Stereotactic Breast Biopsy Accreditation and Advances in Technology

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Introduction

• Objectives
• Program Requirements
• Physicists Role
• Testing Requirements
• Tomosynthesis Guided Biopsy

Educational Objectives

• Understand the annual test requirements for stereotactic breast biopsy systems accredited by the American College of Radiology for both upright add on systems and stand alone prone biopsy.
• Understand the operation of tomosynthesis guided breast biopsy systems.
Physicists Role

- Stereotactic Breast Biopsy Accreditation
  - Annual Testing (required)
  - QC Program Review (required)
  - Dose Measurement (required)

Stereotactic Breast Biopsy Physicist

- Initial Qualifications
  - Qualified to perform Mammography surveys under MQSA
  - Perform one (1) hands on survey of a stereotactic breast biopsy unit under a QMP or at least 3 independent surveys prior to 6/1/97
- Continuing Experience
  - Upon renewal, 2 SBB surveys in the prior 24 months
- Continuing Education
  - Upon renewal, 3 CEU’s in SBB in prior 36 months


Stereotactic Breast Biopsy Program Requirements

- Quality Assurance Questionnaire
- Test Image Data Sheet
- Clinical Images (still on film or high quality photographic paper)
- Phantom Images (on film)
- Medical Physicists Annual Survey Report
- Daily, Weekly Tech QC (one month)
- Monthly, Quarterly, Semi-annual Tech QC records (one year)
Technologist Quality Control

- Daily – Localization Accuracy Test
- Phantom Imaging (weekly)
- Printer QC (monthly)
- Visual Checklist (monthly)
- Compression (semi-annually)
- Repeat Analysis (quarterly)
- Zero Alignment Test (per manufacturer)
- Dark Room Testing (if using film screen)

Daily Localization Accuracy Test
Stereotactic Breast Biopsy

- Annual testing required by physicist
- ACR QC Manual available

Ref: Stereotactic Breast Biopsy Quality Control Manual

1999 American College of Radiology
Stereotactic Breast Biopsy Annual Test – Prone Table

- Unit Assembly Evaluation
- Collimation Assessment
- Focal Spot Performance and System Limiting Spatial Resolution
- kVp Accuracy
- Beam Quality Assessment (Half Value Layer)

Stereotactic Breast Biopsy Annual Test – Prone Table

- Automatic Exposure Control (AEC) or Manual Exposure Assessment
- Uniformity of Screen Speed (Screen Film Systems)
- Digital Receptor Uniformity (For Digital Image Receptors)
- Breast Entrance Exposure, Average Glandular Dose, and Exposure Reproducibility

Stereotactic Breast Biopsy Annual Test – Prone Table

- Image Quality Evaluation
- Artifact Evaluation
- Localization Accuracy Test
Digital Field Uniformity

- May require manufacturers service manual for procedure.

Breast Entrance Exposure Average Glandular Dose, and Exposure Reproducibility

- Use AEC to expose Phantom
- Find closest manual technique
- Replace phantom with ion chamber
- Make 4 exposures
• Check both 512 and 1024 modes
• Made change to technique chart to get 1024 mode to be less than 300 mrad (3 mGy)
• “The average glandular dose to an average (4.2 cm compressed) breast should not exceed 3 mGy (300 mrad) per view for film-screen or digital image receptors”
Required Minimum Scores - Digital Receptor

- Mammography Accreditation Phantom
  - 5.0 Fibers
  - 4.0 Specs
  - 3.5 Masses
  - Total: 12.5

- Mini-phantom
  - 3.0 Fibers
  - 3.0 Specs
  - 2.5 Masses
  - Total: 8.5

Add On Biopsy Systems

- Unit Assembly Evaluation
- Beam Quality Assessment (Half Value Layer)
  - With paddle and at kVp for stereo phantom
- Breast Entrance Exposure, Average Glandular Dose
- Image Quality Evaluation (with mini phantom)
- Localization Accuracy Test
Beyond Mammography Annual Testing

• HVL at Phantom kVp with Stereo Paddle
• HVL Measurement for Tomo Biopsy
• Dose Measurement for Phantom for Both
• Image Quality with Stereo Phantom
• Localization

New Technology – Tomosynthesis Guided Biopsy

FDA Approved Systems

• Hologic Dimensions with Affirm Biopsy Attachment
• Hologic Affirm Prone Biopsy System
• GE and Siemens coming soon!
• Fuji?
• No Manufacturers QC Program
  – Do what you think is best
Prone Table w/ Tomosynthesis

- Hologic Prone System
  - Tungsten x-ray tube with Silver filtration
  - aSe detector with 70 micron detector element
  - 33 cm x 21 cm field size with a FOV of 14.3 cm x 11.7 cm
  - 15 degree tomo acquisition angle

Clinical Case

- 61 Y.O. female screening 2D only
- Called back for asymmetry
- Diagnostic Tomo showed small lesion.
- No ultrasound correlate
- Recommend tomosynthesis guided biopsy
• Pathology showed invasive mammary carcinoma Grade I, T1, N0, M0
• Histologic markers showed ER positive 100%, PR positive 90%, HER2/neu2+ negative
• Patient opted for segmental mastectomy
Conclusion

- ACR accreditation for biopsy systems needed for BICOE
- Tomosynthesis guided biopsy gaining converts
- No required testing for tomosynthesis guided biopsy – do what you think best

Questions?