Brachytherapy Rotation I & II

Resident: ____________________________________

Rotation staff mentor/ advisor(s): __Joann Prisciandaro and Choonik Lee__________________

____________________________________________

Rotation Duration: 2 months each rotation
Rotation Dates: _____________________________

A medical physics resident in radiation oncology at the University of Michigan will be expected to demonstrate the following competencies associated with brachytherapy and radiation safety. Listed below are the minimum standards.
Contents Outline

Knowledge Factors
  - List of reading assignments
  - Regulations
  - General Brachytherapy
  - HDR Brachytherapy
  - LDR I-125 Eyeplaque
  - Shielding
  - Others

Practical Factors
  - Handling radioactive material (receiving packages)
  - HDR
  - LDR Eyeplaque
  - LDR Therasphere
  - IVBT
  - Treatment Planning – clinical and test cases

Case Participation
  - HDR
  - Eyeplaque
  - Therasphere
  - IVBT
  - Others

Knowledge Factors – List of reading assignments

1. Title 10 of the federal code of regulations (parts 19, 20, & 35)
2. State Regulations (MI-LARA) -
   http://www.michigan.gov/lara/0,4601,7-15411407_35791-232895--00.html
3. AAPM Task Group #43U, “Dosimetry of Interstitial brachytherapy sources.”
5. AAPM Task Group #59, “HDR brachytherapy treatment delivery.”
6. AAPM Task Group #64, “Permanent prostate seed implant brachytherapy.”
7. AAPM Task Group #129, “Dosimetry of I-125 and Pd-103 COMS eye plaques for intraocular tumors.”
8. AAPM Task Group #137, “AAPM recommendations on dose prescription and reporting methods for permanent interstitial brachytherapy for prostate cancer.” - Executive Summary
11. AAPM Task Group 144, “Recommendations of the AAPM on dosimetry, imaging, and quality assurance procedures for Y-90 microsphere brachytherapy in the treatment of hepatic malignancies.”
14. ICRU Report 38, “Dose and volume specification for reporting intracavitary therapy in gynecology”

15. ICRU Report 89, “Prescribing, recording, and reporting brachytherapy for cancer of the cervix”


17. ABS guidelines, consensus statements, and task groups – https://www.americanbrachytherapy.org/guidelines/


   a. Uveal Melanoma
   b. Cervix cancer (part 1 and 2)
   c. Breast
   d. Vaginal cuff
   e. Interstitial
   f. HDR and LDR prostate


28. Review ABS Task Groups -
   a. Cervical cancer
   b. Breast cancer
   c. Prostate HDR and LDR

29. IROC Houston source registry: http://rpc.mdanderson.org/RPC/home.htm

30. AAPM Brachytherapy Physics Summer School, 2005 conference proceedings.
31. AAPM Clinical Brachytherapy Physics, AAPM Monogram No. 38 (2017 AAPM Summer School)

Knowledge Factors – Regulations (Rotation I)
MUST BE COMPLETED WITHIN FIRST 2 WEEKS OF ROTATION I

Read and demonstrate an understanding of 10CFR19.
Signature / Date

Read and demonstrate an understanding of 10CFR20.
Signature / Date

Read and demonstrate an understanding of 10CFR35.
Signature / Date

Read and demonstrate an understanding the Michigan State regulations.
Signature / Date

Knowledge Factors – General Brachytherapy (Rotation I)

Review and discuss the IROC Houston source registry.
Signature / Date

Read and demonstrate an understanding of AAPM TG-43U report, including different source strength units used for brachytherapy.
Signature / Date

Perform TG-43 calculations for a single, double, and triple source plan.
Signature / Date
Signature / Date
Signature / Date

Read and demonstrate an understanding of AAPM TG-56 report, in particular, how brachytherapy programs are developed.
Signature / Date

Knowledge Factors – HDR Brachytherapy (Rotation I)

Read and demonstrate an understanding of AAPM TG-59 report. Discuss commissioning and acceptance of remote afterloaders.
Signature / Date

Discuss decay, decay energies (mean energy), and half-lives of brachytherapy sources (e.g., Ra-226, Cs-137, Ir-192, Y-90, Pd-103, Cs-131, and I-125).
Signature / Date

Discuss the advantages and disadvantages of LDR, HDR, and PDR brachytherapy.
Signature / Date

Knowledge Factors – Eye plaque (Rotation I)

Read and discuss COMS protocol.
Signature / Date

Read and demonstrate an understanding of AAPM TG-129 report.
Signature / Date
Knowledge Factors – Handling Radioactive Sources (Rotation II)

Read and demonstrate an understanding of NCRP 155.

Signature / Date

Read and demonstrate an understanding of AAPM Report 98.

Signature / Date

Knowledge Factors – General Brachytherapy (Rotation II)

Read and demonstrate an understanding of AAPM TG-186 report.

Signature / Date

Demonstrates an understanding of breast anatomy, staging, and treatment.

Signature / Date

Demonstrates an understanding of prostate (GU) anatomy, staging, and treatment.

Signature / Date

Review and discuss the ABS guidelines, consensus statements, and task group reports for breast cancer.

Signature / Date

Review and discuss the ABS guidelines, consensus statements, and task group reports for prostate cancers.

Signature / Date

Discuss applicator reconstruction techniques for CT and MR based localization.

Signature / Date

Knowledge Factors – HDR Brachytherapy (Rotation II)

Read and demonstrate an understanding of the GEC-ESTRO recommendations for volume based treatment planning for cervical cancer.

Signature / Date

Read and demonstrate an understanding of the GEC-ESTRO recommendations for volume based treatment planning for cervical cancer.

Signature / Date

Review and discuss the ICRU 89 report.

Signature / Date

Knowledge Factors – Others (Rotation II)

Read and discuss the AAPM report 149 (IVBT).

Signature / Date

Read and discuss the AAPM TG-64 report (Prostate LDR).

Signature / Date

Read and discuss the AAPM TG-137 report (Prostate LDR).

Signature / Date

Read and discuss the AAPM TG-144 report (microspheres).

Signature / Date

Discuss electronic brachytherapy.

Signature / Date
**Practical Factors – Handling Radioactive Sources**
*(Orientation and Rotation I)*

**Receive and check in radioactive sources into inventory**

Signature / Date

**Discuss personal protection techniques and appropriate methods for storing sources (with regard to security and accountability).**

Signature / Date

**Discuss operation and appropriateness of different survey instruments.**

Signature / Date

**Perform hot lab survey and quarterly inventory. Discuss leak checks of sealed sources.**

Signature / Date

**Complete source room competency.**

Signature / Date

**Complete and demonstrate an understanding of radioactive material packaging and transportation lecture.**

Signature / Date

**Discuss the process in which sealed sources and equipment are calibrated.**

Signature / Date

---

**Practical Factors – HDR (Rotation I)**

**Observe morning QA.**

Signature / Date

**Perform morning QA independently.**

Signature / Date

---

**Practical Factors – LDR Eye Plaque (Rotation I)**

**Generate test and/or clinical GYN treatment plans (cylinder, R&T, Miami, etc.).**

<table>
<thead>
<tr>
<th>Applicator Type</th>
<th>Reviewed by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Generate an eye plaque treatment plan.**

Signature / Date

**Assay eye plaque I-125 seeds.**

Signature / Date

**Observe and discuss eye plaque procedure.**

Signature / Date
Perform a post implant survey.

Signature / Date

Perform a post removal survey.

Signature / Date

**Practical Factors – HDR (Rotation II)**

Perform morning QA independently.

Signature / Date
Signature / Date
Signature / Date
Signature / Date
Signature / Date
Signature / Date

Perform/participate in annual QA.

Signature / Date

Review and perform a BED and EQD2 calculation.

Signature / Date

Generate test and/or clinical prostate treatment plans.

Signature / Date
Signature / Date
Signature / Date
Signature / Date
Signature / Date
Signature / Date

**Practical Factors – IVBT (Rotation II)**

Calculate dwell times required for IVBT treatment.

Signature / Date

**Practical Factors – LDR Therasphere (Rotation II)**

Calculate activity required for Therasphere treatment.

Signature / Date

Assay Therasphere vials before and after the infusion.

Signature / Date
## Brachytherapy Case Participation
Document participation in planning, checking, delivering, and administrative paperwork of following implants.

### HDR Cylinder (single or multi-channel)

<table>
<thead>
<tr>
<th>Date</th>
<th>Supervisor</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HDR Tandem and Ring/Split ring

<table>
<thead>
<tr>
<th>Date</th>
<th>Supervisor</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HDR Interstitial (Prostate or Gyn)

<table>
<thead>
<tr>
<th>Date</th>
<th>Supervisor</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LDR Therasphere

<table>
<thead>
<tr>
<th>Date</th>
<th>Supervisor</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### IVBT

<table>
<thead>
<tr>
<th>Date</th>
<th>Supervisor</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LDR Prostate

<table>
<thead>
<tr>
<th>Date</th>
<th>Supervisor</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Others

<table>
<thead>
<tr>
<th>Date</th>
<th>Supervisor</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** HDR test cases are available under the patient name “SQA_HDR, Test patient” (Reg # jip03). Instructions for use are located under the shared directory, Physics\2010 Teaching\Physics Residents\Rotations\Brachytherapy and rad safety rotation.**

T:\Radonc\Shared\Physics\2010 Teaching\Physics Residents\Rotations\03 Brachytherapy and rad safety rotation\Brachytherapy rotation I_II 2018.doc

Last Updated: 4_Apr_2018 (JIP)