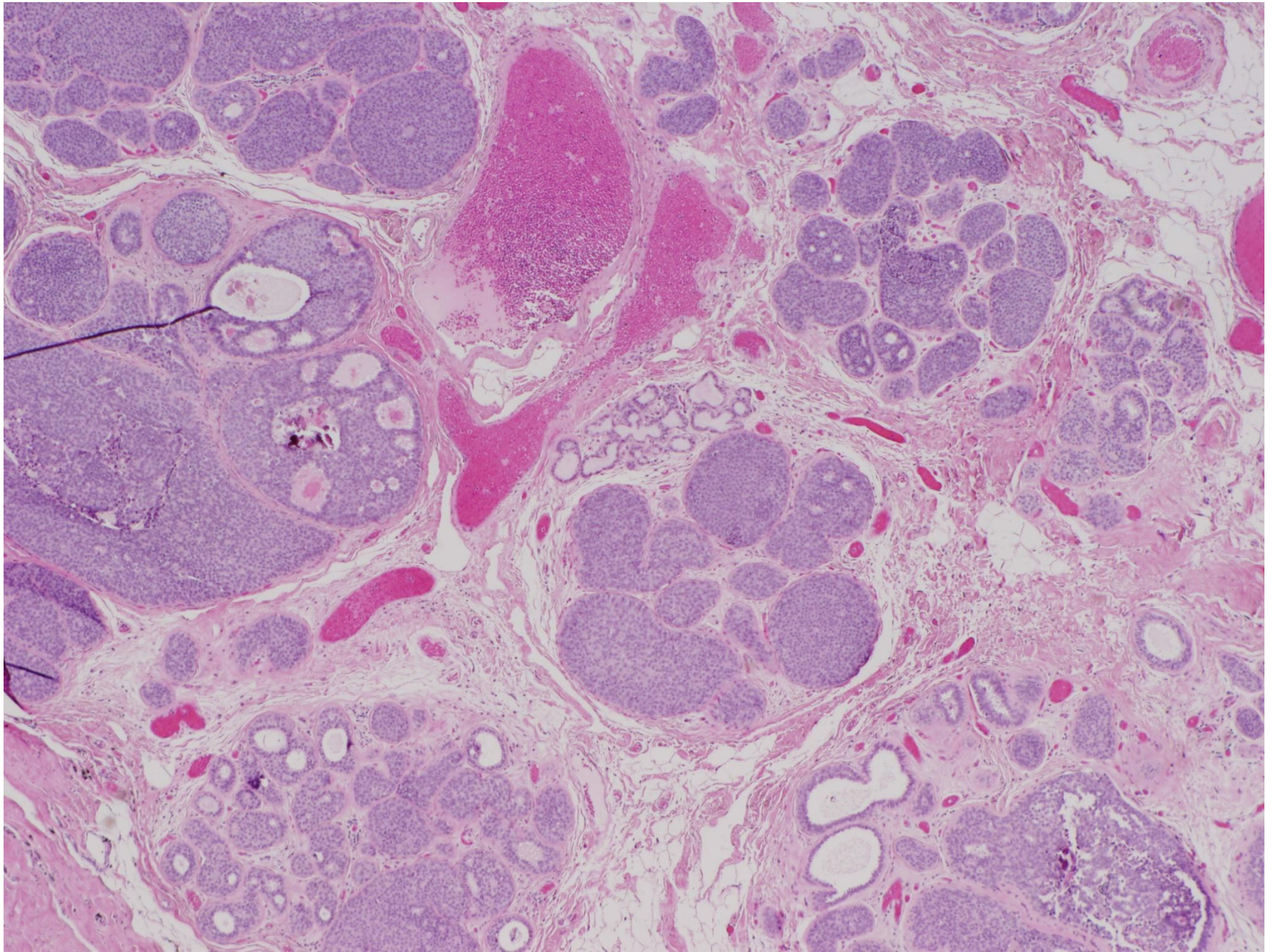
7.0 cm M-L/10 = 0.7 cm  
 4 most lateral slices x 0.7 = 2.8 cm

~~Wire localization~~

SP 15-







# Diagnosis

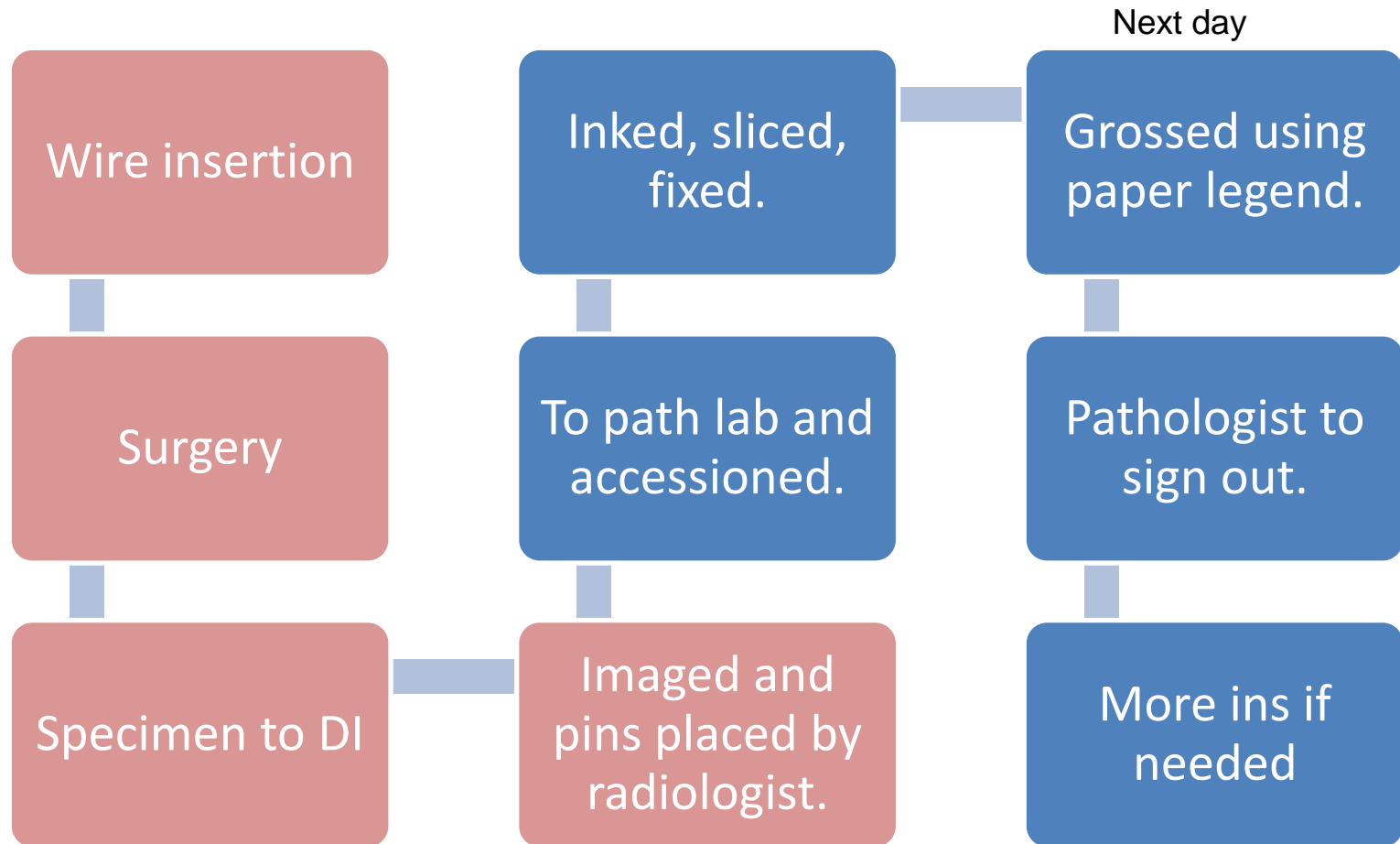
Ductal carcinoma in situ.

- Intermediate nuclear grade with ass. calcifications
- Up to 2.8 cm in maximum linear extent
- Margins negative for DCIS; closest are anterior and lateral (both 0.3 cm)

How will the workflow change?



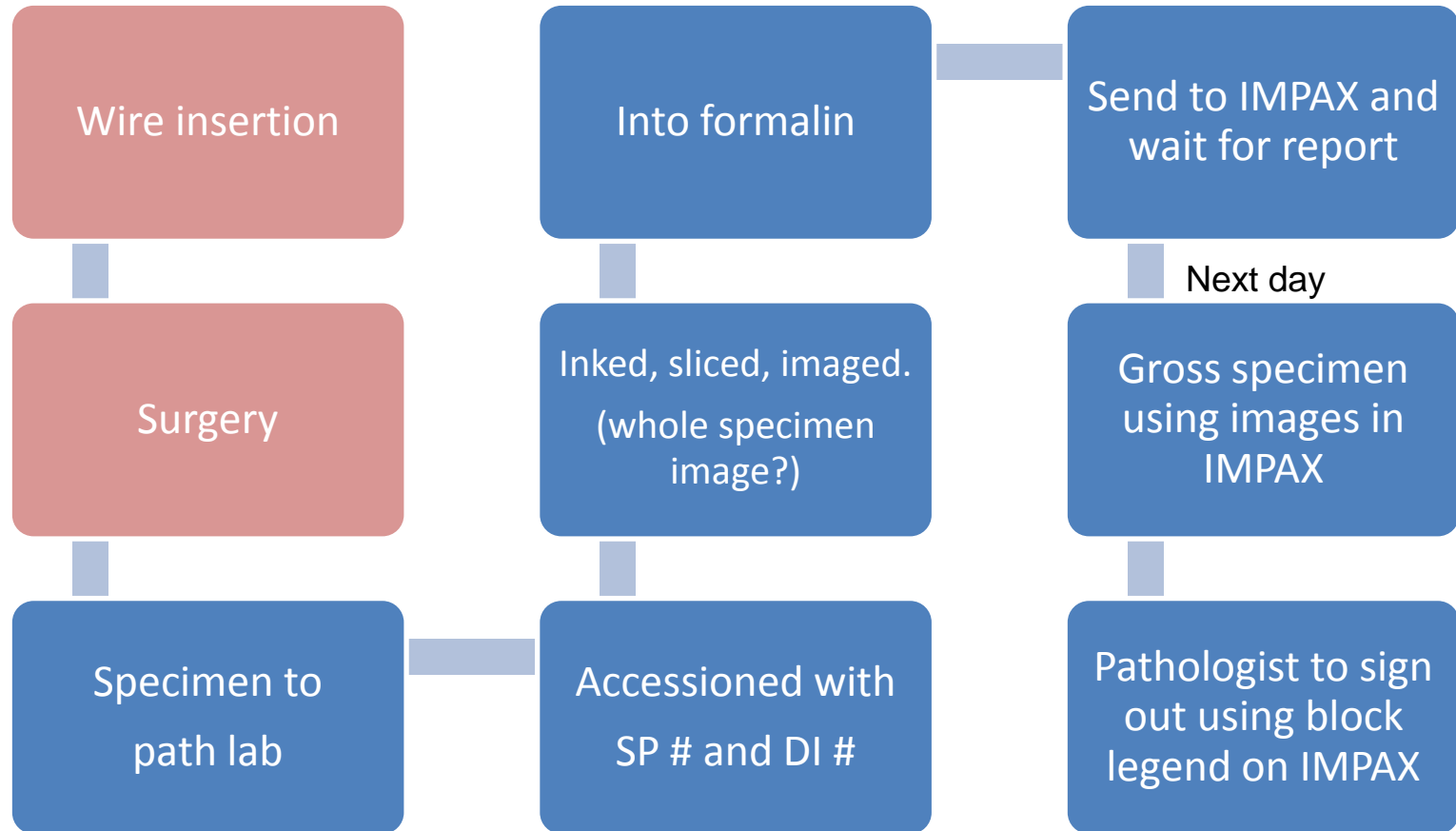
# Current



IWK

CDHA

# Future

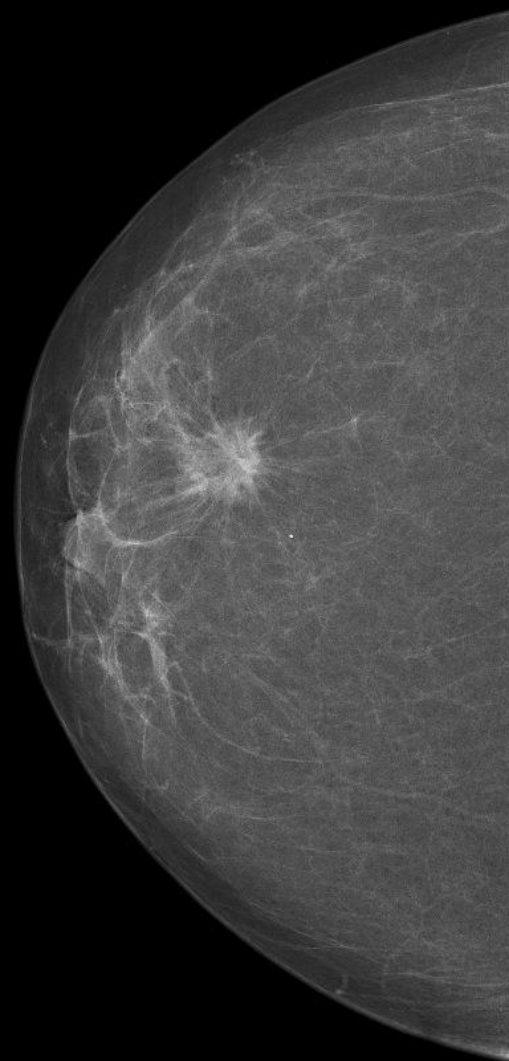


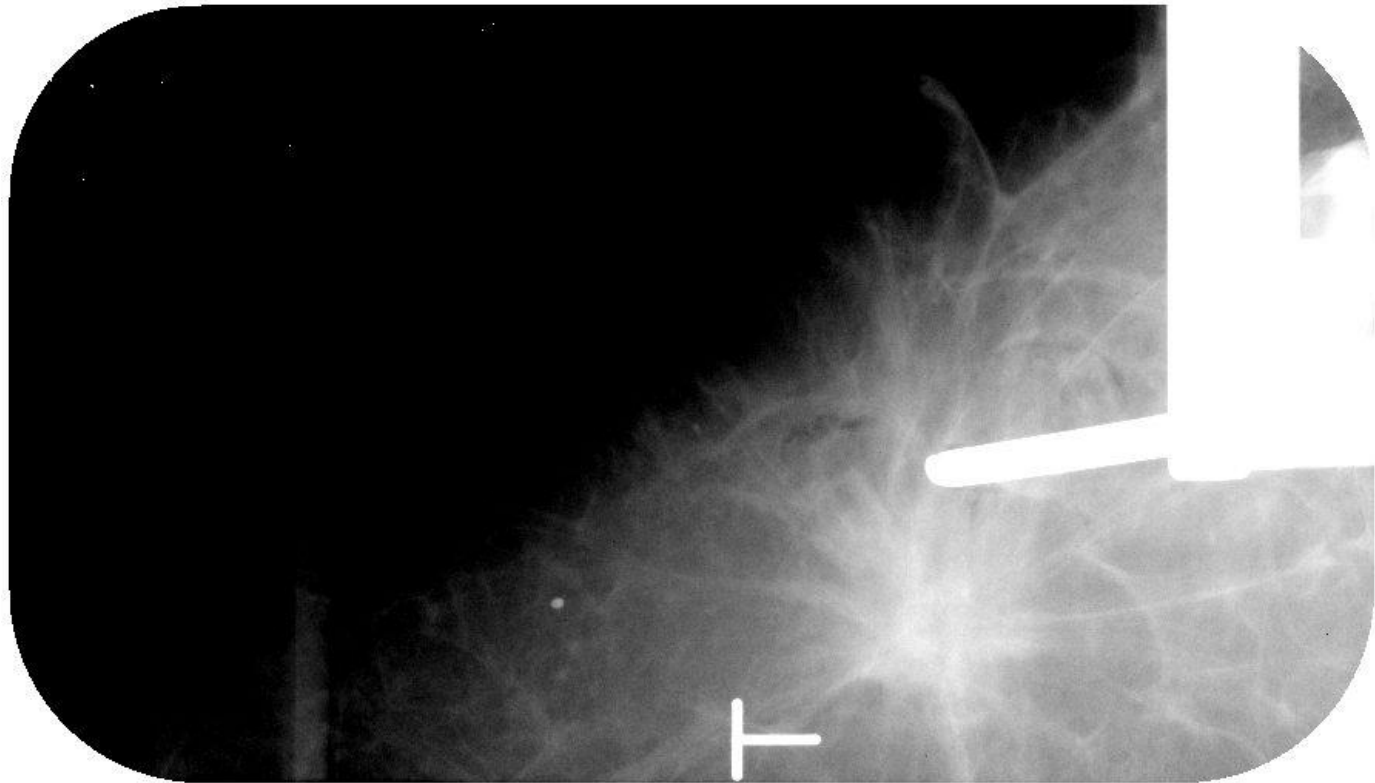
IWK

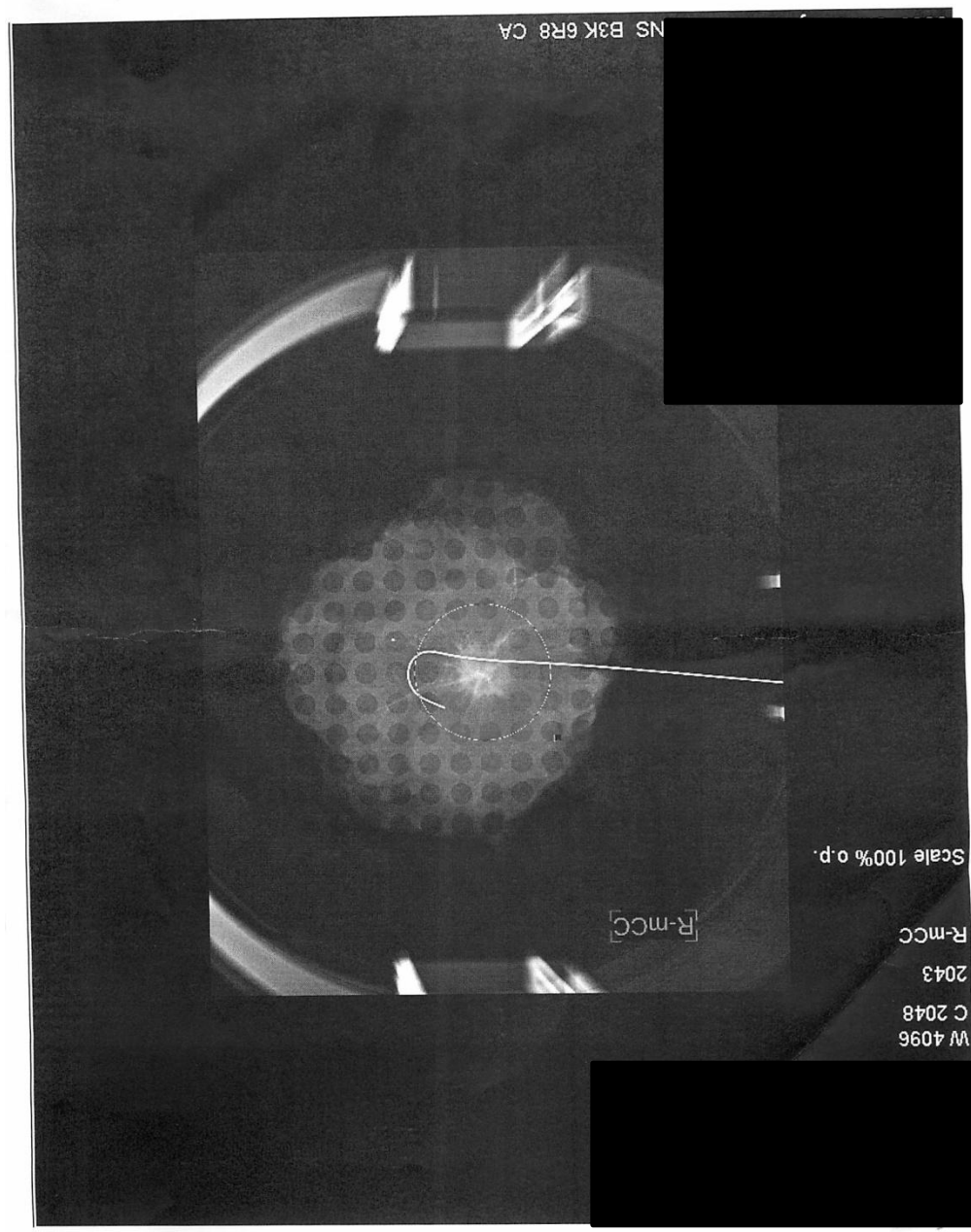
CDHA

Theoretical case with  
specimen radiography

[R-CC]







NS B3K 6R8 CA

Scale 100% o.p.

R-mCC

2043

C 2048

W 4096

R-mCC

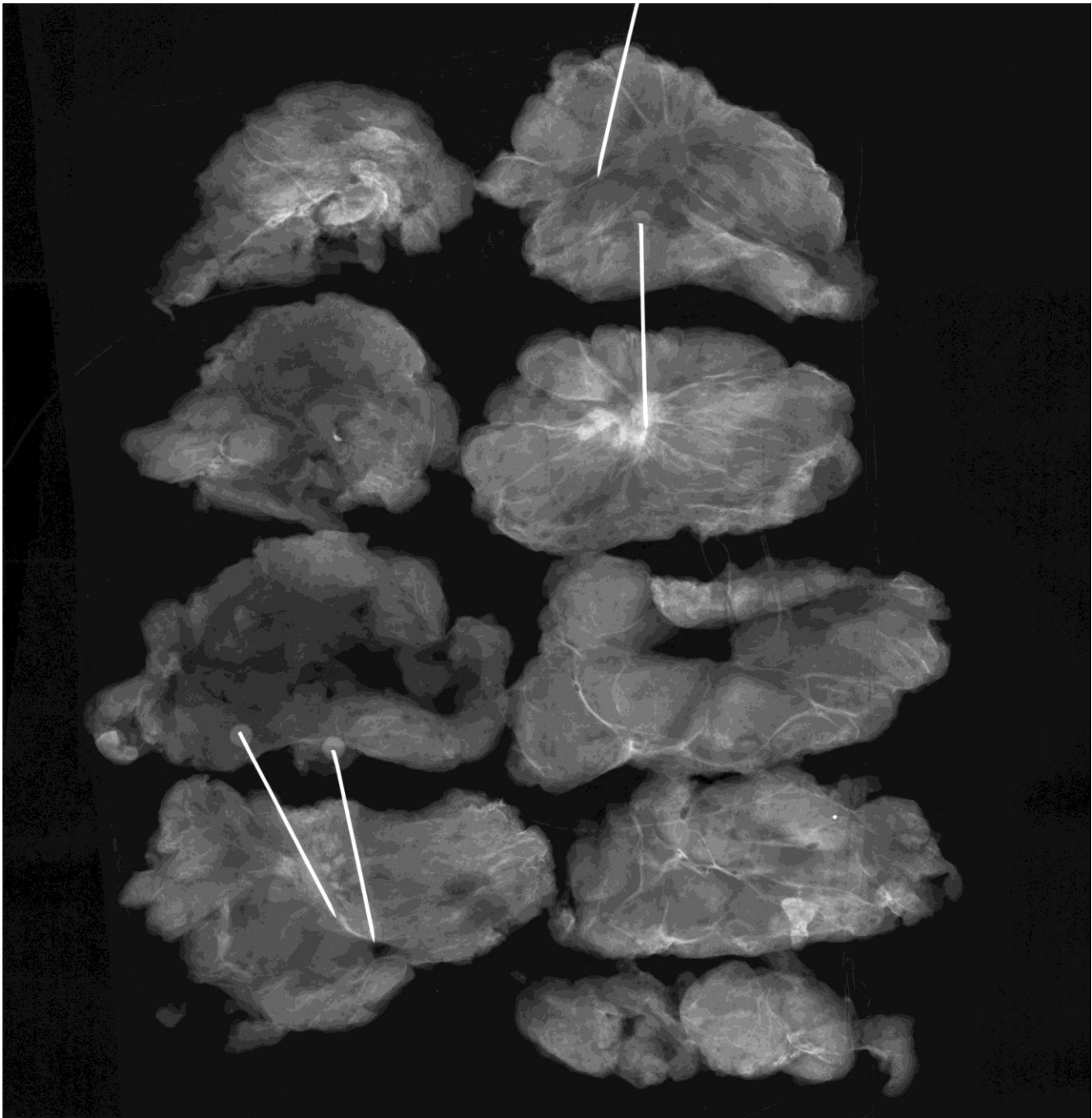


Figure 1 consists of nine scanning electron micrographs (SEM) of a fossil specimen, labeled 1 through 9. The images are arranged in a 3x3 grid. Each image shows a different view of the specimen's surface, which appears to be composed of various mineral grains and structures. Inset boxes labeled A1 through A8 provide magnified views of specific areas of interest. A scale bar is located in the top right corner of the figure.

A diagram of an ellipse with four vertices labeled: S at the top, I at the bottom, D at the left, and an unlabeled vertex at the right.



A1- lat margin  
A2- med margin > radial

Slice #3 in its entirety

A3-anterior and superior margin

A4-superior deep margin

A5-anterior margin and lesion

A6-in deep margin

A7-anterior and inferior margin

A8-inferior and deep margin

Slice #4

A9-anterior margin and lesion

A10-deep margin and lesion

A11-anterior margin and lesion

A12-deep margin and lesion

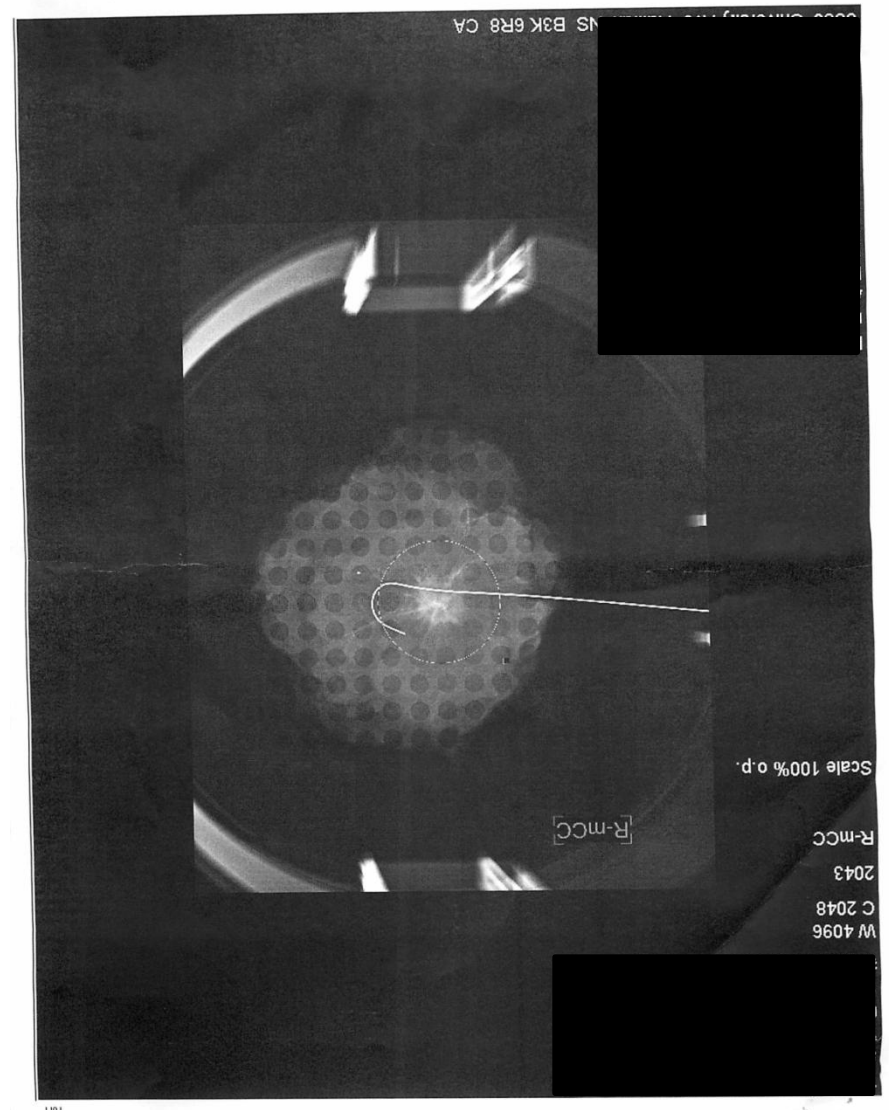
Slice #5

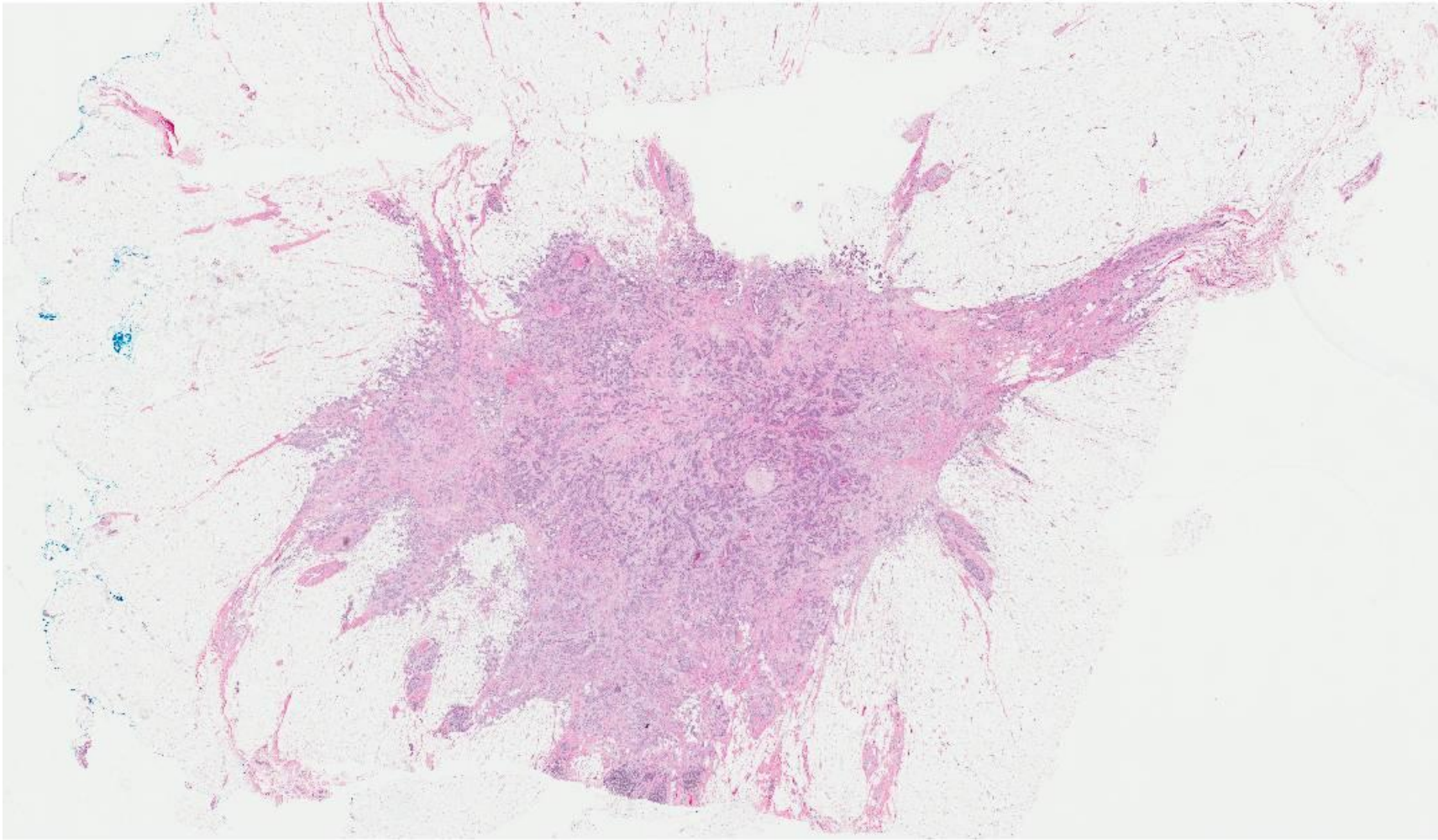
A13-anterior margin and lesion

A14-deep margin and lesion

A15-anterior and inferior margin and lesion

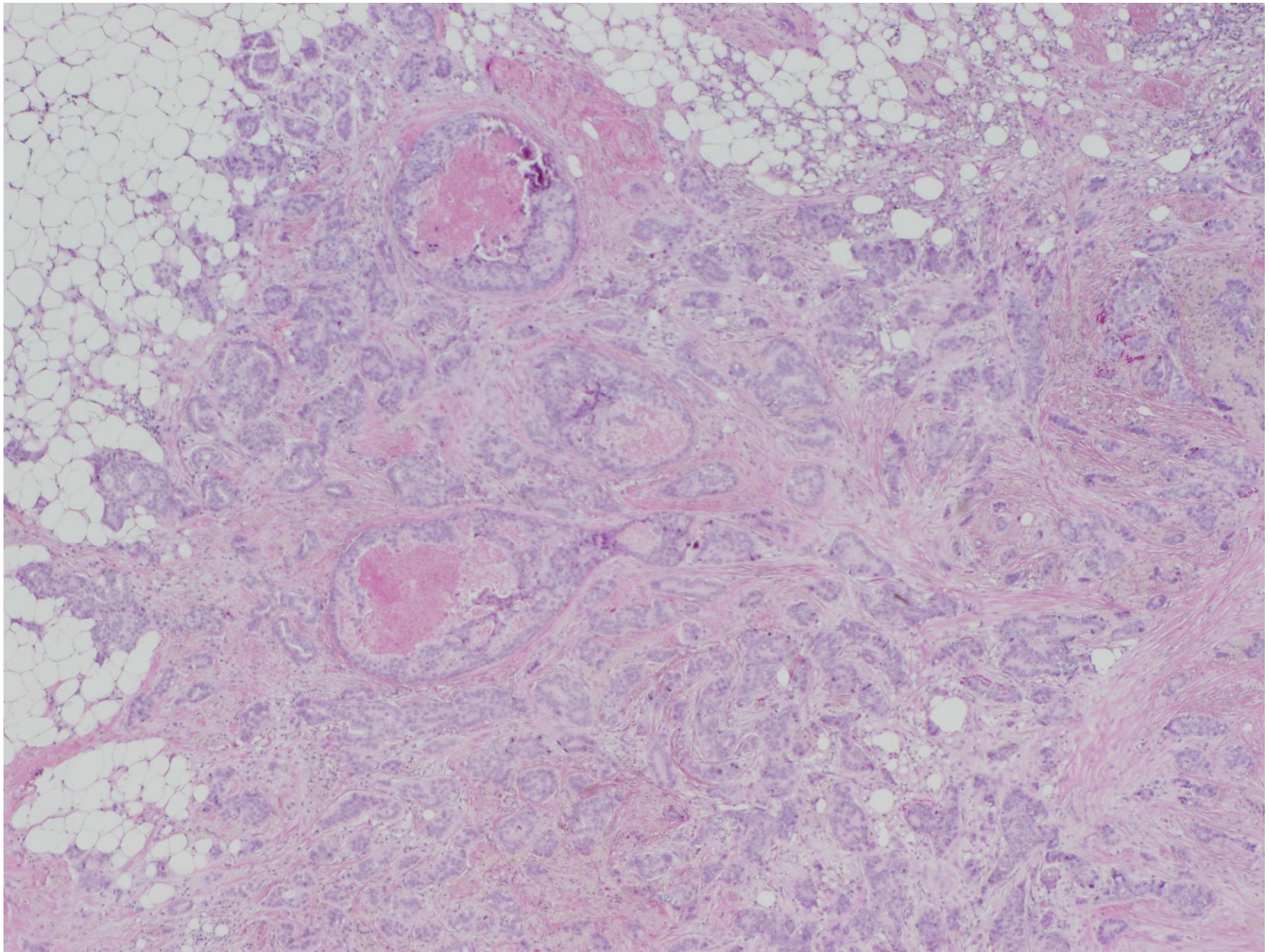
A16-inferior and deep margin with lesion





5mm



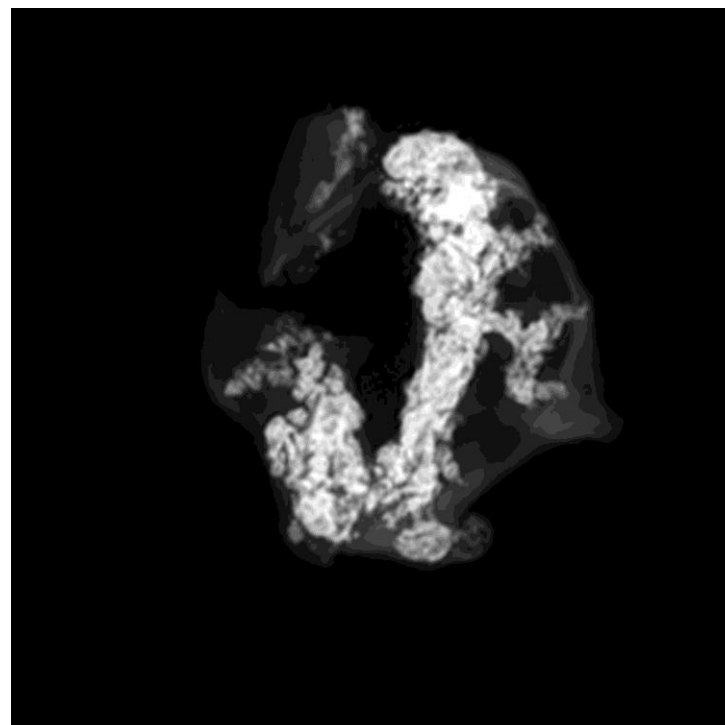


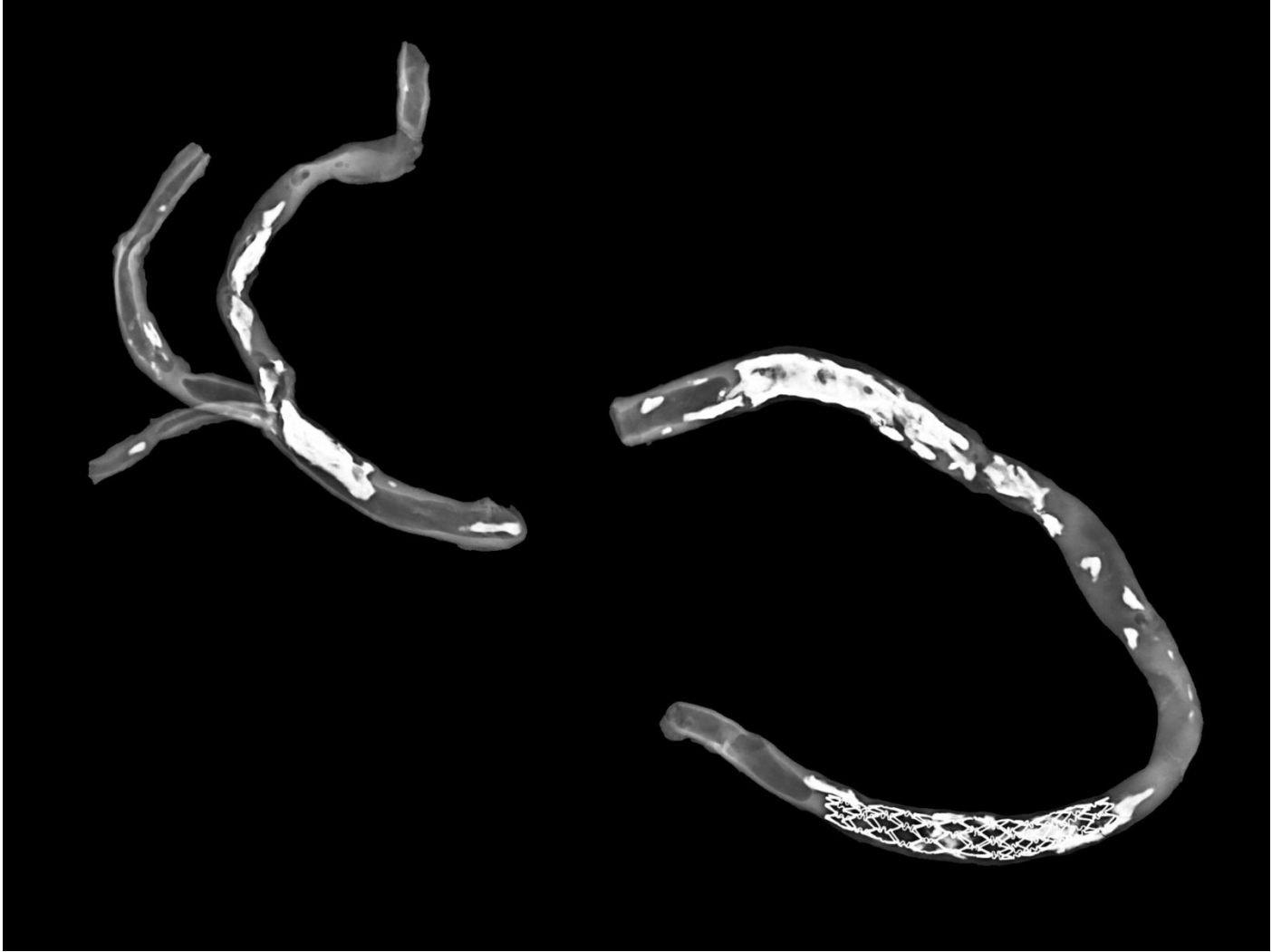
# Benefits

- Shorter ischemic time?
- Fewer sections?
- Decreased need for ‘more-ins?’
- Mastectomies
  - Will facilitate sampling in cases of extensive DCIS
  - PA will not have to spend ++ hours at IWK.
- But may be more work on our end....

# Other uses for the machine

- Heart valves
- Coronary arteries
- Bone tumors
- Ophthalmic pathology
- Others?







# Questions?

