

Educational Council Symposium on Residency Programs

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Residency Program at Washington University

- Minimum requirements for entry: M.S. in medical physics, physics, or other relevant physical science or engineering discipline (ABR board requirement)
- 1st year: intensive training in the following areas, *i.e.* "concentrations"
 - Treatment Planning
 - IMRT
 - Stereotactic Radiosurgery/Gamma Knife
 - Brachytherapy
- 2nd year: Continued training with more leadership-type responsibilities, mixed in with clinical support, and mentoring of incoming 1st year residents
- Includes assignments to QA of various equipment throughout 2 years

Residency Program at Washington University

- **Training Essentials** developed and documented for each area:
 - Hands-on experience: to master concepts and skills under the guidance of responsible physicist/dosimetrist/therapist
 - Didactic training: recommended reading (TG reports, articles), attendance of clinical teaching/QA conferences, physics course, radiation biology course:
 - Teaching experience: prepares and presents lectures for physics/physician/dosimetrist/therapist personnel
- **Competency Evaluation Forms:**
 - Treatment Planning, commissioning/AT, machine calibration and dosimetry, special procedures, brachytherapy, radiation safety and regulatory compliance
- **Oral exam** at end of first and second years:
 - Treatment machines/QA, calibration and radiation measurements/detectors, photon and electron beams, treatment planning and treatment planning systems, brachytherapy and radiation safety, and IMRT and special procedures

Hands-on Experience: First Year Concentrations

| Time Period | Wiesmeyer: Primary Rotation | Zhang: Primary Rotation | Assigned Readings | Assigned Reports |
|-------------------------------|--|--|--|--|
| July-September | Orientation and Team 1 Treatment Planning (7/1-8/7) | Orientation and Team 1 Treatment Planning (8/30-1/1/05) | TG-40 TG-51/21 TG-53, Van Dyk ICRU-62 TG-66 TG-257/0 TG-71 | 8 Treatment Site Specific Reports Derivation from TG-21 to TG-51 and Derivative of IMRT MU from TPR formalism |
| October-December | Team 2: (8/20-11/15) Team 1: (11/22-12/31) | Team 2: (11/22-2/1/4) | Treatment Policies | |
| January- and March | Brachytherapy | Special Procedures incl. IMRT Planning (2/15-3/4/05) | TG-56 TG-59 TG-43 ICRU-38&58 Brachy Procedures | Brachytherapy Site Reports (2) for GYN and Prostate TSET Electron Arc TBI |
| mid-March- May | Special Procedures incl. IMRT Planning | Brachytherapy (3/5/01-3/7/5) | NCI/IMRT Email, AAPM paper, Dept. Procedures, TG-17, TG-54 | |
| June (cont. update if needed) | CT-Simulation, & Plan, Calculation, and Chart Checking | CT-Simulation, & Plan, Calculation, and Chart Checking (7/15-8/20) | Chart Check Procedures | Linear Shielding Assignment |

Hands-on Experience: Second Year Concentrations

| Month | Cornell Hampton (FR-Yr2) | Roy Wood (FR-Yr2) |
|--------|---|---|
| July | External Beam Concentration | External Beam Concentration |
| August | " | " |
| Sept. | " | " |
| Oct. | External Beam & IMRT Concentration | External Beam & Brachytherapy Concentration |
| Nov. | " (This includes US systems) | " |
| Dec. | " | " |
| Jan. | External Beam & Radiotherapy Concentration | External Beam & IMRT Concentration |
| Feb. | " (This includes ESEF and EPID) | " (This includes US systems) |
| Mar. | External Beam & Brachytherapy Concentration | " |
| Apr. | " | External Beam & Radiotherapy Concentration |
| May | " | " (This includes ESEF and EPID) |
| June | Elective Concentration | Elective Concentration |

"External beam concentration" refers to 2nd year resident's responsibilities to provide clinical support, *i.e.*, chart checks

Didactic Training: Coursework

- Physics course meets twice a week from September to March
- Physics course topics include
 - radiologic physics
 - radiation dosimetry and measurement
 - external beam clinical physics
 - brachytherapy physics
 - radiation safety and QA
 - special topics including IMRT, imaging for RT, stereotactic, proton therapy, etc.
- Followed by a 2 month radiation biology course

Teaching Experience: Resident Lectures

| DATE | PRESENTER / ADVISOR | TOPIC |
|--------------|--|---|
| July 15 | Cornell Hampton, Ph.D./ Jacqueline Esthappen, Ph.D. | Electronic Portal Imagers: AT and Dosimetry |
| August 19 | Roy Wood, Ph.D./ Sasa Mistic, M.S. | Commissioning of a Multi-Slice Scanner |
| September 30 | Mark Weismeyer, Ph.D./ Todd Steinberg, M.S. | TG-51 and TG-39 |
| October 28 | Lisha Zhang, Ph.D./ Eric Klein, M.S. | Conventional Treatment Planning for H&N |
| November 18 | Cornell Hampton, Ph.D./ Zuofang Li, D.Sc. | Dosimetry Standards (NIST, ADCL) |
| December 9* | Mark Weismeyer, Ph.D./ S. Murty Gogodu, Ph.D. | Breast Treatment Planning |
| January 20 | Lisha Zhang, Ph.D./ Danae Low, Ph.D. | Film and TLD Dosimetry |

One lecture per month, assigned physicist serves as an advisor

Evaluation Forms: Treatment Planning Concentration

| Barnes Jewish Hospital – Mallinckrodt Institute of Radiology Radiation Oncology Physics Residency Program Resident Competency Evaluation: Treatment Planning and Delivery | | | |
|---|----------------------|---------------------------------|------|
| Resident: _____ | Entrance Date: _____ | Expected Graduation Date: _____ | |
| Skill Description | To be completed by*: | Physics Faculty Advisor | Date |
| Patient positioning and immobilization techniques | 6 months | | |
| Patient data acquisition (distances and separations, contours, CT, MR) | 6 months | | |
| Conventional patient simulation | 6 months | | |
| Virtual patient simulation | 6 months | | |
| Treatment aid design and fabrication | 6 months | | |
| Treatment planning, single field arrangements | 6 months | | |
| Treatment planning, complex field arrangements | 6 months | | |
| Field matching and gapping | 6 months | | |
| MU/Target/Patient-Dose calculations for linear accelerators, superficial and contact therapy units | 6 months | | |
| Data entry into paper chart and electronic chart systems | 6 months | | |

Evaluation Forms: Brachytherapy Concentration

Barnes Jewish Hospital – Mallinckrodt Institute of Radiology
 Radiation Oncology Physics Residency Program
Resident Competency Evaluation: Brachytherapy Therapy Treatment Planning and Delivery

Resident: _____ Entrance Date: _____ Expected Graduation Date: _____

| Description | To be completed by*: | Physics Faculty Advisor | Date |
|--|----------------------|-------------------------|------|
| Brachytherapy source characteristics | 12 months | | |
| LDR source strength specification and calibration | 12 months | | |
| HDR source change and calibration | 12 months | | |
| LDR and HDR RAL periodic quality assurance tests | 12 months | | |
| Ir-192 LDR interstitial treatment planning and delivery | 12 months | | |
| Cs-137 intracavitary treatment planning and delivery | 12 months | | |
| Intracavitary HDR treatment planning and delivery | 12 months | | |
| Permanent prostate implant treatment planning and delivery | 12 months | | |

Residency Program: Obtaining Certification

- Eligibility for taking the ABR certification exam includes “*at least three years of active association with an approved department or division of the subfield in which certification is sought*”
- Graduate study in a medical physics program → up to half year of credit for Masters and one year of credit for Ph.D.
- Complete 2-year residency program → two years of credit
- Part I Physics and Clinical exams can be taken in the midst of satisfying experience requirement
- Experience requirement must be satisfied before taking Part II Therapy Written exam
- Must pass Part II written before taking Part II Oral exam, offered the next year

Residency Program and Beyond (For Me)

- Completed residency program at Washington University in August 2002
- Appointed to Instructor of Radiation Oncology at WUSM in August 2002
- ABR certified by June 2003
- Promoted to Assistant Professor of Radiation Oncology at WUSM in January 2005
- Responsibilities include
 - clinical support in various areas, especially in IMRT, brachytherapy, and portal/CR imaging
 - teaching responsibilities associated with various programs: physics and physician residency, dosimetry training program, and radiation therapist training program.
 - academic pursuits, thus far including film dosimetry, IMRT treatment planning, breast brachytherapy, and portal imaging

Residency Program and Beyond (In Total)

Since 1991:

- 17 people have completed the medical physics residency program at WU, and have continued on in the profession as...
- Hospital physicists (6)
 - Academic clinical physicists (10, of which 2 are chiefs)
 - Chief imaging physicist (1)