



Radiation Oncology

Initial Certification Qualifying (Computer-Based) Examination:

Study Guide for Medical Physics for Radiation Oncology

This exam tests your knowledge of the principles of medical physics underlying the practice of radiation oncology. Included are questions within the domains listed below. Exam performance will be reported to you based on an overall pass/fail grade, with specific information provided regarding quintile performance in the seven individual domains. Because of the nature of scientific knowledge and subcategories, there may be some overlap of items across domains. Each exam will include items from every domain, but individual subtopics may not be included in every exam and the number of items per domain depends on the domain.

I. Basic physics	11% to 13%
II. Radiation measurements	9% to 11%
III. Treatment planning	19% to 21%
IV. Imaging modalities and applications in radiotherapy	16% to 18%
V. Brachytherapy	12% to 14%
VI. Advanced treatment planning and special procedures	15% to 17%
VII. Safety, QA, and radiation protection	11% to 13%

The ranges above are those generally in effect for the exam to be administered in 2023 and are intended only for guidance in candidate preparation. They do not necessarily represent a precise number of scorable items.

I. Basic physics

- A. Fundamental Physics
- B. Atomic and Nuclear Structure
- C. Production of Kilovoltage X-ray beams

D. Production of Megavoltage X-ray beams

E. Radiation Interactions

II. Radiation measurements

A. Radiation Quantities and Units

B. Radiation Measurement and Calibration

III. Treatment planning

A. Photon Beam Characteristics and Dosimetry

B. Electron Beam Characteristics and Dosimetry

C. Prescribing, Reporting, and Evaluating Radiotherapy Treatment Plans

D. Intensity Modulated Radiation Therapy (IMRT)

IV. Imaging modalities and applications in radiotherapy

A. Imaging Fundamentals

B. Simulation, Motion Management, Image Guidance, and Treatment Verification

V. Brachytherapy

VI. Advanced treatment planning & special procedures

A. Special Procedures (e.g., TBI, TSET, IORT, Radiopharmaceutical treatment)

B. Particle Therapy

C. Stereotactic Radiosurgery/Stereotactic Body Radiation Therapy

VII. Safety, QA, and radiation protection

A. Quality Assurance

B. Radiation Protection and Shielding

C. Safety and Incidents

References: References are intended as resources for exam takers and will form the sources for the majority of individual items in the exam. In listing multiple texts, the ABR does not imply or intend that candidates should be fluent in all aspects of every source. Many texts include topics not relevant to

radiation oncology, and others include significant duplicative material. Individual items may be sourced from references not cited in this study guide. Primary references are intended to be the source of the majority of exam items. Secondary references are individual smaller categories of items. Additional references may be the source of individual, selected items. In selection of topics for primary consideration, candidates are encouraged to consider details of this study guide and the [ASTRO-AAPM curriculum](#).

Primary References:

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Secondary References:

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Additional References:

Nath, R. , Anderson, L. L., Luxton, G. , Weaver, K. A., Williamson, J. F. and Meigooni, A. S. (1995), Dosimetry of interstitial brachytherapy sources: Recommendations of the AAPM Radiation Therapy Committee Task Group No. 43. Med. Phys., 22: 209-234. doi:10.1118/1.597458

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United States Code of Federal Regulations, Title 10, Chapter 1 – Nuclear Regulatory Commission, Part 20 – Standards for Protection Against Radiation. <https://www.nrc.gov/reading-rm/doc-collections/cfr/part020/>

United States Code of Federal Regulations, Title 10, Chapter 1 – Nuclear Regulatory Commission, Part 35 – Medical Use of Byproduct Material. <https://www.nrc.gov/reading-rm/doc-collections/cfr/part035/>