

## Professional Doctorate in Medical Physics (DMP) Two Year Experience

Charles W. Coffey  
Vanderbilt University Medical Center  
Nashville, TN

## DMP: Two Year Experience Outline

- ▶ Brief History of the Vanderbilt DMP Program
- ▶ Current Status
  - a. Number of students
  - b. Didactic Curriculum
  - c. Research Project
  - d. 24 Month Residency Experience
- ▶ Lessons Learned to Date
- ▶ Future Plans of the Vanderbilt Program
- ▶ Updates/Plans from Other Institutions

## History: Vanderbilt DMP Program

- ▶ Faculty Approval
- ▶ University Approval
- ▶ (State of Tennessee Council on Higher Education)\*
- ▶ First Students Admitted/Transferred: Fall, 2009
  - a. Three- Year 3 students
  - b. Four- Year 2 students
  - c. Four- Year 1 students
- ▶ CAMPEP Accreditation: July, 2010

## CAMPEP Accreditation

- ▶ Self Study (Therapy and Diagnostic Tracks)
  - Graduate education  
patterned after Vanderbilt CAMPEP-accredited MS Program (+ more)
  - Residency training  
patterned after former Vanderbilt CAMPEP-accredited Therapy  
Residency  
Diagnostic patterned after "sample" Diagnostic Programs
- ▶ Site Visit
  - Graduate Education reviewers
  - Residency Training reviewers
- ▶ Accreditation
  - Combined Program (Graduate Education and Residency Training)

## Current Status

- ▶ Academic Year Student Status: 2010-2011
  - a. Three- Year 4 students (all therapy track) (graduate June 20, 2011)
  - b. Four- Year 3 students (all therapy track)
  - c. Four- Year 2 students (all therapy track)
  - d. Five- Year 1 students (4 therapy, 1 diagnostic track)
- ▶ Curriculum
- ▶ Research Project
- ▶ Two Year Residency Training
- ▶ Recruitment Efforts Fall, 2011
  - Five- Year 1 students (4 therapy, 1 diagnostic track) + 2MS
  - Steady State: (4 therapy + 1 diagnostic per year) = 20 students
  - Total Student Numbers will be limited by Clinical Resources (Years 3 & 4)

## Curriculum

- ▶ Didactic (50 credit hrs)
 

<p style="text-align: center;">Therapy</p> <p>Anatomy &amp; Physiology 8hrs            Health Physics &amp; Detectors Lab 9hrs            Interactions of Rad with Matter 3hrs            Radiation Biology 2hrs            Therapy Physics &amp; Lab(s) 12hrs              Brachy (end of Year 1)              Therapy I &amp; II (Year 2)              Lab I (Year 2) &amp; Lab II (Year 3)</p> <p>Diagnostic Imaging &amp; Lab 8hrs*            Radiation Oncology 1hr            Seminar 1 hr (AAPM TG Reports)            Electives 6 hrs</p>	<p style="text-align: center;">Diagnostic</p> <p>Anatomy &amp; Physiology 8hrs            Health Physics &amp; Detectors Lab 9 hrs            Interactions of Rad with Matter 3 hrs            Radiation Biology 2hrs            Diagnostic Imaging &amp; Lab 8hrs              Intro to Imaging (Year 1)              Diagnostic &amp; Lab (Year 2)</p> <p>Seminar 2hrs (AAPM TG Reports)            Electives 18 hrs</p>
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- ▶ Research Project (6 credit hrs)      Research Project (6 credit hrs)

## Electives

- ▶ Therapy
  - Cancer Biology
  - Quantitative and Functional Imaging
  - Cancer Imaging
  - Biological Basis of Imaging
  - Signal/Image Analysis
  - Neuroimaging
  - Math and Computational Methods
  - Statistics
  - Ethics
  - Health Care Delivery Systems
  - Finance and Economics
- ▶ Diagnostic

## Research

- ▶ Research Topic Subject Matter and Mentor (approved by Director)
- ▶ Literature survey, exp design of materials, equip, methodology
- ▶ Data analysis, results and conclusions
- ▶ Presented formally to Research Project Committee
- ▶ Final report in manuscript form consistent with medical physics
  - literature manuscript submission is required
- ▶ Student is encouraged to submit the research subject matter in an abstract form appropriate for presentation at a national scientific meeting or a peer-reviewed medical physics journal
- ▶ Equivalent to 4-6 months FTE

### Research (continued)

- ▶ Example Projects:
  - ▶ Energy Response and Dosimetry of OSLs for Ir-192 HDR Applications\*
  - ▶ 3D Electron Compensators for Radiotherapy\*
  - ▶ Small Field Dosimetry/Beam Parameterization for Radiosurgery
  - ▶ Retrospective Study: Potential of IGRT for Ophthalmic Brachytherapy\*
  - ▶ IMRT vs 3DCT for Left Breast Radiotherapy
  - ▶ Predicting Table/Patient/Gantry Collisions in Radiosurgery
  - ▶ IMRT vs. RapiARC for Cranial Radiotherapy

\* AAPM Poster Presentation

### Curriculum (continued)

- ▶ Clinical Medical Physics Training (Therapy)
  - Clinical Practicum (6hrs) (approximately 2-3months FTE)
    - 1<sup>st</sup> Summer Term (brachytherapy treatment planning & QA)
    - 2<sup>nd</sup> Fall Term (Linac QA)
    - 2<sup>nd</sup> Spring Term (teletherapy treatment planning & QA)
- Clinical Rotations (30 hrs) (24 months FTE)
  - 3DCT, Brachy, IMRT/RapidARC, Radiosurgery, Other
  - (10 weeks/rotation in each of Year 3 and Year 4)
  - Fall, Spring, Summer Year 3
  - Fall, Spring, Summer Year 4

### Curriculum (continued)

- ▶ Clinical Medical Physics Training (Diagnostic)
  - Clinical Practicum (6hrs) (approximately 2-3 months FTE)
    - 1<sup>st</sup> Summer Term (Conventional Radiology)
    - 2<sup>nd</sup> Fall Term (CT, MRI, Nuc Med)
    - 2<sup>nd</sup> Spring Term (CT, MRI, Mammography)
- Clinical Rotations (30hrs) (24 months FTE)
  - description of rotations
  - Fall, Spring, Summer Year 3
  - Fall, Spring, Summer Year 4

### What We Are Learning

- ▶ Timing of Curriculum
  - ▶ Practicum at the conclusion of 1<sup>st</sup> year (Summer Term)
    - students are now ready to observe AND participate
    - no clinical "ramp-up" is required at the start of rotations
  - ▶ Research begins in Summer of Year 2 and continues into Years 3&4
  - ▶ Electives are preferred to be taken in Years 1&2; however, up to 1 course can be taken in each of Year 3 and Year 4
  - ▶ Advanced Lab and Seminar Topics occur in 3<sup>rd</sup> and 4<sup>th</sup> Years

### What We Are Learning (continued)

- ▶ Teaching and Learning Opportunities Never Cease
- ▶ Patient chart conferences
- ▶ Tumor boards
- ▶ Medical Ethics monthly conferences
- ▶ Webinars presented by equipment manufacturers
- ▶ Professional seminar Thursdays  
becoming a professional
- ▶ equipment manufacturers' new product presentations
- ▶ regulatory issues, errors, and treatment misadministration topics
- ▶ ABR "mock" oral boards preparation/practice/Q&A
- ▶ Participation in the instruction of Medical Residents and RTT students

### Lessons Learned (+)

- ▶ Integration of Didactic and Training (48 months) Continuous Learning
- ▶ Software to Account for Activities: Observe, Participate, & Competence
- ▶ Fellow Students/Colleagues and Friends Are Always Available
- ▶ Slow Times Are Always Filled with Ongoing Projects/Assignments
- ▶ Awarding of "Lab Coat" Status, Summer of 2<sup>nd</sup> Year
- ▶ DMP Assistance in the Clinic is WONDERFUL
- ▶ Competence is assessed by successful completion of treatment plan  
(which then gets 2 independent physicists' checks before inclusion  
and introduction to patient treatment)
- ▶ DMP Assistance with IMRT/RapidARC QA is PRICELESS
- ▶ Convincing administration to offer Stipend in Years 3 & 4
- ▶ Other Rotation allows students to visit other depts (Radiology) and  
institutions that have different equipment and offer practices  
(community hospital/private practice) other than academic

### Lessons Learned (+)

- ▶ NRC 'AMP Status' for HDR operator
- ▶ Growth Potential for Diagnostic Track
- ▶ Convince administration this is a very efficient and cost effective way  
to provide basic QA and treatment planning functions

### Lessons Learned (In process)

- ▶ Busy Clinic Must be Balanced with Proper Mentoring
- ▶ Mentoring is more time consuming than thought (Student/Mentor Ratio  
is important! There is some savings with multiple students)
- ▶ End of Rotation Evaluation is more time consuming than thought
- ▶ Observation/Participation is still a toss-up call
- ▶ In all the Busyness, there are still down times  
options available, dual responsibilities
- ▶ Added workload/responsibility to an already busy clinical day...
- ▶ Making the finances work...another teacher/mentor physicist would be  
nice...
- ▶ Curriculum offerings for electives sometimes is totally dependent on  
the class schedules etc of other academic departments/units
- ▶ One dept cannot offer all 50 hrs of the curriculum
- ▶ Getting the word out/recruiting to increase size of Diagnostic Track

### Future Plans

- ▶ Curriculum Offering
- ▶ (have a better listing per semester of electives)
- ▶ better coordinate intro and advanced lab concepts
- ▶ save individual mentoring effort(s) by classroom/group instruction time
- ▶ Future of MS Program at Vanderbilt ??
- ▶ Making the Finances Work: finding a balance of tuition charged vs. return to dept for education costs of teaching/mentoring and facilities
- ▶ Taking Control of the Evaluation Process

### Other DMP Programs

- ▶ Official/Approved
- ▶ Texas Tech (on hold)
- ▶ In Progress
- ▶ UT San Antonio Health Sciences Center
- ▶ UT MD Anderson Cancer Center

### Conclusions

- ▶ DMP is > 2 + 2
- ▶ Commitment Required: Teaching/Training is a Culture....It is What We Do....the entire TEAM must be on board...
- ▶ For Education Programs that have Sufficient Clinical Training Resources In House with Minimal Outsourcing
- ▶ Will Result in Reduced MS Students that a Program Admits
- ▶ Should Give Edge to Graduates in this Day of Health Care Reform
  1. more tools to offer the workplace
  2. better experience in selection of work environment which suits the student
  3. opportunity to negotiate professional status rather than staff status (this is attractive to employers who want to keep their employees, gives employers more options to pursue: the always upward mobility and continuing higher salary maybe things of the past... employer needs these options to keep their best employees)

So..... It Can Be Done!