ADVANCED TECHNOLOGY CONSORTIUM (ATC)

CREDENTIALING PROCEDURES FOR LUNG BRACHYTHERAPY IMPLANT PROTOCOLS

FACILITY QUESTIONNAIRE

Institutions wishing to enter patients onto ACOSOG-RTOG protocols that include permanent lung brachytherapy implants must be credentialed prior to participation in the study. Permanent lung implants require a team effort by the thoracic surgeon, radiation oncologist, and medical physicist. The procedures described below outline the credentialing requirements for the radiation oncologist and medical physicist. Credentialing of the thoracic surgeon is addressed in the protocol.

Note: If permanent lung implants are an option but are not required by the protocol and the institution chooses not to incorporate them in their plan of treatment, the credentialing procedures described below need not be completed.

RTOG and ACOSOG:

The treatment team is required to submit a Facillity Questionnaire and two reference cases. The first reference case is a dosimetric calculation for a single seed. The second reference case is a treatment plan to be performed following the instructions in the protocol using a post-implant CT scan to be downloaded from the ATC website (http://atc.wustl.edu/). The second reference case must be submitted digitally to the ITC.

Exemptions:

1. Completion of the first reference case will be waived if the treatment team is already credentialed for prostate implants using the model 6711 ^{125}I seeds and the treatment planning system has not changed.
2. Completion of the second reference case will be waived if the treatment team has participated in ACOSOG Z4032 and successfully submitted digitally one or more cases to QARC. If a different planning system is to be used, then the second reference case must be submitted as well.

RTOG and ACOSOG packages are to be submitted to:

Image Guided Therapy QA Center
4511 Forest Park Avenue, Suite 200
St. Louis, MO 63108
Phone: (314) 747-5415
Fax: (314) 747-5423
Email: http://atc.wustl.edu

Changing to a different treatment planning system requires re-credentialing, with resubmission of the reference cases.

Institutions will be expected to transmit the second reference case and all patient plans in digital form to the ITC. Instructions for digital submission are available at http://atc.wustl.edu/.

For questions regarding data transfer, please contact the ITC.

ATC CREDENTIALING PROCEDURES FOR LUNG BRACHYTHERAPY PROTOCOLS
FACILITY QUESTIONNAIRE

I. **Radiation Oncology Facility:** RTF #:_____

Study Group: _____ RTOG# _____ ACOSOG #: _____

Facility Name:_____

Address: _____

_____

_____

Is this Facility also known by other name(s)? If so, please provide:

_____

_____

Facility where external beam will be delivered: _____

Address: _____

_____

PERSONNEL CONTACT INFORMATION

A. Radiation Oncologist Responsible for Implant Patients

Name: _____ Phone: _____

Address: _____ Fax: _____

_____ E-mail: _____

_____

B. Chair/Chief of Radiation Oncology

Name: _____ Phone: _____

Address: _____ Fax: _____

_____ E-mail: _____

_____

C. Physicist Responsible for Implant Patients

Name: _____ Phone: _____

Address: _____ Fax: _____

_____ E-mail: _____

_____

D. Dosimetrist Responsible for Implant Patients

Name: _____ Phone: _____

Address: _____ Fax: _____

_____ E-mail: _____

_____

E. Data Manager Responsible for Implant Patients

Name: _____ Phone: _____

Address: _____ Fax: _____

_____ E-mail: _____

_____

II. **Experience of personnel:**

A. For the Radiation Oncologist named above

How many intraoperative ^{125}I lung implants following sublobar resection have you performed in the past

6 months? _____ 12 months? _____ career total? _____

What technique was used for ^{125}I lung implants? ☐ Mesh ☐ Double Suture

Has this person been previously credentialed for ^{125}I lung implants? No ☐ Yes ☐ date: _____

B. For the Physicist named above

How many intraoperative ^{125}I lung implants following sublobar resection have been evaluated with post implant CT in the past

6 months? _____ 12 months? _____ career total? _____

What technique was used for ^{125}I lung implants? ☐ Mesh ☐ Double Suture

Has this person been previously credentialed for ^{125}I lung implants? No ☐ Yes ☐ date: _____

III. **Equipment:**

Post Implant Plan:

Treatment planning system model and version: _____

CT planning is performed? Yes ☐ No ☐

Can the study be exported as DICOM RT? Yes ☐ No ☐

What can be exported? ☐ CT ☐ Structures ☐ Plan ☐ Dose

Dose calculation matrix resolution is ____ mm x ____ mm x ____ mm.
(should be ≤2mm x ≤2mm x axial slice width)

Is a point source approximation used? Yes ☐ No ☐
If yes, do you use an: anisotropy function ☐ anisotropy factors ☐

If not, explain your procedures for determining and accounting for seed orientation.

Is a heterogeneity correction used? Yes ☐ No ☐

If yes, explain the correction used:

IV. **Quality Assurance Procedures: (attach additional sheets if necessary)**

A. Source strength verification:

1. Dosimetry system used for in-house verification of seed activity:

   Vendor: _____ Model: _____

2. How is the calibration of this system directly traceable to NIST? (Attach copies of ADCL certificates)

3. What are the QA procedures to verify that the calibration of this system has not changed?

4. How frequently are these QA procedures performed? _____

5. For the ^{125}I seeds to be used, what is the NIST calibration date to which your chamber calibration is traceable?

6. Describe your measurement technique for verifying seed strengths for individual patients.

7. Number of seeds assayed per patient: ____% or ____seeds
8. What is your criterion for agreement with the vendor? +/-5% ☐, +/-7% ☐, +/-10% ☐,

Other (explain) _____

_____

9. What seed strength is used for treatment planning? your own measurements ☐ vendor ☐

   Other (explain) _____

B. Source accounting:

1. Are radiographs taken at the completion of the implant? Yes ☐ No ☐

   If yes: AP ☐ lateral ☐ oblique ☐ stereo ☐ other: _____

2. Describe procedures used to account for all seeds at the time of implant:

3. Describe procedures used to account for all seeds at the time of post implant planning:

4. Describe techniques used to identify seeds and avoid identifying the same seed on multiple CT slices:

5. What is the discrepancy limit for unaccounted seeds and what action do you take if the discrepancy exceeds the limit?

C. Other dosimetry and QA procedures

1. Describe any calculations done at the time of commissioning to verify the accuracy of the computer generated treatment plan:

2. Describe your method for ensuring that the dosimetric parameters you use are consistent with the NIST calibration of the source and your calculation method (point source approximation vs. line source):

3. Describe any other quality assurance procedures pertinent to these brachytherapy procedures:

Reference Cases

Please calculate isodose distributions for the two cases described below. Sources should be the model 6711 ^{125}I seeds from Oncura that comply with the AAPM prerequisites – see http://rpc.mdanderson.org), with source strength specified at the beginning of the implant. Do the calculations as you would do them clinically using the TG-43 dosimetry, detailing any assumptions necessary. The first reference case shall be submitted in hard copy format. The second reference case must be submitted digitally as DICOM RT.

Case 1: A single seed, strength 0.635 U (μGy m^2 h^{-1}): If your software allows and you use a line source approximation, calculate both in the longitudinal and mid-transverse planes of the seed. Please submit isodose lines from 0.2 to 100 Gy. (Lines 0.2, 0.5, 1, 5, 10, 50, & 100 Gy are preferred.)

Dosimetry Calculations:

Write below the equation that will be used for hand calculating the instantaneous dose-rate to an arbitrary point from a single seed in the TG-43 formalism. (If possible give notations used by your treatment planning computer). The intent is for you to be able to verify that the values of various parameters in your treatment planning system are the same as in TG-43.

Define the variables in the equation:

For each seed model used to treat patients on this protocol, submit the data used by your treatment planning computer for the following parameters:

- Dose rate constant (Λ)
- Anisotropy function (ϕ) and/or factors
- Radial dose function
- The units of S_K are : _____
- Do your ^{125}I dose calculations agree with TG-43 to within $\pm$5% from 5-70 mm? Yes ☐ No ☐

Case 2:

A CT scan of a patient who has undergone a sublobar resection with lung brachytherapy is provided for this reference case. The scan is in DICOM format and may be downloaded from the ATC website http://atc.wustl.edu/. The CT scan shall be entered into your treatment planning system and planned as you would a patient on the trial in which you are participating. The target volumes shall be drawn on the CT scan by the radiation oncologist who will be treating patients on this study. Pay particular attention to the delineation of the CTV as the evaluation of this case will take the contouring of the CTV into account.

For this case the mesh technique was used. Forty ^{125}I sources (model 6711 from Oncura) were implanted, and each source had a strength of 0.762 U (0.60 mCi).

Institutions are required to submit this reference case in digital format. Treatment planning data must be submitted as DICOM RT. Digital data shall include planning CT, as well as structure, dose, and plan files. The data may be submitted on a CD or sent electronically via sftp to the ITC. Instructions for digital submissions may be found on the ATC website at http://atc.wustl.edu/.

A list of commercial systems that are known to have the capability to export digital data in an acceptable format are listed on the ATC website (http://atc.wustl.edu/credentialing/atc_compliant_tps.html).

Please direct technical questions to the ITC.