**TRUS Verification Quality Assurance**

**Institution:**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Name of the person performing the QA:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Ultrasound unit** Manufacturer:\_\_\_\_\_\_\_\_\_\_\_ Model:\_\_\_\_\_\_\_\_\_\_\_\_ S/N:\_\_\_\_\_\_\_\_\_\_\_\_\_

**Probe** Frequency (MHZ) :\_\_\_\_\_\_\_ Model:\_\_\_\_\_\_\_\_\_\_\_\_ S/N:\_\_\_\_\_\_\_\_\_\_\_\_\_

**Phantom** Manufacturer:\_\_\_\_\_\_\_\_\_\_\_ Model:\_\_\_\_\_\_\_\_\_\_\_\_ S/N:\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Grayscale Visibility Test:

Results: (Action limit: change>2 steps or 10% of baseline value)

|  |  |
| --- | --- |
| Measured number of discreet  steps/Gradient Distance: |  |
| Baseline Value: |  |
| Agreement: |  |

1. Depth of Penetration Test:

Results: (Action limit: change > 1cm from baseline value)

|  |  |  |
| --- | --- | --- |
|  | Axial Plane | Longitudinal Plane |
| Depth at which speckle pattern can be separated from electronic noise: |  |  |
| Baseline Value: |  |  |
| Agreement: |  |  |

1. Axial and Lateral Resolution Test

Results: (Action limit: change >1 mm from baseline value)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Axial Plane | | | Longitudinal Plan | | |
|  | Current | Baseline | Difference  (Abs/%) | Current | Baseline | Difference  (Abs/%) |
| Axial Resolution: |  |  |  |  |  |  |
| Proximal |  |  |  |  |  |  |
| Distal |  |  |  |  |  |  |
| Lateral Resolution: |  |  |  |  |  |  |
| Proximal |  |  |  |  |  |  |
| Distal |  |  |  |  |  |  |

1. Axial and Lateral Distance Measurement Accuracy Test:

Results: (action level: Axial – difference >2 mm or 2% from nominal value; Lateral – difference >3mm or 3% from nominal value)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Axial | Lateral  (proximal) | Lateral  (distal) | Sketch: |
| Expected distance |  |  |  |
| Measured distance |  |  |  |
| Absolute difference |  |  |  |
| Percent Difference |  |  |  |

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1. Distance, Area and Volume Measurement Accuracy Test:

Results: (Action level: Difference >2 mm or 2% for distance; difference >5% of nominal for area and volume measurements)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Top-Bottom  Distance | Left-Right  Distance | Area  Measured | Volume  Measured |
| Expected |  |  |  |  |
| Measured |  |  |  |  |
| Absolute Difference |  |  |  |  |
| Percent Difference |  |  |  |  |

1. Needle Template/Electronic Grid Alignment Test:

Results: (Action level: alignment should be correct to within 3mm)

|  |  |
| --- | --- |
| Coordinate of Greatest Discrepancy | Error (mm) |
|  |  |

1. Treatment Planning System Volume Test

Results: (Action limit: The volumes calculated by the ultrasound system and the treatment planning computer should agree to within 5%)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Target Volume (cc) |  | Absolute difference (cc) | Percent Difference (%) |
| Known volume |  |  |  |  |
| Measured with ultrasound |  | Ultrasound volume relative to known volume |  |  |
| Measured with treatment planning system |  | TPS volume relative to ultrasound volume |  |  |

Notes:

* It is reasonable to coordinate testing with the vendors, as long as you are confident that the vendor is competent in the tests he/she is doing.
* It is advised to use the CIRS Model 045 Brachytherapy QA Phantom to follow TG-128, although any phantom that allows the recommended tests is acceptable.
* Axial resolution is essentially independent of depth, however one may measure it at different depths, but it is generally unnecessary.
* All tests should be performed with the probe frequency most commonly used during implants and the maximum power output.