Recommendations for the Revision of
AAPM Report No. 36

A Report of the
Medical Physics Residency Education and Promotion Sub-committee
of the
AAPM Committee on Education and Training of Medical Physicists

Presented by Richard G. Lane

AAPM Report Number 36

Essentials and Guidelines for Hospital Based Medical Physics Residency Training Programs

A Report of the
AAPM Presidential Ad Hoc Committee
On
The Clinical Training of Radiological Physicists

Revised and Approved July 1990

AAPM Presidential Ad-Hoc Committee on The Clinical Training of Radiological Physicists 1988-1989

E.S. Sternick, Chair

Members

- R. G. Evans
- E. R. Heitzman
- J. G. Keriakes
- E. C. McCullough
- R. L. Morin
- J. T. Payne
- J. A. Purdy
- N. Suntharalingum

Consultants

- J. A. Deye
- J. S. Krohmer
- A. R. Smith

Purpose of Ad Hoc Committee (1988)

- To review current state of education and training of medical radiological physicists
- To describe a hospital based education and training program for medical radiological physicists that would include basic education requirements, course work, clinical training, and the necessary prerequisites for certification.

AAPM Report Number ??

(Revision of AAPM Report No. 36)

Recommendations for Hospital Based Medical Physics Residency Training Programs

A Report of the Sub-committee on
Medical Physics Residency Education and Promotion
AAPM Committee on Education and Training of Medical Physicists

submitted March, 2005

Medical Physics Residency Education and Promotion Sub-committee
2003-2005

- R. G. Lane, Chair
- K. R. Hogstrom
- D. Stevens
- J. Gibbons
- L. Verhey
- E. Cheney
- M. Martin
- K. Doppke
- B. Paliwal

CAMPEP Liaison

- E. Klein

Consultants

- R. Wendt
- M. Herman

Charge to the MPREP Sub-committee

- Revise AAPM Report No. 36
- Promote Residency Training Programs

AAPM
Report No. 36

Table of Contents

Section I
Introduction
Section II
Essentials and Guidelines
Section III
Stipends and Bennefits
Section IV
Appendices I - V
I. Areas of Competence
II. Education Requirements
III. Radiation Physics Knowledge
IV. Clinical Knowledge
V. Radiation Biology Knowledge

AAPM
Report No. 36

Section I
Introduction

AAPM
Report No. 36

Section II
Essentials and Guidelines

Introduction
Objective
Structure and Content

Recommend revision to AAPM Report No. 36

Section II
Essentials and Guidelines

Introduction (radiation oncology)

Replace list of duties
"calibration,calculation,measurement, planning, design, quality assurance, training, education, research, others as listed in Appendix IA"

with statement
" ---radiation oncology physicists are responsible for those aspects of radiation oncology where physics plays a role in safe and accurate planning and delivery of radiation therapy to the patient."

Recommend revision to AAPM Report No. 36

Section II
Essentials and Guidelines

Introduction (diagnostic imaging)

Replace list of duties
"calibration,calculation,measurement, image quality improvement and maintenance, training, education, research, others as listed in Appendix IB"

with statement
" ---diagnostic imaging physicists are responsible for those aspects of diagnostic imaging where physics plays a role in safe and accurate diagnostic imaging procedures for patient care."

Recommend revision to AAPM Report No. 36

Section II Essentials and Guidelines

Introduction (nuclear medicine)

Replace list of duties

"calibration,calculation,measurement, quality assurance, radiation safety, training, education, research, others as listed in Appendix IA"

with statement

" ---nuclear medicine physicists are responsible for those aspects of nuclear medicine where physics plays a role in safe and accurate nuclear medicine diagnostic and therapeutic patient procedures."

AAPM Report No. 36

Section II Essentials and Guidelines

Objective

The objective of a medical physics residency program is to educate and train medical physicists to a competency level sufficient to practice medical physics independently.

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Section II Essentials and Guidelines

Introduction

Objective

Residency Education Requirements

Structure and Content

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Section II Essentials and Guidelines

Residency Education Requirements

"—the graduate will have medical physics knowledge equivalent to that of a graduate of a CAMPEP accredited medical physics graduate program as appropriate for the 'medical physics' specialty."

AAPM Report No. 79
(Revision of AAPM Report No. 44)

Academic Program Recommendations
For Graduate Degrees
In Medical Physics

A Report of The
AAPM Committee on Education and Training of Medical Physicists

November, 2002

AAPM
Report No. 36

Section II
Essentials
and
Guidelines

Structure and Content
- Training Length
- Program Director
- Staff
- Training Content
- Training Complement
- Training Evaluation
- Facilities
- Clinical Resources
- Institutional Support
- Educational Environment
- Conferences
- Library Resources

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revision to
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Report No. 36

Section II
Essentials
and
Guidelines

Structure and Content
- Training Length – 2years
- Program Director – 7 yrs experience
- Staff – medical dosimetrist
- Training Content - >15MV
- Training Complement - 2:1, 1:1, 1:1
- Training Evaluation – more frequent
- Facilities – CT-simulator
- Clinical Resources – 500ExtBm, 30 Brachy
- Institutional Support – no change
- Educational Environment – no change
- Conferences – no change
- Library Resources – no change

AAPM
Report No. 36

Section III
Stipends and Benefits

AAPM
Report
No. 36

Section IV

Appendices I - V

I. Areas of Competence
II. Education Requirements
III. Radiation Physics Knowledge
IV. Clinical Knowledge
V. Radiation Biology Knowledge

AAPM Report
No. 36

Appendix I

Expected
Areas of
Competence

Appendix IA
Radiation Oncology

Treatment Equipment
Simulators
Radiation Protection
Patient Treatments
Brachytherapy
Additional

AAPM Report
No. 36

Appendix I

Expected
Areas of
Competence

Appendix IB
Diagnostic Imaging

Imaging Systems
Computer Systems
Radiation Protection
Dosimetry
Additional

AAPM Report
No. 36

Appendix I

Expected
Areas of
Competence

Appendix IC
Nuclear Medicine

Equipment
Radiation Safety
Room Design
Patient Dosimetry
Radiopharmacy
Clinical Studies
Additional

AAPM
Report No. 36

Appendix II

Education Requirements for Medical Physics Residents

- M.S. or Ph.D. in Medical Physics, physics, or related field
- Curriculum
  - Physics, Math, Electronics, Computers, Physical Chemistry
- Background Knowledge
  - Radiation Physics, Dosimetry, Measurements, Protection, Imaging, Biology, Anatomy, Physiology, Clinical Radiation Oncology

AAPM
Report No. 36

Appendix IIIA

Radiation Physics Topic Outline for Radiation Oncology Physics Residents

- Atomic and nuclear structure
- Radioactive decay
- Particulate radiation interactions <
- X-Ray production
- High energy treatment machines <
- X- and gamma ray interactions
- Exposure measurement <
- Radiation quality <
- Absorbed dose measurement <
- Calibration of treatment beams <
- Dose distributions – external beam <
- Dose distributions – sealed sources <
- Computerized treatment planning <
- Radiation protection <

AAPM
Report No. 36

Appendix IIIB

Radiation Physics Topic Outline for Diagnostic Imaging Physics Residents

- Atomic and nuclear structure
- Radioactive decay
- Particulate radiation interactions
- X-Ray production <
- X-ray generators <
- X- and gamma ray interactions <
- Exposure measurement <
- Radiation quality <
- Absorbed dose measurement <
- Imaging Concepts <
- Filters and beam limiting devices <

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Report No. 36

Appendix IIIB

Radiation Physics Topic Outline for Diagnostic Imaging Physics Residents

- Imaging Geometry <
- Scattered Radiation <
- Intensifying Screens <
- Film <
- Fluoroscopy <
- Special Techniques <
- Computed Tomography <
- Ultrasound <
- Magnetic Resonance <
- (Mammography)
- (ACR Programs in Radiology)

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Report No. 36

Appendix IIIC

Radiation
Physics Topic
Outline
for
Nuclear
Medicine
Physics
Residents

- Atomic and nuclear structure
- Radioactive decay
- Particulate radiation interactions
- X- and gamma ray interactions
- X-ray production
- Exposure measurement
- Radiation detectors
- Counting Statistics
- Instrumentation <
- Radiopharmaceuticals <
- Radiopharmaceutical dosimetry <
- Radiation safety <
- Radiation Quality
- Measurement of Absorbed dose

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Report No. 36

Appendix IVA

Clinical Topic
Outline
for
Radiation
Oncology
Physics
Residents

- Primary malignancies of each anatomical site
  - Epidemiology
  - Pathology
  - Site of primary occurrence
  - Modes of metastases
  - Sites of metastases
  - Extent of disease
  - Complications
  - Treatment – primary disease
  - Treatment – metastatic disease
  - Radiation dosimetry and treatment planning
  - CPR

AAPM
Report No. 36

Appendix IVB

Clinical Topic
Outline
for
Diagnostic
Imaging
Physics
Residents

- Medical terminology
- Anatomy
- Physiology
- Patient procedures
  - Radiographic
  - Fluoroscopic
  - Special imaging
- Contrast media
- CPR
- (Regulatory Guidelines)

AAPM
Report No. 36

Appendix IVC

Clinical Topic
Outline
for
Nuclear
Medicne
Physics
Residents

- Use of radiopharmaceuticals
- Instrumentation
- Patient preparation
- Nuclear medicine procedures
- Therapy
- Role of FDA and NRC
- CPR

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Report No. 36

Appendix VA

Radiation
Biology Topic
Outline
for
Radiation
Oncology
Physics
Residents

- Interaction of radiation/matter
- Mammalian cell radiosensitivity
- Radiation response modifiers <
- Solid tumor systems
- LET <
- RBE <
- Cell and tissue kinetics
- Tissue radiosensitivity <
- Time-dose-fractionation <

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Appendix VA

Radiation
Biology Topic
Outline
for
Radiation
Oncology
Physics
Residents

- New modalities <
- Chemo adjuvants <
- Hyperthermia
- TBI
- Late effects <
- Embryo and fetal effects <
- Radiophysiology of human tissues <

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Report No. 36

Appendix VB

Radiation
Biology Topic
Outline
for
Diagnostic
Imaging
Physics
Residents

- Interaction of radiation/matter
- Mammalian cell radiosensitivity
- Radiation response modifiers
- Solid tumor systems
- LET
- RBE
- Cell and tissue kinetics
- Tissue radiosensitivity
- Time-dose-fractionation

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Report No. 36

Appendix VB

Radiation
Biology Topic
Outline
for
Diagnostic
Imaging
Physics
Residents

- Total body irradiation – acute effects
- Late effects <
- Embryo and fetal effects <
- Risk analysis of low level exposure <
- (Radiation Epidemiology)

AAPM
Report No. 36

Appendix VC

Radiation Biology Topic Outline for Nuclear Medicine Physics Residents

- Interaction of radiation/matter
- Mammalian cell radiosensitivity
- Radiation response modifiers
- Solid tumor systems
- LET
- RBE
- Cell and tissue kinetics
- Tissue radiosensitivity
- Time-dose-fractionation

AAPM
Report No. 36

Appendix VC

Radiation Biology Topic Outline for Nuclear Medicine Physics Residents

- Total body irradiation – acute effects
- Late effects <
- Embryo and fetal effects <
- Risk analysis of low level exposure <
- (Radiation Epidemiology)

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