University of California, Irvine
Department of Radiation Oncology

Medical Dosimetry Program Handbook

2014 - 2015

CONTENTS

I. Mission Statement

The mission of the Medical Dosimetry Program is to provide the necessary knowledge base and clinical skills such that upon successful completion the graduating student is able to function safely and competently as an independent **Medical Dosimetrist** and contribute to the profession and health care of the public**.** Furthermore, the graduating student should be fully prepare to take, and pass, the medical dosimetry certification board (MDCB) examination.

II. Medical Dosimetrist

A Medical Dosimetrist is an integral member of the radiation oncology team who has the necessary skills to develop a computer-based radiation treatment plan that meets a physician's radiation dose prescription with minimum dose to healthy organs nearby and can be readily implemented by the therapists in the radiotherapy treatment unit.

III. Medical Dosimetry Program Goals

Goal 1

A graduating student should be able to function safely, competent and with minimum supervision as an entry-level medical dosimetrist.

Outcomes:

a. The student should have knowledge of treatment planning using basic as well as advanced treatment techniques.
b. The student should have knowledge, understanding and implementation of treatment protocol parameters.
c. The student should have knowledge, understanding and implementation of simple hand calculations pertaining to emergency simulation-and-treatment cases.
d. The student should have knowledge, understanding and handling of record-and-verify systems.

Goal 2

A graduating student will possess the necessary knowledge for critical thinking and problem-solving skills to situations that may be encounter in the clinic.

Outcomes:

a. The student should have the knowledge to recommend/advise the physician on whether a specific treatment technique may be more suitable for a patient identifying pros and cons of the recommended technique.
b. The student should have the knowledge and confidence to work with therapists and physicists on the most efficient patient setup for a special treatment procedure.

Goal 3

A graduating student will possess the skills to communicate effectively with any member of the radiation oncology team regarding any circumstance that involves a patient treatment.

Outcomes:

a. Oral presentations and written reports on self-study projects given during training should prepare the student for this task.
b. One-on-one presentation of a plan to a physician and justifying the process used to

generate that plan, all part of the dosimetry training, should help with the student's communication skills.

Goal 4

A graduating student will possess the understanding, appreciation and need for continuing education and patient confidentiality.

Outcomes:

a. Continuing education and patient confidentiality through HIPPAA and other training are the core fundamentals not only of the medical dosimetry program but the UCI Radiation Oncology Department as a whole.

IV. Program Structure and Governance

The Department of Radiation Oncology at the University of California, Irvine (UCI) has a strong educational track record represented by a successful ACGME accredited radiation oncology residency training program and a CAMPEP accredited medical physics residency program. As such JRCERT accreditation of the Medical Dosimetry Program is currently in progress.

For a Medical Dosimetry Student this environment provides a great opportunity for interaction with other trainees that fosters mutual share of clinical knowledge.

Details of the program structure and governance are outlined as follows:

A. Medical Dosimetry Program within the Organization

The program is administered by the Division of Medical Physics within the Department of Radiation Oncology which is one of the Departments of the School of Medicine at UCI. The Program Director is also the Director of Medical Physics.

The Medical Dosimetry Student is employed, at no salary, by the Department of Radiation Oncology, who grants the student a certificate upon successful completion of the dosimetry program.

B. Program Staff:

Department staff consists of:

- 3 board certified radiation oncology faculty
- 3 board certified medical physics faculty
- 2 radiation biology faculty
- 1 assistant hospital physicist
- 2 medical dosimetrists (one of them is a CMD, the second is a dosimetry instructor at a local university-based radiation therapy program and has over 20 years dosimetry experience)
- 8 registered radiation therapists
- 2 radiation oncology registered nurses
- 1 medical assistant
- 1 department administrator
- 1 clinical operations manager
- 2 administrative office staff

- 2 reception staff
- 4 radiation oncology residents
- 1 physics resident

The Medical Dosimetry Student is an active member of the department, albeit in his/her capacity as a trainee. To this extent, the student is primarily mentored by the dosimetry staff and physics faculty as a whole, with the physics faculty taking a lead role with respect to the didactic portion of the training. The student also benefits from mentorship by the clinical and radiation biology faculty. The clinical faculty are instrumental in their clinical roles, particularly clinical treatment planning. Interaction with the radiation therapists provides training in the area of CT-simulation as it relates to treatment planning as well as patient set-up, safe and accurate treatment delivery.

C. Procedure for Granting Certificates

A certificate of graduation from the program is granted to the Medical Dosimetry Student upon successful completion of all treatment planning rotations and didactic components. The student's performance is evaluated on a continuing basis. Should the student be deemed insufficiently conversant with a particular area included in a rotation, this area will be carried to the next rotation as an added objective to be completed simultaneously with the current rotation.

The graduation certificate includes the name of the institution, name of the student, program duration and area of training (namely Medical Dosimetry). It is signed by the Program Director, Department Chair, Medical School Dean and University Chancellor and bears the University seal.

D. Training Curriculum Essentials

It consists of didactic and practical clinical training components:
The didactic component consists of attendance of physics, radiobiology, clinical lecture series and Departmental journal club. Attendance of Departmental and multidisciplinary clinical conferences is also expected. Attendance is mandatory and is documented. Furthermore, the student is assigned a one-month self-study project and at the end of the project the student is expected to give an oral presentation. There are twelve self-study topics assigned to the Medical Dosimetry Student during the academic year.
The practical and assigned self-study components consist of five treatment planning rotations covering the main treatment sites and using different planning techniques. Duration of the treatment planning rotations is about 1.5 – 2 months. Each rotation has its own goals and objectives content, and evaluation parameters.
The typical didactic and clinical training schedule is shown in Appendix I.

E. Mechanism of Recruitment and Admissions of Medical Dosimetry Students

Recruitment of medical dosimetry students follows a similar process to that of a junior faculty. An advertisement, compliant with the university's requirements for equal opportunity employment and diversity, approved by the Department Chair and the Dean's office, is placed in the UCI Radiation Oncology website. Applications are solicited and evaluated by an internal Medical Dosimetry Committee (MDC) which consists of the Program Director and Co-Director, Physics faculty, Dosimetry staff and a Radiation

Oncology Physician. The application packet includes resume, list of professional references and transcripts. The applications are evaluated for compliance with entry requirements. **A mandatory prerequisite for admission is that the candidate has a Bachelors Degree in Radiation Therapy or equivalent and has had 3-years of radiation therapy experience at a minimum post-graduation prior to applying to the medical dosimetry program.** Applicants that do not fulfill this requirement are not considered for the program. A short list is created and candidates are invited for telephone and/or onsite interviews. The onsite interviews are of one day duration during which candidates meet with Department faculty and staff. The interviewees are then evaluated by the interviewers. The evaluations are reviewed by MDC and candidates are ranked according to performance. The top candidate is offered the position. Should he (she) decline, the position is offered to the next applicant on the list until the position is filled.

F. Collaborative Arrangements

The program is exclusively centered at UCI where training in the required treatment planning aspects of Radiation Oncology takes place. However, due to collaborative agreements with other institutions in the area, the Medical Dosimetry Student may participate as casual observer on the treatment planning process for Tomotherapy treatments at Long Beach Memorial Medical Center (LBMMC), on proton therapy at Loma Linda Proton Facility, on GammaKnife at Hoag Hospital and CyberKnife at Orange Coast Radiation Oncology Center. These opportunities should broaden the Medical Dosimetry Student training experience.

G. Program Director

The Program Director is a medical physicist with over twenty five years of clinical experience. He is board certified by the American Board of Radiology (ABR) in Therapeutic Radiological Physics and by the American Board of Medical Physics (ABMP) in Radiation Oncology Physics. He is also a fellow of the Canadian College of Physicists in Medicine (CCPM) and the American Association of Physicists in Medicine (AAPM). He is active on AAPM committees, has served on WGCMPR and is a founding member of the Society of Directors of Academic Medical Physics Programs (SDAMPP). The Program Director is a Clinical professor and Director of the Medical Physics Division in the Department of Radiation Oncology, UCI.

H. Program Co-Director

The Program Co-Director is a medical physicist and a UCI Associate Clinical Professor with over 10 years of clinical experience. He is board certified by the American Board of Radiology (ABR) in Therapeutic Radiological Physics. He is a member of the Society of Directors of Academic Medical Physics Programs (SDAMPP) and Varian Medical Systems consultant on treatment planning using ECLIPSE software.

IV. Training Requirements

A. Requirements for successful program completion

Successful completion of the Medical Dosimetry Program requires that the student acquires a specific set of treatment planning skills as well as the associated didactic knowledge base. To acquire the treatment planning skill set, the student is required to document successful completion of treatment plans (external beam 3DCRT, IMRT, VMAT with RapidArc, brachytherapy, hand-calculations, assign self-studies) as well as evidence of fundamental knowledge of quality assurance, radiation dosimetry, special procedures, and radiation safety practices.

The didactic component is tested at the end of each year by taking the RAPHEX, RABEX and in-house MDCB-like board examinations. The RAPHEX and RABEX exams are standardized tests covering basic didactic material essentials. If the student fails one, or both, examinations, remedial counseling is provided in areas that require student improvement. Another evaluation tool used for preparation is the annual American College of Radiology (ACR) in-training examination offered to the radiation oncology residents. The student is tested on the physics and radiobiology components of this examination and it is internally graded to assess the student's performance. This test exam takes place prior to the scheduled RAPHEX, RABEX and in-house MDCB-like exams.

B. Design and Content

There are two main components to the training; namely didactic and practical. These are described below.

- **Didactic component**

Consists of the following:

(a) Radiation Oncology Physics Lecture Series (2 hours/week)
(b) Radiation Biology Lecture Series (1 hour/week, September - June)
(c) Clinical Lectures (periodically, by arrangement)
(d) General Adult Tumor Board Conference (1 hour/week)
(e) Brain Tumor Board Conference (1 hour/2 weeks)
(f) Gynecologic Oncology Tumor Board (1 hour/week)
(g) Radiation Oncology New Case Conference (1/2 hour daily)
(h) Chart Reviews (1 hour/week)
(i) Film Reviews (1/2 hour daily)
(j) Treatment Planning Rounds (1 hour/week)

All the above are year-round activities unless stated otherwise, save for public holidays (e.g. Thanksgiving, Christmas, New Year). Attendance is mandatory.

Items (c-g) provide instruction in the areas of clinical oncology and anatomy and physiology from a point of view of disease involvement and standard of care required. In other words, these presentations are designed to cover all the relevant aspects related to the tumor site in question from a multidisciplinary approach. These include etiology, anatomic presentation, radiological and pathological findings and recommendations for clinical management. Furthermore, it is expected that the prospective Medical Dosimetry Student had covered part of this material during his/her radiation therapy training since a

BS in radiation therapy with at least 3-years of experience is a requirement for admission to the Medical Dosimetry Program.

The assigned self-study projects consist on reviewing and understanding publications like AAPM task group reports, ICRU reports, QUANTEC reports, publish treatment techniques for Total-Body-Irradiation (TBI), Total-Skin-Electron Irradiation (TSEI), Fetal Dose recommendations and MDCB Code of Ethics and AAMD/MDCB Scope of Practice. Each assignment is designed to be complemented in one-month time.

- **Practical Clinical Component**

The practical component consists of five treatment planning rotations. Each rotation has its own learning objectives and is of 1.5 - 2 months duration. During these rotations, the Medical Dosimetry Student is required to participate in all aspects of Medical Dosimetry. These include consultation and assistance in patient simulation, CT imaging and set-up, multimodality image-based treatment planning, intensity modulated radiation therapy (IMRT and VMAT), and high-dose rate brachytherapy treatment planning. The student is required to document all clinical activities in a log book which evolves to a portfolio outlining the clinical training experience. This is further complemented with a series of past clinical treatment planning cases that the student is required to reproduce into a clinically acceptable treatment plan. During the second half of the training program the student is expected to work on current treatment plans and produce clinically acceptable and high quality treatment plans using whichever treatment technique that may be required for that plan.

In a program of this size, it is deemed appropriate for the student to work with dosimetrists and physicists and be involved in all daily clinical activities (treatment planning, patient simulation, etc.) and gain practical skills and confidence gradually.
However, for those treatment procedures not regularly offered in the clinic such as Total-Body-Irradiation (TBI) or Total-Skin-Electron-Therapy (TSET) the student is assigned a self-study followed by an oral presentation and written report on the topic that subsequently is added to the student's log/portfolio.

There is an active brachytherapy program in the Department that includes High Dose Rate brachytherapy program (HDR) and radioactive microsphere administration for liver tumors. The medical dosimetry student is an active participant in this effort. Gaining competence in this area of clinical practice is integral to the student's training.

At UCI Radiation Oncology, IMRT and VMAT, in the form of RapidArc™, are used extensively to treat different tumor sites. Treatment delivery is performed with a Trilogy™ and a state-of-the-art TrueBeam STX linacs. The latter is used for stereotactic radiosurgery (SRS), stereotactic radiotherapy (SRT), and stereotactic-body radiotherapy (SBRT). Infrared motion tracking, respiratory gating and 4DCT are also used for these treatments. The Dosimetry Student receives treatment planning training in these areas.

C. Sample Training Plans

The Medical Dosimetry Program is a one-year program that starts on July 01 and ends on June 30. The training is structured such that the student gains experience gradually in

performing dosimetric tasks under the direction of faculty physicists, staff dosimetrists, radiation therapists, radiation oncologists and radiation oncology residents. Feedback and mentoring are provided on a continuing basis as tasks are undertaken. In cases where progress in the program falls short of expectation, there is a provision for the resident to be counseled by faculty physicists, dosimetrists and the program director until the required level of competence is attained. If necessary, the training program may be extended.

Successful completion of a rotation requires satisfactory completion of all activities outlined in the rotation (clinical, didactic, etc.). Attendance at a minimum of 70% of clinical conferences is required. Attendance is documented, so are clinical and didactic activities (e.g. clinical tasks, presentations, clinical development projects, where applicable, as pertinent to the particular rotation).

D. Disciplinary Actions

University policies relating to performance and disciplinary action apply. These consist of:

- verbal counseling,
- followed by written counseling,
- followed by a letter of warning
- and finally dismissal,

in escalating order, should the issues in question persist.

However, there have not been issues encountered in students' progress in the program to date in view of the rigorous selection criteria for Medical Dosimetry Student candidates. More specific details on Medical Dosimetry Student's recruitment are provided in the appropriate section(s) of this document.

E. Evaluation of the Curriculum

The training objectives are reviewed periodically by the Medical Dosimetry Committee (MDC). This review occurs in response to

(i) feedback received from the medical dosimetry student,
(ii) recommendations received from faculty and staff,
(iii) new techniques and clinical modalities introduced to the Department's clinical practice.

There are several instances of use of the mechanisms enumerated above over the past several years, (e.g. inclusion of 4D CT-simulation, RapidArc™, etc.) into the training curriculum.

The method employed in evaluation of each rotation is divided into the following parts:

(a) clinical activities
(b) assigned self-studies
(c) attendance record of didactic lectures, clinical conferences and rounds
(d) professional conduct (interaction with team members, etc.)

The process of modification of the program has been outlined in (i-iii) above. The medical dosimetry student is informed of any pending changes at the time of orientation when (s)he starts the program if these changes are known at the time. New modalities that arise during the training period are brought to the attention of the student in advance of their inclusion in the particular clinical rotation. The student's agreement is taken into consideration when these changes are incorporated.

V. Medical Dosimetry Students

A. Admissions

Resident recruitment is initiated by the preparation of an advertisement. The advertisement has to fulfill the following criteria to comply with University practices:

- compliance with equal opportunity employment legislation
- gender equality
- ethnic diversity
- veterans
- disabled persons
- compliance with State and Federal rules, regulations and applicable employment laws

Furthermore, the advertisement has a summary of the following information and requirements for the Medical Dosimetry Program:

- program length
- entry qualifications; namely a BS or equivalent in radiation therapy with at least 3-years of work experience post-graduation
- synopsis of the training program content (didactic and clinical content)
- facilities available for training
- periodic evaluations

Prospective candidates are required to submit the following application material:

- letter of application
- statement of interest
- resume
- names and contact information of three professional references

The name and contact information where applications are to be sent and the deadline for receipt of applications are clearly stated in the advertisement.

The advertisement is passed on to the Department Chair's office for review and approval. It is then sent to the University's Office of Equal Opportunity and Diversity and Office of the Dean, School of Medicine for review of compliance with applicable rules and regulations summarized above. The advertisement, once it has received the required University approvals, is then ready to be posted.

The applicants are screened based on their academic standing, experience and letters of reference by the Medical Dosimetry Committee (MDC). A short list of the top three or

four candidates is drawn by the program co-director. These candidates are invited for an interview. The interview consists of one-on-one meetings with the Department's faculty and staff. The candidates are given a tour of the Department. They are given an opportunity to ask questions about the Department and the Dosimetry Program. Mutual expectations are outlined. The interview lasts a half day. Each interviewer is provided with an evaluation form to assess each candidate. These evaluation forms serve to score the candidates and are used in their ranking.

Upon completion of the interviews, a meeting of the MDC is convened by the Program Co-Director, who chairs it. At this meeting, candidates' evaluations are reviewed. A ranking of the candidates is established. The committee recommends that the top candidate is recruited. All pertinent documentation (evaluation forms and scoring of candidates) relating to the recruitment process is kept on file in the Department's administrative office. These records include candidates' applications and faculty evaluation forms. This is a university requirement. These documents are confidential material and protected by privacy laws.

An offer letter is prepared by the Department administrator. This letter sets out the terms and conditions of the offer consistent with University policies. The letter is co-signed by the Program Director and the Department Chair.

B. Recruitment Efforts

The advertisement is posted on the Radiation Oncology's website and provides ample time for prospective applicants to submit their credentials for consideration as well providing a deadline for receipt of applications.

C. Enrollment

The program intake is one to two medical dosimetry students a year.

D. Evaluation of Student Progress

During the course of training the Medical Dosimetry Committee (MDC) composed of the following members:

(a) M. Al-Ghazi, PhD, FCCPM, DABR, DABMP, FAAPM,
Program Director, Medical Physics Director and Faculty Physicist
(b) D. Roa, PhD, DABR, Faculty Physicist and Program Co-Director and MDC Chair
(c) V. Sehgal, PhD, DABR, Faculty Physicist
(d) S. Dietrich, BS, RT, CMD, Senior Dosimetrist
(e) W. Braggins, BS, RT, Dosimetry Instructor

MDC meet quarterly and provide written evaluation of the Dosimetry Student for the preceding three months period. The MDC then discusses the evaluation with the student. The student is afforded the opportunity to comment on the evaluation. The student then signs the evaluation with his(her) comments and this is kept in the student's file.

During each rotation, assignments have their respective mentors. Successful completion of the rotation is based on the resident having:

(a) attended a minimum of 70% of didactic lectures, rounds and clinical conferences (tumor boards, etc.),
(b) has an overall score of "meets expectations" in the specific goals for the rotation and
(c) has an overall performance of "Good" in the General Professional Interactions portion of the rotation.

E. New Student Orientation

University/School of Medicine Orientation: The Medical Dosimetry Student attends a one day orientation session on July 01, the first day of commencing the program. This start date is the first day of the academic year for the School of Medicine. It also coincides with the beginning of the medical residency programs in all School of Medicine disciplines. The dosimetry student therefore, attends the same orientation day as the medical residents, including the Department's clinical radiation oncology residents. During the orientation day, the dosimetry students are made familiar with University of California and School of Medicine policies and procedures. They are provided with an orientation packet. This is an extensive packet and is available in hard copy only. It can be provided upon request.

Medical Dosimetry Student Orientation: The day following the medical center-wide orientation, the resident spends a day of orientation to the Department of Radiation Oncology and it facilities. This orientation process includes the following:

- Meeting with the program director and physics faculty
- Detailed explanation of the program structure and content
- Definition of mutual expectations
- Introducing Departmental facilities.
- Arrangement to meet with the Department's administrator to be signed on and similar employment formalities.
- Informed of the requirement to take and complete the mandatory safety training.

F. Maternity/Paternity Leave

The Department of Radiation Oncology neither encourages nor discourages pregnancy by its medical dosimetry students during the one year of dosimetry training. The Department does, however, have an obligation to ensure that:

The pregnancy does not hinder training opportunities for the pregnant student.
That a student's pregnancy does not have a negative impact on the student's training.

In accordance with the above general policy, coupled with the fact that pregnancy in medical personnel is an increased risk, the Department suggests very cautious utilization of educational leave by the pregnant student. Should a complication occur, resulting in the need for disability, the eight and six weeks rules remain in effect.
The Program Director should be advised of the Medical Dosimetry Student's pregnancy within a reasonable period of time to allow for a possible alteration in the student's schedule, which may minimize the workload near term (i.e. an easier rotation), and to ensure that maternity leave does not coincide with a critical student's education experience.

The Program Director should also be notified so that the Medical Dosimetry Student may be counseled regarding any potential radiation safety issues. The Radiation Safety Office may also be notified to counsel the student and arrange for additional monitoring as needed.
Complications of pregnancy which require a student to be absent for greater than six weeks in any academic year will be handled on an individual basis. At the discretion of the Program Director, reduction in educational leave or extension of the one-year program would be possible options involving excess disability time.

Paternity leave will be granted for five working days (Monday through Friday). Should greater time be required will be handled on an individual basis. Paternity leave in excess of eight weeks total absence will be handled in a similar fashion to excessive maternity disability.

G. Safety

The UCI Medical Center's (UCIMC) Radiation Safety Officer provides medical dosimetry students, physics and radiation oncology residents with an annual radiation safety in-service as part of their training. In addition, the Medical Center's Environmental and Health and Radiation Safety Offices perform periodic drills as part of the Medical Center's safety program required to maintain JCAHO accreditation.

All faculty, staff, residents and students are required to complete an on-line safety training course. This is documented in their respective personnel files. The details are outlined in the next paragraph.

As an employee of the University of California, Irvine (UCI), the Dosimetry Student, like all UCI personnel, is required to complete the **mandatory** web-based safety training course offered by the UCI online learning center. This requires that the resident is issued a username and password to the website:

http://uclc.uci.edu

This is an extensive and comprehensive training course consisting of modules on such topics as: confidentiality, infection control, hazardous materials and their materials safety data sheets (MSDS's), fire safety, electrical safety (including high voltage), radiation safety, various code calls (code blue, code red, etc.) and many other aspects of workplace safety for healthcare personnel. Each module consists of a set of lessons. Each lesson culminates in a test that must be completed successfully. Upon successful completion of the entire course, a certificate is issued and kept in the student's personnel file.

As a member of the Department, the Medical Dosimetry Student is issued a radiation monitoring badge. His/Her radiation exposure record is reviewed monthly by the Radiation Safety Officer and the Director of Medical Physics in accordance with the Medical Center's ALARA program.

Policies and procedure manuals for the Department, Medical Center and University are kept up to date and are available online to the student as well as the entire University community. This is required by law.

H. Dress Code

The Medical Dosimetry Student must wear proper attire corresponding to gender and a white lab coat that is provided by the student himself/herself. A UCI Medical Center identification badge should be worn at all times during working hours and within the Medical Center premises. No jewelry, display of tattoos or any other form of garment/ornament not in-line with proper attire is allowed.

I. Code of Ethics

The Medical Dosimetry Student is expected to conduct himself/herself with respect towards other members of the Radiation Oncology Department, University as whole and most importantly patients that the Medical Dosimetry Student may come in contact. The student is expected to adhere and follow an honorable conduct throughout the training and show professionalism and responsibility which are consistent with the UCI standards for excellence.

J. Dismissal

The unlikely event of dismissal will be initiated only after the sequence of disciplinary actions described in section V have been exhausted. At this point a letter of dismissal describing all prior actions taken will be redacted, a copy will be given to the student and dismissal will become effective immediately. No tuition refund or any other monetary restitution will be granted.

VII. Program Administration

A. Structure within the Hospital or Medical Center

The Medical Dosimetry program is operated within the Division of Medical Physics. The latter is a Division within the Department of Radiation Oncology, which in turn is one of the Departments within the University of California, Irvine School of Medicine (SOM). SOM is accredited by the American Association of Medical Colleges (AAMC). The University of California, Irvine (UCI) is part of the University California System comprising ten campuses and three National Laboratories and is the **largest academic system in the nation**.

The Department of Radiation Oncology at UCI is located in the Chao Family Comprehensive Cancer Center. This is a **National Cancer Institute Designated Comprehensive Cancer Center** and is one of 40 such institutions in the United States. It is located on the grounds of the UCI Medical Center (UCIMC). UCIMC is the teaching hospital for UCI School of Medicine and is the only **Level I trauma** center in Orange County. It is also the only university medical center in the county providing specialty care for a population of approximately four million people. UCIMC ranked amongst the **top 100 hospitals** in the nation for the past decade. It is accredited by the Joint Commission on Accreditation of Healthcare Organizations (**JCAHO**) with JCAHO

scores consistently in the 90th percentile. Accreditation documents are posted for public viewing at suitable locations in the facility.

The Department of Radiation Oncology provides the full spectrum of clinical, research and educational services commonly found in an academic setting.

B. Role of the Program Director and Medical Dosimetry Committee

The program director has overall responsibility for the training of the Medical Dosimetry student. This responsibility starts with the preparation of the advertisement, initial screening, presentation of candidates to the Medical Dosimetry Committee (MDC) chaired by the Program Director, implementing recommendations of the MDC, appointment of the selected candidate, design and implementation of the training program, ongoing evaluation and follow-up on the student's progress, advising the student on placement upon completion of the program and follow-up regarding board examination until this is successfully achieved.

The role of the Medical Dosimetry Committee is as follows:

(a) acts as a steering committee for the medical dosimetry program,
(b) reviews the training curriculum periodically and provides recommendations consistent with national training standards to insure that the program remains current and in compliance with accepted practices,
(c) seeks feedback from appropriate faculty and staff (radiation oncologists, radiation biologists, physicists, dosimetrists, therapists and the medical dosimetry student) pertaining to opportunities for program improvement.

MDC membership includes three faculty physicists, two staff dosimetrists and one radiation oncologist (J.V. Kuo, M.D.) who directs the Radiation Oncology Residency Program in the Department. The committee meets at the call of its chair and at a minimum twice annually. Minutes are kept. This committee is chaired by the Medical Dosimetry Program Director.

VIII. Resources

A. Faculty and Staff

Medical Dosimetry Program Director
Muthana S. A. L. Al-Ghazi; PhD, PPhys, FCCPM, DABR, DABMP, FAAPM
Clinical Professor and Director of Medical Physics

Medical Physics Faculty
Dante E. Roa; PhD, DABR
Associate Clinical Professor and Program Co-Director

Varun Sehgal; PhD, DABR
Associate Clinical Professor

Medical Dosimetry Staff

Salam Dietrich; BS, RT, CMD
Senior Medical Dosimetrist

William Braggins; BS, RT
Senior Medical Dosimetrist

Radiation Biology
J. Leslie Redpath; PhD
Professor Emeritus and Academic Vice Chair

Charles Limoli; PhD
Professor

Clinical Radiation Oncology
Nilam S. Ramsinghani; MD, DABR, FACRO,
Clinical Professor and Chair,

Jeffrey V. Kuo; MD, DABR
Clinical Professor, Radiation Oncology Residency Program Director

Parima Daroui; MD, PhD
Assistant Clinical Professor

The faculty and staff are responsible for imparting expertise to the medical dosimetry student commensurate with their respective specialties.

B. Finances

A $10,000.00 annual tuition fee for either in-state or out-of-state is charge to the student interested in the Medical Dosimetry Program. There is no stipend or salary given to the student during the year of training. The student is responsible for covering textbook(s) expenses as well as local, national and international meeting attendance expenses.

C. Facility

Clinical Facilities
The department offers the full range of radiotherapy services; external beam, intensity modulated radiation therapy (IMRT), including VMAT, brachytherapy and radiopharmaceutical therapy. Hardware and software employed in the clinical program at present is detailed below.

The facilities available for training are as follows

- Varian Trilogy dual energy (two photon and 6 electron energies) linac (with 120 leaf millennium MLC, electronic portal imaging, EPID, IMRT, RapidArc™, SRS/SRT, cone-beam CT, on-board-imaging, respiratory gating, infrared tracking)
- Varian TrueBeam STX with the Edge Package for Stereotactic Treatments
- ARIA information management system

- Eclipse treatment planning system with IMRT, RapidArc™, virtual simulation, CT/MRI/PET-CT image fusion and BrachyVision capabilities planning capabilities
- Multimodality Image Management (MIM Vista) software used for image fusion of multiple image sets originating in different modalities (CT. MRI, PET-CT, etc.)
- High dose rate, HDR, brachytherapy remote afterloading system (VariSource iX) with image-based brachytherapy treatment planning system and a full set of applicators.
- Acuity Brachytherapy Suite
- 16-slice Philips 85 cm aperture CT-simulator with 4DCT capabilities
- CDR SBRT frame for performing stereotactic body radiotherapy
- Access to UCIMC's several CT and MRI imagers and PET-CT scanner for multi-modality image-based treatment planning. The PET-CT scanner is especially equipped for radiation therapy treatment planning. These imaging facilities are housed in the Radiology Department on the UCIMC campus within close proximity of the Department of Radiation Oncology. Treatment planning systems in the Department are connected to the CT, MRI and PET-CT scanners over the hospital network. Imaging studies are readily transferable to the planning systems over the hospital network.
- Fully equipped mould room for fabrication of immobilization and field shaping and modifying devices
- Fully equipped radioisotope laboratory
- Apparati for delivery of radiopharmaceuticals (Y-90 Therasphere and Sir-sphere) for the treatment of hepatocellular carcinoma and liver metastases

Classrooms and Conference Rooms

The Department has a conference room where classes, meetings and conferences are held. It is equipped with standard audiovisual facilities.

There are classrooms and conference rooms throughout the Medical Center as can be found in a University Medical School. These are equipped with audiovisual equipment used for instructional purposes.

Research Facilities

Facilities for making posters and talks for presentation at regional and national conferences are available in the Department (standard office software, e.g. PowerPoint). Software for data analysis and production of manuscripts is also available in the Department. In addition there is an Instructional Media Center at UCIMC. This offers professional services to the Medical Center and University community to produce specialized research project reports should their services be sought. Given the extensive array of software packages available in the Department, almost all project reports have been produced within the Department.

Libraries

There are extensive library resources available to the Medical Dosimetry Student. These are as follows:

- A collection of reference textbooks available in the residents' office
- Departmental library and faculty personal book and journal collections immediately accessible to the resident
- The Medical Center library
- The University libraries
- On-line access to the digital library that is available to the resident from his(her) desktop computer.

UCI, as a Research University has a comprehensive collection of books and journals. In addition, this institution as a member of the University of California (UC) System, consisting of ten Campuses and three National Laboratories, make available to members of the system their respective library resources. It is quite possible that this is one of the largest library collections in the world available on-line as well as through inter-library loan extending all the way to the Library of Congress.

IX. Summary of Strengths

The program strengths are exemplified by the spectrum of clinical activities the medical dosimetry student undertakes and is exposed to during his/her clinical training period. It is a practical clinical immersion in a primarily clinical Department. The fact that we have at most, two medical dosimetry students for the number of faculty and staff associated with the training means that the student gets ongoing daily attention and direction. This is in addition to an extensive didactic component to strengthen the student's background knowledge. As outlined earlier, the didactic component spans the entire range of topics. It is not limited to radiation oncology physics only, but also includes comprehensive training in radiation biology and clinical radiation oncology through attendance of didactic lectures, clinical case conferences and tumor board meetings.

Appendix I

Medical Dosimetry Program - Academic Schedule

MONTH	Week	Subject	LECTURES	Lecturer	Self Study Topics	ROTATION	Supervisor
JUL	1		No Lecture			Introd. to the Department	
	2	Radiobiology	No Lecture		Geom. & Trig. Review	UCI Patient Simulation Protocols	Sim Therapist
		Physics	Physics Review	M. Al-Ghazi, PhD	Pt Immobilization & CT	Introduction to ECLIPSE	D. Roa
		Clinical lectures	TBA	TBA		Introduction to MIM	TBA
	3	Radiobiology	No Lecture		Geom. & Trig. Review		
		Physics	Physics Review	M. Al-Ghazi, PhD	Pt Immobilization & CT	3D-CRT Brain Test Plans	S. Dietrich
			TBA	TBA			
	4	Radiobiology	No Lecture		Geom. & Trig. Review		
		Physics	Physics Review	M.Al-Ghazi, PhD.	Pt Immobilization & CT	3D-CRT Brain Test Plans	S. Dietrich
		Clinical lectures	TBA	TBA			
	5					IMRT Brain Test Plans	S. Dietrich / D. Roa
		Physics	No Lecture				
		Clinical lectures	TBA	TBA			
AUG	1	Radiobiology	No Lecture				
		Physics	Physics Review	M.Al-Ghazi, PhD.	TG-142 Study	IMRT/VMAT Brain Test Plans	S. Dietrich / D. Roa
		Clinical lectures	TBA	TBA			
	2	Radiobiology	Annual Radiation Safety In-Service	John Gratzle			
		Physics	Structure of Matter	M. Al-Ghazi		VMAT Brain Test Plans	S. Dietrich
		Clinical lectures	TBA	TBA			
	3	Radiobiology	No Lecture				
		Physics	Structure of Matter and Radioactivity and X-Ray Production	M.Al-Ghazi, PhD.		3D-CRT Pelvis Test Plans	W. Braggins
		Clinical lectures	TBA	TBA			
	4	Radiobiology	No Lecture				
		Physics	Radioactivity and X-Ray Production/ Interaction with Radiation	M.Al-Ghazi, PhD.	Report / Presentation	3D-CRT Pelvis Test Plans	W. Braggins
		Seminar	TBA	TBA			
SEP	1	Radiobiology	Overview course:Interactions of Ionizing radiation with biological systems (#1) DNA damage types and assays (#2)	C. Limoli, Ph.D.	TG-51 Study	IMRT Pelvis Test Plans	D. Roa
		Physics	Interaction of Radiation with Matter I	M.Al-Ghazi, PhD.			
		Clinical lectures	TBA	TBA			
	2	Radiobiology	Molecular DNA repair (#3) Questions and review	C. Limoli, Ph.D.			
		Physics	Interaction of Radiation with Matter II / Clinical Radiation Generators	M.Al-Ghazi, PhD.		VMAT Pelvis Test Plans	W. Braggins
		Clinical lectures	TBA	TBA			
	3	Radiobiology	Apoptosis (#5)	C. Limoli, Ph.D.			
		Physics	Clinical Radiation Generators	M.Al-Ghazi, PhD.		3D-CRT Chest / Abdomen Test Plans	S. Dietrich
		Clinical lectures	TBA	TBA			
	4	Radiobiology	Survival curves & cell death mechanisms (#6) Chromosome aberrations (#4)	C. Limoli, Ph.D.			
		Physics	Clinical Radiation Generators	M.Al-Ghazi, PhD.	Report / Presentation	3D-CRT Chest / Abdomen Test Plans	S. Dietrich
		Seminar	TBA	TBA			
OCT	1	Radiobiology	No lecture				
		Physics	Clinical Radiation Generators	M.Al-Ghazi, PhD.	TG-119 Study	IMRT Chest / Abdomen Test Plans	S. Dietrich / D. Roa
		Clinical lectures	TBA	TBA			
	2	Radiobiology	LET, RBE, OER (#7) Cellular repair (PLDR, SLDR), dose rate effects (#8)	C. Limoli, Ph.D.		VMAT Chest / Abdomen Test Plans	S. Dietrich
		Physics	Quality of X-Ray Beams	M.Al-Ghazi, PhD.			
		Chief rounds	TBA	TBA			
	3	Radiobiology	No lecture				
		Physics	Quality of X-Ray Beams	M.Al-Ghazi, PhD.		3D-CRT Head-and-Neck Test Plans	W. Braggins
		Clinical lectures	TBA	TBA			
	4	Radiobiology	Normal tissue damage (#9) Tumor responses (#10)	C. Limoli, Ph.D.			
		Physics	Measurement and Calculation of Absorbed Dose I	M.Al-Ghazi, PhD.		3D-CRT Head-and-Neck Test Plans	W. Braggins
		Clinical lectures	TBA	TBA			
	5	Radiobiology	TBA	TBA			
		Physics	TBA	TBA	Report / Presentation	IMRT Head-and-Neck Test Plans	W. Braggins / D. Roa
		Clinical lectures	TBA	TBA			
NOV	1	Radiobiology	□/□ ratios – dose fractionation (#15)	C. Limoli, Ph.D.			
		Physics	Electron Beams I: Principles, Interactions and Dosimetry	V. Sehgal, Ph.D	ICRU 83 Study	IMRT Head-and-Neck Test Plans	W. Braggins
		Clinical lectures	TBA	TBA			
	2	Radiobiology	Hypoxia, angiogenesis & tumor microenvironment (#11)	C. Limoli, Ph.D.			
		Physics	Measurement and Calculation of Absorbed Dose I/ Dose II	M.Al-Ghazi, PhD.		IMRT Head-and-Neck Test Plans	W. Braggins
		Clinical lectures	TBA	TBA			
	3		THANKSGIVING HOLIDAY --- Nov. 22-23, 2012			THANKSGIVING HOLIDAY --- Nov. 22-23, 2012	
	4	Radiobiology	Cell cycle and tissue kinetics (#12) Cell cycle molecular (#13)	C. Limoli, Ph.D.			
		Physics	Measurement and Calculation of Absorbed Dose II/III	M.Al-Ghazi, PhD.	Report / Presentation	HDR Tandem & Ovoids Test Plans	S. Dietrich / V. Sehgal
		Seminar	TBA	TBA			
DEC	1	Radiobiology	Chemotherapy (#14)	C. Limoli, Ph.D.			
		Physics	Measurement and Calculation of Absorbed Dose II/III	M.Al-Ghazi, PhD.	QUANTEC Study	HDR Cylinder / Capri Test Plans	S. Dietrich / V. Sehgal
		Clinical lectures	TBA	TBA			
	2	Radiobiology	Signaling (#16) / Molecular biology (#17)	C. Limoli, Ph.D.			
		Physics	Measurement and Calculation of Absorbed Dose III	M.Al-Ghazi, PhD.		HDR Savi Test Plans	S. Dietrich / V. Sehgal
		Chief rounds	TBA	TBA			
	3	Radiobiology					
		Physics	Dose Distribution and Scatter Analysis I	M.Al-Ghazi, PhD.		HDR Biliary Test Plans	S. Dietrich / V. Sehgal
		Clinical lectures	TBA	TBA			
	4	Radiobiology					
		Physics	Break		Report / Presentation		
		Seminar					

JAN	1	Radiobiology					
		Physics	Dose Distribution and Scatter Analysis II	M.Al-Ghazi, PhD.	TBI / TSEI Study		
		Clinical lectures	TBA	TBA			
	2	Radiobiology					
		Physics	Dose Distribution and Scatter Analysis III	M.Al-Ghazi, PhD.			
		Clinical lectures	TBA	TBA			
	3	Radiobiology	Radiation units (#18)/ Radiation effects and the human body (#19)	C. Limoli, Ph.D.		CLINICAL TREATMENT PLANNING ANY SITE, ANY TECHNIQUE	RAD. ONCOLOGISTS MED. PHYSICISTS
		Physics	Treatment Planning I: Isodose Distributions	M.Al-Ghazi, PhD.			
		Clinical lectures	TBA	TBA			
	4	Radiobiology					
		Physics	Treatment Planning I: Isodose Distributions	M.Al-Ghazi, PhD.			
		Clinical lectures	TBA	TBA			
	5	Radiobiology					
		Physics	Electron Beams II: Clinical Applications	V. Sehgal, Ph.D	Report / Presentation		
		Seminar	TBA	TBA			
FEB	1	Physics	Electron Beams III: Treatment Planning	V. Sehgal, Ph.D	Fetal Dose Study		
		Chief rounds	TBA	TBA			
	2	Physics	Electron Beams III: Treatment Planning	V. Sehgal, Ph.D		CLINICAL TREATMENT PLANNING ANY SITE, ANY TECHNIQUE	RAD. ONCOLOGISTS MED. PHYSICISTS
		Clinical lectures	TBA	TBA			
	3	Physics	Large Field Radiotherapy: WAI, HBI TBI, TSET	M. Al- Ghazi, PhD			
		Physics	Treatment Planning II: Patient Setup and Treatment Aids	M.Al-Ghazi, PhD.			
		Clinical lectures	TBA	TBA			
	4	Physics	Brachytherapy I: Principles and Sources	V. Sehgal, Ph.D	Report / Presentation		
		Seminar	TBA	TBA			
MAR	1		**MDCB IN-TRAINING EXAM**	D. Roa Ph.D.	SRS / SBRT Study		
	2		LDR/HDR brachytherapy physics	TBA		CLINICAL TREATMENT PLANNING ANY SITE, ANY TECHNIQUE	RAD. ONCOLOGISTS MED. PHYSICISTS
	3	Radiobiology					
		Physics	Brachytherapy II: Systems of Dose Calculations	V. Sehgal, Ph.D			
		Clinical lectures	TBA	TBA			
	4	Physics	Brachytherapy III: Treatment Planning and Clinical Applications	V. Sehgal, Ph.D	Report / Presentation		
		Seminar	TBA	TBA			
APR	1	Physics	Brachytherapy IV: Remote Afterloading Techniques and HDR	V. Sehgal, Ph.D	Permanent Seed Implant Study		
		Clinical lectures	TBA	TBA			
	2	Physics	REVIEW	V. Sehgal, Ph.D		CLINICAL TREATMENT PLANNING ANY SITE, ANY TECHNIQUE	RAD. ONCOLOGISTS MED. PHYSICISTS
		Chief rounds	TBA	TBA			
	3	Physics	Quality assurance of Radiotherapy I	D. Roa, Ph.D			
		Clinical lectures	TBA	TBA			
	4	Radiobiology					
		Physics	Quality assurance of Radiotherapy II	D. Roa, Ph.D	Report / Presentation		
		Seminar	TBA	TBA			
MAY	1	Radiobiology					
		Physics	Radiation Protection	D. Roa, Ph.D	LDR, MDR & IORT Study		
		Clinical lectures	TBA	TBA			
	2	Radiobiology					
		Physics	Conformal Therapy	D. Roa, Ph.D			
		Clinical lectures	TBA	TBA			
	3	Radiobiology				CLINICAL TREATMENT PLANNING ANY SITE, ANY TECHNIQUE	RAD. ONCOLOGISTS MED. PHYSICISTS
		Physics	Fundamentals of Computers / Review	D. Roa, Ph.D			
		Clinical lectures	TBA	TBA			
	4		**RAPHEX EXAM**	M. Al-Ghazi, PhD			
			Residents visit LLUMC	B. Patyal	Report / Presentation		
JUN	1	Physics	RAPHEX Exam Review	M Al-Ghazi, PhD			
					MDCB Code of Ethics & AAMD MDCB Scope of Practice		
	2		**RABEX EXAM**	J.L. Redpath, PhD		CLINICAL TREATMENT PLANNING ANY SITE, ANY TECHNIQUE	RAD. ONCOLOGISTS MED. PHYSICISTS
	3	Radiobiology			Report / Presentation		
		Physics					
		Seminar					
	4	Radiobiology	RABEX Exam Review	J.L. Redpath, PhD			
					END OF TRAINING		