Doctor of Medical Physics

A Proposal for an Interdisciplinary Degree in the College of Arts and Sciences

Texas Tech University
College of Arts and Sciences

April 2008

Name of Institution:
Texas Tech University

Name of Proposed Program:
Doctor of Medical Physics in the College of Arts and Sciences

Display how proposed program would appear on the Coordinating Board program inventory; include Texas CIP code designation.
(CIP Code: 26.0203.0002; Medical Biophysics) College of Arts and Sciences

How would name of program appear on student diplomas?
Doctor of Medical Physics: College of Arts and Sciences

How would name of program appear on student transcripts?
Doctor of Medical Physics

Administrative unit responsible for program:
College of Arts and Sciences

Proposed date for implementation of program.
August, 2008

Person to contact for further information about proposed program:
Name: William S. Kubricht, Jr., MMSc. DABR
Title: Chief, Clinical Physics, Division of Radiation Oncology
Southwest Cancer Treatment and Research Center,
Lubbock, TX 79415
Phone: 806-549-5327

Signatures:

Chief Executive Officer (Campus) Date

Chief Executive Officer (System) Date

Governing Board Approval Date**:** _____

Table of Contents

Substantive Degree Program Request

The Doctor of Medical Physics (DMP)

A NEW INTERDISCIPLINARY DOCTORAL LEVEL CLINICAL DEGREE
The Texas Tech University College of Arts and Sciences

Introduction

The modern practice of Medical Physics, in the treatment of cancer, is a professional specialty that requires an in-depth knowledge of both basic science and clinical experience. Medical Physics is an essential component of other medical specialties including Diagnostic Radiology, Radiology of Nuclear Medicine, and Surgical, Gynecologic, Urologic, and Dental Oncology. Medical Physics is recognized by the American Board of Medical Specialties under the auspices of the American Board of Radiology (**ABR**). Physicists with these credentials are the only professionals currently eligible for the licensure that is mandatory in the State of Texas.

Historically, Medical Physicists have been trained as M.S. or Ph.D.'s in the basic academic field of Physics. Clinical experience has often been gained on-the-job. In Texas, Medical Physicists, other than those 'grandfathered,' cannot practice without certification by the American Board of Radiology (**ABR**) and subsequent licensure by the State of Texas. Under this system, the 50%± failure rate on the ABR exam (**See Appendix A**) is attributed in part to a lack of structured clinical training. Furthermore, by 2012, the ABR will no longer accept candidates for the ABR exam without clinical training in teaching programs accredited by The Commission on Accreditation of Medical Physics Educational Programs (**CAMPEP; See Appendix B),** the accrediting agency and sole judge of the adequacy of such teaching programs. The new degree program that we propose, Doctor of Medical Physics (**DMP**), is not a Ph.D. and does not compete with existing Ph.D. programs. The DMP combines academic training with clinical training and experience and prepares students for obtaining the required

credentialing and for successful entrance into the profession of Medical Physics in Texas.

Once the Texas Higher Education Coordinating Board has approved the DMP, this degree request must also be further approved and accredited by CAMPEP. Because CAMPEP and the American Association of Physicists in Medicine (**AAPM**) are providing significant input into the design of this new degree, it is anticipated that we will be readily credentialed.

This degree is designed to be interdisciplinary with academic training across several departments within the College of Arts and Sciences (**CA&S**) including the Department of Physics, the Department of Biological Sciences, the Department of Chemistry and Biochemistry, the Department of Psychology, and the Department of Statistics and incorporates training in basic medical science in the TTU/Health Science Center School of Medicine (**SoM**) with clinical experience gained at various institutions [Southwest Cancer Treatment and Research Center (**SCTRC**), Joe Arrington Cancer Center (**JACC**), and M. D. Anderson Cancer Center (**MDACC**)]. It will be housed within the CA&S. The needed expertise in academic training resides within the college and is complimented through it partnership with SoM.

New students will be drawn from both national and international pools due to the nature of this program that will be unique to Texas Tech. Additionally, existing undergraduate programs at Texas Tech and at such other universities can prepare students at the undergraduate level within their existing curriculum to enter this program. Such students will be drawn from departments including Physics, Biology, and Animal Sciences. The new program is complimentary to, rather than competitive with, existing academic programs and will attract additional graduate students into existing classes.

First and foremost, Medical Physics is a legitimate medical specialty recognized by the ABR and is under the auspices of the American Board of Medical Specialties (**ABMS**). Medical Physicists who hold a diploma from the ABR are automatically eligible for full active membership of the American College of Radiology (**ACR**) and are candidates for Fellowship just as is any Physician

member. Generally speaking, properly credentialed Medical Physicists are eligible for full active membership in any of the appropriate medical professional societies within the specialties of Diagnostic Radiology, Radiation Oncology, and Nuclear Medicine. The physics subspecialties are The Physics of Diagnostic Radiology (**PDR**), Therapeutic Radiological Physics (**TRP**) and The Physics of Nuclear Medicine (**PNM**).

Medical Physicists are actively involved in both teaching and clinical roles in medical residency programs such as Urology and Gynecology as well as the traditional role of training of new Medical Physicists. Obviously they have a strong presence in their clinical role within their respective area of specialization in treatment facilities such as the SCTRC**,** JACC, and the MDACC.

Other than Radiation Oncology, the modern practice of Medical Physics complements and draws on medical specialties such as Diagnostic Radiology, Radiology of Nuclear Medicine, and Surgical, Gynecologic, Urologic, and Dental Oncology. Consequently, it is desirable for the proposed new degree program to draw upon a broad base of medical knowledge, now provided by the Health Science Center's School of Medicine's permission for students in this pilot program to attend the first year of medical school as their core courses. The design of the proposed program satisfies this requirement.

It is clear within the profession that we need to be training about 250 to 300 new, properly credentialed, medical physicists in this country, annually (Duke University, 2005). Currently, we are training only about 50 to 60 each year. Additionally, of the 3,000 medical physicists in the U.S. today (of which only about 800 are ABR-credentialed), about half are over age 50, and approaching retirement, thus, there is an increasing national shortage. The credentialing process is deliberately built into the proposed degree program. Even with existing academic programs at other universities, our approach of a multidisciplinary program combined with clinical training is unique and ensures that we turn out well-trained medical physicists who are adequately postured to achieve the previously mentioned credentialing process. Evidence of the need and anticipated success of this program is signaled by the other universities,

nationwide, who have voiced their intentions to follow suit, using the TTU program as the model program.

This is a unique opportunity to partner between TTU-CA&S and the HSC-SoM while meeting a growing national need for properly trained and credentialed professionals in the field of Medical Physics. It does not duplicate nor complete with existing degree programs and it creates the opportunity for TTU-CA&S and the HSC-SoM to be among the first in the nation to offer this degree.

Acronyms used:

American Association of Physicists in Medicine (**AAPM**)
American Board of Medical Specialties (**ABMS**)
American Board of Radiology (**ABR**)
American College of Radiology (**ACR**)
College of Arts & Sciences (**CA&S**)
Computerized Tomography (**CT**)
Doctor of Medical Physics (**DMP**)
Joe Arrington Cancer Center (**JACC**)
Magnetic Resonance Imaging (**MRI**)
M. D. Anderson Cancer Center (**MDACC**)
Medical Collage Aptitude Test (**MCAT**)
Positron Emission Tomography (**PET)**
Southwest Cancer Treatment and Research Center (**SCTRC**)
The Physics of Diagnostic Radiology (**PDR**)
The Physics of Nuclear Medicine (**PNM**).
Therapeutic Radiological Physics (**TRP**)
TTU/Health Science Center School of Medicine (**SoM**)

I. Program Administration

A. Administration

The proposed Doctor of Medical Physics program is a new degree. It is a professional clinical degree rather than a research oriented Ph.D. degree and is a unique multi-institutional, multi-disciplinary program supported by several disciplines and departments within the CA&S at TTU and by the HSC-SoM. The program will be supervised by the Program Director William Kubricht, MMSc, DABR, under the direction of the Dean's Office of the CA&S at Texas Tech University (Fig. 1). Associate Dean David Roach (Ed.D.) will be the primary facilitator of this program within the Dean's Office with the direct involvement of Associate Dean Rob Stewart (Ed.D.) and Dean Jane Winer (Ph.D.). Administrative representatives of the SoM will interact with Dean Winer and members of the Dean's Office in CA&S in assuring communication and appropriate coordination between these two entities. Program records will be kept within the CA&S. Certification of completion of degree requirements will come from the Director of the DMP program and the Dean of the CA&S or her designated representative.

A Coordinating Committee composed initially of the chairs of each of the departments within CA&S that are contributing to this degree as well as selected faculty from the SoM will work with the Program Director in meeting the goals and objectives of this degree program. Additionally, an Advisory Board (Appendix C), composed of academic members, representatives of the medical community, and community leaders will serve in an advisory and oversight capacity to ensure the quality and focus of this new degree program. Graduate students pursuing the DMP will be advised by faculty and adjunct faculty members associated with the cooperating departments within the CA&S and the SoM. The degree will be granted by CA&S with the cooperation of the SoM.

B. Non-academic Unit Relationship

The Southwest Cancer Treatment and Research Center, and other community oriented cancer treatment facilities such as The JACC, were developed to provide high quality treatment of patients with neoplastic disease. The new program will maintain association with these centers and with faculty members from a number of other discipline institutions such as MDACC at the Texas Medical Center, Houston, to ensure that all needed expertise required is available to this degree program. Furthermore, these and other such locations will provide opportunities for students to conduct 3- to 6-month rotations of their residency programs in years 4 and 5.

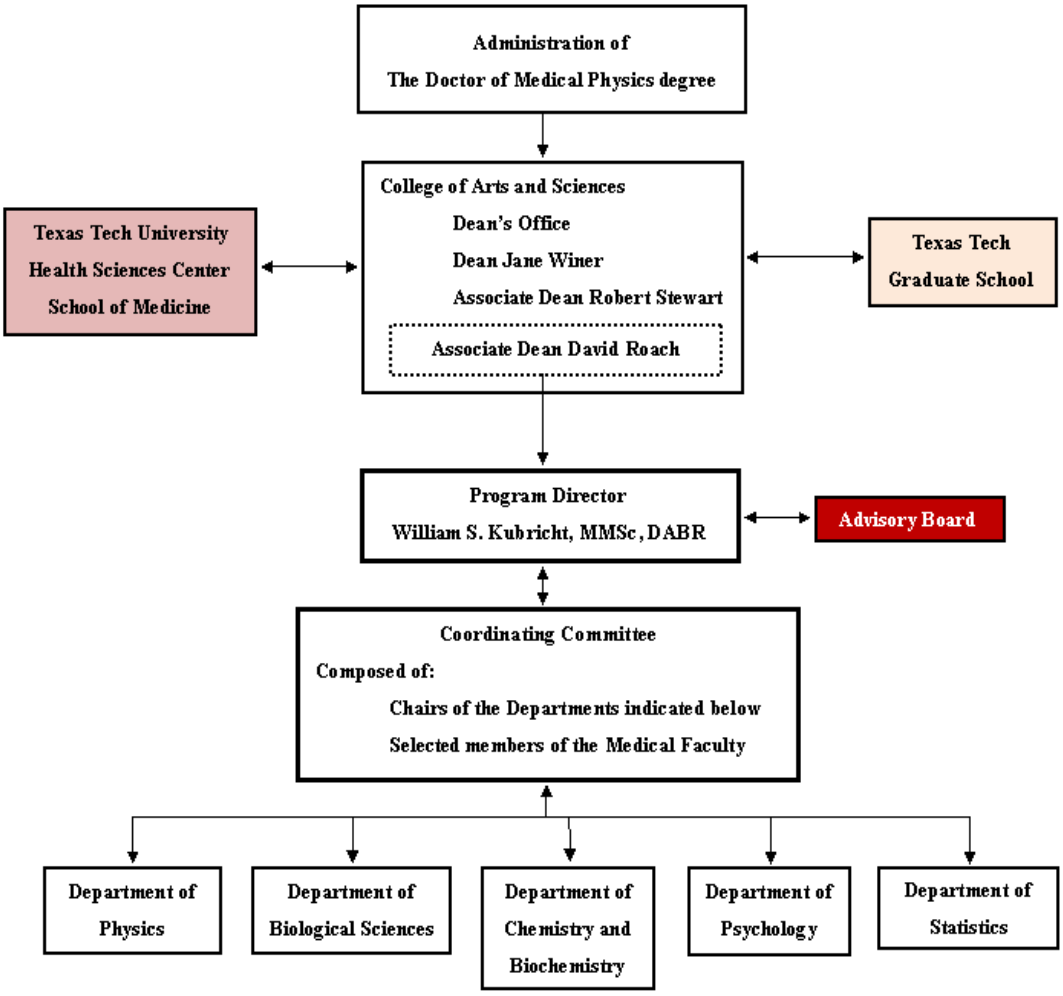


Figure 1. The organizational structure for administration of the multi-institutional and multi-disciplinary Doctor of Medical Physics degree.

C. New Organization Units

The Program Director (initially William Kubricht), as an Adjunct Professor in the Department of Physics, CA&S, will provide the overall organization coordination of the program and oversight of students to ensure that they are meeting all expectations and are completing all requirements. The Program Director is also charged with overseeing new student recruitment, securing extramural funding in support of the program, and with ensuring visibility for the program on both a local and national scale. This organizational unit will be

located within the CA&S in an exact structure yet to be determined. Day-to-day functions will be addressed out of the Dean's office or jointly with the Graduate School.

II. Program Description

A. Educational Objectives

The educational objectives of the program are to provide graduates with the breadth and depth of education and clinical experience necessary to pursue a career directly related to the treatment of patients with neoplastic disease and to operate the modern equipment and technology used in the care of these patients. Specifically, our objective is to equip students to compete successfully in the rapidly growing field of Medical Physics. In order to assure the viability of graduates entering the job market, one major area of study will be chosen by the students in the program (radiation oncology, diagnostic radiology, and nuclear medicine). Upon completion of this program, students will be able to successfully sit for the ABR Board Exam and secure licensure to practice Medical Physics in their respective states. While currently only three states, including Texas, require licensure, ALL states are moving toward this requirement. This will ensure their ability to make their contribution to the treatment of patients with neoplastic disease. This will further equip them to practice with their physician colleagues, radiation oncologists.

B. Admission Standards

The admission standards will be the same as those currently required for entrance into both the Graduate School of TTU and the SoM including the Medical College Aptitude Test (**MCAT**). Students will be admitted if they have a Bachelor's or Master's degree in Biology, Physics, or a related field. Candidates from other degree programs will be required to have an adequate background in

the Physics, Chemistry and Biology to be qualified to enter core courses in the Medical School and core courses in Physics. A cumulative GPA of 3.5 or better is required for entrance into this program.

An additional requirement prior to admission is an interview with faculty members representing the SoMl and the CA&S. An on-campus interview is required with few exceptions. The objectives of this interview are: 1) to make the student aware of the nature and requirements of this program, 2) to ensure that only highly qualified individuals are accepted into the program, 3) to help the student understand the multi-institutional, multi-disciplinary nature of this program, and 4) to insure that prospective students understand the objectives and career path upon which this program is focused and that this is consistent with the career objectives of the student. The interview procedures are vital to ensuring that only highly motivated and qualified candidates enter this program and that there is a high probably of successful completion of the degree.

C. Degree Requirements and Curriculum.

The DMP is a new 5-year clinical degree and in no way affects the traditional Ph.D. degree for those students who wish to focus on research and teaching. As with the Doctor of Musical Arts degree at Texas Tech, research and a dissertation are not required for the DMP. Instead, DMP students are required to take 60 Semester Credit Hours (SCH) of graduate coursework beyond the B.S. degree and a minimum of 36 hours of Medical Physics Clinical Practicum (e.g., MEDP 6001, etc.; Table 1).

Students will qualify for admission to this program through a minimum GPA of 3.5, a successful interview process with faculty members representing

Table 1. Typical Doctor of Medical Physics Degree Program.

Year	Fall	Spring	Summer I, II
1	MSCI 5060 Clinically Oriented Anatomy[a] MSCI 5070 Biology of Cells and Tissues MEDP 6012: Medical Physics Seminar/ Tumor Board	MSCI 5030 Structure and Function of Major Organ Systems MSCI 5040 Host Defense MEDP 6012: Medical Physics Seminar/ Tumor Board	MEDP 6001 Medical Physics Clinic[c] MEDP 6002 Medical Physics Clinic MEDP 6012: Medical Physics Seminar/ Tumor Board
2	PHYS 5311 Nuclear Physics (PHYS 4312) ZOOL 5401 Animal Histology for Advanced Students MEDP 6003 Medical Physics Clinic	BIOL 6301 Radiation Biology PHYS 5303 Electromagnetic Theory MEDP 6004 Medical Physics Clinic	MEDP 6005 Medical Physics Clinic MEDP 6006 Medical Physics Clinic
3	STATS 5302 Applied Statistics I MEDP 6007 Medical Physics Clinic MEDP 6008 Medical Physics Clinic	PSY 5377 Behavioral Medicine BIOL 5306 Advanced Cancer Biology MEDP 6009 Medical Physics Clinic	MEDP 6010 Medical Physics Clinic MEDP 6011 Medical Physics Clinic
4	Clinical Rotations[d]	Clinical Rotations	Board Review Sit for First ABR Exam
5	Clinical Rotations	Clinical Rotations	Board Review Sit for Second ABR Exam (to be approved by ABR) Graduation from TTU
6	Fellowship Year	Specialized studies in areas of interest	Sit for Oral Boards

[a] Black indicates Medical School Blocks.

[b] Blue indicates coursework at TTU

[c] Red indicates clinical training and experience.

[d] Green indicates clinical rotations at various institutions including Southwest Cancer Treatment and Research Center, Joe Arrington Cancer Center (TBA), M. D. Anderson Cancer Center, Texas Medical Center, Houston, TX (TBA), Mayo Clinic, Rochester, Minn. (TBA)

the SoM and the CA&S, and by successfully completing the MCAT with a score of 28 or greater. Throughout the students clinical experience, they will be required to write a series of review papers on assigned topics in the style and format of peer-reviewed professional journals in fields related to Medical Physics. Prior to graduation, students will go through two levels of written ABR Board examinations. Graduation is contingent upon passing of these examinations. Following graduation, students will sit for the ABR oral examination.

While no M.S. degree is offered for this program, students with appropriate M.S. degrees in the field may be given credit for graduate courses already completed and will be accorded advanced standing depending on official copies of their transcripts and approval by the faculty and the TTU Graduate School.

Specifically:

- Students will take core courses presently available in the first year of Texas Tech University Health Science Center School of Medicine which include Gross Anatomy, Physiology, Histology, and Pathology.
- Students will take at least six presently available organized courses in the Department of Physics, the Department of Biological Sciences, the Department of Chemistry and Biochemistry, the Department of Psychology, and the Department of Statistics. One new course (Radiation Biology) will be taught initially as a ‘special studies course’ (BIOL 6301) by professors from MDACC, Houston, TX, to provide this needed course material. It is visualized that this will eventually become a new course offering in the catalogue.
- Student will take at least 36 hours of Clinical Practicum that consist of intensive specialized training and clinical experience. These are listed under the course number MEDP 600x until a permanent number can be assigned.

- Students will participate in 3- to 6-month rotations at various cancer treatment facilities such as SCTRC, JACC, and MDACC.

Course distributions.

1. Foundation/leveling courses.

   The students are required to have a Bachelor's or Master's degree in Biology, Physics, Chemistry, or a closely related field satisfying all requirements for entrance into the Medical School plus additional courses needed for preparation to take the required graduate school curricula outlined below. They are required to take leveling courses before entering this program should they lack a background in these subjects. These include but are not limited to courses listed in Appendix D.

2. Required courses (Table 1):

   All students are required to take 4 medical block courses and 7 TTU courses; 60 Semester Credit Hours (SCH) of courses beyond the B.S. degree as follows: (A full description of each course is in Appendix D). Students will take existing courses with the exception of BIOL 6301. No special sections of these classes are needed. If there are prerequisites required, the students will take them prior to enrolling in the required course.

   Courses taken during Years 1 and 2 (approximately equivalent to 40 hours of graduate class work)

   - **MSCI 5030-001**: Structure and Function of Major Organ Systems.
   - **MSCI 5040-001**: Host Defense.
   - **MSCI 5060-001**: Clinically Oriented Anatomy.
   - **MSCI 5070-001**: Biology of Cells and Tissues.

Taken during Years 1 to 3

- **PHYS 5303:** Electromagnetic Theory (3:3:0)
- **PHYS 5311:** Nuclear Physics (3:3:0) (piggyback with PHYS 4312)
- **BIOL 6301**: Radiation Biology (3:3:0) (see Appendix E)
- **BIOL 5306:** Advanced Cancer Biology (3:3:0)
- **ZOOL 5401**: Histology I (4:2:6)
- **STAT 5302**: Applied Statistics (3:3:0)
- **PSY 5377**. Behavioral Medicine (3:3:0)

In addition to the core coursework above, all students are required to complete a minimum of 36 hours of practicums in clinical radiation oncology. Students will register for the appropriate number of semester hours MPHY 600x (until a permanent number is assigned) in lieu of dissertation hours (See Table 1).

<u>Medical Physics Clinics</u> - Early and Advanced Training and Experience in Clinical Radiation Oncology (Table 1; Minimum of 36 hours required).

1. **MEDP 6001:** Clinical Therapeutic Radiation Oncology (3 hours)
   Instrumentation and application of physics to clinical therapeutic treatment procedures including: radiographic beam definition, TAR, TMR, PPD, DDF, FSCF, OPF, BSF and other beam acquisition data and procedures.

2. **MEDP 6002:** Clinical Therapeutic Radiation Oncology (3 hours)
   Instrumentation and application of physics to clinical nuclear

medicine diagnostic procedures including CT, PET, MRI, PET/CT, traditional nuclear medicine, and ultrasound.

3. **MEDP 6003:** External Beam Radiation Therapy (3 hours)
    - Electron Beam Therapy
    - 3-Dimensional Conformal Radiation Therapy: Advanced computer applications
    - Intensity modulated radiation therapy: Advanced computer applications
    - Stereotactic radio surgery: Advanced computer applications
    - Total Body Irradiation
    - Quality Assurance

4. **MEDP 6004:** Interstitial Brachytheraphy (3 hours)
    - Low dose and high dose brachytherapy: Advanced computer applications
    - Gynecologic implants
    - Genitourinary implants
    - Head and neck implants
    - Prostate implants: Advanced computer applications
    - Other applications
    - Radiation Protection
    - Quality assurance

5. **MEDP 6005:** Intracavitary Brachytheraphy (3 hours)
    - Low dose and high dose brachytherapy: Advanced computer applications
    - Gynecologic implants
    - Genitourinary implants

- Head and neck implants
- Prostate implants: Advanced computer applications
- Other applications
- Radiation Protection
- Quality Assurance

6. **MEDP 6006:** Treatment Planning (3 hours)
    - Isodose distributions
    - Patient data, corrections, and setup
    - Field shaping, skin dose, and field separation

7. **MEDP 6007:** Radiation Protection and Safety (3 hours)
    - Room design
    - Regulations
    - Survey Meters
    - Measurement of low-level radiation
    - Neutron monitoring

8. **MEDP 6008:** Medical Physics Practicum *(Diagnostic)* (3 hours) Experience and training in a diagnostic physics clinical setting; instrumentation methodology, calibration, and quality assurance. This course also includes diagnostic radiology patient interaction, clinical conference attendance, and review of imaging techniques in Radiology

9. **MEDP 6009:** Medical Physics Practicum (Therapy) (3 hours) Experience and training in a radiotherapy physics clinical setting; treatment planning, instrumentation calibration, and quality assurance. This course also includes radiotherapy patient interaction, clinical conference

attendance, and review of treatment techniques in Radiation Oncology

10. **MEDP 6010:** Clinical Therapy Physics I (3 hours) Instrumentation and application of physics to clinical radiotherapy procedures, equations for absorbed dose calculations, phantoms, methodologies in computerized treatment planning, and introduction to the special techniques of brachytherapy and stereoradiosurgery.

11. **MEDP 6011:** Clinical Therapy Physics II (3 hours) Photon and electron beam algorithms for dosimetry calculations. Methodologies in three-dimensional treatment planning with specific applications to radiotherapy. Laboratory applications of physics to clinical radiotherapy procedures, experience with equipment in a modern clinical radiotherapy environment, and methodology and techniques for the verifications of simulated clinical procedures.

12. **MEDP 6012:** Medical Physics Seminar/Tumor Board (1 hour) Weekly seminar on various topics related to medical physics.

Elective Courses

Students work with their graduate mentor in consultation with their graduate committee to decide if and what courses should be included beyond the required coursework. These decisions are based on the student's specific area of interest for specialization, courses taken prior to entering the DMP degree program, courses available for scheduling within the students program of study, and

to address possible weaknesses in a student's program . Electives can include short courses taught at MDACC as well as regularly scheduled courses at Texas Tech University. The list below provides examples of potential elective courses but is not all inclusive of potential coursework.

Texas Tech University

See Appendix D.

M. D. Anderson Cancer Center

1. Introduction to Radiotherapy Physics: Principles and Calibrations
2. Introduction to Physics and Administrative Aspects of Radiation Oncology for Administrative Staff
3. Brachytherapy: Principles and Practices
4. External Beam Dosimety: Basic Methods and Calculations
5. PET/CT: Hands on Short Course

Internships/Residencies

Throughout year 3, the student will begin with early observational clinical exposure and beginning residency. Years 4 and 5 are structured residencies involving actual patient contact, treatment planning, treatment supervision and quality assurance of delivery of the prescription. Rotations at other institutions begin in Years 4 and 5.

Specific requirements for fulfillment of the residency include:

- A letter of understanding with the host institution and objective/aspirations for the residency
- A one-page progress report 6 weeks into the residency
- A one-page progress report 12 weeks into the residency

- A final report (10 to 20 pages) due at the end of the residency
- A 20-minute presentation to faculty and students after the residency is completed.

D. Existing Degree Programs in Supporting Fields

The proposed Doctor of Medical Physics program is a unique multi-institutional, multi-disciplinary doctoral degree program supported by several disciplines and departments at TTU and by the SoM. To our knowledge, no other program in the U.S. today offers the duality of training in both traditional physics and biology with medical courses and clinical experience. At the present time, both the Master of Science and the Doctor of Philosophy degrees are offered at other institutions in programs often described as 'Medical Physics' (Appendix F). Degree programs in traditional physics are offered by many universities across the country. However, only 17 of such programs in this country are accredited by CAMPEP**,** none of which are at Texas Tech University. The ABR has stated that after 2012, candidates will not be allowed to sit for the Boards either written or oral in which the student did not come from the CAMPEP-accredited program. The proposed program will position TTU to be the site of a CAMPEP-approved degree program and the only such program to combine basic science courses with medical courses into an interdisciplinary degree.

The proposed program is receiving nation-wide support as indicated in the attached letters from other institutions (Appendix G).

E. Effect on Existing Programs

Both traditional M.S and Ph.D. programs and those currently accredited by CAMPEP will be impacted in a positive sense by the evolution of the DMP degree. Numerous institutions, many of which have CAMPEP-accredited programs, have expressed support and an interest in following the example reflected in this proposal (see letters of support;

Appendix G). Traditional M.S. and Ph.D. programs are fundamentally research oriented which for students with a desire to teach and do research is valuable. However, for those students who wish to pursue clinical careers, the DMP as outlined in this proposal is anticipated to positively affect the success rate of candidates upon sitting for the ABR written and oral exams.

Existing programs will benefit as the proposed program attracts new graduate students who will bring additional students into existing classes. These classes are not overloaded at the present time, thus, existing departments will benefit from the additional students. A new course will be taught initially under the BIOL 6301 special studies designation. The syllabus for this class is included in Appendix E. This class will be available for traditional students as well as providing additional options to strengthen existing programs.

Current faculty will not be reassigned because of the proposed program. The additional work-load anticipated due to the increase of additional doctoral-level students will be largely absorbed by the appointment of adjunct faculty members from SoM, JACC, and the SCTRC. Most of these appointments and their further approved Graduate Faculty Status are already in place. Because this is a graduate-level program, all participating faculty are required to be members of the graduate faculty and qualified to meet Southern Association of Colleges and Schools minimum standards.

The students in the Doctor of Medical Physics program will be supported through student loans as are traditional medical students. Additionally, scholarships will be sought through extramural funding sources to attract outstanding students. Thus, there will be no competition between students in the DMP program for funding sources available for traditional graduate students. Once this program is underway, it will be viable to approach funding sources as a first priority of the Program Director and the Coordinating Committee to further develop and support

the DMP program in all aspects. Any scholarships made available to DMP students should at a minimum provide for a salary consistent with a Graduate Research Assistantship in the CA&S, fringe benefits including tuition (both medical school and TTU), fees, insurance, and laboratory fees. This would be a minimum of $40,000 per student, annually.

F. Accreditation

As stated in the Introduction, CAMPEP is the accrediting agency and the sole judge of the adequacy of teaching programs in the field of Medical Physics. Discussions are already underway with members of the Board of CAMPEP, AAPM, and the ABR in which advice and counsel as to the structure of the curriculum portion of this proposal is constructed. Given the input from these three organizations it is anticipated that this program will receive CAMPEP accreditation in a timely fashion. Application for accreditation will be applied for as soon as this degree program is approved by the State Coordinating Committee.

G. Evaluation

Evaluation Procedures

Student evaluation of program. Texas Tech University requires that a standard course evaluation be completed by each student every time a course is taught. Thus, each individual course is evaluated on a regular basis. Additionally, an evaluation form, to be completed by students, will be developed unique to the character of this program to aid in evaluating the focus and success of this program in meeting its educational and clinical objectives from the student's perspective.

External evaluation of program. The ultimate measure of success for students completing this degree will be the percentage success rate in passing the ABR examinations and the obtaining of final Board Certification and licensure by the state. The percentage success in achieving these goals will be compared with the National averages. An

additional evaluation of success will be to track the professional positions obtained by graduates of this program.

Review by the Advisory Board. Periodically, the Advisory Board will review the status of this degree program including numbers and success of graduate students, appropriateness of coursework and practicum experience, and status of extramural funding of the program.

***Internal Program Review by the Graduate School*.**

Examples of Student Assessments (to be developed)

III. Program Need/Demand

A. Similar Programs

There are no other known programs in the U.S. today that combine the basic academic interdisciplinary program with clinical training. Currently, there are only 17 CAMPEP-approved Medical Physics degree programs in the U.S. and Canada (Appendix H). However, presently ALL offer the traditional M.S. and/or Ph.D. programs. The DMP degree that we propose is an entirely new concept in this country. It is our understanding that Washington University, St. Louis, Missouri; Vanderbilt, Nashville, Tennessee; Duke University, Durham, North Carolina; University of Wisconsin, Madison; University of Florida, Gainesville; and University of Texas Graduate School of Biomedical Science (MDACC), Houston have all had discussions regarding our program. Individuals from some of these institutions have suggested that the Texas Tech program may well become the model for clinical Medical Physics training in this country. At the present time, numerous programs exist in the U.S. that operate under traditional academic degree programs. The lack of a clinical focus, as opposed to a research oriented degree, is a major contributor to the high failure rate for candidates when sitting for the ABR Boards. As previously stated, very few degree programs are clinically oriented and CAMPEP-approved.

B. Justification for the Program

In a recent article published by Duke University (See Appendix F), it states that “There is currently a national shortage of trained medical physicists. There are about 3,000 medical physicists in the U.S.” [Of this number, only about 800 hold a diploma from the American Board of Radiology.] “The current need is for approximately 250-300 new medical physicists per year, but only about 50-60 are being produced by the current training programs. In addition, about 50% of current medical physicists are over the age of 50, meaning that there will be an increasing shortage in the coming years due to retirement.”

This is a clinical degree and is not a Ph.D. The Ph.D. trains scientists prepared for research and teaching. The entire focus of the DMP is in the treatment of patients with neoplastic disease. The traditional research oriented programs of the M.S. or Ph.D. provide inadequate clinical experience prior to graduation and do not adequately prepare students to sit for the examinations offered by the American Board of Radiology which leads to certification by that body. Vanderbilt University, following this trend, is moving toward the DMP and hopes to accept their first class in August of 2008. It is our understanding that several others on the list will soon follow suit.

With careful examination into curriculum, particularly in the latter years of the program, one would recognize that this is a professional degree that closely tracts, in principle at least, with the MD degree. The nature of the specialty of Radiation Oncology is that the Radiation Oncologist (physician) must be more scientific in his thinking while the Radiation Oncology Physicist must be more artistic (clinical) in their thought processes. This is the unique nature of the rigorous years 1, 2, and 3 leading to substantial time in residence in the latter years. A 6th year after graduation is required by the ABR and provides a fellowship year in which the candidate focuses on subspecialty areas of interest such as surgical implant techniques.

This interdisciplinary program should be located in the CA&S rather than in the SoM. The CA&S houses the core academic courses required by this program. Furthermore, this program will draw students at both the graduate and the undergraduate level. Furthermore, it provides an opportunity for an important relationship between CA&S and the SoM. Although the DMP is a clinical degree, it is a balance between the clinical experiences and training provided by the SoM and academic coursework needed and found within the various departments in the CA&S. This degree represents a true partnership between TTU and SoM and hopefully will provide a model for future programs to develop as appropriate. The needed expertise resides within the college and is complemented through its partnership with SoM. The SoM has agreed to the role of being a resource in providing appropriate coursework as needed.

IV. Program Potential

A. Cumulative Headcount Enrollment

The current limitation lies in the limitation of the number of students that may attend the first year of medical school. At present the Medical School can accept five Medical Physics students per year without compromising the student-teacher ratio at the Medical School and subsequently their accreditation. It is anticipated that we will be able to place five students each in other medical schools, both in and out of state, for the first year. Because it is policy in this country for all four blocks in the first year of medical school to be subject to standardized testing, it is anticipated that there will be a consistent level of knowledge obtained in the first year of medical school regardless of which one is attended. These students will be handled as transfer students at the end of their first year of medical school. By the end of the fourth year of this program, it is anticipated that a minimum of 20 students would be postured to graduate from this program and to sit for the ABR Boards.

B. Projected Graduates per annum

By the fifth year of this program, a minimum of 5 students will graduate annually. With acceptance of students into other medical schools to complete year 1 of the program, this number could increase substantially.

V. Resources

A. Personnel

i. Additions or changes

The proposed degree program involves current faculty within several existing departments in the CA&S and within the SoM (letters of support are attached in Appendix I). Specifically, these include the Department of Physics, the Department of Biological Sciences, the Department of Chemistry and Biochemistry, the Department of Psychology, and the Department of Statistics within the CA&S.

Bill Kubricht, Clinical Physics, will serve as the first Director of the DMP. He is an adjunct Professor in Physics and a full member of the Graduate Faculty. Day-to-day functions can be addressed out of the Dean's office or jointly with the Graduate School. This comports with the Medical School's preferences to remain an active contributor to the program but having it administered from the university. This arrangement will be formalized in a memo of understanding.

New adjunct faculty members have been added already to the Department of Physics specific to this program (see vitas attached in Appendix J). These include:

William S. Kubricht, MMSc, DABR
Chief, Clinical Physics,
Division of Radiation Oncology,
Southwest Cancer Treatment and Research Center,
TTH/HSC, Lubbock. Texas

Rufus Mark, M.D.
Radiation Oncologist, Joe Arrington Cancer Center
Assistant Clinical Professor of Radiation Oncology

Texas Tech University Medical Center
Lubbock, Texas

Murali Nair, Ph.D.
Chief Medical Physicist and Radiation Safety Officer
Joe Arrington Cancer Center
Lubbock, Texas

Carlos P. Torres, M.D.
Medical Director, Radiation Oncology
University Medical Center
Clinical Assistant Professor
Internal Medicine
Texas Tech Medical University
Lubbock, Texas

No new full-time faculty positions are required for this program at this time. As the program matures and external funding is acquired, it is visualized that new faculty or instructors may be hired to expand this program.

ii. Release time for administration and other services

None anticipated at this time

iii. Full-time faculty

At least twelve full-time faculty members from two institutions and four departments within the CA&S participate in this program. Each will teach at least one of the required courses. Additionally, four Adjunct professors in the Department of Physics participate in this degree program. Others will be added as needed but until this program matures and becomes self supporting, it is anticipated that no new faculty positions will be required. The addition of five graduate students each year will not be a significant addition to faculty workload. Supervision of these students will be divided among the full-time faculty and the adjunct faculty involved as well as medical staff from participating institutions.

iv. Part-time faculty

Existing adjunct faculty in Physics (TTU: Kubricht, Torres, Mark, Naire). To be appointed as adjunct professors from MDACC (Dr.s Ibbott, Followill, Frank, and Bloom)

v. Graduate student assistants

Graduate students in this program will not be on traditional graduate student assistantships. Resources needed for these students are reflected under the following section.

vi. Costs.

These students will be supported by individual student loans as is standard procedure for medical students. Their anticipated starting salary, upon completion of this program, will enable repayment of student's loans. Additionally, Medicare provides some reimbursement to hospital-based programs that would be applied to assistantships. In Year 4, students enter residencies and are paid by the respective hospitals. Additionally, external funding will be actively sought for scholarships to allow the recruitment of the highest quality graduate students and provide continuity to the program.

vii. Clerical/support staff

Initially, students and related work will be handled within the existing framework and by existing personnel in the College and the departments appropriate to the specific graduate student. After the program is approved and student numbers are increasing, extramural funding sources will be identified to create a new position for a secretary/book keeper position.

viii. Current faculty members

All faculty members who participate in this new program are currently employed within the TTU system (letters of support are attached in Appendix K) or, if from other institutions, will hold adjunct professorships and graduate faculty status. The proposed program includes four required blocks within the medical school and eight

required courses within the CA&S. These courses are taught by faculty as described below:

MSCI 5030: Lorenz Lutherer, Ph.D.
MSCI 5040: Jan Colmer-Hammood, Ph.D.
MSCI 5060: Vaughan Lee, Ph.D.
MSCI 5070: Jim Hutson, Ph.D.
ZOOL 5401: James Carr, Ph.D.
PHYS 5303: Walter Borst, Ph.D.
PHYS 5311: Marius Wigmans, Ph.D.
BIOL 5306: L. Gollahon, Ph.D.
BIOL 6301: David Followill, Ph.D./ Geoffery Ibbott, Ph.D.
STATS 5302: A. Trindade, Ph.D.
PSY 5377: L. Cohen, Ph.D.

Courses taken are from those currently listed in the course catalogues of TTU and the SoM. One course will be developed as special topics course in the initial phases of the program and is expected to evolve into an individual course offering unless an equivalent course can be identified or an appropriate undergraduate course can be used to develop a piggyback graduate section while the permanent course is being developed. Elective courses taken depend upon the individual student but are currently available in the course inventory. BIOL 6301 will be taught by adjunct faculty members to cover required materials not currently included in existing courses (Appendix E). This may become a new course offering in time but would not require the hiring of new faculty. Specific information on full-time faculty members and adjunct faculty members is included in Appendix J.

ix. Teaching assignment changes

The core courses required by this degree program are within the existing curriculum and are included in the graduate course inventory

in existing departments and require no teaching assignment changes. BIOL 6301 (Radiation Biology) will be team-taught by members of the medical team at MDACC (Followill and Ibbott) and by the resident Program Director (Kubricht). This is an example of the opportunity these students will have in access to experts in their field of study. A member of the faculty of the Department of Biological Sciences will participate in teaching this course. It is visualized that this will ultimately become an approved new course offering included in the catalogue. It is likely that additional specialized courses will be developed over time to address emerging technologies and information as needed.

x. New positions

None anticipated.

xi. Faculty qualifications

1. Graduate program faculty policy

All faculty members, full time and adjunct, hold the terminal degrees in their field and are approved by the Graduate School for Graduate Faculty Status. Furthermore, each holds appropriate credentials for their specific field within this program. (See Appendix J)

2. Graduate program faculty supervisors

Each student will be assigned a mentoring committee to be approved by the Director of the DMP program. The chair and members of this committee will be members of the Graduate Faculty but may be in the category of Adjunct Graduate Faculty as well as tenure-track Graduate Faculty from Departments including Physics, Biological Sciences, and Chemistry and Biochemistry, and the Health Sciences Center or others as appropriate. All faculty members (full-time and adjunct) participating in this program have credentials and qualifications to supervise graduate students. Graduate student mentoring committees will be constructed such

that the needed combinations of specific expertise will be available to address both the academic and the clinical aspects of this degree.

B. Library

Libraries, both at TTU and SoM, are well equipped and will be used extensively. Letters from the respective library administrators are attached in Appendix L attesting to the libraries holdings.

C. Equipment

xii. Acquisition

Until appropriate permanent funding is secured, acquisition of new equipment will be borne by the treatment facilities previously mentioned (SCTRC; JACC, MDACC)

xiii. Expenditure projections

None at this time until appropriate funding is secured

D. Facilities

All facilities necessary for this program currently exist at TTU, SoM, SCRTC, JACC, MDACC.

VI. Costs

In the initial start-up phase of this program, there will be little associated cost. Graduate students entering this program will be funded through loans as is routine with students entering medical school. Furthermore, students entering the DMP program will incur less cost than traditional medical students because tuition costs in years 2 and 3 are lower than those incurred by medical students. In the following years, students will be paid by the hospitals in which they will do their residency programs.

Because students will enroll in courses to be taught anyway in which other non-DMP students will also be enrolled, there will be no additional cost of instruction for these enrollments. All needed faculty are currently employed by TTU or by the associated medical institutions and no additional costs for

faculty are required. The estimated Medical Physics formula funding, based on 2008-2009 weight and rates for sciences,[1] is as follows:

Weight = $59.02
Rate (Doctoral Science) = 20.05
n of Students = 5
Single course SCH = 3.0

Weight*Rate = $1,183.35, *formula*
(i.e., each enrolled SCH = $1,183.35)

n*SCH = 15.0
(i.e., these students will generate 15 SCH in each course)

Formula*Generated SCH = $17,750

These students' enrollment (as a group) will generate $17,750 per course in which they enroll. Each individual enrollment will generate $3,550.

A. Anticipated Sources of Funding

Private sources, National Institutes of Health, and National Cancer Institute.

B. Cost Estimates

Initial requests for external funding will be at least $6 million. Once this degree program is approved, this external funding will be aggressively pursued to cover costs of graduate student scholarships, travel for students and faculty, secretarial and bookkeeping support, new faculty positions, expendable supplies, and other program costs.

Literature Cited

Dobbins, III, J.T. 2007. Introduction. I. Welcome from the Director. In: Duke Medical Physics Graduate Program. http://medicalphysics.duke.edu/intro.html

[1] The Science rate is used in reference to the students' enrollments in TTU science courses and their matriculation as TTU doctoral students. The estimate excludes any course fees or special instruction fees. This estimate does not apply to enrollments in medical school courses at TTUHSC-SOM.

Appendix A. The American Board of Radiology Examination results for physicists (2003 to 2007).

MOC PDB Login ID: Password:

Home | Fees, Exam Dates & Locations | News | Contact Us

INITIAL CERTIFICATION
Radiologic Physics

- The Certificate
- Requirements
- Registration Form
- Fees, Exam Dates & Locations
- Study Guide
- Sample Questions
- Practice Exam
- Calculators
- Scoring & Results
- Conditions & Reregistration
- Nuclear Regulatory Commission (NRC)
- International Graduates
- FAQs (Initial)

QUICK LINKS

- Forms
- Verification FAQs
- Fees, Exam Dates & Locations
- Change of Address
- MOC Personal Data Base Forgot Password?
- MOC Practice Quality Improvement (PQI)
- Pearson VUE Registration
- SAM, PQI & Summit Info

Radiologic Physics

Scoring

When exams are scored, each question is analyzed by the psychometrics group of the American Board of Radiology. Any questions with unusual statistics are reviewed by subject-matter experts to verify that questions are unambiguous and keyed correctly (for example, questions that proved to be extremely difficult and questions that low-scoring candidates answered correctly more frequently than high-scoring candidates). The Difficulty for each question (the total percentage of examinees answering the question correctly) and the Discrimination for each question (how well a question discriminates between the upper and lower groups of examinees in the total exam) are also evaluated.

A statistical analysis of the total examination is prepared and evaluated, using a coefficient factor of reliability that judges the overall quality of the examination. Thus, it is possible to determine the degree of reliability of a given examination and to utilize this information in preparing subsequent examinations.

CANDIDATES IN RADIOLOGIC PHYSICS MUST PASS BOTH PARTS 1 & 2 OF THE EXAMINATION FOR ADMISSION TO THE ORAL EXAMINATION.

PART 1

Candidates who fail both portions of the Part 1 exam must repeat the entire Part 1 exam at the next annual exam.

Candidates who fail just the Clinical portion of Part 1 and pass the General portion can re-take the Clinical portion at the make-up exam if they have passed Part 2 on their current application. Candidates who are eligible for Part 1 only or who have not passed Part 2, must wait for the next annual exam.

Candidates who fail just the General portion of Part 1 must re-take the entire Part 1 exam at the next annual exam.

Part 2

Candidates who fail a Part 2 exam must re-take the Part 2 exam at the next annual exam.

Exam results are sent by U.S. Mail 4 to 6 weeks after the exams. In this time period do not request scores by e-mail, fax, or any other method. If you have not received your results within 6 weeks after the exam, you may contact the ABR **office.**

Computer-Based Exam - Hand score Request

1. The deadline for requesting a hand score is 2 months after the date your results letter was mailed.
2. You must submit your request in writing (mail, fax, or e-mail).
3. The fee is $150 for one exam, $175 for two exams, $200 for three exams. You may pay by credit card.
4. Results will be sent to you by regular mail. Please allow 4 to 6 weeks after the date of your request for our response.

Oral Exam - Feedback Request

1. The deadline for requesting feedback is 2 months after the date your results letter was mailed.
2. You must submit your request in writing (mail, fax, or e-mail).
3. The fee for feedback is $150.00 for full and/or conditioned exams. You may pay by credit card.
4. Results will be sent to you by regular mail. Please allow 4 to 6 weeks after the date of your request for our response.

ABR Exam Results for Physicists

Physicists Radiologic Physics Part 1—General

Year	% Passed
2003	82
2004	79
2005	77
2006	77
2007	75

Physicists Radiologic Physics Part 1—Clinical

Year	% Passed
2003	85
2004	84
2005	80
2006	82
2007	79

Physicists
Radiologic Physics
Part 2—Diagnostic

Year	% Passed
2003	70
2004	70
2005	67
2006	60
2007	70

Physicists
Radiologic Physics
Part 2—Nuclear

Year	% Passed
2003	54
2004	63
2005	57
2006	56
2007	56

Physicists
Radiologic Physics
Part 2—Therapy

Year	% Passed
2003	75
2004	76
2005	73
2006	69
2007	70

Physicists
Radiologic Physics Oral:
First-time Takers

Year	% Passed
2003	48
2004	51
2005	59
2006	53
2007	47

Return to top of page

Contact Us

1

2

Appendix B. AAPM Newsletter

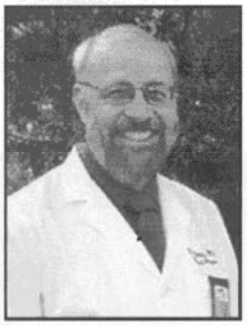
CELEBRATE 50 YEARS

Newsletter

AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE

VOLUME 33 NO. 1 JANUARY/FEBRUARY 2008

AAPM President's Column



Gerald A. White
Colorado Springs, CO

I recently had the occasion to travel to Las Vegas for a meeting of the Alliance for Quality Imaging to work on strategy for the CARE Bill. Before the junket alarm goes off, be advised that I flew in after work, arriving at about midnight, and left the next evening just as the meeting ended. The only thing that "stayed in Vegas" was my MacDuff tartan wool tie that I unfortunately left in the room. (Certainly the next occupant was thrilled to add that to his Las Vegas wardrobe). Let me say that I am not a gambler in the Las Vegas sense. By way of reference I describe an event at my computer literacy training at the hospital. When the enterprise servers went up, everyone, no exceptions, was required to take a class to introduce them to the computer world prior to getting a login and password. The Mordac of our deployment was not impressed with the fact that we in Oncology had pulled cables and installed our own network years before there was an IT department in the hospital. The instruction was, as one might expect, silly, error ridden and frustrating to an important character such as me who had so many other things waiting to be done. I was humbled, however, at the Mouse function exercise. We were asked – yes forced – to play the Microsoft Solitaire on our screens in full view of other classmates. I did not know how to play Solitaire and so failed my Mouse test miserably. (I did get my login, but still do not know how to play the game.)

As I walked through the casino on my way to the CARE meeting, I passed the craps tables. They are, to the non-initiate, quite complex, and far more puzzling than Solitaire. There are 40 plus regions, some with multiple texts and perhaps sub-regions with their own meanings. I suspect, however, that they all have a function and to those with the appropriate knowledge and motivation they can each be used to gain success or failure depending on chance, strategy and which side of the enterprise you sit on.

As I sat in the CARE Bill meeting amidst talk of education and training I thought about the many pathways we have in Medical Physics for entry into the profession. They are quite complex, with multiple disciplines and sub disciplines, different degrees and different education and training offerings associated with degrees from various Departments and Universities. Fortunately, success or failure in the broad endeavor is not dictated so much by chance but rather by vision, planning, and execution. We are now at a point where vision, planning and execution of training programs for clinical Medical Physicists will change the way we prepare ourselves for the profession. The ABR has adopted a close variant of the AAPM consensus position on requirements for entry into the profession. Beginning in 2012, examinees will need to be enrolled in or have completed a CAMPEP accredited degree program or residency, and beginning in 2014 a CAMPEP approved residency will be required. This will require a large scale up of both degree programs and residencies, and more fundamentally, a review of our conceptions of the necessary components of both.

We are firmly planted in the related and non-exclusive worlds of Science

TABLE OF CONTENTS

Appendix C. ADVISORY BOARD MEMBERS

Doctor of Medical Physics Degree Program

Academic Members

Donald R. Haragan, PhD
Former President and Interim Chancellor
Texas Tech University

John Borrelli, PhD
Former Dean, Graduate School
Texas Tech University

Lynn Hatfield, PhD
Former Chairman, Department of Physics
Texas Tech University

Bernhard Mittemeyer, MD
Former Interim President, Health Science Center
Texas Tech University

Academic Members and Visiting Faculty

Goeffry Ibbott, PhD
Director, Radiological Physics Center
M. D. Anderson Cancer Center

David Followill, PhD
Radiological Physics Center
M. D. Anderson Cancer Center

Eric Klein, Ph.D.
Former Chair, CAMPEP Board of Directors
Washington University, St. Louis, MO

Elizabeth Bloom, MD
Radiation Oncologist
M. D. Anderson Cancer Center

Steven J. Frank, MD
Radiation Oncologist
M. D. Anderson Cancer Center

Community Leaders

Harold Jones, President
Senior Financial Representative

Todd Cepica, Director
Southwest Cancer Treatment and Research Center

Appendix D. Required coursework for the degree of Doctor of Medical Physics as well as potential elective courses that may be taken.

Year 1, 2, and 3

Medical School Blocks (Equivalent to 40 Semester Credit Hours)

MSCI 5030-001. Structure and Function of Major Organ Systems. This block, in Weeks 23-34, covers structural and function aspects of the cardiovascular, respiratory, renal/urinary, gastrointestinal, endocrine, and reproductive systems, integrating structure with function at the gross, cellular, and molecular levels. A two week segment devoted to nutritional concepts and their clinical application accompanies the discussion of the structure function of the gastrointestinal systems.

MSCI 5040-001. Host Defense. This block, which occupies weeks 35-41, covers the structural and functional aspects of the immune system, integrating structure with function at the tissue, cellular and molecular levels; and examines the pathogenic microorganisms that invade humans. The mechanisms by which these microorganisms cause disease and the specific immune responses that develop to eliminate the microorganisms are emphasized

MSCI 5060-001. Clinically Oriented Anatomy. This block, consisting of Weeks 1-11, provides students with the foundation in anatomy and embryology necessary for success in the remainder of the curriculum and introduces students to applications of anatomy to the practice of medicine. It includes the traditional content and concepts of gross and developmental anatomy presented in a clinical context, coordinated with introductions to case based presentations and panel discussions with physicians.

MSCI 5070-001. Biology of Cells and Tissues. This block, in Weeks 12-22, includes the structure and function of cells and tissues and an introduction to genetics. The segment concerning cells and tissues includes contributions from the traditional disciplines of biochemistry, histology, physiology and pathology and is organized in a progression from molecules to cells to tissues. The segment on genetics begins with an introduction to classical genetics and proceeds to the concepts and clinical applications of recombinant DNA technology. The segment concludes with the genetic aspects of neoplasia.

Texas Tech University Courses (22 hours)

PHYSY 5303: Electromagnetic Theory (3:3:0). Electrostatics and magnetostatics, time varying fields, Maxwell's equations and conservation laws, electromagnetic waves in materials and in waveguides. M.S. and Ph.D. core course.

PHYS 5311. Nuclear Physics (3:3:0). Prerequisite: PHYS 5301. This is a course dealing with nuclear physics covering such topics as nuclear structure models, interactions, reactions, scattering, and resonance. Nuclear energy is discussed as an application.

ZOOL 5401. Animal Histology for Advanced Students (4:2:6). Prerequisite: ZOOL 2405 or a course in chordate anatomy or consent of instructor. Microscopic anatomy of the normal cells, tissues, and organ systems of the human and other mammals are studied. Open to graduate students who have not taken ZOOL 3401 or equivalent.

BIOL 5306. Advanced Cancer Biology (3:3:0). Prerequisite: BIOL 5320; ZOOL 5304 is recommended. This course presents a comprehensive overview covering the history of cancer biology to the most recent findings in the field. Molecular and cellular biology as well as clinical topics will be covered.

BIOL 6301. Advanced Topics in Biology (3:0:0). Prerequisite: Consent of instructor. Special areas of current interest not commonly included in other courses. Content normally different each time offered. May be repeated for additional credit.

> **Radiation Biology. (3:0:0)** Effects of ionizing radiations of living cells and organisms, including physical, chemical, and physiological bases of radiation cytotoxicity, mutagenicity, and carcinogenesis, the acute radiation syndromes, carcinogenesis, genetic effects, and radiobiological basis of radiotherapy. (**See Appendix E**).

STATS 5302. Applied Statistics I (3:3:0 each). Prerequisite: Consent of instructor. Graphical presentation of data, histograms, confidence intervals for binomial probabilities, one-sample and two-sample t-test, regression and correlation with two variables, hypothesis testing and confidence intervals, multivariate regression and correlation, partial correlation coefficients, analysis of variance and covariance, multiple comparison procedures. Emphasis on analysis of research data. Not for mathematics, statistics, engineering, or physical science majors; these students should take STAT 5384, 5385.

PSY 5377. Behavioral Medicine (3:3:0). Prerequisite: PSY 5338 or equivalent. Introduces graduate students in the applied social sciences to the contributions of psychology to the understanding of health and illness.

Prerequisites

MATH 1351. [MATH 2313, 2413, 2417, 2513, 2517] Calculus I (3:3:0). Score on the mathematics placement examination of 7, MATH 1350, 1550, or score on MPE of 5 and MATH 1321. Differentiation of algebraic and transcendental functions, applications of the derivative, differentials, indefinite integrals, definite integrals. Fulfills Core Mathematics requirement. (Honors section offered.)

MATH 1352. [MATH 2314, 2414, 2419, 2519] Calculus II (3:3:0). Prerequisite: MATH 1351 or consent. Methods of integration, parametric equations, polar coordinates, hyperbolic functions, applications. Fulfills Core Mathematics requirement. (Honors section offered.)

MATH 2350. [MATH 2315, 2415] Calculus III (3:3:0). Prerequisite: MATH 1352. Partial differentiation, functions of several variables, multiple integrals, line integrals, surface integrals, Stokes Theorem. Fulfills Core Mathematics requirement. (Honors section offered.)

PHYS 2402. Principles of Physics III (4:3:3). Prerequisite: PHYS 2401. Study of atomic, molecular, and nuclear phenomena. Relativity, quantum effects, hydrogen atom, many electron atoms, some molecular physics. Includes laboratory.

PHYS 3304. Modern Physics Laboratory (3:0:6). Prerequisite: PHYS 2402. Laboratory course on advanced physical principles, including experiments in optics, atomic, molecular, solid state, and nuclear physics.

PHYS 3305, 3306. Electricity and Magnetism (3:3:0 each). Prerequisite: PHYS 2401 and adequate mathematical background. Electric and magnetic fields, electrostatics, magnetostatics, electrodynamics, electromagnetic waves and radiation, special relativity, and Maxwell's equations throughout both courses.

PHYS 4312. Nuclear and Particle Physics (3:3:0). Prerequisite: PHYS 4307. This is a course dealing with modern nuclear physics covering such topics as nuclear structure models, radioactivity, nuclear reactions, elementary particles, nuclear conservation, forces, and symmetry.

BIOL 1403. Biology I (4:3:3). Prerequisite: One year of high school biology. Enrollment as a freshman requires a minimum composite SAT1 score of 1100, or a minimum composite ACT score of 24, or a minimum AP Biology score of 5. Students accepted provisionally cannot take BIOL 1403. Fundamentals of molecular biology, cell biology, genetics, and evolutionary theory. First semester of an integrated course recommended for students majoring in biological

sciences or related disciplines. Fulfills Core Natural Science requirement. (Writing Intensive)

BIOL 1404. Biology II (4:3:3). Prerequisite: BIOL 1403. Fundamentals of organismal biology, population biology, and biological diversity. Second semester of an integrated course recommended for majors in biological and related sciences. (Writing Intensive)

BIOL 3320. Cell Biology (3:3:0). Prerequisite: BIOL 1403, 1404, 3416, and junior standing. An integrated study of the basic principles of cell structure and function.

BIOL 3416. Genetics (4:3:3). Prerequisite: BIOL 1401, 1402, or 1403. Genetic principles with emphasis on mechanisms and problem solving. (Writing Intensive)

CHEM 3305. Organic Chemistry I (3:3:0). Prerequisite: CHEM 1308. First semester of a thorough foundation course in organic chemistry. Fulfills Core Technology and Applied Science requirement.

CHEM 3105. Organic Chemistry Laboratory I (1:0:3). Prerequisite: CHEM 1108; corequisite: CHEM 3305. First semester of fundamental techniques of organic chemistry.

CHEM 3306. Organic Chemistry II (3:3:0). Prerequisite: CHEM 3305. Second semester of a thorough foundation course in organic chemistry.

CHEM 3106. Organic Chemistry Laboratory II (1:0:3). Prerequisite: CHEM 3105; corequisite: 3306. Second semester of fundamental techniques of organic chemistry.

CHEM 3311. Biological Chemistry I (3:3:0). Prerequisite: CHEM 3306 and BIOL 1401 and 1402 or BIOL 1404. First semester of a three-semester course in general biochemistry.

Elective Courses

CHEM 5331. Biochemistry II (3:3:0). Prerequisite: CHEM 5330. Properties of biological compounds. Chemical processes in living systems. For advanced study by graduate students with majors outside the department. Not appropriate for graduate students in the department.

CHEM 5332. Biochemistry III (3:3:0). Prerequisite: CHEM 5330. Third semester of a three semester general biochemistry series for nonmajors. Topics include nucleotide metabolism and cellular processes involving nucleic acids. Not appropriate for graduate students in the department.

STATS 5326. Statistical Analysis (3:3:0). Prerequisite: Calculus or consent of instructor. Descriptive statistics, testing and estimation in one- and two-sample problems, analysis of variance, multiple comparisons, linear regression and correlation, nonparametric methods.

PHYS 5301. Quantum Mechanics (3:3:0) Experimental basis and history, wave equation, Schrödinger equation, harmonic oscillator, piecewise constant potentials, WKB approximation, central forces and angular momentum, hydrogen atom, spin, two-level systems, and scattering. M.S. and Ph.D. core course.

PHYS 5305. Statistical Physics (3:3:0). Elements of probability theory and statistics; foundations of kinetic theory. Gibb's statistical mechanics, the method of Darwin and Fowler, derivation of the laws of macroscopic thermodynamics from statistical considerations; other selected applications in both classical and quantum physics. M.S. and Ph.D. core course.

PHYS 5306. Classical Dynamics (3:3:0) Lagrangian dynamics and variational principles. Kinematics and dynamics of two-body scattering. Rigid body dynamics. Hamiltonian dynamics, canonical transformations, and Hamilton-Jacobi theory of discrete and continuous systems. M.S. and Ph.D. core course.

Appendix E. Syllabus for Radiation Biology to be taught as a Special Studies BIOL 6401

BIOL 6301
RADIATION BIOLOGY
Spring SYLLABUS

I. Instructor:

David Followill, Ph.D.
Geoffrey Ibbott, Ph.D.
M. D. Anderson Cancer Center
BOX 547
1515 Holcombe Blvd
Houston, TX 77030

Phone: 713-745-8989
Fax: 713-794-1364
Email: dfollowi@mdanderson.org
gibbott@mdanderson.org

II. Course Description:

This is a graduate course whose goal is to provide an understanding of how radiation interacts with and affects living organisms. Much of the focus in the class is how a medical physicist would apply this understanding to a clinical setting in the treatment of patients with cancer. The course will also provide the medical physicist with the background and resources to be an educational resource at the medical facility wherever he/she may practice. These basic principles covered include the kinetics of cell division and organization of normal tissues, the response of normal as well as tumor tissues to irradiation, the mechanism of cell kill induced by radiation, and the clinically relevant associations of volume treated, time-dose relationships, fractionation effect, and role of oxygenation in radiotherapy. Descriptions of the radiobiology of brachytherapy and particle beam irradiation are also discussed in detail. Students will also have an understanding and ability to apply mathematical models of the radiobiological response to alter treatment regimens.

III. Course Purpose:

The purpose of this course is to outline radiobiological principles for radiation therapists, radiation physicists, and radiobiologists who act as support personnel on the radiotherapy team.

IV. Text:

G Gordon Steel, "Basic Clinical Radiobiology", 3rd edition, 2002

Eric Hall, " Radiobiology for the Radiologist", 6th edition, 2005

V. Expected Learning Outcomes:

Upon completion of this course, the students will be able to:

(a) Understand the basic interactions between radiation and living tissue at the cellular level, organ specific and whole body
(b) Discuss the implications of irradiating normal tissues
(c) Understand the various mathematical models of radiation cell killing
(d) Be able to apply those mathematical models to develop new treatment regimens based on expected biological outcomes.
(e) Understand the mechanism of the various radiation dose modifiers as well as the interaction between radiation and chemotherapeutic agents.
(f) Understand radiation carcinogenesis and the effect on the developing embryo.

VI. Methods for Assessing the Expected Learning Outcomes:

The expected learning outcomes for the course will be assessed through several of the following methods: exams, class discussion, homework assignments and special projects.

VII. Grades:

A-F

Midterm exam	40%
Final exam	50%
Homework	10%

VIII. Point Distribution:

90 – 100 = A
80 – 89 = B
70 – 79 = C
60 – 69 = D
< 59 = F

IX. General Information:

"The University is committed to the principle that in no aspect of its programs shall there be differences in the treatment of person that equal opportunity and access to facilities shall be available to all. If you require special accommodations in order to participate, please contact the instructor. Students should present appropriate, verification from "Access TECH" located in the Counceling Center. No requirement exists that accomTECH is located at: http://www.accesstech.dsa.ttu.edu/default.asp .

.

X. Tentative Schedule of Classes:

Introduction: Overview of Radiation Biology

Lecture 1 Introduction: The Significance of Radiobiology in Radiotherapy

Topics	Reading Assignment
▪ Role in Management of Cancer	G G Steel 3rd Edition, Chapter 1
▪ Time scale of effects	
▪ Response of Normal and Malignant Tissues	
▪ Response curves and isoeffect relationships	
▪ Therapeutic Index	

Lecture 2 Cell Proliferation and Growth Rate of Tumors

Topics	Reading Assignment
▪ Measurement of tumor size	G G Steel 3rd Edition, Chapter 2
▪ Growth rate of human tumors	
▪ Factors affecting tumor growth	
▪ Cell kinetic methods	

Lecture 3 Proliferation and Cellular Organization of Normal Tissues

Topics	Reading Assignment
▪ Proliferative organization of tissues	GG Steel 3rd Edition, Chapter 3
▪ Radiation response in relation to proliferative organization	
▪ Modifiers of proliferation	

Lecture 4 Radiation Response and Tolerance of Normal Tissues

Topics

Reading Assignment

- Concept of Normal tissue tolerance
- Early versus late effects — GG Steel 3rd Edition, Chapter 4
- Cellular and molecular mechanisms of normal tissue damage
- Effects in specific normal tissues

Lecture 5 Models of Radiation Cell Killing

Topics

Reading Assignment

- Target theory
- Linear Quadratic model — GG Steel 3rd Edition, Chapter 7
- Repair saturation model
- Lethal, potentially lethal damage model

Lecture 6 DNA Damage and Cell Killing

Topics

Reading Assignment

- Radiation damage to DNA
- Chromosome aberrations — GG Steel 3rd Edition, Chapter 8
- Cell death
- Sequence of events that determine radiosensitivity

Lecture 7 Volume Effects in Normal Tissues

Topics

Reading Assignment

- Tolerance in relation to tissue structure — GG Steel 3rd Edition, Chapter 5
- Influence of cellular migration
- Volume effects and modeling

Lecture 8 Cell Survival as a Determinant of Tumor Response

Topics

Reading Assignment

- Clonogenic cells
- Cell survival curves — GG Steel 3rd Edition, Chapter 6
- Assays and analysis
- Repair and Recovery
- 5 R's of radiotherapy

Lecture 9 Genetic Control of the Cellular Response to Ionizing Radiation

Topics

Reading Assignment

- Cell cycle control of radiation damage — GG Steel 3rd Edition, Chapter 9
- DNA repair
- Apoptosis

Lecture 10 Dose Response Relationships in Radiotherapy

Topics

Reading Assignment

- Shape of dose response curve — GG Steel 3rd Edition, Chapter 10
- Clinical estimates of steepness of dose response curves
- Therapeutic window
- Intro to NTCP models

Lecture 11 Clinical Manifestations of Normal Tissue Damage

Topics

Reading Assignment

- *Documentation of normal tissue injury* — *GG Steel 3rd Edition, Chapter 11*
- Classification of normal tissue damage
- Factors influencing normal tissue damage

Lecture 12 Time-Dose Relationships: The Linear Quadratic Approach (Dr. Followill)

Topics — Reading Assignment

- LQ versus NSD — GG Steel 3rd Edition, Chapter 12
- LQ model in detail

- Value of α/β ratio
- Hypo and Hyper fractionation
- Incomplete repair

Lecture 13 The Linear Quadratic Model in Clinical Practice

Topics	Reading Assignment
▪ The α/β ratio ▪ Changing dose per fraction ▪ Changing overall treatment time ▪ Examples of application of LQ model	GG Steel 3rd Edition, Chapter 13

Lecture 14 Review of the Linear Quadratic Calculations

Topics	Reading Assignment
▪ The 4 R's of fractionation ▪ The radiobiological rationale behind dose fractionation ▪ The effect of tissue type on the response to dose fractionation ▪ Effect of tissue/tumor types on a/b ratios ▪ Quantitation of multifraction survival curves ▪ BED and isoeffect dose calculations	

Mid Term Exam

Lecture 15 Modified Fractionation

Topics	Reading Assignment
▪ Conventional fractionation ▪ Modification of dose per fraction ▪ Time factor for fractionation ▪ Slit course radiotherapy ▪ Reasons for increased late normal tissue damage	GG Steel 3rd Edition, Chapter 14

Lecture 16 The Radiobiology of Tumors

Topics

Reading Assignment

- Tumor control probability — GG Steel 3rd Edition, Chapter 17
- Experimental tumor systems
- Radiosensitivity of human tumor cells

Lecture 17 The Oxygen Effect and Tumor Micro-Environment

Topics

Reading Assignment

- Importance of oxygen — GG Steel 3rd Edition, Chapter 15
- Hypoxia
- Reoxygenation
- Drug resistance and malignant progression

Lecture 18 Overcoming Tumor Radioresistance Resulting from Hypoxia

Topics

Reading Assignment

- Hypoxic radiosensitization — GG Steel 3rd Edition, Chapter 16
- Hyperthermia
- Bioreductive drugs
- Vascular targeting therapies

Lecture 19 Radiation Carcinogenesis

Topics

Reading Assignment

- Initiation, promotion, progression dose response for radiation-induced cancers
- Importance of age at exposure sand time since exposure — Eric Hall, 5th Edition, Chapter 10 and 11
- Malignancies in prenatally exposed children
- Second tumors in radiation therapy patients
- Effects of chemotherapy on incidence
- Risk estimates in humans
- Calculations based on risk estimates

Heritable Effects of Radiation

- Single gene mutation
- Chromosome aberrations
- Relative vs. absolute mutation risk
- Double dose
- Heritable effects in humans
- Risk estimates for heritable effects

Lecture 20 Radiation Effects in the Developing Embryo

Topics

Reading Assignment

- Intrauterine death
- Congenital abnormalities and neonatal death — Eric Hall, 5th Edition, Chapter 12
- Microcephaly, mental retardation
- Growth retardation
- Dose, dose rate, and stage in gestation
- Human experience of pregnant woman exposed to therapeutic dose

Lecture 20 (cont'd)

Radiation Protection

- General philosophy
- Stochastic and deterministic effects
- Relative weighting factors
- Equivalent dose, committed dose
- Collective exposure dose
- Dose limits for occupational and public exposure
- ICR and NCRP

Lecture 21 The Dose Rate Effect: Brachytherapy and Targeted Radiotherapy

Topics

Reading Assignment

• Dose rate effect
• Dose rate effect on cell survival and normal tissues
• Radiobiology of brachytherapy
• Targeted radiotherapy

Lecture 22 Particle Beams in Radiotherapy

Topics

Reading Assignment

- RBE and LET GG Steel 3rd Edition, Chapter 19
- Response to high LET
- Biology of high LET radiotherapy
- Physical basis for charged particle therapy

Lecture 23 The Combination of Radiotherapy and Chemotherapy

Topics

Reading Assignment

- Mechanisms of combined therapy GG Steel 3rd Edition, Chapter 20
- Sequencing of chemo and radiotherapy
- Assessing efficacy of combined therapies
- Current status of therapies

Lecture 24 Retreatment Tolerance of Normal Tissues (Dr. Followill)

Topics

Reading Assignment

- Tolerance of various tissues GG Steel 3rd Edition, Chapter 21
- Clinical experiences

Lecture 25 Radiation Injuries and Responses

Topics

Reading Assignment

- Radiation accidents
- Radiation injuries
- Emergency response
- Medical management

Lecture 26 Studies of Population Exposures and Risk Models

Topics

Reading Assignment

- Population exposure measurement
- Radiation risk estimates
- Radiation risk models
- Epidemiological studies
- Risk vs. benefit

Lecture 27 Biological Optimization (NTCP/TCP modeling)

Topics	
Reading Assignment	
• Normal tissue control probability models for treatment planning purposes	
• Tumor control probability models for treatment planning	
Final Exam	

Appendix F. Duke University Medical Physics Program

Introduction

Table of Contents

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1. Welcome from the Director

Welcome to the Medical Physics Graduate Program at Duke University. We appreciate your taking time to review our program and its academic offerings.

Our Medical Physics Graduate Program offers both M.S. and PhD degrees, and is an interdisciplinary program sponsored by five departments: radiology, radiation oncology, physics, biomedical engineering, and occupational and environmental safety (health physics). We offer four academic tracks: diagnostic imaging physics, radiation oncology physics, nuclear medicine physics, and health physics. We have a large faculty involved in medical physics research and clinical service, with a number of our colleagues being internationally recognized experts in their fields of scholarship. Areas of faculty expertise include magnetic resonance angiography, magnetic resonance microscopy, advanced digital imaging algorithms, detector and display characterization, computer-aided diagnosis, ultrasound, monoclonal antibody imaging and therapy, hyperthermia coupled with radiation therapy, image guided radiation therapy, intensity modulated radiation therapy, tumor and normal tissue radiation response modeling, optical-CT dosimetry and imaging, radiosurgery, high dose-rate brachytherapy, treatment optimization, SPECT and PET imaging, neutron-stimulated imaging, and dosimetry.

Our medical physics graduate program enrolled its first class of students in Fall 2005. Our faculty have many years of experience mentoring outstanding PhD students from our collaborations with biomedical engineering and physics, and we are excited about adding medical physics as a specific area of graduate training. Please contact us with any questions you may have. We look forward to receiving your application for graduate study at Duke.

Best wishes in your academic endeavors,

James T. Dobbins III, Ph.D.
Director, Medical Physics Graduate Program

[return to top]

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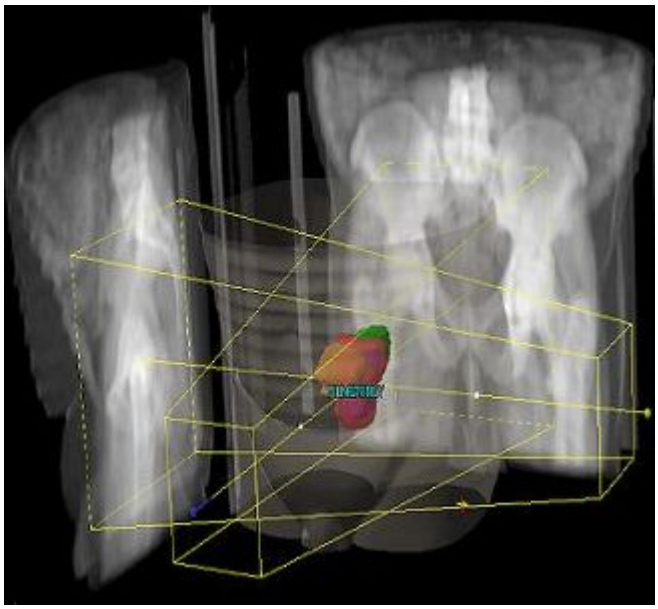
2. What is Medical Physics?

- Medical Physics is defined as the application of physics to the needs of medicine
- Launched by 2 Nobel prizes in physics; subsequently 2 Nobel prizes in Medicine or Physiology
- Responsible for the technical foundations of radiology, radiation oncology, and nuclear medicine
- Built on foundation of physics, but with distinct body of knowledge and scholarship
- Distinct from biophysics
- Incorporates both theoretical and experimental methods, but inherently an applied discipline

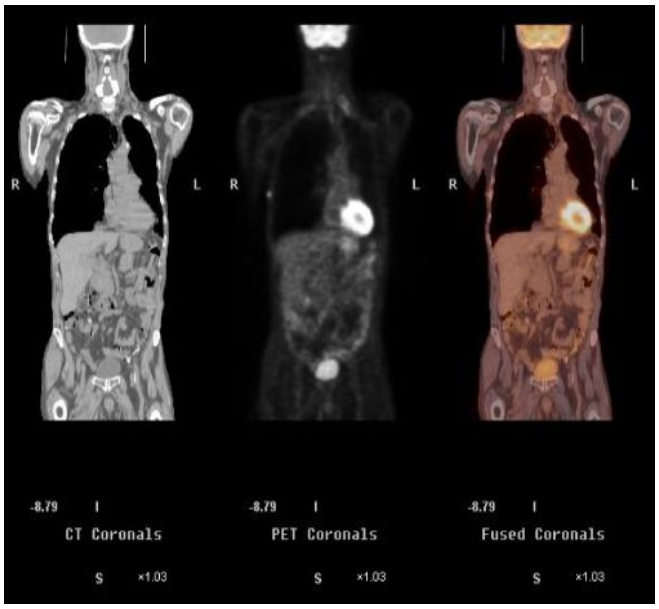
For more information, we recommend the American Association of Physicists in Medicine (AAPM) Public Education Website [external link] which addresses issues like: what is a medical physicist, the medical physicist in radiation therapy and diagnostic medical imaging, history of medical physics, etc.

Medical Physics: Examples in Practice and Research

Medical physics includes such diverse areas as diagnostic x-ray imaging, radiation therapy, diagnostic and therapeutic nuclear medicine imaging, and radiation safety. We highlight below just a few examples taken from active research at Duke.



Radiation therapy: Radiation dose distributions for intensity-modulated radiosurgery of spinal tumor.



Nuclear medicine: Fusion of whole-body anatomical (CT) and function (PET) images.

[return to top]

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3. What makes the Duke Medical Physics Program unique?

The most unique resource of the Duke Medical Physics program is the faculty. There are currently over 40 faculty members associated with the program from Radiology, Radiation Oncology, Physics, Biomedical Engineering and Radiation Safety, and many of these are internationally-recognized experts in their fields of study.

The Program has available one of the best Medical Centers in the United States, with outstanding facilities in Radiology and Radiation Oncology for the clinical training elements of the programs. There is state-of-the-art advanced imaging and radiation therapy equipment in the clinical departments. For example, we are one of the first beta sites to use the cone-beam CT on-line image guided radiation therapy system by Varian. We have 5 new Varian dual energy linacs with capability for dynamic intensity modulated radiation therapy. We also have a large radiosurgery program with Radionics micro-multi-leaf collimator.

State-of-the-art research laboratories exist as well, including 15,000 square feet in the Bryan Research Building, as well as the 7,000 square feet for the Duke Advanced Imaging Labs and 5,000 square feet for the Medical Physics Graduate Program in Hock Plaza (see picture). Existing equipment and facilities include radiation protection lab equipment (whole body counter, high resolution germanium gamma detector, Packard Liquid Scintillation Counter), dedicated equipment for radiation dosimetry, nuclear medicine cameras and scanners in PET and SPECT, digital imaging laboratories with dedicated equipment for physics and clinical research in digital radiography, the Center for In Vivo Microscopy, laboratories for monoclonal antibody imaging and therapy, excellent resources for MRI imaging (including a research MR scanner, the Brain Imaging and Analysis Center, and the Center for Advanced Magnetic Resonance Development), ultrasound laboratories in BME, and an imaging laboratory for students in the BME department.

[return to top]

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4. Employment opportunities in Medical Physics

Graduates trained in Medical Physics enjoy a wide variety of employment opportunities. Students at the Ph.D. level with interest in academic careers will find jobs as faculty members in departments of Medical Physics, Radiology, Radiation Oncology, Nuclear Medicine, Physics or Nuclear Engineering. Additionally, Ph.D. graduates may be employed in government labs or in industry. The research work of Ph.D. Medical Physics graduates is primarily in areas related to developing and evaluating new methods for the diagnosis and treatment of disease, and in new arenas such as molecular imaging and therapeutics, small animal imaging, and functional imaging. Any area of medical research that uses ionizing or non-ionizing radiation would require the involvement of physicists.

Ph.D. students trained with a specialty in Health Physics may find employment as Radiation Safety Officers at universities or large laboratories, or they may be employed as faculty in Health Physics training programs. Specialists in Health Physics will also help meet the growing demand for workers trained in radiation safety following the federal government's new initiatives in homeland security.

In addition to the academic and research job opportunities for Medical Physics graduates, there is also the career path of clinical physicist. Every hospital and clinic that uses radiation requires the services of individuals trained to maintain the diagnostic and therapeutic equipment needed to serve patients. Medical Physicists in Radiation

Oncology also participate directly in clinical service by performing treatment planning for patients according to the treatment regimen prescribed by the Radiation Oncologist. In addition, clinical physicists are involved in active research to implement and develop novel therapies. Clinical physicists may be employed at the M.S. or Ph.D. level. The Duke Medical Physics Program would provide the specialized training necessary for graduates to become board-eligible clinical physicists if they so choose.

There is currently a national shortage of trained medical physicists. There are about 3000 medical physicists in the U.S. The current need is for approximately 250-300 new medical physicists per year, but only about 50-60 are being produced by the current training programs. In addition, about 50% of current medical physicists are over the age of 50, meaning that there will be an increasing shortage in the coming years due to retirement. Thus, the job market for medical physics graduates is quite strong.

A critical shortage also exists in the supply of qualified radiation safety professionals throughout a broad spectrum of activities within the United States, including medical practice and research, regulatory oversight, academic research, environmental protection, occupational safety, and the research and application of nuclear technologies. A recent survey conducted by the Health Physics Society indicates that present demand for radiation safety professionals is approximately 130% of supply. Demand during the next five years, which appears to be related solely to attrition, is expected to exceed supply by nearly 160%.

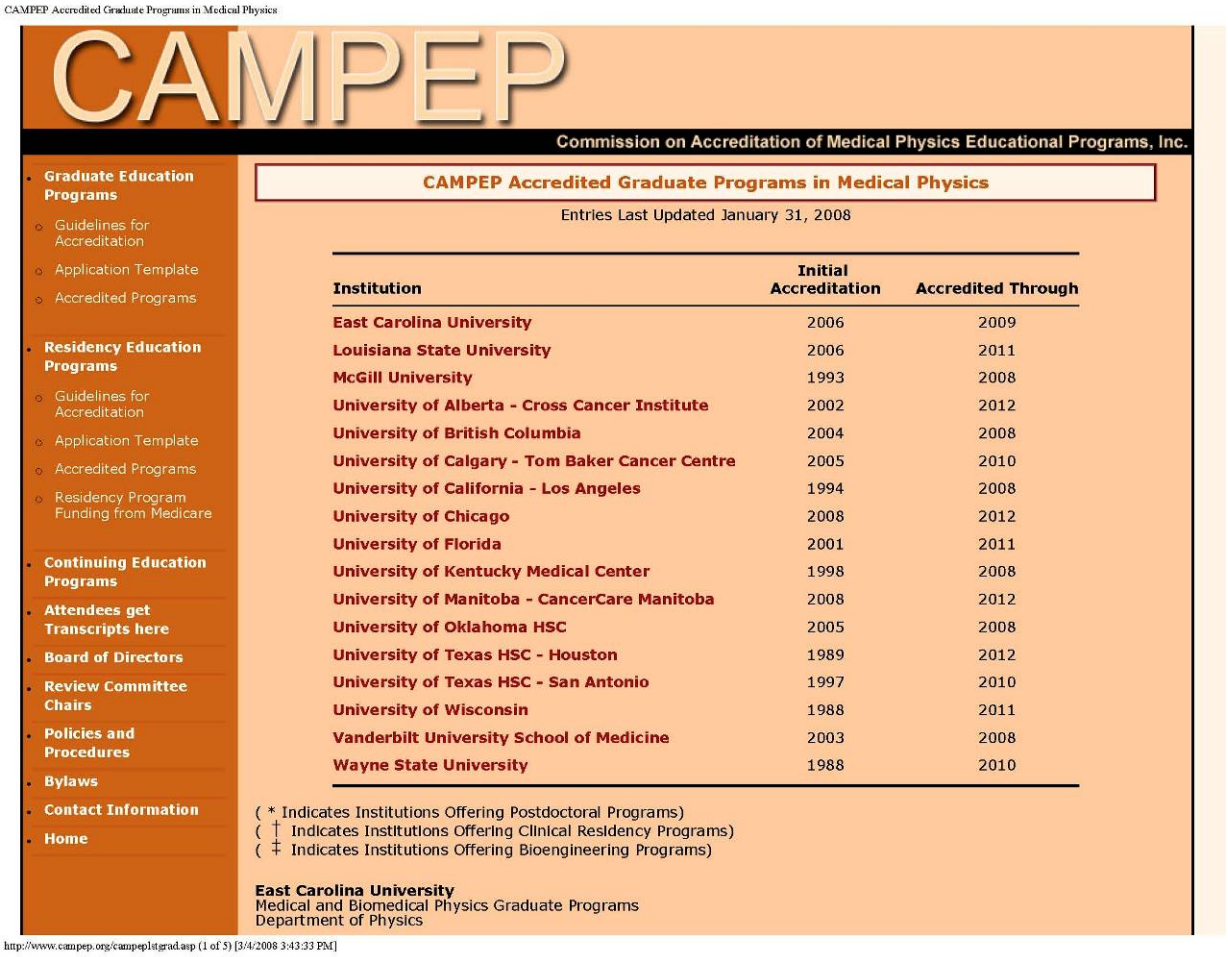
The salaries are excellent for graduating students trained in medical physics. Each year the American Association of Physicists in Medicine (AAPM) produces an extensive salary survey . In a recent (2005) survey, the average salaries for medical physicists without board certification are $110,000 and $123,000 for those with M.S. and Ph.D. degrees, respectively. With board certification, these increase to $150,200 for M.S. and $163,400 for Ph.D. employees.

For more information, we recommend the AIP Career Network Website [external link].

[return to top]

Appendix G. Letters of Support from other Institutions

Appendix H. CAMPEP Accredited Graduate Programs in Medical Physics.



CAMPEP Accredited Graduate Programs in Medical Physics

CAMPEP

Commission on Accreditation of Medical Physics Educational Programs, Inc.

- **Graduate Education Programs**
  - Guidelines for Accreditation
  - Application Template
  - Accredited Programs
- **Residency Education Programs**
  - Guidelines for Accreditation
  - Application Template
  - Accredited Programs
  - Residency Program Funding from Medicare
- **Continuing Education Programs**
- **Attendees get Transcripts here**
- **Board of Directors**
- **Review Committee Chairs**
- **Policies and Procedures**
- **Bylaws**
- **Contact Information**
- **Home**

CAMPEP Accredited Graduate Programs in Medical Physics

Entries Last Updated January 31, 2008

Institution	Initial Accreditation	Accredited Through
East Carolina University	2006	2009
Louisiana State University	2006	2011
McGill University	1993	2008
University of Alberta - Cross Cancer Institute	2002	2012
University of British Columbia	2004	2008
University of Calgary - Tom Baker Cancer Centre	2005	2010
University of California - Los Angeles	1994	2008
University of Chicago	2008	2012
University of Florida	2001	2011
University of Kentucky Medical Center	1998	2008
University of Manitoba - CancerCare Manitoba	2008	2012
University of Oklahoma HSC	2005	2008
University of Texas HSC - Houston	1989	2012
University of Texas HSC - San Antonio	1997	2010
University of Wisconsin	1988	2011
Vanderbilt University School of Medicine	2003	2008
Wayne State University	1988	2010

(* Indicates Institutions Offering Postdoctoral Programs)
(† Indicates Institutions Offering Clinical Residency Programs)
(‡ Indicates Institutions Offering Bioengineering Programs)

East Carolina University
Medical and Biomedical Physics Graduate Programs
Department of Physics

http://www.campep.org/campeplstgrad.asp (1 of 5) [3/4/2008 3:43:33 PM]

Greenville, NC 27858
Degree available: M.S., Medical Physics, Ph.D., Biomedical Physics
Director: Edson L. B. Justiniano, PhD
justinianoe@ecu.edu

Louisiana State University
Department of Physics and Astronomy
202 Nicholson Hall
Baton Rouge, LA 70803-4001
Director: Kenneth Hogstrom, Ph.D.
email: **hogstrom@lsu.edu**
Program Administrator Tel: (225) 578-2163
Degrees available: M.S. in Medical Physics and Health Physics
medphys@phys.lsu.edu
http://www.phys.lsu.edu

McGill University * ‹
Montreal General Hospital
Department of Medical Physics
Livingston Hall, Room L5-109
1650 Avenue Des Cedres
Montreal, PQ H3G 1A4, Canada
Director: Ervin B. Podgorsak, Ph.D.
Tel: (514) 934-8052 / Fax: (514) 934-8229
Degrees available: M.S., Ph.D.
mak@medphys.mcgill.ca
http://www.medphys.mcgill.ca

University of Alberta - Cross Cancer Institute * ‹
Department of Medical Physics
11560 University Avenue
Edmonton, T6G 1Z2, Canada
Director: Gino Fallone, Ph.D.
Tel: (780) 432-8750/Fax: (780) 432-8615
Degrees available: M.Sc., Ph.D.
gino.fallone@cancerboard.ab.ca
http://med.phys.ualberta.ca/medphys/

University of British Columbia
Department of Physics and Astronomy
Medical Physics Program
6224 Agricultural Road
Vancouver, BC V6T 1Z1, Canada
Director: Alex Mackay, Ph.D.
Tel: (604) 822-6447 / Fax: (604) 822-5324
Degrees available: M.Sc., Ph.D.
mackay@physics.ubc.ca
http://www.physics.ubc.ca

University of Calgary - Tom Baker Cancer Centre
Department of Medical Physics
Tom Baker Cancer Centre
1331 - 29 Street NW
Calgary, AB T2N 4N2
Director, Peter B. Dunscombe, FCCPM, FAAPM

Tel: (403) 521-3789 / Fax: (403) 521-3327
peterdun@cancerboard.ab.ca
http://www.cancerboard.ab.ca/tbccmedphys/

University of California - Los Angeles *
The Departments of Radiological Sciences, Radiation Oncology, and Molecular and Medical Pharmacology
Biomedical Physics Interdepartmental Graduate Program
10833 LeConte Avenue, B2-049F CHS
Los Angeles, CA 90095-6948
Director: Michael F. McNitt-Gray, Ph.D.
Tel: (310) 825-7811 / Fax: (310) 825-7705
Degrees available: M.S., Ph.D.
mmcnittgray@mednet.ucla.edu
http://www.nuc.ucla.edu/bmp

University of Chicago
University of Chicago
Graduate Programs in Medical Physics
MC 2026
5841 S. Maryland Ave.
Chicago, IL 60637
Director: Maryellen L. Giger, Ph.D.
Tel: (773) 702-6154 / Fax: (773) 702-0371
Degrees available: Ph.D.
m-giger@uchicago.edu
http://medicalphysics.uchicago.edu/

University of Florida
Department of Nuclear & Radiological Engineering
202 Nuclear Science Building
Gainesville, FL 32611-8300
Director: David Hintenlang, Ph.D.
Tel: (352) 392-8112 / Fax (352) 392-3380
Degree available: M.S., Ph.D.
dhinten@ufl.edu
http://www.nuceng.ufl.edu

University of Kentucky Medical Center ‹
Radiation Sciences
900 South Limestone Street
Lexington, KY 40536-0200
Director: Ralph C. Christensen, Ph.D.
Tel: (859) 323-1100 X8-0847 / Fax (859) 323-6003
Degree available: M.S.
rcchri1@pop.uky.edu
(In email address - 1 is #1)

University of Manitoba - CancerCare Manitoba * ‹
Division of Medical Physics
675 McDermot Avenue
Winnipeg, MB R3E 0V9, Canada
Director: Stephen Pistorius, P.Phys., Ph.D.
Tel: (204) 787-2211 / Fax: (204) 775-1684
Degrees available: M.Sc., Ph.D.
stephen.pistorius@cancercare.mb.ca

graduate@cancercare.mb.ca
view website

University of Oklahoma Health Science Center Graduate Program in Medical Physics
Dept. of Radiological Sciences.
University of Oklahoma
1200 Everett Drive, CH-1 NP606
Oklahoma City, OK 73104
Director: J. R. Sonnad, PhD
Tel: (405) 271-8001 Ext: 52415 / Fax: 405-271-6404
jsonnad@ouhsc.edu

The University of Texas - Houston Health Science Center *‹
Graduate School of Biomedical Sciences
The University of Texas M. D. Anderson Cancer Center
Department of Radiation Physics - 56
1515 Holcombe Boulevard
Houston, TX 77030
Director: Ed Jackson, Ph.D.
Tel: (713) 745-1210 / Fax: (713) 563-2480
Degrees available: M.S., Ph.D.
gmoore@mdanderson.org
http://gsbs.gs.uth.tmc.edu/programs/medphys/

University of Texas HSC - San Antonio
Department of Radiology
7703 Floyd Curl Drive, Rm. 532E
San Antonio, TX 78229-3900
Director: Geoffrey D. Clarke, Ph.D., FACMP
Tel: (210) 567-5550 / Fax: (210) 567-5541
Degrees available: M.S., Ph.D.
clarkeg@uthscsa.edu
http://radsci.uthscsa.edu

University of Wisconsin *‹
Department of Medical Physics
1300 University Avenue
1530 Medical Sciences Center
Madison, WI 53706
Director: James A. Zagzebski
Tel: (608) 262-2171 / Fax: (608) 262-2413
Degrees available: M.S., Ph.D.
jazagzeb@facstaff.wisc.edu
http://www.medphysics.wisc.edu

Vanderbilt University School of Medicine
Departments of Radiology and Radiation Oncology
1301 22nd Ave. South, TVC B-902
Nashville, TN 37232-5671
Director: Charles W. Coffey, II, PhD
Tel: (615) 322-2555 Fax: (615) 343-0161
Degrees awarded: MS
charles.coffey@vanderbilt.edu
http://sitemason.vanderbilt.edu/msmp

Wayne State University ‹
Karmanos Cancer Institute
Department of Radiation Oncology
4100 John R. Street
Detroit, MI 48201
Director: Jay Burmeister, Ph.D.
Tel: (313) 745-2483 / Fax: (313) 966-2314
Degrees available: M.S., Ph.D.
burmeist@karmanos.org
http://www.med.wayne.edu/radonc/medphys

CAMPEP, Inc.
One Physics Ellipse
College Park, MD 20740
Phone 301-209-3346
Fax 301-209-0862
Send general questions to **campep_admin@campep.org**

Appendix I. Letters of Support from Faculty and Administration within TTU/HSC-SoM

SOUTHWEST CANCER
TREATMENT
AND RESEARCH
CENTER
UMC HEALTH SYSTEM

Southwest Cancer Treatment
and Research Center
602 Indiana Avenue
Lubbock, Texas 79415

p 806.775.8600
f 806.775.8602
teamumc.com

March 6, 2008

Jane Louise Winer, PhD
Dean, College of Arts & Sciences
Texas Tech University
Lubbock, TX 79409

Dear Dean Winer,

I am writing in support of the Doctor of Medical Physics teaching program.

We not only support the principle imparted by this program, but we want to emphasize the benefit it provides to Oncology in general and to the specialty of Radiation Oncology, in particular.

We are happy to participate in this program to the degree that the students will be welcome at this facility for the appropriate portion of their training as is consistent with the signed affiliation agreement and within our hospital's standard policies and procedures.

Thank you for the opportunity to be a part of this endeavor.

Sincerely,

Todd Cepica
Administrative Director

In Collaboration With
TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER

Appendix J. Vitas for Participating Faculty, Adjunct Faculty, and Selected Advisors to the DMP Program.

Listed Below:

Bloom, Elizabeth, M.D. Anderson, Houston, TX

Followill, David, M.D. Anderson, Houston, TX

Frank, Steven J., M. D. Anderson, Houston, TX

Ibbott, Geoffrey, M. D. Anderson, Houston, TX

Klein, Eric, Washington University, St. Louis, MO

Kubricht, William Samuel, Southwest Cancer Treatment and Research Center, Lubbock, TX

Mark, Rufus, Joe Arrington Cancer Center, Lubbock, TX

Nair, Murali, Joe Arrington Cancer Center, Lubbock, TX

Torres, Carlos P., Southwest Cancer Treatment and Research Center, Lubbock, TX

CURRICULUM VITAE

NAME **Elizabeth S. Bloom, M.D.**

PRESENT TITLE AND AFFILIATION

Primary Appointment

Assistant Professor, Department of Radiation Oncology, The University of Texas M. D. Anderson Cancer Center, Radiation Treatment Center at Bellaire

OFFICE ADDRESS

The University of Texas M. D. Anderson Cancer Center
Radiation Treatment Center at Bellaire
6602 Mapleridge Street
Houston Texas 77081
Phone: 713-745-6123
Fax: 713-745-2440
Email: ebloom@mdanderson.org

EDUCATION

Degree-Granting Education

Northwestern University Medical School
Honors Program in Medical Education
Undergraduate work, 09/1984 – 06/1986
Evanston, Illinois, B.S., 06/1988, Medicine
Medical School, 09/1986 – 06/1990
Chicago, Illinois, M.D., 06/1990

Postgraduate Training

Transitional Internship, Columbus-Cabrini Medical Center, Chicago, Illinois, 06/1990 –06/1991
Radiotherapy Residency, The University of Texas M. D. Anderson Cancer Center, Houston, Texas, 07/1991 -- 06/1995

CREDENTIALS

Board Certification

American Board of Radiology, certificate in Radiation Oncology, 06/1995
American Board of Radiology, recertification in Radiation Oncology, 10/2004

Licensure(s)

Active

Texas J0796, 03/1992

Inactive

Mississippi, 14697, 01/22/1996, 06/30/1999

PROFESSIONAL MEMBERSHIPS/ACTIVITIES

Professional Society Activities, with Offices Held

1. Society of Therapeutic Radiology and Oncology for the Gulf Coast, 1995 - 1996,
2. Secretary/Treasurer, 09/1995 - 08/1996
3. Mississippi State Medical Association, 1996 - 1999
4. Coast Counties Medical Society, 1996 - 1999
5. The University of Texas M. D. Anderson Associates, 1998 - present
6. Texas Radiological Society, 1992 - 1995, 2000 – present

EXPERIENCE/SERVICE

Academic Appointments

Assistant Professor, Department of Radiation Oncology, The University of Texas M. D. Anderson Cancer Center, Houston, Texas, 10/1999 – present

Assistant Professor, Department of Radiation Oncology, The University of Texas M. D. Anderson Cancer Center, Radiation Treatment Center at Bellaire, Houston, Texas, 12/1999 – present

Academic Administrative Appointments/Responsibilities (selected)

Chief Resident, Division of Radiation Oncology, The University of Texas M. D. Anderson Cancer Center, Houston, Texas, 01/1994 -- 12/1994

Creator and Chairperson, Keesler Medical Center, Oncology Journal Club, Keesler AFB, Mississippi, 12/1995 – 09/1996

HONORS AND AWARDS (selected examples)

Medical School

1. Air Force Health Professions Scholarship Program (four-year)
2. POW-MIA 5K Race 1st Place
3. Great Lakes Naval Hospital Swim Club 250-mile Award

4. Lackland Air Force Base Mileage Awards (Swimming)

Residency

Monetary donation to The University of Texas M. D. Anderson Cancer Center in my name, 01/1995

Military

Top Performer, Officer Training School (Military Indoctrination for Medical Service Officers), 07/1995

American College of Radiation Oncology (ACRO) Certificate for Continuing Medical Education, 03/1997

PUBLICATIONS

a. Articles in Peer-Reviewed Journals

Stroh EL, Besa PC, Cox JD, Fuller LM, Cabanillas FF. Treatment of Patients with Lymphomas of the Uterus or Cervix with Combination Chemotherapy and Radiation Therapy. *Cancer* 1995; 75: 2392-9

b. Invited Articles

Bloom ES. October Is Breast Cancer Awareness Month. *The Bellaire Buzz* 2002; OCT

RESEARCH

Protocol Participation (selected examples)

ID 2003-0819 "Randomized Trial of External Beam Radiation with or Without Short-course Hormonal Therapy in Intermediate Risk Prostate Cancer Patients" – 1 patient enrolled

Collaborator, ID 00-381 "A Phase III Intensity Modulated Radiotherapy Dose Escalation Trial for Prostate Cancer Using Hypofractionation"

CURRICULUM VITAE

David S. Followill, Ph.D.

PRESENT TITLE AND AFFILIATION

Primary Appointment

Associate Professor, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas

HOME ADDRESS

4518 Braeburn Dr.
Bellaire, Texas 77401
Phone: (713) 664-1563

OFFICE ADDRESS

The University of Texas M. D. Anderson Cancer Center
1515 Holcombe Blvd.
Unit Number: 547
Houston, Texas 77030
Room Number: GP1 3.300
Phone: (713) 745-8989
Fax: (713) 794-1364

EDUCATION

Degree-Granting Education

Texas A & M University, College Station, Texas, BS, 1981, Radiation Protection Engineering

Texas A & M University, College Station, Texas, MS, 1983, Nuclear Engineering (Health Physics Option)

University of Texas Health Science Center, Graduate School of Biomedical Sciences, Houston, Texas, PHD, 1991, Biophysics

Postgraduate Training

Post-doctorate, UT M. D. Anderson Cancer Center, Department of Radiation Physics, Houston, Texas, William Hanson, Ph.D., 7/1991−7/1992

CREDENTIALS

Board Certification

American Board of Radiology, Therapeutic Radiological Physics, 6/1995

Licensures

Active

Texas Board of Licensure for Professional Medical Physicists, Texas, MP0403, 11/1995−1/2009

EXPERIENCE/SERVICE

Academic Appointments

Radiation Safety Technician, Texas A & M University, College Station, Texas, 10/1979−9/1981

Health Physicist, Texas A & M University, College Station, Texas, 9/1981−5/1983

Radiation and Health Safety Coordinator, Texas Tech University, Lubbock, Texas, 6/1983−5/1985

Senior Research Assistant, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 6/1985−9/1985

Predoctoral Fellow, Department of Experimental Radiotherapy, UT M. D. Anderson Cancer Center, Houston, Texas, 8/1985−8/1991

Post-doctorate, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 8/1991−8/1992

Assistant Physicist, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 8/1992−9/1998

Assistant Professor, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 9/1998−8/2004

Associate Professor, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 9/2004−present

Administrative Appointments/Responsibilities

Assistant Director, Radiation Physics - Outreach, Radiological Physics Center, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 1994−2001

Associate Member of GSBS Faculty, UT M. D. Anderson Cancer Center, Houston, Texas, 1999−2004

Faculty Senator, UT M. D. Anderson Cancer Center, Houston, Texas, 2000−2003

Associate Director, Radiation Physics - Outreach, Radiological Physics Center, UT M. D. Anderson Cancer Center, Houston, Texas, 2001−present

Full Member, GSBS Faculty, UT M. D. Anderson Cancer Center, Houston, Texas, 2004−present

Faculty Senator, UT M. D. Anderson Cancer Center, Houston, Texas, 2006−present

Other Appointments/Responsibilities

Ex-officio Member, Radiation Oncology Committee, Children's Cancer Group, Houston, Texas, 1995−present

Ex-officio Member, Radiation Oncology Committee, National Surgical Adjuvant Breast Project, Pittsburgh, Pennsylvania, 1998−2001

Member, Steering Committee, Age-Related Member Degeneration Radiation Trial Research Group, Philadelphia, Pennsylvania, 1998−2002

Member, Quality Assurance Group, Age-Related Member Degeneration Radiation Trial Research Group, Philadelphia, Pennsylvania, 1998−2002

Member, Task Group 67 - Benchmark Data Set, American Association of Physicists in Medicine, College Park, Maryland, 2000−2003

Member, Physics Committee, American Society for Therapeutic Radiology and Oncology, Fairfax, Virginia, 2000−2005

Member, Executive Committee, QA Committee, Collaborative Ocular Melanoma Study (NCI, NEI), Baltimore, Maryland, 2001−2006

Member, Task Group 71 - Monitor Unit Calculations for Photon and Electron Beam Radiotherapy, American Association of Physicists in Medicine, College Park, Maryland, 2001−present

Member, Image Guided Radiation Therapy Committee, Radiation Therapy Oncology Group, Philadelphia, Pennsylvania, 2001−present

Member, Task Group 70 - TG-25 Revision for Electron Beam Dosimetry, American Association of Physicists in Medicine, College Park, Maryland, 2001−present

Member, Therapy Physics Commitee, Subcommittee on Treatment Planning Systems and Dosimetry, American Association of Physicists in Medicine, College Park, Maryland, 2005−present

Member, Therapy Physics Committee, American Association of Physicists in Medicine, College Park, Maryland, 2005−present

Member, Task Group 129 - Eye Plaque Dosimetry, American Association of Physicists in Medicine, College Park, Maryland, 2006−present

Member, Task Group 148 - Quality Assurance for Helical Tomotherapy, American Association of Physicists in Medicine, College Park, Maryland, 2006−present

Member, Committee 3 Task Group - Radiation Protection Issues of Modern Radiotherapy Techniques, International Commission on Radiological Protection, Stockholm, Sweden, 2006−present

Member, Therapy Physics Committee, American Association of Physicists in Medicine, College Park, Maryland, 2007−present

Consultantships

International Atomic Energy Agency, Vienna, Austria, Consultant, Project “Development of procedures for resolving discrepancies identified in the TLD dose quality audit programme”, 12/1997

International Atomic Energy Agency, Vienna, Austria, Consultant, Project “Development of procedures for dosimetry review visits at radiotherapy hospitals”, 9/1999−10/1999

International Atomic Energy Agency, Vienna, Consultant, Project “Development of a TLD based quality audit programme for radiotherapy dosimetry in non-reference conditions”, 6/2001

International Atomic Energy, Vienna, Austria, Consultant, Project "Finalizing the Document for Resolving Discrepancies in Clinical Dosimetry," 11/2005−12/2005

Institutional Committee Activities

Faculty Senate Education Committee, Member, 2000−2003

Continuing Medical Education Advisory Committee, Member, 2000−present

Medical Physics Program Steering Committee, Member, 2000−present

HONORS AND AWARDS

Dean's Honor List, Texas A&M University, 1978−1981

Freshman Men's Honor Society, Phi Eta Sigma, Texas A&M University, 1978

Nuclear Engineering Honor Society, Sigma Nu Epsilon, Texas A&M University, 1980

Graduated Magna Cum Laude, Texas A&M University, 1981

Rosalie B. Hite Fellowship, UT M. D. Anderson Cancer Center, GSBS, 1987−1988

GSBS Dean’s Excellence Award, UT M. D. Anderson Cancer Center, GSBS, 2002−2003

JACMP LAP Award for Excellence, JACMP, 2003

JACMP PTW Award for Excellence, JACMP, 2004

AAPM Fellow Award, AAPM, 2006

RESEARCH

Grants and Contracts (past 5 years)

Funded

Co-Investigator, 95%, Radiological Physics Center, CA10953, NIH/NCI, PI - Geoffrey Ibbott, Ph.D., 1/1/2005−12/31/2010, $15,893,032 ($2,648,839/year)

Co-Investigator, 5%, Advanced Technology Radiation Therapy Quality Assurance Review Consortium, CA 81647, Washington University, PI - Geoffrey Ibbott, Ph.D., 7/1/2007−6/30/2012, $409,901 ($81,980/year)

PUBLICATIONS

Articles in Peer-Reviewed Journals

1. Newman RA, Siddik ZH, Travis EL, Followill D, Ayele W, Burditt T, Krakoff IH. Assessment of pulmonary and hematologic toxicities of liblomycin, a novel bleomycin analog. Invest New Drugs 8:33-41, 2/1990.
2. Followill DS, Kester D, Travis EL. Histological changes in mouse colon after single- and split-dose irradiation. Radiat Res 136:280-8, 11/1993.
3. Followill DS, Travis EL. Differential expression of collagen types I and III in consequential and primary fibrosis in irradiated mouse colon. Radiat Res 144:318-28, 12/1995.
4. Followill D, Geis P, Boyer A. Estimates of whole-body dose equivalent produced by beam intensity modulated conformal therapy. Int J Radiat Oncol Biol Phys 38:667-72, 6/1997.
5. Followill DS, Davis DS, Hanson WF. TG-21 versus TG-25: a comparison for electrons. Med Phys 24:1117-21, 7/1997.
6. Tailor RC, Followill DS, Hanson WF. A first order approximation of field-size and depth dependence of wedge transmission. Med Phys 25:241-4, 2/1998.
7. Tailor RC, Chu C, Followill DS, Hanson WF. Equilibration of air temperature inside the thimble of a Farmer-type ion chamber. Med Phys 25:496-502, 4/1998.
8. Followill DS, Tailor RC, Tello VM, Hanson WF. An empirical relationship for determining photon beam quality in TG-21 from a ratio of percent depth doses. Med Phys 25:1202-5, 7/1998.
9. Tailor RC, Followill DS, Hanson WF. A generic approach for field-size and depth dependence of central-axis wedge transmission. Med Phys 25:241-4, 1998.
10. Ibbott GS, Nelson A, Followill DS, Balter P, Hanson WF. An Anthropomorphic Head and Neck Phantom for Evaluation of Intensity Modulated Radiation Therapy. Standards and Codes of Practice in Medical Radiation Dosimetry, Proceedings of an International Symposium, Vienna 2:209-217, 11/2002.
11. Gifford KA, Followill DS, Liu HH, Starkschall G. Verification of the accuracy of a photon dose-calculation algorithm. J Appl Clin Med Phys 3:26-45, 2002.
12. Nag S, Quivey JM, Earle JD, Followill D, Fontanesi J, Finger PT. The American Brachytherapy Society recommendations for brachytherapy of uveal melanomas. Int J Radiat Oncol Biol Phys 56:544-55, 6/2003.
13. Krintz AL, Hanson WF, Ibbott GS, Followill DS. A reanalysis of the Collaborative Ocular Melanoma Study Medium Tumor Trial eye plaque dosimetry. Int J Radiat Oncol Biol Phys 56:889-98, 7/2003.
14. Diener-West M, Albert DM, Frazier Byrne Sl, Davidorf FH, Followill DS, Green RL, Hawkins BS, Kaiser PK, Robertson DM, Straatsma BR. Comparison of Clinical, Echographic and Histopathologic Measurements from Eyes with Medium-Sized Choroidal Melanoma: in the Collaborative Ocular Melanoma Study. Archives of Ophthalmology 121:1163-1171, 2003.
15. Urie M, FitzGerald TJ, Followill D, Laurie F, Marcus R, Michalski J. Current calibration, treatment, and treatment planning techniques among institutions participating in the Children's Oncology Group. Int J Radiat Oncol Biol Phys 55:245-60, 2003.
16. Followill DS, Hanson WF, Ibbott GS, Eglezopoulos LR, Chui CS. Differences in electron beam dosimetry using two commercial ionization chambers and the TG-21 protocol: another reason to switch to TG-51. J Appl Clin Med Phys 4:124-31, 2003.

17. Followill DS, Stovall MS, Kry SF, Ibbott GS. Neutron source strength measurements for Varian, Siemens, Elekta, and General Electric linear accelerators. J Appl Clin Med Phys 4:189-94, 2003.
18. Tailor RC, Followill DS, Hernandez N, Ibbott GS, Hanson WF. Predictability of electron cone ratios with respect to linac make and model. J Appl Clin Med Phys 4:172-8, 2003.
19. Followill DS, Davis DS, Ibbott GS. Comparison of electron beam characteristics from multiple accelerators. Int J Radiat Oncol Biol Phys 59:905-10, 7/2004.
20. Marcus DM, Peskin E, Maguire M, Weissgold D, Alexander J, Fine S, Followill D. The age-related macular degeneration radiotherapy trial (AMDRT): one year results from a pilot study. Am J Ophthalmol 138:818-28, 11/2004.
21. Kry SF, Salehpour M, Followill DS, Stovall M, Kuban DA, White RA, Rosen II. Out-of-field photon and neutron dose equivalents from step-and-shoot intensity-modulated radiation therapy. Int J Radiat Oncol Biol Phys 62:1204-16, 7/2005.
22. Kry SF, Salehpour M, Followill DS, Stovall M, Kuban DA, White RA, Rosen II. The calculated risk of fatal secondary malignancies from intensity-modulated radiation therapy. Int J Radiat Oncol Biol Phys 62:1195-1203, 7/2005.
23. Molineu A, Followill DS, Balter PA, Hanson WF, Gillin MT, Huq MS, Eisbruch A, Ibbott GS. Design and implementation of an anthropomorphic quality assurance phantom for intensity-modulated radiation therapy for the Radiation Therapy Oncology Group. Int J Radiat Oncol Biol Phys 63:577-83, 10/2005.
24. Ibbott GS, Molineu A, Followill DS. Independent evaluations of IMRT through the use of an anthropomorphic phantom. Technol Cancer Res Treat 5:481-7, 10/2006.
25. Kry SF, Followill D, White RA, Stovall M, Kuban D, Salehpour M. Uncertainty of calculated risk estimates for secondary malignancies after radiotherapy. Int J Radiat Oncol Biol Phys 68:1265-1271, 4/2007.
26. Mann AL, Kim JE, Aberg T, Blair NP, Dierner-West M, Followill D, Gilson MM, Olsen KR, Hawkins BS. Incidence of cataract and outcomes after cataract surgery in the first 5 years after 125I brachytherapy in the COMS: COMS report No. 27. Opthalmology 114, Issue 7:1363-1371, 7/2007.
27. Kry SF, Titt U, Followill D, Ponisch F, Vassiliev ON, White RA, Stovall M, Salehpour M. A Monte Carlo model for calculating out-of-field dose from a high-energy photon therapy. Med Phys 34 (9):3489-3499, 9/2007.
28. Kry SF, Price M, Followill D, Mourtada F, Salehpour M. The use of Lif (TLD-100) as an out-of-field dosimeter. J Appl Clin Med Phys 8:4:169--175, 10/2007.
29. Davidson S, Ibbott G, Prado K, Dong L, Liao Z, Followill D. Accuracy of two heterogeneity dose calculation algorithms for IMRT in treatment plans designed using an anthropomorphic thorax phantom. Med Phys 34:1850-7, 2007.
30. Followill D, Evans-Radford D, Cherry C, Molineu A, Fisher G, Hanson WF, Ibbott G. Design, Development, and Implementation of the Radiological Physics Center's Pelvis and Thorax Anthropomorphic Quality Assurance Phantoms. Med Phys 34:2070-6, 2007.

Invited Articles

1. Michalski J, Purdy JA, Gaspar L, Souhami L, Ballow M, Bradley J, Chao CKS, Crane C, Eisbruch A, Followill D, Forster K, Fowler J, Gillin MT, Graham ML, Harms WB, Huq S, Kline RW, Langer M, Mackie TR, Mukherji S, Podgorsak EB, Roach M Ryu J, Sandler H, Schultz CJ, Schell M, Verhey LJ, Vicini F, Winter KA. Image-Guided Radiation Therapy Committee. Int. J. Radiation Oncology Biol. Phys 51:60-65, 2001.
2. Greven KM, Levenback C, Chao CK, Delaney T, Del Priore G, Eifel P, Erickson BA, Followill D, Gaffney D, Garcia M, Gerszten K, Grigsby P, Henderson R, Hricak H, Hsu J, Jhingrin A, Kaye A, Kudelka A, Lukka H, Mutch D, Nag S, Rotman M, Shefter T, Smith W, Stehman F, Souhami L, Wenzel L, Winter KA, Wolfson A. Radiation Therapy Oncology Group. Research Plan 2002-2006. Gynecology Cancer Working Group. Int J Radiat Oncol Biol Phys 51:58-9, 2001.

Editorials

N/A

Abstracts (more than 30 in past 5 years)

Book Chapters

1. Followill DS. Radiation Dosimetry Quality Assurance of Radiotherapy Facilities. In: Proceedings of the 1st Summer School of the Latin-American Association of Physicists in Medicine (ALFIM) and the AAPM International Affairs Subcommittee for Latinamerica. University of Chicago, IL, 2000.
2. Olch A, Kline R, Ibbott G, Followill D, Anderson J, Deye J, Fitzgerald T, Gillin M, Huq S, Palta J, Purdy J, Urie M. Quality Assurance for Clinical Trials: A Primer for Physicists. In: AAPM Report No. 86. Medical Physics Publishing, 37-44, 2004.

Books (edited and written)

1. Chavaudra J, Dutreix A, Followill DS, Georg D, Hanson W, Izewska J, Jarvinen H, Johansson KA, Mijnheer BJ, Nisbet A, Novotny J, Rosenwald JC, Sernbo G, Sipila P, Shortt K, Thwaites D, Van Dam J, Vatnitsky S, Venselaar J, Winkler P. On-site Visits to Radiotherapy Centres: Medical Physics Procedures. IAEA-TECDOC-1543. International Atomic Energy Agency: Vienna, Austria, 2007.

Manuals, Teaching Aids, Other Teaching Publications

1. Followill D, Tailor R, Hanson W. Wedge Transmission, A change in RPC Policy. AAPM Newsletter, September/October, 5-6, 1994.
2. Followill D, Hanson W. Brachytherapy source strengths: A safety issue revisited. AAPM Newsletter, January/February, 8, 1997.
3. Hanson W, Followill D. TG-51 Recommendations. AAMP Newsletter, January/February, 2000.
4. Followill D. There's Change in the Air (TG-21 to TG-51). AAPM Newsletter, January/February, 2000.
5. Followill D, Lowenstein J, Ibbott G. Quality Assurance: It's here to stay. AAPM Newsletter, January/February, 2003.

EDITORIAL AND REVIEW ACTIVITIES

Editor/Service on Editorial Board(s)

Associate Editor, Medical Physics, American Association of Physicists in Medicine, 1999−present

Journal Reviewer

Reviewer, Medical Physics, 1992−present

Reviewer, International Journal of Radiation Oncology, Biology, Physics, 2000−present

Reviewer, Physics and Medicine and Biology, 2000−present

Reviewer, Journal of Applied Clinical Medical Physics, 2003−present

TEACHING

Teaching Within Current Institution - The University of Texas M. D. Anderson Cancer Center

Formal Teaching

Courses Taught

Lecturer and Laboratory Instructor, Dosimetry of High Energy Electron X-ray Therapy Machines Short Course, UT M. D. Anderson Cancer Center, Course Hours: 7
1993−2001

Laboratory Instructor, External Beam Dosimetry - Principles and Calibrations Short Course, UT M. D. Anderson Cancer Center, Course Hours: 12
1993−2003

Lecturer, Interstitial and Intracavitary Dosimetry – Basic Methods and Calculations, UT M. D. Anderson Cancer Center, Course Hours: 2
2000−present

Course Director and Lecturer, Introduction to Physics and Administrative Aspects of Radiation Oncology for Administrative Staff Short Course, UT M. D. Anderson Cancer Center, Course Hours: 12
2000−present

Course Co-Director and Laboratory Coordinator, External Beam Dosimetry - Principles and Calibrations Short Course, UT M. D. Anderson Cancer Center, Course Hours: 17
2004−present

Teaching Outside of Current Institution

Formal Teaching

Courses Taught

Instructor, External Beam Calibration, IAEA, TG-21 and HPA Protocols, IAEA
1994−present

Instructor, Introduction to Radiation Protection, UT Health Science Center Graduate School of Biomedical Sciences, Course Hours: 4
1996−present

Instructor, Introduction to Medical Physics III: Therapy, UT Health Science Center Graduate School of Biomedical Sciences, Course Hours: 9
2001−2004

Course Co-Director and Instructor, Radiation Biology, UT Health Science Center Graduate School of Biomedical Sciences, Course Hours: 4
2002−present

Co-Coordinator and Lecturer, Quality Assurance of Physical and Technical Aspects in Radiotherapy, Argonne National Laboratories and the IAEA
1/2004

Co-Coordinator and Lecturer, Quality Assurance of Physicsl and Technical Aspects in Radiotherapy, Argonne National Laboratories and the IAEA
6/2005

Advisory Committees

Member, Advisory Committee (M.S.), Malcolm Heard, 2002−2005

Chairman, Advisory Committee (M.S.), Jason Shoales, 2003−2005

Member, Advisory Committee (M.S.), Claire Nerbun, 2003−present

Member, Advisory Committee (M.S.), Earl Gates, 2003−present

Member, Advisory Committee (M.S.), Kenneth Homan, 2003−present

Chairman, Advisory Committee (M.S.), Scott Davidson, 2004−present

Member, Advisory Committee (M.S.), Stephen Kry, 2004−present

Supervisory Committees

Member, Supervisory Committee (M.S.), Matthew Vossler, 1996−1998

Member, Supervisory Committee (M.S.), Kent Gifford, 1998−2001

Member, Supervisory Committee (M.S.), Christopher Cherry, 1998−2002

Chairman, Supervisory Committee (M.S.), Dee Ann Radford, 1999−2001

Chairman, Supervisory Committee (M.S.), Amanda Krintz, 2000−2002

Member, Supervisory Committee (M.S.), Michael Beach, 2001−2003

Member, Supervisory Committee (M.S.), Stephen Kry, 2002−2003

Chairman, Supervisory Committee (M.S.), Gary Fisher, 2002−2004

Member, Supervisory Committee (M.S.), Malcolm Heard, 2002−2005

Chairman, Supervisory Committee (M.S.), Jason Shoales, 2003−2005

Member, Supervisory Committee (M.S.), Caire Nerbun, 2003−present

Member, Supervisory Committee (M.S.), Earl Gates, 2003−present

Member, Supervisory Committee (M.S.), Kenneth Homan, 2003−present

CONFERENCES AND SYMPOSIA

Presentations at National or International Conferences

Invited

Radiation Dosimetry QA of Radiotherapy Facilities, AAPM, Chicago, Illinois, 7/2000

Radiological Physics Center: RADS Database, American Association of Physicists in Medicine Annual Meeting / World Congress of Medical Physics 2000, Chicago, Illinois, 7/2000

Dosimetry Physics: IAEA Protocol RS 398 and Quality Assurance in External Beam Raidation Therapy, a Theoretical to Practical Course, Society of Medical Physics of Nuevo Leon, Monterey, Mexico, 12/2003

Collaboration in International Quality Assurance: The Radiological Physics Center, International Society of Intra-operative Radiation Therapy, Miami, Florida, 3/2005

Determination and Treatment of Targets in Radiation Therapy: Application of New Technologies, Society of Medical Physics of Nuevo Leon, Monterey, Mexico, 12/2005

Radiological Physics Center Activities and the Credentialing Process, RTOG, Research Associates Panel Presentation, Toronto, Canada, 6/2006

Radiological Physics Center Activities: The State of Radiotherapy, AAPM, Northeast Chapter, New Castle, New Hampshire, 6/2006

Acceptance Testing and Commissioning Measurements for Linear Accelerators, Society of Medical Physics of Nuevo Leon, Monterey, Mexico, 11/2006

Heterogeneity and Quality Assurance, Stereotactic Body Radiation Therapy: Starting a Clinical Program, Dallas, Texas, 5/2007

Seminar Invitations from Other Institutions

Radiological Physics Center:A Quality Assurance Resource for Clinical Trials and Radiation Oncology, Aptium Best Practice Conference, Palo Alto, California, 2005

Secondary Dose Equivalent from IMRT Treatments and Risk Estimates, Memorial Sloan Kettering Cancer Center, New York, New York, 1/2006

Photon Beam Commissioning Measurements, Massachusetts General Hospital, Boston, Massachusetts, 4/2007

Lectureships and Visiting Professorships

International Atomic Energy Agency Technical Cooperation Expert, Nacional Institute of Nuclear Investigations, Mexico City, Mexico, 2/1995

International Atomic Energy Agency Technical Cooperation Expert, Nacional Institute of Nuclear Investigations, Mexico City, Mexico, 10/1995

International Atomic Energy Agency Technical Cooperation Expert, Nacional Institute of Nuclear Investigations, Mexico City, Mexico, 11/1998

Lecturer, Society of Medical Physicists in Nuevo Leon, Monterey, Mexico, 12/2003

Lecturer, Society of Medical Physicists in Nuevo Leon, Monterey, Mexico, 12/2006

Other Presentations at State and Local Conferences

Tele-conference Lecture Series, UTHSC Graduate School of Biomedical Sciences/ U.T. Pan American University, UTHSC Graduate School of Biomedical Sciences, Houston, Texas, 2003

PROFESSIONAL MEMBERSHIPS/ACTIVITIES

Professional Society Activities, with Offices Held

National and International

Health Physics Society, South Texas Chapter

Member, 1984−present

National Health Physics Society

Member, 1984−present

American Association of Physicists in Medicine

Member, 1991−present

American Association of Physicists in Medicine, Southwest Chapter

Member, 1991−present

American College of Medical Physics

Member, 1992−2002

American Society of Therapeutic Radiologists and Oncologists

Member, 2000−present

American Brachytherapy Society

Member, 2002−2003

Radiation Research Society

Member, 2006−present

UNIQUE ACTIVITIES

1. Reviewed and provided detailed results of dosimetry review visits to the following radiotherapy physics facilities: **(1991)** University of New Mexico, (Albuquerque, NM), Nevada Radiation Oncology Center, (Las Vegas, NV), Natalie Warren Bryant Cancer Center (Tulsa, OK), **(1992)** University of West Virginia (Morgantown, WVA), Medical University of South Carolina (Charleston, SC), Catawba Memorial Hospital (Hickory, NC), Presbyterian Hospital, Charlotte (NC), St. Luke's Hospital (Milwaukee, WI), Rex Cancer Center (Raleigh, NC), Moses H. Cone Memorial Hospital (Greensboro, NC), **(1993)** St. Rita's Medical Center (Lima, OH), Mercy Hospital (Port Huron, MI), Bowman Gray School of Medicine (Winston Salem, NC), Gundersen Clinic (LaCrosse, WI), St. Joseph Hospital (Marshfield, WI), M. D. Anderson Cancer Center (Houston, TX), Iowa Methodist Medical Center (Des Moines, IA), Lexington Radiation Therapy Center (Lexington, KY), Mansfield General Hospital (Mansfield, OH), Bloomington Hospital (Bloomington, IN),

Munson Medical Center (Traverse City, MI), Memorial Mission Hospital (Asheville, NC), Memorial Sloan Kettering Cancer Center (New York, NY), **(1994)** Moncreif Radiation Center (Fort worth, TX), Georgetown University Medial Center (Washington, DC), Northside Oncology (Atlanta, GA), St. Joseph's Hospital (Atlanta, GA), Emory Clinic (Atlanta, GA), Genessee Hospital (Rochester, NY), Lexington Radiation Center (Lexington, KY), Scott and White Hospital (Temple, TX), Univ. of Texas Medical Branch (Galveston, TX) **(1995)** Presbyterian Hospital (Dallas, TX), Bayfront Medical Center (Tampa, FL), Lee Moffitt Cancer Center (Tampa, FL) Sir Charles Gairdner Hospital (Nedlands, W. Australia), Passavant Cancer Center (Pittsburg, PA), Jamieson Memorial Hospital (New Castle, PA), Sacred Heart Hospital (Spokane, WA), North Iowa Mercy Health Center (Mason City, IA), Riverside Regional Medical Center (Newport News, VA), Polyclinic Hospital (Harrisburg, PA), **(1996)** Huntsville Hospital (Huntsville, AL), Overton V.A. Medical Center (Shreveport, LA), North Radiation Therapy Center (Robbinsdale, MN), Bergan Mercy Medical Center (Omaha, NE), Memorial Hospital Regional Radiation Oncology Center (Hollywood, FL), St. John's Mercy Medical Center (St. Louis, MO), Greenville Hospital System (Greenville, SC), Emory Clinic (Atlanta, GA), VA Hospital (Albany, NY), Albany Medial Center Hospital (Albany, NY), **(1997)** John B. Amos Cancer Center (Columbus, GA), Johns Hopkins University (Baltimore, MD), Parkland Hospital (Dallas, TX), Huguley MDACC (Ft. Worth, TX), Walter Reed Army Hospital (Washington, DC), SUNY Health Science Center (Syracuse, NY), CNY Radiation Oncology (Syracuse, NY), Presbyterian Hospital (Charlotte, NC), Carolinas Medical Center (Charlotte, NC), **(1998)** Mount Sinai – NY Hospital (New York, NY), Fox Chase Cancer Center, Philadelphia, PA), British Columbia Cancer Agency (Vancouver, BC, Canada), Mobile Infirmary Medical Center (Mobile, AL), Mallinckrodt Institute (St. Louis), Washington Hospital Center (Washington, DC), **(1999)** Catawba Memorial Hospital (Hickory, NC), Dallas VA Medical Center (Dallas TX), St. Vincent's Medical Center (Jacksonville, FL), Florida Cancer Center (Jacksonville, FL), West Bank Radiation Center (Minneapolis, MN), Mercy Cancer Center (Minneapolis, MN), Moore Regional Hospital (Pinehurst, NC), **(2000)** St. Mary's Medical Center (Philadelphia, PA); South Jersey Hospital System (Millville, NJ); Maine Medical Center (Portland, ME), Covenant Cancer Center (Waterloo, IA), University of California (San Francisco, CA), **(2001)** Moses H. Cane Memorial Hospital (Greensboro, NC), Forsyth Regional Cancer Center (Winston - Salem, NC), Morehead Memorial Hospital (Eden, NC), at Methodist Cancer Center (St. Louis Park, MN), St. Luke's Medical Center (Milwaukee, WI), Univ. of Vermont, Fletcher Allen Health Care Center (Burlington, VT), St. Luke's Cancer Center (Bethlehem, PA), Univ. of Minnesota (Minneapolis, MN), Fairview Southdale Medical Center (Minneapolis, MN), **(2002)** Naval Medical Center (Portsmouth, VA), Emory Clinic (Atlanta, GA), Grady Memorial Hospital (Atlanta, GA), Stanford University (Palo Alto, CA), Santa Clara Valley Center (San Jose, CA), Mayo Clinic (Rochester, MN), Allegheny Hospital (Pittsburgh, PA), Fox Chase Cancer Center (Philadelphia, PA), **(2003)** Central Wisconsin Cancer Program (Fond du Lac, WI), Cancer Center of Northern Wyoming (Sheridan, WY), Apple Hill Medical Center (York, PA), Cherry Tree Cancer Center (Hanover, PA), **(2004)** Mallinckrodt Institute of Radiology – Washington University in St. Louis (St. Louis, MO), London Regional Cancer Center (London, Ontario, Canada), Christiana Care Health Services (Newark, DE), CentraCare Health System (St. Cloud, MN), **(2005)** Harper Hospital (Detroit, MI), University of Iowa (Des Moines, IA), Mayo Clinic (Rochester, MN), **(2006)** Cancer Therapy and Research Center (San Antonio, TX), Cancer Center of the Carolinas (Greenville, SC), Hillcrest Medical Center (Tulsa, OK), Juravinski Cancer Center (Hamilton, Ontario, Canada), **(2007)** Swedish Cancer Institute – First Hill (Seattle, WA).

DATE OF LAST CV UPDATE

3/4/2008 4:31:31 PM

Stephen Jay Frank

Assistant Professor, Department of Radiation Oncology
The University of Texas M. D. Anderson Cancer Center, Houston, Texas

M. D. degree, 2000, Emory University School of Medicine, Atlanta, Georgia
Field of Study: Medicine

Positions and Honors.

Postgraduate Training

1991-1996 Nuclear Engineer, United States Nuclear Propulsion Program, Washington DC
2000-2001 Internship in Internal Medicine, Emory University, Atlanta, GA
2001-2005 Residency in Radiation Oncology, The University of Texas M.D. Anderson Cancer Center, Houston, TX

Credentials:

Board Certification:
2006 American Board of Radiology-Board Certification Radiation Oncology

Licensure(s)
Texas: L3648

Academic Appointments:

2005 – Present: Assistant Professor, Division of Radiation Oncology, the University of Texas M.D. Anderson Cancer Center, Houston, TX

Military Service:

U.S. Navy, Lieutenant, Active Duty 1991-1996

Honors: (selected examples)

2002 Berlex Oncology Foundation Award
2002 Fletcher Society Resident Research Award
2002 RSNA Research Trainee Award
2003 MD Anderson Resident Research Travel Grant
2003 Texas Radiological Society Outstanding Resident Presentation Award
2004 Seattle Prostate Institute Brachytherapy Fellowship
2004 ASTRO Radiation Physics Committee
2004 American College of Radiology Council Steering Committee
2005 3rd International IMRT Treatment Planning Conference Travel Award

A. Selected peer-reviewed publications (in chronological order).

Frank, S. J., P. D. Frimm, J. D. Sylvester, G. S. Merrick, B. J. Davis, A. Zietman, B. J. Moran, D. C. Beyer, M Roach, D. H. Clarke, R. G. Stock, L. W. Robert, J. M. Michalski, K. E. Wallner, M Hurwitz, L. Potters, D. A. Kuban, B. R. Prestidge, R.

Vera, S. Hathaway, and J. C. Blasko. 2006. Interstitial implant alone or in combination with external beam radiation therapy for intermediate-risk prostate cancer: A survey of practice patterns in the United States. Brachytherapy 6(1):2-8.

Lee, A. K., and **S. J. Frank**. 2006. Update on radiation therapy in prostate cancer. Hematol Oncol. Clin. North Am. 20(4):857-878.

Frank, S. J., K. S. Chao, D. L. Schwartz, and R. S. Weber. 2005. Apisarnthanarax S, Macapinlac HS Technology insight: PET and PET/CT in head and neck tumor staging and radiation therapy planning. Nat. Clin. Pract. Oncol. 2(10):526-533.

Jagsi, R., D. A. Buck, A. K. Singh, M. Engleman, V. Thakkar, **S. J. Frank**, and D. Flynn. 2005. Results of the 2003 Association of Residents in Radiation Oncology (ARRO) surveys of residents and chief residents in the United States. Int. J. Radiat. Oncol. Biol. Phys. 61(3):642-648.

Frank, S. J., A. Jhingran, C. Levenback, and P. J. Eifel. 2005. Definitive treatment of invasive squamous cell carcinoma of the vagina with radiation therapy. Int. J. Radiat. Oncol. Biol. Phys. 62(1):138-147.

CURRICULUM VITAE

Geoffrey S. Ibbott, Ph.D.

PRESENT TITLE AND AFFILIATION

Primary Appointment

Professor and Chief, Section of Outreach Physics, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas

Chief, Section of Outreach Physics, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas

HOME ADDRESS

3329 Harbour Breeze Lane
Pearland, Texas 77584
Phone: (281) 412-4301

OFFICE ADDRESS

The University of Texas M. D. Anderson Cancer Center
1515 Holcombe Blvd.
Unit Number: Unit 547
Houston, Texas 77030
Room Number: GPI 3.300
Phone: 713) 745-8989
Fax: (713) 794-1364

EDUCATION

Degree-Granting Education

University of Colorado, Denver, Colorado, BA, 1979, Physics

University of Colorado Health Sciences Center, Denver, Colorado, MS, 1981, Medical Physics

Colorado State University, Ft. Collins, Colorado, PHD, 1993, Radiation Biology

CREDENTIALS

Board Certification

American Board of Radiology, Therapeutic Radiological Physics, 6/1983

American Board of Radiology, Diagnostic and Medical Nuclear Physics, 6/1994

Licensures

Active

Texas Board of Licensure for Professional Medical Physicists, Texas, MP0491, 2/2006-3/2008

EXPERIENCE/SERVICE

Academic Appointments

Lab Assistant, University of Colorado Medical Center, Denver, Colorado, 5/1968-6/1970

Student Trainee, Oak Ridge Associated Universities, Oak Ridge, Tennessee, 6/1970-9/1970

Lab Technician, University of Colorado Health Sciences Center, Denver, Colorado, 9/1970-6/1974

Instructor, Community College of Denver, Denver, Colorado, 9/1973-5/1977

Medical Physicist, Department of Radiology, University of Colorado Health Sciences Center, Denver, Colorado, 7/1974-8/1990

Affiliate Faculty, Department of Radiology and Radiation Biology, Colorado State University, Fort Collins, Colorado, 9/1982-3/1986

Senior Instructor, Department of Radiology, University of Colorado Health Science Center, Denver, Colorado, 7/1985-8/1990

Radiological Physicist, Department of Therapeutic Radiology, Yale-New Haven Hospital, New Haven, Connecticut, 9/1990-3/1993

Lecturer, Department of Therapeutic Radiology, Yale University School of Medicine, New Haven, Connecticut, 7/1991-3/1993

Assistant Professor and Director of Physics, Department of Radiation Medicine, Radiation Sciences, University of Kentucky Medical Center, Lexington, Kentucky, 3/1994-12/1997

Associate Professor and Director of Physics, Department of Radiation Medicine, Division of Radiation Sciences, University of Kentucky Medical Center, Lexington, Kentucky, 7/1998-12/2000

Associate Professor and Chief, Section of Outreach Physics, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 1/2001-8/2005

Professor and Chief, Section of Outreach Physics, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 9/2005-present

Administrative Appointments/Responsibilities

Director of Physics, The University of Kentucky Medical Center, Lexington, Kentucky, 3/1994-12/2000

Chief, Section of Outreach Physics, Department of Radiation Physics, Division of Radiation Oncology, UT M. D. Anderson Cancer Center, Houston, Texas, 1/2001-present

Other Appointments/Responsibilities

Member, Radiation Therapy Committee, American Association of Physicists in Medicine, College Park, Maryland, 1976-1979

Member, Professional Information and Clinical Relations Committee, American Association of Physicists in Medicine, College Park, Maryland, 1980-1983

Member, Hyperthermia Committee, American Association of Physicists in Medicine, College Park, Maryland, 1983-1986

Member, Professional Council, American Association of Physicists in Medicine, College Park, Maryland, 1983-1986

Chair, Committee of Academic Program Directors, American Association of Physicists in Medicine, College Park, Maryland, 1985-1986

Member, Education Council, American Association of Physicists in Medicine, College Park, Maryland, 1987-1990

Member, Program Committee, American Association of Physicists in Medicine, College Park, Maryland, 1989-1991

Member, Federal Legislative Oversight Committee, American Society for Therapeutic Radiology and Oncology, Fairfax, Virginia, 1991-1996

Member, Government and Public Relations Committee, Commission on Radiation Oncology, American College of Radiology, Reston, Virginia, 1991-1997

Member, Committee on Research and Technology Assessment, Commission on Radiation Oncology, American College of Radiology, Reston, Virginia, 1993-1996

Chair, Professional Council, American Association of Physicists in Medicine, College Park, Maryland, 1993-1997

Member, Program Committee, American Association of Physicists in Medicine, College Park, Maryland, 1993-1997

Member, Committee on Coding and Nomenclature, Commission on Economics, American College of Radiology, Reston, Virginia, 1993-1999

Member, Committee on Radiologist Resources, Commission on Human Resources, American College of Radiology, Reston, Virginia, 1993-2000

Member, Commission on Medical Physics, American College of Radiology, Reston, Virginia, 1993-2002

Member, Committee on Quality Assurance, Commission on Standards and Accreditation, American College of Radiology, Reston, Virginia, 1995-2001

Chair, Subcommittee on Accreditation of Regional Calibration Laboratories, American Association on Physicists in Medicine, College Park, Maryland, 1996-2000

Member, Executive Committee, American Association of Physicists in Medicine, College Park, Maryland, 1998-2000

Member, Outcomes Research Committee, American Society for Therapeutic Radiology and Oncology, Fairfax, Virginia, 1998-2000

Member, Compliance Committee, American Society for Therapeutic Radiology and Oncology, Fairfax, Virginia, 1999-2000

President, American Association of Physicists in Medicine, College Park, Maryland, 1999-2000

Member, Subcommittee on Dosimetry of Low-Energy Brachytherapy Sources, American Association of Physicists in Medicine, College Park, Maryland, 1999-present

Member, Joint ACR/ASTRO Committee on Economics, American College of Radiology, Reston, Virginia, 2000-2001

Member, Practice Expense Advisory Committee, American Society for Therapeutic Radiology and Oncology, Fairfax, Virginia, 2000-2001

Chair, Board of Directors, American Association of Physicists in Medicine, College Park, Maryland, 2000-2001

Chair, Government and Public Relations Committee, Commission on Medical Physics, American College of Radiology, Reston, Virginia, 2000-2002

Chair, Subcommittee on QA Physics of Cooperative Trials, American Association of Physicists in Medicine, College Park, Maryland, 2001-present

Member, Radiation Therapy Committee, American Association of Physicists in Medicine, College Park, Maryland, 2001-present

Member, Newsletter Editorial Board, American Association of Physicists in Medicine, College Park, Maryland, 2001-present

Member, Subcommittee on Accreditation of Regional Calibration Laboratories, American Association of Physicists in Medicine, College Park, Maryland, 2001-present

President, Council on Ionizing Radiation Measurements and Standards, Duluth, Georgia, 2002-2003

Member, Scientific Program Committee, Physics Subcommittee, Radiological Society of North America, Oak Brook, Illinois, 2002-2004

Member, Government Relations Committee, American Society for Therapeutic Radiology and Oncology, Fairfax, Virginia, 2002-present

Member, Nominating Committee, American Association of Physicists in Medicine, College Park, Maryland, 2004-2005

Member, Council Steering Committee, American College of Radiology, Reston, Virginia, 2004-present

Member, Government and Regulatory Affairs Committee, American Association of Physicists in Medicine, College Park, Maryland, 2004-present

Member, Refresher Course Committee, Radiological Society of North America, Oak Brook, Illinois, 2004-present

Member, Commission on Medical Physics, American College of Radiology, Fairfax, Virginia, 2006-present

Consultantships

Food and Drug Administration, Rockville, MD, Member and Consultant, Medical Advisory Committee, Radiological Devices Panel, 2000-2009

Institutional Committee Activities

Faculty Senate, Member, 2003-2006

GSBS Medical Physics Steering Committee, Member, 2004-present

HONORS AND AWARDS

Freshman Science Award, Willamette University, 1968

Memorial Award for Professional Achievement, Health Physics Society, Central Rocky Mountain Chapter, 1973

Elected Fellow, American Association of Physicists in Medicine, 1996

Farrington-Daniels Award for Best Paper, American Association of Physicists in Medicine, 1997

Elected Fellow, American College of Radiology, 1998

Distinguished Service Award, American Board of Radiology, 2003

Award for Excellence for the Best Basic Dosimetry Paper (as co-author), PTW, 2004

LAP Award for Excellence for the Best Radiation Oncology Paper (as co-author), American College of Medical Physics, 2004

Outstanding Achievement Award in the Practice of Medical Physics, M. D. Anderson Cancer Center, Department of Radiation Physics, 2006

Who's Who in America, 60th ed., Marquis Who's Who, 2006

Who's Who in Medicine and Healthcare, 6th ed., Marquis Who's Who, 2006

Who's Who in Science and Engineering, 9th ed., Marquis Who's Who, 2006

Who's Who in the World, 24th ed., Marquis Who's Who, 2006

Who's Who in Science and Engineering, 10th ed., Marquis Who's Who, 2008

RESEARCH

Grants and Contracts (past 5 years)

Funded

Principal Investigator, 63%, The Radiological Physics Center, CA10953, NIH, 1/1/2005-12/31/2010, $15,893,032 ($2,648,839/year)

Principal Investigator, 5%, Advanced Technology Radiation Therapy Quality Assurance Review Consortium, 2 U24 CA081647, Washington University, 7/1/2007-6/30/2012, $409,901 ($81,980/year)

Protocols

Funded

Principal Investigator, Dosimetry Related to Inter-institutional Clinical Trials, LAB90-016, 2007-2008

PUBLICATIONS

Articles in Peer-Reviewed Journals (More than 70; Last 5 years follow)

44. Krintz AL, Hanson WF, Ibbott GS, Followill DS. A reanalysis of the Collaborative Ocular Melanoma Study Medium Tumor Trial eye plaque dosimetry. Int J Radiat Oncol Biol Phys 56:889-98, 7/2003
45. Followill DS, Hanson WF, Ibbott GS, Eglezopoulos LR, Chui CS. Differences in electron beam dosimetry using two commercial ionization chambers and the TG-21 protocol: another reason to switch to TG-51. J Appl Clin Med Phys 4:124-31, 2003
46. Followill DS, Stovall MS, Kry SF, Ibbott GS. Neutron source strength measurements for Varian, Siemens, Elekta, and General Electric linear accelerators. J Appl Clin Med Phys 4:189-94, 2003
47. Tailor RC, Followill DS, Hernandez N, Ibbott GS, Hanson WF. Predictability of electron cone ratios with respect to linac make and model. J Appl Clin Med Phys 4:172-8, 2003
48. Cho SH, Ibbott GS. Reference photon dosimetry data: a preliminary study of in-air off-axis factor, percentage depth dose, and output factor of the Siemens Primus linear accelerator. J Appl Clin Med Phys 4:300-6, 2003
49. Tailor RC, Hanson WF, Ibbott GS. TG-51: experience from 150 institutions, common errors, and helpful hints. J Appl Clin Med Phys 4:102-11, 2003
50. DeWerd LA, Huq MS, Das IJ, Ibbott GS, Hanson WF, Slowey TW, Williamson JF, Coursey BM. Procedures for establishing and maintaining consistent air-kerma strength standards for low-energy, photon-emitting brachytherapy sources: recommendations of the Calibration Laboratory Accreditation Subcommittee of the American Association of Physicists in Medicine. Med Phys 31:675-81, 3/2004
51. Rivard MJ, Coursey BM, DeWerd LA, Hanson WF, Huq MS, Ibbott GS, Mitch MG, Nath R, Williamson JF. Update of AAPM Task Group No. 43 Report: A revised AAPM protocol for brachytherapy dose calculations. Med Phys 31:633-74, 3/2004
52. Followill DS, Davis DS, Ibbott GS. Comparison of electron beam characteristics from multiple accelerators. Int J Radiat Oncol Biol Phys 59:905-10, 7/2004
53. Nag S, Cardenes H, Chang S, Das IJ, Erickson B, Ibbott GS, Lowenstein J, Roll J, Thomadsen B, Varia M. Proposed guidelines for image-based intracavitary brachytherapy for cervical carcinoma: report from Image-Guided Brachytherapy Working Group. Int J Radiat Oncol Biol Phys 60:1160-72, 11/2004
54. Bencomo JA, Chu C, Tello VM, Cho SH, Ibbott GS. Anthropomorphic breast phantoms for quality assurance and dose verification. J Appl Clin Med Phys 5:36-49, 2004
55. Williamson JF, Butler W, Dewerd LA, Huq MS, Ibbott GS, Mitch MG, Nath R, Rivard MJ, Todor D. Recommendations of the American Association of Physicists in Medicine regarding

the impact of implementing the 2004 task group 43 report on dose specification for 103Pd and 125I interstitial brachytherapy. Med Phys 32:1424-39, 5/2005
56. Gifford KA, Horton JL, Jr, Jackson EF, Steger TR, 3rd, Heard MP, Mourtada F, Lawyer AA, Ibbott GS. Comparison of Monte Carlo calculations around a Fletcher Suit Delclos ovoid with radiochromic film and normoxic polymer gel dosimetry. Med Phys 32:2288-94, 7/2005
57. Molineu A, Followill DS, Balter PA, Hanson WF, Gillin MT, Huq MS, Eisbruch A, Ibbott GS. Design and implementation of an anthropomorphic quality assurance phantom for intensity-modulated radiation therapy for the Radiation Therapy Oncology Group. Int J Radiat Oncol Biol Phys 63:577-83, 10/2005
58. Halvorsen PH, Das IJ, Fraser M, Freedman DJ, Rice RE, 3rd, Ibbott GS, Parsai EI, Robin TT, Jr, Thomadsen BR. AAPM Task Group 103 report on peer review in clinical radiation oncology physics. J Appl Clin Med Phys 6:50-64, 2005
59. Guerrero T, Zhang G, Segars W, Huang TC, Bilton S, Ibbott G, Dong L, Forster K, Lin KP. Elastic image mapping for 4-D dose estimation in thoracic radiotherapy. Radiat Prot Dosimetry 115:497-502, 2005
60. Cho SH, Vassiliev ON, Lee S, Liu HH, Ibbott GS, Mohan R. Reference photon dosimetry data and reference phase space data for the 6 MV photon beam from varian clinac 2100 series linear accelerators. Med Phys 32:137-48, 2005
61. Minniti R, Chen-Mayer H, Seltzer SM, Huq MS, Bryson L, Slowey T, Micka JA, DeWerd LA, Wells N, Hanson WF, Ibbott GS. The US radiation dosimetry standards for 60Co therapy level beams, and the transfer to the AAPM accredited dosimetry calibration laboratories. Med Phys 33:1074-7, 4/2006
62. Tailor RC, Hanson WF, Wells N, Ibbott GS. Consistency of absorbed dose to water measurements using 21 ion-chamber models following the AAPM TG51 and TG21 calibration protocols. Med Phys 33:1818-28, 6/2006
63. Randall ME, Ibbott GS. Intensity-modulated radiation therapy for gynecologic cancers: pitfalls, hazards, and cautions to be considered. Semin Radiat Oncol 16:138-43, 7/2006
64. Gillin MT, Dunning BF, Lawton CA, Foley WD, Byhardt RW, Morton G, Baikadi M, Pisansky TT, Michalski JM, Ibbott G, Lopez F. Quality assurance methods for the first Radiation Therapy Oncology Group permanent prostate implant protocol. Brachytherapy 5:152-6, 7/2006
65. Timmerman R, Galvin J, Michalski J, Straube W, Ibbott G, Martin E, Abdulrahman R, Swann S, Fowler J, Choy H. Accreditation and quality assurance for Radiation Therapy Oncology Group: Multicenter clinical trials using stereotactic body radiation therapy in lung cancer. Acta Oncologica 45:779-86, 9/2006
66. Ibbott GS, Molineu A, Followill DS. Independent evaluations of IMRT through the use of an anthropomorphic phantom. Technol Cancer Res Treat 5:481-7, 10/2006
67. Li Z, Das RK, Dewerd LA, Ibbott GS, Meigooni AS, Perez-Calatayud J, Rivard MJ, Sloboda RS, Williamson JF. Dosimetric prerequisites for routine clinical use of photon emitting brachytherapy sources with average energy higher than 50 Kev. Med Phys 34:37-40, 1/2007
68. Davidson SE, Ibbott GS, Prado KL, Dong L, Liao Z, Followill DF. Accuracy of two heterogeneity dose calculation algorithms for IMRT in treatment plans designed using an anthropomorphic thorax phantom. Med Phys 34:1850-7, 5/2007
69. Followill D, Radford DA, Cherry C, Molineu A, Fisher G, Hanson WF, Ibbott GS. Design, development, and implementation of the Radiological Physics Center's pelvis and thorax anthropomorphic quality assurance phantoms. Med Phys 34:2070-6, 5/2007
70. Frey GD, Ibbott GS, Morin RL, Paliwal BR, Thomas SR, Bosma J. The American Board of Radiology perspective on maintenance of certification: Part IV: Practice quality improvement in radiologic physics. Medical Physics, 10/2007
71. Ibbott GS, Followill DS, Molineu HA, Lowenstein JR, Alvarez PE, Roll JE. Challenges in Credentialing Institutions and Participants in Advanced Technology Multi-institutional Clinical Trials. Int J of Radiat Oncol Biol Phys. In Press
72. Ibbott GS, Hanson WF, Martin E, Kuske RR, Arthur D, Rabinovitch R, White J, Wilenzick RM, Harris I, Tailor RC. Dose specification and quality assurance of RTOG protocol 95-17; a cooperative group study of 192lr breast implants as sole therapy. Int J of Radiat Oncol Biol Phys. In Press

Invited Articles

1. Thrall DE, Ibbott GS. Physics and treatment planning. Semin Vet Med Surg (Small Anim) 10:135-47, 8/1995.
2. Ibbott GS, Hevezi JM. Reimbursement for high dose rate brachytherapy should be based on the number of dwell positions of the source during treatment. Med. Phys. 26:347-9, 3/1999.
3. Chaney E, Ibbott G, Hendee WR. Methods for image segmentation should be standardized and calibrated. Med Phys 32:3507-10, 12/2005.
4. Morin RL, Ibbott GS. The medical physics consult - gel dosimetry. J of the Amer College of Radiol 3:144-6, 2/2006.

Other Articles

1. Ibbott G, Maryanski M, Drogin A, Gearheart D, Painter T, Meigooni A. Characterization of a New Brachytherapy Source by BANG® Gel Dosimetry. DosGel 99: Proceedings of the 1st International Workshop on Radiation Therapy Gel Dosimetry. Canadian Organisation of Medical Physicists and the Canadian College of Physicists in Medicine:196-8, 1999.
2. Ibbott G, Nelson A, Followill D, Balter P, Hanson W. An anthropomorphic head and neck phantom for evaluation of intensity modulated radiation therapy. Standards and Codes of Practice in Medical Radiation Dosimetry 2:209-17, 2002.
3. Ibbott G, Beach M, Maryanski M. An anthropomorphic head phantom with a BANG® polymer gel insert for dosimetric evaluation of IMRT treatment delivery. Standards and Codes of Practice in Medical Radiation Dosimetry 2:361-8, 2002.
4. Aguirre J, Tailor R, Ibbott G, Stovall M, Hanson W. Thermoluminescence Dosimetry as a Tool for the Remote Verification of Output for Radiotherapy Beams: 25 Years of Experience. Standards and Codes of Practice in Medical Radiation Dosimetry 2:191-9, 2002.
5. Izewska J, Svensson H, Ibbott G. Worldwide Quality Assurance Networks for Radiotherapy Dosimetry. Standards and Codes of Practice in Medical Radiation Dosimetry 2:139-55, 2002.
6. Ibbott G. Applications of Gel Dosimetry. Journal of Physics: Conference Series 3:58-77, 2004.
7. Heard MP, Ibbott GS. Measurement of brachytherapy sources using MAGIC gel. Journal of Physics: Conference Series 3:221-3, 2004.
8. Gifford K, Horton J, Steger T, Heard M, Jackson E, Ibbott G. Verification of Monte Carlo calculations around a Fletcher Suit Delclos ovoid with normoxic polymer gel dosimetry. Journal of Physics: Conference Series 3:217-20, 2004.
9. Ibbott GS. Clinical applications of gel dosimeters. Journal of Physics: Conference Series 56:108-31, 2006.

Abstracts (more than 50 in the past 5 years)

Book Chapters

1. Hendee WR, Rossi RP, Spitzer VM, Banjavic RL, Cacak RK, Ibbott GS. Identification of Clinical Needs. Preparation of Performance Specifications. Design of a Quality Assurance Program. Brief Description of Radiologic Modalities. In: The Selection and Performance of Radiologic Equipment. Ed(s) Hendee WR. Williams and Wilkins: Baltimore, 4-33, 40-84, 163-208, 225-254, 1985.
2. Ibbott GS. Brachytherapy treatment devices and treatment planning. In: Biomedical uses of radiation, part B: therapeutic applications. VCH Publishers: Weinheim, 1009-54, 1999.
3. Ibbott GS. Managed Care: What is it? The Projected Impact of Managed Care on Medical Physics. In: Introduction to the Professional Aspects of Medical Physics. Ed(s) Hogstrom KR, Horton JL. UT M.D. Anderson Cancer Center: Houston, 140-54, 1999.
4. Ibbott GS. Detectors for 2D or 3D Dosimetry Measurements. In: General Practice of Radiation Oncology Physics in the 21st Century. Ed(s) Shiu AS, Mellenberg DE. Medical Physics Publishing: Madison, 329-56, 2000.
5. Ibbott GS. Visualization and measurement of complex dose distributions using BANG TM polymer gel dosimeters. In: Medical Imaging and Precision and Therapy. Ed(s) Xie N-Z. The Foundation of International Scientific Exchange: Guangzhou, 144-62, 2000.

6. Ibbott GS. What Every Medical Physicist Should Know about the JCAHO Standards. In: Accreditation Programs and the Medical Physicist. Ed(s) Dixon RL, Butler PF, Sobol WT. Medical Physics Publishing: Madison, 139-73, 2001.
7. Ibbott GS. Professional Roles in VBT. In: Intravascular Brachytherapy Fluoroscopically Guided Interventions. Ed(s) Balter S, Chan RC, Shope TB. Medical Physics Publishing, 531-44, 2002.
8. Galvin JM, Ibbott GS. Commissioning and Accreditation of a Stereotactic Body Radiation Therapy Program. In: Stereotactic Body Radiation Therapy. Ed(s) Kavanagh BK, Timmerman RD. Lippincott Williams & Wilkins: Philadelphia, 85-93, 2005.
9. Ibbott GS. Radiation Dosimetry: 3-Dimensional. In: Encyclopedia of Medical Devices and Instrumentation. Ed(s) Webster JG. John Wiley & Sons: Hoboken, 481-500, 2005.

Books (edited and written)

1. Hendee WR Ibbott GS. Radiation Therapy Physics., 2nd. Mosby Year-Book Publishers: Philadelphia, 1996.
2. Hendee WR, Ibbott GS, Hendee EG. Radiation Therapy Physics., 3rd. John Wiley and Sons: Hoboken, 2004.

Manuals, Teaching Aids, Other Teaching Publications

1. Ibbott GS, Brezovich I, Fessenden P, Pipman Y, Sandhu T, Sathiaseelan V, Stauffer P, Galdi A, Saylor T. Performance Evaluation of Hyperthermia Equipment, AAPM Report No. 26. American Institute of Physics, 6/1989.
2. Miller DW, Bloch PH, Cunningham JR, Curran BH, Ibbott GS, Jones D, Jucius SZ, Leavitt DD, Mohan R, van de Geijn J. Task Group 23 of the Radiation Therapy Committee. American Association of Physicists in Medicine Report No. 55: Radiation Treatment Planning Dosimetry Verification. American Institute of Physics: Woodbury, NY, 8/1995.
3. Thomadsen BR, Ibbott GS. Radiological Society of North America. RSNA Publications, 1997.
4. Ibbott GS. IAEA TECDOC 1074, Safety measures to address the Year 2000 issue at medical facilities which use radiation generators and radioactive materials. International Atomic Energy Agency, 3/1999.
5. Ibbott GS. Report of the International Workshop on Safety Measures to Address the Year 2000 Issue at Medical Facilities Which Use Radiation Generators and Radioactive Materials., 6/1999.
6. Olch A, Kline R, Ibbott G, Anderson JR, Deye J, Fitzgerald TJ, Followill D, Gillin MT, Huq MS, Palta JR, Purdy JA, Urie MM. Quality Assurance for Clinical Trials: A Primer for Physicists, Prepared by AAPM Subcommittee on QA for Clinical Trials. AAPM Report No. 86., 10/2004.

EDITORIAL AND REVIEW ACTIVITIES

Editor/Service on Editorial Board(s)

Guest Associate Editor, Medical Physics, American Association of Physicists in Medicine, 1999-present

Guest Associate Editor, International Journal of Radiation Oncology Biology Physics, Elsevier, 2003-2005

Associate Senior Editor, International Journal of Radiation Oncology Biology Physics, Elsevier, 2005-present

Member of Editorial Review Board

Member, Medical Physics, 1982-1999

Journal Reviewer

Reviewer, Medical Physics, The American Association of Physicist in Medicine, 1982-present

Reviewer, International Journal of Radiation Oncology Biology Physics, Elsevier, 1990-present

Reviewer, Physics in Medicine and Biology, 1995-present

Reviewer, Journal of Applied Cliical Medical Physics, 2002-present

TEACHING

Teaching Within Current Institution - The University of Texas M. D. Anderson Cancer Center

Formal Teaching

Courses Taught

Instructor, Radiation Biology, Course Number: GS020042, Course Hours: 4
Fall 2002, 8/2002-12/2002

Instructor, Introduction to Radiotherapy Physics: Part II - Calibrations, Course Hours: 15
Fall 2003, 8/2003-12/2003

Course Director, Radiation Biology, Course Number: GS020042, Course Hours: 6
8/2004-12/2004

Training Programs

Member, Graduate Faculty, Medical Physics
3/2001-present

Supervisory Teaching

Committees

Advisory Committees

Chair, Michael Beach, Contact Hours: 28, 6/2001-12/2001

Chair, Malcolm Heard, Contact Hours: 32, 6/2002-2/2003

Chair, Jackeline Esteban, Contact Hours: 20, 11/2002-3/2003

Member, Jason Shoales, Contact Hours: 8, 9/2003-4/2004

Member, Hilary Vass, Contact Hours: 4, 11/2003-4/2004

Chair, Claire Nerbun, Contact Hours: 24, 11/2003-5/2004

Member, Scott Davidson, Contact Hours: 2, 10/2004-present

Member, Ryan Hecox, 9/2005-3/2006

Chair, Paige Nitsch, Contact Hours: 120, 7/2006-present

Chair, Whitney Bivens, Contact Hours: 120, 8/2006-present

Supervisory Committees

Chair, Michael Beach, Contact Hours: 72, 12/2001-5/2003

Member, Kent Gifford, Contact Hours: 24, 5/2002-4/2004

Member, Gary Fisher, Contact Hours: 20, 2/2003-9/2004

Chair, Malcolm Heard, Contact Hours: 84, 2/2003-8/2005

Chair, Jackeline Esteban, Contact Hours: 72, 3/2003-10/2004

Member, Hilary Vass, Contact Hours: 4, 4/2004-8/2004

Member, Jason Shoales, Contact Hours: 28, 4/2004-8/2005

Chair, Claire Nerbun, Contact Hours: 80, 5/2004-9/2005

Chair, Hilary Vass, Contact Hours: 72, 8/2004-4/2005

Teaching Outside of Current Institution

Formal Teaching

Courses Taught

Instructor, Research in Health-Related Radiation Sciences, University of Kentucky, Course Number: RM695, Course Hours: 80
6/1994-9/2000

Instructor, Introduction to General Medical Physics, University of Kentucky, Course Number: RM740, Course Hours: 30
8/1994-12/2000

Instructor, Practicum in External Beam Therapy Physics, University of Kentucky, Course Number: RM849, Course Hours: 120
8/1994-12/2000

Instructor, Radiation Biology, University of Kentucky, Course Number: RAS546, Course Hours: 60
8/1994-12/2000

Instructor, Physics for Radiation Oncology Residents, University of Kentucky, Course Hours: 60
9/1994-5/2000

Instructor, Graduate Practicum in Radiation Medicine, University of Kentucky, Course Number: RM660, Course Hours: 100
1/1995-6/2000

Instructor, Physics of Radiation Therapy, University of Kentucky, Course Number: RM649, Course Hours: 60
1/1995-6/2000

Instructor, Advanced Radiation Dosimetry, University of Kentucky, Course Number: RAS601, Course Hours: 60
1/1997-6/1999

Instructor, Physics for Diagnostic Radiology Residents, University of Kentucky, Course Hours: 45
1/2000-12/2000

Training Programs

Member, Graduate Committee, University of Colorado Health Sciences Center
9/1981-5/1986

Director, Graduate Training Program in Medical Physics, University of Colorado
9/1981-5/1986

Participant, Radiologic Technology Training Program and Dosimetry Training Program, Yale-New Haven Hospital
9/1990-3/1994

Participant, Therapeutic Radiology Residents Training Program, Yale University School of Medicine
9/1990-3/1994

Member, Graduate Faculty, Medical Physics Training Program, University of Kentucky Medical Center
3/1994-12/2000

Practicum Director and Coordinator of Academic Med, Radiation Science Program, University of Kentucky Medical Center
1/1995-12/2000

Participant, Diagnostic Radiology Resident Training Program, University of Kentucky Medical Center
1/2000-12/2000

Supervisory Teaching

Committees

Advisory Committees (more than 25 Research Advisory Committees)

Graduate Students Committees (more than 25 Research Advisory Committees)

Presentations at National or International Conferences (Invited (more than 80)

Seminar Invitations from Other Institutions (total of 25)

Lectureships and Visiting Professorships (total of 7)

PROFESSIONAL MEMBERSHIPS/ACTIVITIES

Professional Society Activities, with Offices Held

National and International

American Association of Physics Teachers

Member, 1970-1980

Health Physics Society

Member, 1971-present

American Association of Physicists in Medicine

Member, 1972-present
Board of Directors, 1982-1984
President, Rocky Mountain Chapter, 1983
President, Connecticut Chapter, 1993-1994
Board of Directors, 1995-1997
President, Ohio River Valley Chapter, 1997
National President-Elect, 1998
President, 1999
Chairman of the Board, 2000

Physicist-Surveyor for Patterns of Care Outcome Surveys
Member, 1977-1978

American Society for Therapeutic Radiology and Oncology

Member, 1980-present

North American Hyperthermia Group

Member, 1983-1990

Physicist-Surveyor for Patterns of Care Outcome Surveys

Member, 1983

Radiation Research Society

Member, 1983-present

American College of Radiology

Member, 1984-present
Councilor at Large, 1996-2001

Colorado Radiological Society

Member, 1984-1990

Physicist-Surveyor for Patterns of Care Outcome Surveys

Member, 1985

International Electrotechnical Commission - U.S. Technical Advisory Group, IEC 62C

Member, 1990-present
Chair, 1993-present

Radiological Society of Connecticut
Member, 1991-1994

American Board of Radiology

Member, Radiation Oncology written examination committee, 1994-present
Oral Examiner in Radiological Physics, 1996
Oral Examiner in Radiological Physics, 1998
Oral Examiner in Radiological Physics, 2000
Oral Examiner in Radiological Physics, 2002
Oral Examiner in Radiological Physics, 2003
Oral Examiner in Radiological Physics, 2005

Joint Commission on Accreditation of Healthcare Organizations from Trilateral Committee
Liaison, 1994-1997

Kentucky Medical Society

Member, 1994-2000

Council of Scientific Society Presidents

Member, 1998-2000

UNIQUE ACTIVITIES

1. Veterans Admin. Hosp., Lexington, KY, Radiation Safety Committee, Member, 1995–1997
   University of Kentucky, Radioactive Drug Research Committee, Member, 1996–2000
   University of Kentucky, Institutional Review Board, Member, 1997–2000
   University of Kentucky, Billing Guidelines and Compliance Committee, Member, 1998-200
   University of Kentucky, Radiation Safety Committee, Member, 1999–2000
2. Reviewed and provided detailed results of dosimetry review visits to the following radiotherapy physics facilities: **(2001)** St. Luke's Medical Center (Milwaukee, WI), University of Vermont, Fletcher Allen Cancer Center (Burlington, VT) **(2002)** Massachusetts General Hospital (Boston, MA), Beth Israel Deaconess Medical Center (Boston, MA), Thomas Jefferson VA Hospital (Philadelphia, PA), Medical College of
   Virginia, (Richmond, VA) **(2003)** Memorial Hospital (Colorado Springs, CO), Poudre Valley Radiation Oncology (Fort Collins, CO) **(2004)** Presbyterian Medical Center (Denver, CO) **(2005)** University of Colorado, Anschutz Cancer Pavilion (Aurora, CO), Northwest Regional Cancer Treatment Center (Niles, IL), Berwyn Radiation Oncology (Berwyn, IL), University of Medicine and Dentistry of New Jersey (Newark, NJ) **(2006)** Longwood Radiation Oncology Center, Harvard Medical School (Boston, MA), University of Florida (Jacksonville, FL)

DATE OF LAST CV UPDATE

12/17/2007

William Samuel Kubricht

Chief, Clinical Physics, Division of Radiation Oncology
Adjunct Professor and Graduate Faculty , Department of Physics, Texas Tech University

Education:

1968 – B.S. Houston Baptist College, Houston, TX, in Biology and Chemistry

1971 to 1974 - Residency, Emory University Clinic, Atlanta, GA, in Therapeutic Radiological Physics

1971 – MMSc, Emory University, Atlanta, GA in Therapeutic Radiological Physics

Positions and Employment

1959-1960	**United States Marine Corps**
1960-1968	**United States Marine Corps Reserve**
1974-1976	**Chief, Clinical Physics, Georgia Baptist Hospital, Atlanta, GA**
1974-1976	**Chief, Clinical Physics, South Fulton Hospital, Atlanta, GA**
1976-1989	**Chief, Clinical Physics, Mary Bird Perkins Cancer Center, Baton Rouge, LA**
1976-1989	**Consulting Clinical Physicist, Baton Rouge General Medical Center, Dept. Radiology, Baton Rouge, LA**
1976-1989	**Consulting Clinical Physicist, Women's Hospital, Dept. Radiology, Baton Rouge, LA**
1978-1989	**Adjunct Assistant Professor and Head, Clinical Physics Training, Nuclear Science Center. LSU, Baton Rouge, LA**
1978-1989	**Consulting Clinical Physicist, Our Lady of the Lake Regional Medical Center, Dept. of Radiology, Baton Rouge, LA**
1976-1989	**Consulting Clinical Physicist, Earl K. Long Memorial Hospital, Baton Rouge, LA**
1995-2002	**Head, Clinical Physics, Bellaire Cancer Treatment Center, Houston, TX**
2006–present	**Chief, Clinical Physics, Southwest Cancer Treatment & Research Center, University Medical Center, Lubbock, TX**
2006-present	**Adjunct Professor, Department of Animal and Food Sciences, Texas Tech University, Lubbock**
2006-present	**Coordinator of Memorandum of Agreement between the Medical College of Lanzhou University, Lanzhou, China and the College of Arts and Sciences of Texas Tech University and the Health Sciences Center, Lubbock, Texas.**
2006-present	**Member, American Society of Therapeutic Radiology Oncology (ASTRO) Grass Roots Legislative Committee**
2006-present	**Member, The TTUHSC Lubbock/Odessa Institutional Review Board for the Protection of Human Subjects (IRB)**
2006-present	**Membership on the TTU Graduate Faculty**
2006-present	**University Medical Center, Professional Staff, Cancer Committee**

2007-present **Adjunct Professor, Department of Physics, Texas Tech University, Lubbock, TX**

Certifications

2003 **Texas Medical Physics License (MP0451)**
1976 **Diplomat, American Board of Radiology (DABR; Therapeutic Radiological Physics)**

Professional Memberships

American College of Radiology (current)
American Society of Therapeutic Radiology and Oncology (current)
Texas Radiological Society (current)
Founding Member, M.D. Anderson Associates (current)
American Association of Physicists in Medicine (pending)
American Society of North American (pending)
American Society of Clinical Oncology (pending)
American College of Radiation Oncology (pending)
Gilbert H. Fletcher Society (Inactive)
Louisiana Radiological Society, 1978 to 1991
Baton Rouge Oncology Group, 1978 to 1991

Honors and Invited Lectures

1968 **Guest Lecturer, Texas Academy of Science, "Radio-cytogenetics, a Mathematical Model" Beaumont, TX**
1968 **Guest Instructor, Radiobiology, Houston Baptist College, Houston, TX**
2006 **Invited lecturer, Lanzhou University College of Medicine, Lanzhou, China**
2006 **Invited Speaker, Metropolitan Rotary Club, "Recent advances in radiation oncology" Lubbock, TX**
2006 **Invited Speaker, 2006 Thornton Distinguished Lecture, "Dr. Strangelove: or how I learned to deal with the bomb" Texas Tech University, Lubbock, TX**
2007 **Invited Speaker, Lubbock Rotary Club, "2006: It was a very good year" Lubbock, TX**

Post Graduate Short Courses

2006 **"Interstitial and Intracavitary implant technique", MDACC, TMC, Houston, TX**

2005 **Varian Medical Systems, Las Vegas, NV. "Eclipse Computer System/Physics and Administration"**
2005 **The University of Texas M.D. Anderson Cancer Center, Houston, TX "PET/CT Hands-on Short Course."**
2005 **Louisiana State University School of Medicine/Willis Knighton Medical Center, Shreveport, LA. "Practical considerations and applications of Tomotherapy in Clinical Practice"**
2004 **Texas Radiological Society, Annual Meeting, Austin, Texas Radiation Oncology Scientific Session**
2002 **The University of Texas M.D. Anderson Cancer Center, Houston, TX "Interstitial and Intracavitary Dosimetry: Basic Methods and Calculations"**

1982 **The University of Texas M.D. Anderson Cancer Center, Houston, TX "External Beam, Interstitial and Intracavitary Dosimetry - Manual and Computer Methods of Calculations."**

1982 **The University of Texas M.D. Anderson Cancer Center, Houston, TX "External Beam Dosimetry - Principles and Calibrations."**

1980 **The University of Texas M.D. Anderson Cancer Center, Houston, TX "High Energy Electron, X-Ray and Neutron Dosimetry."**

Professional Accomplishments

2006 **Developed the cooperative agreement between Lanzhou University College of Medicine, Lanzhou, China, and TTUHSC and TTU for exchange of students, faculty and medical training and expertise.**

2007 **Wrote the initial curriculum for the Radiation Oncology portion of the urology residency application program, TTUHSC.**

2007 **Initiated and developed the Medical Physics doctoral program jointly sponsored by TTUHSC and TTU. Wrote the initial curriculum for this program (in progress).**

Research and Training Support

2006 **Established Southwest Cancer Treatment and Research Center participation in the Stanford University School of Medicine National Institutes of Health grant for web-based medical dosimetry training.**

Rufus J. Mark

Radiation Oncologist
Joe Arrington Cancer Center
Assistant Clinical Professor of Radiation Oncology
Texas Tech University Medical Center
Lubbock, Texas

B.S. 1978-1981 Yale University, New Haven, CT – Biology
M.D. 1982-1986 University of California, Los Angeles School of Medicine

A. Positions and Honors.

.

Positions:

1986-1987 **Internship: Categorical: Presbyterian Hospital, Pacific Medical Center, San Francisco, CA**

1987-1990 **Residency: Radiation Oncology: Department of Radiation Oncology, University of California, Los Angeles**

1989-1990 **Chief Resident: Radiation Oncology; Department of Radiation Oncology, University of California, Los Angeles**

1988-1991 **General Medical Physician: LAX Readicare Medical Clinic, El Segundo, CA**

1990-1991 **Assistant Clinical Professor of Radiation Oncology, Department of Radiation Oncology, University of California, Los Angeles**

1991-1995 **Radiation Oncologist; Radiation Medical Group, San Diego, CA**

1994-1995 **Associate Professor of Radiation Oncology, Department of Radiation Oncology, University of California, San Diego**

1995-2002 **Director, Department of Radiation Oncology; Director Breast Care Center; Gamma Knife radiation Oncologist; Cancer Detection Center Physician; Good Samaritan Hospital, Los Angeles, CA**

1997-1999 **Director, Donald P. Loker Cancer Center; Director, Department of Radiation Oncology, California, Hospital Medical Center, Los Angeles, CA**

2002-Present **Radiation Oncologist, Joe Arrington Cancer Center, Covenant Medical Center, Lubbock, TX; Assistant Clinical Professor of Radiation Oncology, Texas Tech University Medical Center.**

Other Experience and Professional Membership

1995 **Gamma Knife Course: University of California, San Francisco, Department of Radiation Oncology**

1997 **Prostate Implant Course; Northwest Tumor Institute, Seattle Washington**

Membership in Professional Societies

American Society of Therapeutic Radiation Oncology (ASTRO)
American Society of Clinical Oncology (ASCO)
American Brachytherapy Society (ABS)
Phi Beta Kappa (Elected 1981)
New York Academy of Sciences (Elected 1994)

Licenses:

State of California Physician License: G-062361
State of Nevada Physician License: 6922
State of Texas Physician License: L-2445
State of New Mexico License: MD-2004-0486
State of Florida Physician License: ME-0069478 (inactive)
Fluoroscopy License: RHL-1314480
DEA Registration: BM-1514480
Board Certified in Radiation Oncology (ABR) – June 6, 1991
UPIN#: E-86774

Honors:

Phi Beta Kappa, May 1981
Summa Cum Laude, May 1981
American Radium Society, Travel Grant Award, 1990
American Cancer Society Life Saver Award, 1996

B. Selected peer-reviewed publications (in chronological order).

Has authored and co-authored over 70 abstracts and peer-reviewed publications

Selected examples:

Young, R. F., S. Jacques, **R. Mark,** O. Kopyov, B. Copcutt, A. Posewitz, F. Li. 2000. Gamma knife thalamotomy for treatment of tremor: Long-term results. J. Neurosurg, 93:128-135.

Zimmerman, R. P., **R. J. Mark**, and G. F. Juillard. 1997. Concomitant pilocarpine during head and neck irradiation reduces xerostomia. Int. J. Rad. Onc. Biol. Phys. 37:571-576.

Mark, R. J., R. P. Zimmerman, and J. Grief. 1996. Capsular contracture after lumpectomy and radiation therapy in patients with a prior history of uncomplicated bilateral augmentation mammoplasty. Radiology, 200:612-625.

Mark, R. J., L. Tran, J. Poen, Y. S. Fu, J. Heaps. 1996. Post irradiation sarcomas of the gynecologic tract. Amer. J. Clin. Oncology 19:59-64.

Mark, R., J. C. Poen, L. Tran, Y. S. Fu, and G. F. Juillard. 1996. Angiosarcoma: A report of 67 cases and a review of the literature. Cancer 77:2400-2406.

Mark, R. J., W. L. Lutge, L. Tran, K. T. Shimizu, L. M. Tran, M. T. Selch, and R G. Parker. 1995. Craniopharyngioma: Treatment in the CT and MR imaging era. Radiology 197:195-198.

MURALI NAIR Ph.D, DABR

8403, Richmond Ave, Lubbock, Texas 79424

Tel: (806)-794-0953

E-mail: murali.nair@sbcglobal.net

A. Education:

Ph.D. in Medical Physics 1986 University of Missouri Columbia, Columbia, Missouri.
Thesis: *Application of dual energy subtraction data for heterogeneity correction in dosimetry of irregular field treatment: Advisor: F. Marc Edwards PhD .*

MS in Applied Radiation Physics 1978, University of Birmingham , UK
Thesis: *Dosimetry of high Intensity Co-60 afterloading source for intracavitary irradiation of esophageal lesions: Advisor: Antoni K. Bradshaw PhD*

B. Board Certification:

American Board of Radiology in Therapeutic Radiology Physics (1985),
American Board of radiology in Diagnostic Radiology Physics (1995)

License: Texas Licensure for Medical Physicists in therapy and diagnostic Radiology, License # MP 0409 : Current
New Mexico State Certificate of Registration for therapy, diagnostic Radiology and radiation safety consult in nuclear medicine: Current

C. Experience

1. 1996- present : ***Chief Medical Physicist and Radiation Safety Officer***, Joe Arrington Cancer Center, Lubbock, Texas

Therapy services:

Commissioning of machines and treatment Planning:

- Varian Cl2300CD, Cl2300EX with 120 MLC, Cl2100C,
- MLC based IMRT both step and shoot and sliding window technique
- Philips/ ADAC treatment planning system server and 2 workstations for 3D and IMRT , both step and shoot and dynamic delivery
- Nomos Peacock and Corvus planning system with BAT localization
- Networking of planning systems with MR, CT and PET imaging modalities
- Nucletron HDR unit classic and V2 system
- Large bore Philips CT scanner for CT simulation in radiation therapy
- Fusion with CT, MR and PET images
- Radioimmunotherapy for Non Hodgkin's Lymphoma using I-131 (Bexxar) and Y-90 (Biogen-IDEC)
- Iodine-125 seed implant for prostate cancer using MMS planning system and Trans Rectal Ultrasound (TRUS) guidance

Stereotactic Radio Surgery:
Radionics Stereotactic Radiosurgery localization and delivery system
Xknife Planning system for treatment of AVM, Trigeminal, brain mets, acoustic neuromas with stereotactic radiosurgery and fractionated therapy

Gamma Knife (Elekta) : Commissioning, radiation treatment planning and licensing
HDR Brachytherapy:
Intracavitary: Bronchial, esophageal, and GYN
Interstitial HDR brachytherapy for breast and prostate cancer

Radiation Safety Officer:
Functioned under US Nuclear Regulatory Commission and State of Texas.

2. 1989 to 1996*:*
Director Medical Physics and RSO, Guthrie Healthcare System, Sayre. PA

- ♦ Radiation therapy treatment planning using CMS Modulex planning system
- ♦ Mevatron KD dual energy accelerator
- Licensed by US. Nuclear Regulatory Commission and Pennsylvania State Bureau of Radiation Control as RSO
- Performed machine calibration treatment planning and brachytherapy services.
- Performed I-131 (over 100 patients) and Sr-90 Metastron therapy (over 20 patients)
- Performed HDR and LDR Brachytherapy

.
3. 1985- 1989
Medical Physicist/Radiation Safety Officer, Flower Memorial Hospital, Sylvania, Ohio
Clinical Radiation Therapy:

- External beam treatment planning
- AECL/Theratronix Planning system
- Machine calibration and QA, Varian Clinac 1800, Clinac 6x
- Radiation safety supervision for nuclear medicine including I-131 therapy (over 50 patients),
- LDR brachytherapy Cs-137, Ir-192 and I-125
- Licensed as Radiation Safety Officer (RSO) by the U.S Nuclear Regulatory Commission and State of Ohio Bureau of Radiation Control

D. Publications and Meeting Presentations

On request.

Carlos P. Torres, M.D.
8409 County Road 6940
Lubbock, TX 79407
Home Phone: 806-368-7313
Cell Phone: 806-786-2073
E-mail: c.torres@yahoo.com

CURRENT POSITION:

Medical Director, Radiation Oncology, Southwest Cancer Treatment & Research Center, University Medical Center, Lubbock, TX

Clinical Assistant Professor, Texas Tech Medical University

POST-GRADUATE TRAINING

1985-86 Chief Resident in Radiation Oncology, University Health Center of Pittsburgh, Pittsburgh, PA

1982-86 PGY-2 to PGY-4 in Radiation Oncology, University Health Center of Pittsburgh, Pittsburgh, PA

1981-82 PGY-1 in Internal Medicine, Trenton Affiliated Hospitals, Trenton, New Jersey

1979-80 Medical Internship, Veterans Memorial Medical Center, Diliman, Quezon City, Philippines

EDUCATION

1975-79 Graduated Medical School, University of the Philippines College of Medicine, Ermita, Manila, Philippines

1971-75 Completed four years of Bachelor of Science in Pre-Med, University of the Philippines, Diliman, Quezon City, Philippines

CURRENT MEDICAL LICENSURES

State of Pennsylvania MD-030497-E
State of Texas K8531
State of Indiana 0151380
State of Nevada 10634
State of California

CITIZENSHIP U.S.

EXAMINATIONS

SPEX passed November 1998

FLEX passed in 1981

ECFMG: 329-144-0 passed 10/19/80

BOARD CERTIFICATION:

American Board of Radiology in Radiation Oncology May 1988

SOCIETIES:

American Society of Therapeutic Radiology and Oncology (ASTRO)

American College of Radiation Oncology (ACRO)

Texas Medical Association

Lubbock-Garza Medical Association

Participating Member in:

ECOG-Eastern Cooperative Oncology Group
SWOG- Southwest Oncology Group
RTOG-Radiation Therapy Oncology Group

POST GRADUATE TRAINING:

Low Dose Prostate Brachytherapy: University of Virginia. In practice since Oct 1998

High Dose Prostate Brachytherapy . Texas Tech University Medical Center

Stereotactic Radiosurgery/Radiation Therapy, BrainLab, Cleveland Clinic

Lectures and Publications on Request

Appendix K. Letters of Support from the TTU

TEXAS TECH UNIVERSITY
College *of* Arts & Sciences

Office of the Dean

M E M O R A N D U M

To: Fred Hartmeister, Dean of the Graduate School

From: Jane Winer, Dean of the College of Arts & Sciences Jane L. Winer

Date: April 11, 2008

Re: Doctor of Medical Physics Proposal

The attached Doctor of Medical Physics (DMP) document is a proposal for an interdisciplinary graduate degree. The intent of this proposed program is to provide academic and clinical training for professionals entering the field of Medical Physics. This is a new and unique educational approach for educating and training professionals in this field. Notably, this proposal is for a DMP degree—not a Ph.D.

The current proposal has gone through several layers of review and revision so far. It has been evaluated and recommended by the Arts and Sciences Committee on Academic Programs. Chairs of related Arts & Sciences departments have been consulted and have indicated support for this proposal. Appropriate representatives from the TTUHSC School of Medicine have been kept abreast of the development of this proposal as it has progressed. Preliminary review of and guidance for this proposal have been garnered from the Office of the Provost and from the Graduate School as well.

A TTU entourage accompanied by Vice Provost Liz Hall traveled to Austin last week for an information gaining visit with the staff of The Higher Education Coordinating Board. Initial reactions were that this was one of the better proposals they have seen. Close communication will continue with this staff to make sure the proposal is written according to state guidelines and regulations.

The review process for a new program has many stages. At this point, based on extensive evaluation of the proposal by the College of Arts and Sciences, I recommend this proposal to the next level of review by the Graduate School.

xc: Liz Hall
Rob Stewart
David Roach
William Kubricht
Vivien Allen

Box 41034 | Lubbock, Texas 79409-1034 | T 806.742.3833 | F 806.742.3893

TEXAS TECH UNIVERSITY™

1
2

Department of Physics 3 .
Box 41051 Science 101 4
Lubbock, TX 79409-1051

Dean Jane Winer
College of Arts and Sciences
Texas Tech University

Dear Dean Winer,

I support the initiative that would enable TTU to offer a Doctor of Medical Physics degree. Medical Physics is a growing field with a huge potential to attract quality students to TTU and also to generate an intellectually vigorous graduate program. Please let me know how we can contribute to this program as a department.

Sincerely yours,

Nural Akchurin, Ph.D.
Professor & Chairman
MS 1051 Lubbock, Texas 79409-1051
T 806.742/3769 | F 806.742.1182

An EEO/Affirmative Action Institution

TEXAS TECH UNIVERSITY
College *of* Arts & Sciences
Department of Biological Sciences

March 6, 2008

Dean Jane Winer
College of Arts and Sciences
Texas Tech University

Dear Dean Winer,

I am writing to express my enthusiastic support of The Doctor of Medical Physics degree that is currently being proposed for Arts and Sciences. This program will provide a new career tract for our undergraduates in Biological Sciences and those in Chemistry and Biochemistry, and the Department of Physics. In addition, students in this program will subsequently have to take either leveling classes in Biology, Chemistry or Physics or to be enrolled in several of our graduate classes to complete the requirements for their degree. The development of this program will not entail the addition of additional faculty, but will use current graduate and undergraduate level classes. I also see the development of this program as providing significant opportunities for recruitment of students to our College and to Texas Tech.

Thank you for your support of these efforts.

Sincerely,

John Zak
Professor and Chair

Box 43131 | Lubbock, Texas 79409-3131 | T 806.742.2715 | F 806.742.2963

TEXAS TECH UNIVERSITY
College *of* Arts & Sciences

Department of Chemistry and Biochemistry

March 6, 2008

Jane Winer, Ph.D.
Dean, College of Arts and Sciences
Texas Tech University
Lubbock, TX 79409

Dear Dean Winer:

I am writing to express the support of the Department of Chemistry and Biochemistry for the Doctor of Medical Physics degree program. We look forward to whatever appropriate contributions the Department can make to further this worthwhile endeavor.

If you have any questions concerning this, please don't hesitate to contact me.

Sincerely,

Dominick J. Casadonte, Jr.

Dominick J. Casadonte, Jr.
Minnie Stevens Piper Professor and Chair
(806) 742-1832 (*CHEM 125D*)
(806) 742-3067 (*CHEM 104 Main Office)*
(806) 543-1197 (*Cell)*
(806) 742-1289 (*fax*)
Dominick.Casadonte@ttu.edu (*E-mail*)

Appendix L. Letters of Support from the TTU Library and the TTU/HSC-SoM Library.