Maintenance of Certification
Therapeutic Medical Physics Study Guide
Updated 9/2016

General Information

Approximately 30% of the material on the examination is core therapeutic medical physics, technology, and safety. The rest is taken from recent advances in the field. Traditional therapy physics texts and the resources below will be helpful in preparing for the exam.

Length and Structure

The exam is approximately 150 questions in length. All questions are multiple-choice, and have three to five possible answers. A scientific calculator is available, but no complex calculations are required.

Clinical Procedures Candidates should have a general knowledge of common radiation therapy procedures.

Resources:

Reports from the American Association of Physicists in Medicine (AAPM), the National Council on Radiation Protection and Measurements (NCRP), the International Commission on Radiation Protection (ICRP) and the International Commission on Radiation Units and Measurements (ICRU):

NCRP Report No. 147
NCRP Report No. 151
NCRP Report No. 160
AAPM Report 45 (Task Group 34)
AAPM Report 51 and updates (Task Group 43)
AAPM Report 54 (Task Group 42)
AAPM Report 61 (Task Group 59)
AAPM Report 62 (Task Group 53)
AAPM Report 67 (Task Group 51)
AAPM Report 72 (Task Group 50)
AAPM Report 75 (Task Group 58)
AAPM Report 76 (Task Group 61)
AAPM Report 81 (Task Group 63)

AAPM Report 82 (Radiation Therapy Committee IMRT Subcommittee)
AAPM Report 83 (Task Group 66)
AAPM Report 85 (Task Group 65)
AAPM Report 87 (Task Group 62)
AAPM Report 91 (Task Group 76)
AAPM Report 95 (Task Group 75)
AAPM Report 97 (Task Group 74)
AAPM Report 101 (Task Group 101)
AAPM Report 104 (Task Group 104)
AAPM Report 106 (Task Group 106)
AAPM Report 114 (Task Group 114)
AAPM Report 142 (Task Group 142)
AAPM Report 148 (Task Group 148)
AAPM Report 166 (Task Group 166)
AAPM Report 216 (Task Group 69)
ICRU Reports No. 50 and 62
ICRP Report 118

Journal articles, such as:

- QUANTEC Reports, published in International Journal of Radiation Oncology Biology Physics. 76 S1 2010
- D Georg et al. Current status and future perspective of flattening filter free photon beams. *Medical Physics.* 2011;38(3):1280-93.
- J Palta et al. Intensity-Modulated Radiation Therapy – The State of the Art. *Medical Physics.*
- 2003;30:3265.
- A Siochi et al. Information technology resource management in radiation oncology. *Journal of Applied Clinical Medical Physics*. 2009;16-35
- A Arjomandy et al. An overview of the comprehensive proton therapy machine quality assurance procedures implemented at The University of Texas M.D. Anderson Cancer Center Proton Therapy Center-Houston. *Medical Physics.* 2009;36(6):2269
- S Kry et al. Ion recombination correction factors (P(ion)) for Varian TrueBeam high-dose-rate therapy beams. *Journal of Applied Clinical Medical Physics*. 2012;13(6):3803
- Mackie TR. History of tomotherapy. *Physics in medicine and biology*. 2006;51(13):R427-53
D Schwartz et al. Adaptive Radiotherapy for Head-and-Neck Cancer: Initial Clinical Outcomes From a Prospective Trial. *International Journal of Radiation Oncology Biology Physics*. 2011;83(3):986- 993
- S Fox et al. Performance evaluation of an automated image registration algorithm using an integrated kilovoltage imaging and guidance system. *Journal of Applied Clinical Medical Physics*. 2006;7(1):105-14
- E Ford et al. A streamlined failure mode and effects analysis. *Medical Physics.* 2014;41(6)
- M Law et al. Informatics in radiology: DICOM-RT and its utilization in radiation therapy. *Radiographics*. 2009; 29(3):655-667

Standard reference texts including:

- Khan: The Physics of Radiation Therapy, 5th Ed, Lippincott Williams & Wilkins, 2014
- Hendee, Ibbott, and Hendee: Radiation Therapy Physics, John Wiley & Sons, 2005
- Paganetti: Proton Therapy Physics, CRC Press, 2011
- Wazer et al; Accelerated Partial Breast Irradiation: Techniques and Clinical Implementation, Springer 2009

Curry et al.: Christensen's Physics of Diagnostic Radiology, 4th Ed, Lippincott Williams & Wilkins, 1990
Heilburn: Cyberknife Radiosurgery Practical Guide-Author Heilbrun, CyberKnife Society, 2005
Bushberg et al.: The Essential Physics of Medical Imaging, Lippincott Williams & Wilkins, 2011
Germano: LINAC and Gamma Knife Radiosurgery (Neurosurgical Topics), Thieme/AANS, 2000
Halperin et al.: Perez and Brady's Principles and Practice of Radiation Oncology, Lippincott Williams & Wilkins, 2013
Knoll: Radiation Detection and Measurement, Wiley, 2010
Metcalfe et al.: The Physics of Radiotherapy X-rays from Linear Accelerators, Medical Physics Pub Corp, 1997
Van Dyk: "Imaging for Radiation Therapy Treatment Planning" in The Modern Technology of Radiation Oncology, Medical Physics Publishing, 2005
Hall and Giaccia: Radiobiology for the Radiologist, 7th Ed, Lippincott Williams & Wilkins, 2011
Mundt and Roeske: Image-Guided Radiation Therapy: A Clinical Perspective, BC Decker Inc, 2005 T Pawlicki et al,: Quality and Safety in Radiotherapy, CRC Press, 2010

Sample Questions

A linear accelerator is calibrated to deliver 1 cGy/MU at 100 cm source-to-surface distance (SSD). What is the approximate dose per monitor unit at an SSD of 400 cm used for total-body photon irradiation?

A. 4 cGy/MU
B. 1 cGy/MU
C. 1/4 cGy/MU
D. 1/16 cGy/MU

Key = D

For treatment machines with IMRT capability, secondary barriers may need to be thicker. Why aren't primary barriers also made thicker?

A. IMRT beams are usually lower energy than 3D-CRT beams.
B. The primary beam workload is unchanged when IMRT is used.
C. Occupancy factors are lower for IMRT treatments.
D. The leakage radiation is decreased when IMRT is used.

Key = B

For stereotactic body radiation therapy (SBRT), how is the conformity index or PITV defined?

A. The ratio of the volume covered by the prescription isodose contour to the target volume.
B. The product of the area of the prescription isodose curve and the tumor volume.
C. The volume encompassed by the primary target during excursions due to respiratory motion.
D. The expansion volume around the internal target volume, for planning purposes.

Key = A