ACR Required QC Tests

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ACR Required Tests

• Annual survey
  • Physical and mechanical inspection
  • Image uniformity and artifact survey
  • System sensitivity
  • Ultrasound scanner electronic image display performance

• Geometric accuracy (optional)
• Contrast resolution (optional)
• Spatial resolution (optional)
• Primary interpretation display performance (optional)
• Evaluation of QC program (if applicable)
Before getting started with testing...

• ACR recommends QC performed under supervision of a qualified medical physicist
  • Properly trained designee

• Inventory establishment and verification

• Phantoms and testing methods
  • Material acoustic properties
Physical and Mechanical Inspection

• Scanner and monitor: console cracks, damaged buttons/transducer holders, dysfunctional lights-switches/locks, dirty air filter, damaged power cords, contamination, etc.

• Transducer/cable: delamination, holes, air bubbles, separation, cable roll-over damage, exposed wiring, connector damage/bent pins, excessive dust, etc.
Physical and Mechanical Inspection

Promised dirty air filter
Image Uniformity and Artifact Survey

• Multi-purpose or uniformity phantom
  • Shallower imaging depth, lower dynamic range, turn off spatial compounding, max frame averaging

• Factors to consider when artifact(s) identified
  • Location, number, and severity (could use computerized tool)
  • Check impact of cable and port
  • Clinical practice reality

CIRS 551
in air

King et al. 2010
"snow globe"
System Sensitivity (Depth of Penetration, DOP)

• Subjective assessment
  • Consistent imaging mode and transmit frequency, 100% power output, higher dynamic range, one focal zone (if relevant) deeper than expected DOP, turn off speckle reduction/smoothing
  • Visually define the deepest depth with consistent presentation of speckles during live scan and measure this depth
  • Compare with acceptable range or previous data

• Objective measurement (optional)
  • A pair of uniform-gel image and in-air image w/ same acquisition parameters (IEC 61391-2)
Scanner Display Performance - Qualitative

• Clean display

• Use test patterns to visually check luminance, contrast, resolution, pixel defect and other non-uniformities, etc.

TG18-QC

TG18-UN80

TG18-UN10
Scanner Display Performance - Quantitative (optional)

• Measure luminance response
  • Maximum and minimum luminance

• If necessary and available, adjust monitor output and re-measure
Summary Form

ACR Mayo Clinic Rochester/Midwest

Documentation of corrective action
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Thank you for your attention!