



Medical Physics Residency Training Program in Radiation Oncology Physics

Department of Radiation Oncology
Division of Medical Physics
University of Chicago Hospitals
Chicago, Illinois

Program Overview:

The Medical Physics Residency Training Program in Radiation Oncology Physics is a clinical training program at the University of Chicago Medical Center. The training program is based on the Guidelines for Accreditation of Medical Physics Residency Programs as published by Commission on Accreditation of Medical Physics Education Program. The program is directed toward providing a 2 year program of progressive supervised clinical training for graduates of CAMPEP accredited medical physics graduate education programs or graduates of other programs such as the University of Chicago graduate program in Medical Physics. Additional medical physics didactic training will be provided to graduates of other physics-related programs.

Program Objectives

The objective of the residency program is to provide training in radiation oncology physics in a structured clinical environment for individuals wishing to practice professional radiation oncology physics. Residents, under the supervision of board certified medical physicists, will participate in the routine clinical duties of a radiation oncology physicist. At the conclusion of the program the resident will be able to demonstrate competency in all areas of radiation oncology physics and will be prepared to sit for the certification examination of the American Board of Radiology in Therapeutic Radiology Physics.

Organizational Structure

The Department of Radiation Oncology at the University of Chicago is comprised of 3 divisions: Clinical Radiation Oncology, Medical Physics, and Cancer Biology. The department provides service to three clinical sites: University of Chicago Hospitals in Hyde Park section of Chicago, University of Illinois/Chicago campus, and Sherman Community Hospital in Elgin, IL. Radiation Oncology staff includes: 8 Ph.D. physics faculty, 7 clinical physics staff, 7 dosimetrists, 1 dosimetry trainees, 2 physics residents, 10 M.D. radiation oncology faculty, 10 medical residents, and 6 Ph.D. cancer biology faculty. Total external beam treatments number

150 – 210 per day. Brachytherapy procedures are performed at the University of Chicago Medical Center and the University of Illinois/Chicago campus. Patients are routinely enrolled on national and institutional protocols.

The medical physics residency program is housed in the Division of Medical Physics. Physics residents report to the Director of the Residency Program in Medical Physics (Chester Reft, Ph.D.). The program director chairs the Medical Physics Residency Program Committee, which reviews residents' progress and the overall self-study program. Dr. Reft reports to the departmental Resident Education Committee, which oversees the medical residency and physics residency programs, and reviews the clinical training and didactic education program on a regular basis. Dr. Reft is also a member of the committee. The chair of the committee is the medical residency Program Director (P. Connell, M.D.).

The medical physics residents are hospital employees and are fully funded by the hospital. The medical physics residents receive benefits, including salary, as PGY1 and PGY2 medical residents. These benefits are stipulated in the Graduate Medical Education manual, which is updated every year

The residency program takes advantage of didactic education provided through the University of Chicago Graduate School program in Medical Physics. The physics residents may audit the courses provided they do not interfere with their clinical training. The department also provides clinical training for 4th year radiation therapist students from the University of Wisconsin B.S. degree program. Several practical courses are given in radiation therapy physics to the students, which may be attended by the physics residents.

History of Program Development

The Department of Radiation Oncology approved as part of its long-term strategic plan, the creation of a Medical Physics Residency Program in Radiation Oncology Medical Physics. Dr. Franca Kuchnir was the first director of the residency and had applied for CAMPEP accreditation of the program in March of 2000. The first two residents began training in September, 2000 and graduated in September, 2002. Mary Martel, Ph.D. was the second director and Chester Reft is the current (and third) director of the program. The current plan is for a 2 year Residency program with one new resident accepted per year. This will allow for overlap and continuity in the program and add to the educational experience.

Prior to the start of the residency program, the Division of Medical Physics has long trained postdoctoral fellows for entry into clinical academic medical physics positions. Dr. Kuchnir was the first postdoctoral fellow in 1971, training under the supervision of Dr. Lester Skaggs, division director. There have been many postdoctoral fellows since then and the majority of the fellows has achieved ABR or ABMP certification and has academic careers in clinical departments.

Training Requirements:

Elements of Clinical Training

The training program follows the “Essentials and Guidelines for Hospital Based Medical Physics Residency Training Programs” as outlined in AAPM Report #36. It is also a goal of the program for the resident to demonstrate understanding of the topics from the study guides of the American Board of Medical Physics and the American Board of Radiology.

Clinical Training:

The resident will work closely with faculty and staff medical physicists responsible for clinical tasks. The resident will follow a clinical rotation with well-defined training objectives, which includes the training objectives of the various clinical rotations. The resident will keep a log documenting their participation in all clinical activities. This log will be reviewed by the supervising physicist and the program director on a monthly basis. The resident’s performance will be evaluated at the end of each rotation by use of a rotation evaluation form. Additional reading assignments may be given to strengthen theoretical understanding of various clinical procedures.

The Residency Training Program aims to commence each July and residents will participate in a six week orientation program which includes 4 weeks of didactic classes and 2 weeks in the clinic. This will serve to familiarize them with the equipment, techniques, and procedures for the operation of the clinic.

Conference/Seminar Attendance:

A variety of departmental and divisional conferences take place on a regular basis that will help the resident to develop an in-depth understanding of the clinical problems associated with the practice of medical physics in radiation oncology. Conferences and seminars include:

- Dosimetry and radiation safety in-services, each given on a yearly basis
- Visiting professor lectures, approximately 10 per year
- Journal club once a month with the medical residents
- Journal club once a month with the graduate students
- Journal club once a month with the medical physics staff
- Clinical, Physics and Biology Faculty seminars once a month
- Chart rounds once a week
- Anatomical site-specific oncology seminars given 2 mornings per week, with the medical residents and senior radiation oncologists
- Quality assurance meeting bi-monthly

There are also several opportunities to attend conferences outside of the department:

- Radiological Society of North America annual meeting, December of every year in Chicago. The resident will choose from the list of refresher courses with review by the Program Director. The resident will be expected to give a report to physics staff about highlights of the meeting.
- American Association of Physicists in Medicine Annual Meeting and American Society for Therapeutic Radiology and Oncology. The resident may choose to go to one of these

annual meetings, or the AAPM Summer School. The resident will be expected to give a report to physics staff about highlights of the meeting.

- Midwest Chapter of the AAPM meetings, on a semi-annual basis.
- Other local meetings, such as the annual Varian-sponsored IMRT symposium, Chicago Radiological Society semi-annual meetings.

Didactic Curriculum:

Residents will be expected to have completed the didactic components of AAPM TG Report 79 prior to entry into the residency program. Information about didactic study includes:

- Summer Orientation Course 4 weeks (required for all)
- The clinical radiation Oncology Physics Course for Therapeutic Radiology Residents (2 year course)
- Dosimetry and Treatment Planning class for radiation therapy students (required; physics resident is teaching assistant for this course)

Requirements for program completion:

1. Demonstration of adequate medical physics education.
2. Demonstration of clinical competency in all clinical training rotations as documented in the rotation evaluation form and checklists completed by the supervising medical physicist.
3. Presentation of at least two medical physics report presentations or medical physics classes.
4. Documented attendance at the majority of the required clinical and medical physics seminars and conferences including medical physics seminars, dosimetry and safety in-services, chart rounds, and morning conferences.
5. Satisfactory assessment of progress as determined by means of an oral examination at the end of each rotation, conducted by the Medical Physics staff.

Program Length

For all residents, the length of the training program is designed to be two years. The didactic training for graduates of programs other than medical physics will be completed in the 2 year period and not interfere with clinical training time.

Residents:

Admissions

Residents will be expected to have completed a comprehensive curriculum in Medical Physics that covers the didactic components of AAPM TG 79. Preferred candidates must have a M.S. or Ph.D. degree in medical physics from a CAMPEP accredited program. The next preference is for candidates having a M.S. or Ph.D. degree in medical physics from a program not accredited by CAMPEP. All candidates must have completed the didactic components of AAPM TG 79.

Interested applicants are directed to our website: <http://www.radonc.uchicago.edu>.

The top candidates are selected by the program director and assistant director. The selected candidates are then discussed at a meeting with the entire faculty to determine the candidates to invite for on-site interviews during February. Applicants are notified of the decision by the faculty on the first Friday in March..

Evaluation of Residence Progress

The program director and the chief mentor meet with the resident bi-weekly to review the resident's logbook and to periodically go over rotation objectives and checklists. At the end of each clinical rotation, the supervising faculty or staff will provide a formal evaluation of the resident's performance. Formal evaluation by oral examination is made at 12 and 18 months by representative staff involved with the resident training during that year

Staff

The Medical Physics faculty has clinical, teaching, research and development duties. In addition, the senior faculty has administrative responsibilities. The faculty devotes 50 - 80% of their effort to clinical operations including service, supervision, quality assurance as well as development and implementation of new technology. Teaching responsibilities are on a rotation or sharing basis. There is strong collaboration between medical and physics faculty in the clinic. While only faculty members are involved in a preceptor role, all staff members are available and work with the trainees. The majority of the clinical faculty and staff are certified in their respective specialty boards. Within the group, there is professional expertise in all aspects of treatment planning, delivery, documentation and verification of treatments as well as in depth knowledge of the more sophisticated aspects of clinical physics such as SRS/SRT, SBRT, IMRT, video monitoring of patients under treatment, TBI, TSET, in vivo dosimetry, QA, prostate seed implantation, dose evaluation, LDR and HDR brachytherapy. The atmosphere is one of formal and informal teaching with medical residents, therapists, graduate and visiting physics students frequently present in the clinical physics quarters.

Residents will work under the direction of the faculty and staff of the Division of Medical Physics at all 3 clinical sites. At the UC site, the ratio of physics staff to residents is approximately 3 to 1. Current staff includes:

Charles Pelizzari, Ph.D. Associate Professor, Division Chief
Chester Reft, Ph.D., Assistant Professor
Kamil Yenice, Assistant Professor

Hania Al-Hallaq, Ph.D., Instructor
Bulent Aydogan, Ph.D., Instructor
Christopher Stepaniak, Ph.D., Clinical Physicist
Brett Smith, M.S., Clinical Physicist
Daniel Spelbring, Ph.D., Director Medical Information Systems
Karl Farrey, MS, Clinical Physicist
Carla Rash, BS, Dosimetrist
Wells Jackson, BS, RTT, Dosimetrist
Malgorzata Kopec, Dosimetrist
Jennifer Steber, Dosimetrist
Parvathi Chiru, RTT, Dosimetrist
Dan Joyce, RTT, Dosimetrist
Simeon Bisevac, BS, Engineer
Emil Muresan, Physics Assistant
1 Dosimetrist trainee

Several clinical and biology faculty members with teaching interaction with the residency program are listed below:

David Grdina, Ph.D., Professor-Teaching Faculty-Medical and Physics Residency Program
P. Connell, M.D. Assistant Professor, Teaching Faculty-Physics Residency Program

Clinical Services and facilities

The department of Radiation Oncology is equipped with the latest state of the art therapy and simulation machines, as well as with the latest technology such as CT simulation, portal imaging, video patient monitoring, dynamic MLC, full 3-D treatment planning for photon and electrons, SRS, IMRT, interstitial and intracavitary LDR and HDR, intravascular brachytherapy and a superficial therapy machine.

The department has a long standing accredited four-year medical residency program, with three residents per year. We treat 800 to 1000 patients per year at The University of Chicago (UofC) and an equal amount in the other two locations combined, University of Illinois at Chicago (UIC) and Sherman Hospital in Elgin. The University of Chicago offers an excellent educational environment.

Resident Offices, Classrooms, and Conferences

The Division of Medical Physics is located in the Department of Radiation Oncology, on the same floor as administration and other offices, and one floor above the main clinic. The physics residents have an office carrel in the housestaff/medical residents' room, on the same floor as the clinic. Secretarial support is provided by Division administrative support staff. Residents are provided with a personal computer and access to the institutional intranet. Graduate courses, medical resident conferences and other meetings are given in the department's conference room, located on the first floor of the department.

Clinical Facilities, Laboratories, and Shops

The clinical facilities at the University of Chicago and the University of Illinois are available to the training program. At The University of Chicago Center for Advanced Medicine we have four Varian Clinacs 2100 EX accelerators equipped with dynamic MLCs, EPIDs and a patient information system (VARIS). Two of the accelerators have on board imaging capabilities. This equipment is available for physics use on weekends and evenings. Accessories for SRS, SRT, SBRT, TBI, TSET, custom patient immobilization and a home-developed video system for fast and accurate patient repositioning and monitoring of patient motion are in use. We have an aggressive program of IMRT. The department is equipped with two Philips wide bore CT based simulators and Pinnacle software, block cutting and mold room. We have a well-established LDR brachytherapy program. Treatment planning tools consist of full 3-D capabilities for photons and electrons (Pinnacle), IMRT (Pinnacle), SRS/SRT for circular and shaped beams (iPlan from Brain Lab). We have multiple treatment planning stations so that training can be done in parallel with clinical service.

At the University of Illinois Outpatient Care Center (opened October 1999) there is similar equipment: two Varian Clinac 2100 EX with MLCs, EPIDs and VARIS, Ximatron conventional simulator and AcQsim simulators, block/mold room, LDR brachytherapy program, including eye plaques. In addition there is a superficial machine (Oldelft Therapax-150) and a HDR unit (Varisource). Availability of the machines for physics use is on evenings and weekends. Treatment planning tools are comparable to those at UC: ECLIPSE for photons and electrons and Eclipse/CADPLAN for IMRT. There are multiple treatment planning stations. The UIC facility was modeled after UC.

Sherman Hospital has a Varian Clinac Trilogy and a Siemens CT simulator with software for treatment planning, Varis, and Eclipse treatment planning system.

Dosimetry laboratories are available to the program at The University of Chicago and the University of Illinois. We have capabilities and expertise in state of the art dosimetry techniques such as standard and specialized ion chambers, diodes for photon, electron and stereotactic beams, a diamond detector, TLD annealing ovens and automated TLD readers, OSLD read-out system, state of the art film densitometer, 2 water tank dosimetry systems, a 25 linear diode array as well as a two dimensional diode array (Mapcheck) for dosimetry of dynamic MLC, three humanoid phantoms for TLD and film dosimetry, an IMRT and a CT phantom and a large supply of tissue, bone and lung equivalent plastic slabs.

Libraries

The department has reference and repeat copies of textbooks available to the residents. Up-to-date collections of the journals relevant to Radiation Oncology and Medical Physics are also maintained in the department. In addition the residents have privileges at the University of Chicago library system which contains one of the most complete medical library collections. There is online access to Medline and electronic journals.

Summary

A major strength of this program is that it resides in a mature academic environment where residents have good access to clinical training (treating 1500 patients per year) and didactic education (medical residency program and a graduate program in medical physics). Good relationships exist among staff members, facilitating the integration of the resident into the clinical routine. Specialization among the staff permits in-depth training in the clinical and physics aspects of both routine and special procedures. Abundant training and educational opportunities exist including resident teaching opportunities. Didactic programs are available for all aspects of medical physics. A vast variety of medical physics subjects are covered in the department's dosimetry in-services and seminars.