Prostate Brachytherapy Ultrasound Quality Control

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Disclaimer

- The mention of any specific product or vendor does not imply recommendation of or preference for that product or vendor

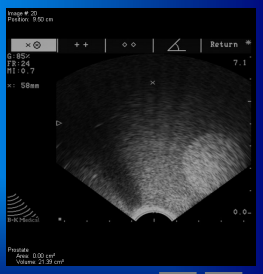
Need for QC

- Prostate visualization
- Dosimetry calculations dependent upon accuracy of distance, area, volume measurements and calculations
- Need position verification

Commercially Available Phantom

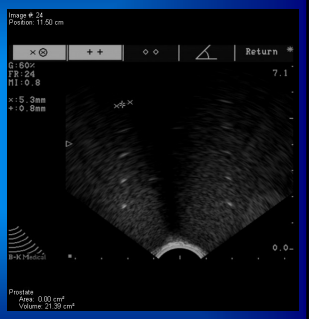
Depth of Penetration

- Dependent upon transducer frequency
- Can be reduced if elements die
- Annual test
- Look for where the normal speckle pattern becomes lost in electronic noise
- Check using both planes (different arrays)



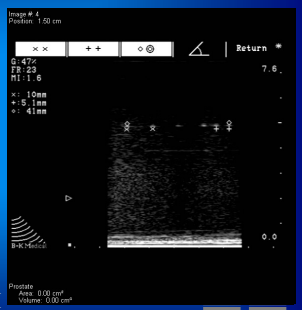
Spatial Resolution

- Necessary for good visualization of prostate border
- Impacted by
  - Transducer frequency
  - Focus of the US beam
- Annual test
- Measure width and height of monofilaments
- Consistency



Linear Distance Accuracy

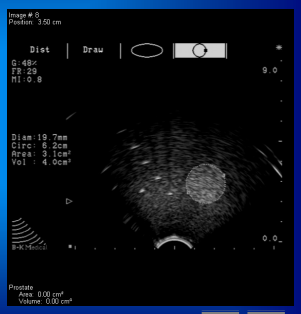
- Fundamental to area and volume measurements
- Usually stable
- Annual test
- Use electronic calipers to measure distance between targets with known separation
- Measure multiple directions
- Error ≤ 1.5 mm or 1.5% H
  ≤ 2.0 mm or 2.0% V



Area Measurement Accuracy

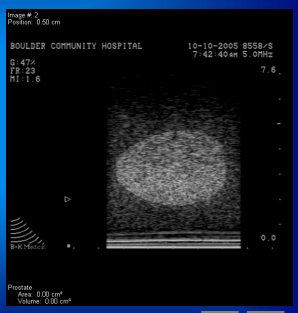
- Usually stable
- Annual test
- Use area draw function to circumscribe region of known diameter or area
- Error ≤ 5%

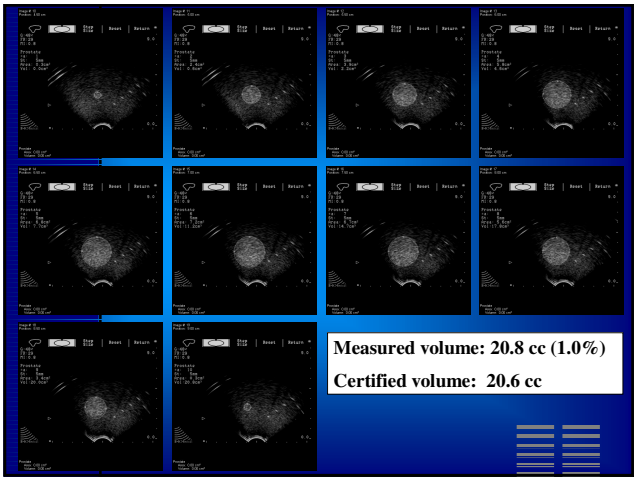
Measured area = 3.1
Nominal area = 3.05



Volume Measurement Accuracy

- Usually stable
- Annual test
- Contour target of known volume
- Error ≤ 5%



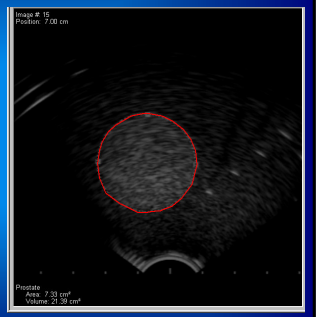


Measured volume: 20.8 cc (1.0%)

Certified volume: 20.6 cc

Volume Measurement Accuracy

- It is also recommended to check the measured volume with your treatment planning system
  - Acceptance testing
  - 5% error limit



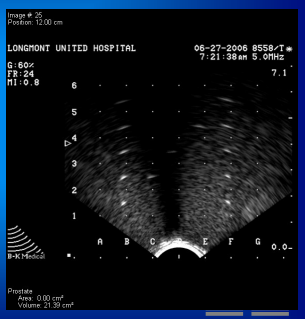
Variseed volume: 21.4 cc (3.9%)

US Measured volume: 20.8 cc

Certified volume: 20.6 cc

Electronic Grid Accuracy

- Annual test
- Visual alignment
- Note good lateral alignment
- Shadow and vertical offset due to phantom dessication



Needle/Electronic Template Alignment

- Prior to each case
- Necessary for pre-plan implants
- 5 mm limits? (site specific)
- No appropriate phantom available at this time

TG128: Development of QC Test Procedures for Endorectal Ultrasound

- Currently under construction
- Hope to complete by the end of 2006
- To be published in *Medical Physics*

- ***WANT TO HELP???***