University of Michigan
Department of Radiation Oncology
Division of Radiation Physics

General Physics and QA Rotation

Resident: _____

Rotation staff mentor/ advisor: _Kwok Lam and Don Roberts_____

Rotation duration: 2 months
Rotation Dates: _____

A medical physics resident in radiation oncology at the University of Michigan will be expected to demonstrate the following competencies associated with general physics and QA. These are considered the minimum standards. Resident should complete the list of assignment during his/her rotations.

Contents Outline

Knowledge Factors – List of reference

Short list of useful references (this is by far not a comprehensive list):

- F.M. Khan, The Physics of Radiation Therapy, 3rd Edition, Lippincott Williams & Wilkins, Copyright 2003.
- F.H. Attix, Introduction to Radiological Physics and Radiation Dosimetry, 1986
- The Modern Technology of Radiation Oncology, Editor J. Van Dyk, Medical Physics Publishing, Copyright 1999.
- C.J. Karzmark *et al.*, Medical Electron Accelerators, McGraw-Hill Companies, Copyright 1993.
- C.J. Karzmark and Robert J. Morton, A Primer on Theory and Operation of Linear Accelerators in Radiation Therapy
- P.Metcalfe, T. Kron, and P. Hoban, The Physics of Radiotherapy x-rays from Linear Accelerators, Medical Physics Publishing, Copyright 1997.
- AAPM Task Group #40, "Comprehensive QA for Radiation Oncology."
- AAPM Task Group #142, "Quality Assurance of Medical Accelerators."
- AAPM Task Group #179, "Quality Assurance for image-guided radiation therapy utilizing CT-based technologies."
- AAPM Task Group #21, "A protocol for the determination of absorbed dose from high-energy photon and electron beams."
- AAPM Task Group #51, "Protocol for Clinical Dosimetry of High-Energy Photon and Electron Beams."
- Addendum to AAPM Task Group #51, Med Phys 41(4), 041501-1 – 20 (2014).
- AAPM Task Group #61, "AAPM protocol for 40 – 300 kV x-ray beam dosimetry in radiotherapy and radiobiology."
- AAPM Task Group #66, "Quality assurance for computed-tomography simulators and the computed-tomography-simulation process."
- "Ion chamber dosimetry instrumentation, beam scanning systems and calibration phantoms for radiation dosimetry", L. Humphries and J.A. Purdy.

Knowledge Factors (Cont.)

Demonstrate an understanding of detectors (e.g., theory of operation and limitations)

Signature / Date	

Demonstrate an understanding of TG-66 and the proposed QA tolerances

Signature / Date	

Demonstrate an understanding of TG-40 and the proposed QA tolerances

Signature / Date	

Demonstrate an understanding of TG-142 and the proposed QA tolerances

Signature / Date	

Demonstrate an understanding of TG-179 and the proposed QA tolerances

Signature / Date	

Demonstrate an understanding of TG-21

Signature / Date	

Able to define all TG-21 correction factors and the proposed QA tolerances

Signature / Date	

Demonstrate an understanding of TG-51 and addendum

Signature / Date	

Able to define all TG-51 correction factors and the proposed QA tolerances

Signature / Date	

Successfully performed a TG-51 hand calculation

Signature / Date	

Demonstrate an understanding of TG-61 and the proposed QA tolerances

Signature / Date	

Demonstrate an ability to draw a block diagram of a linac and explain the functions of each major subsystem

Signature / Date	

Demonstrate an understanding of the theory of machine operation

Signature / Date	

Demonstrate an understanding of machine components

Signature / Date	

Demonstrate an understanding of interaction of radiation in matter

Signature / Date	

Practical Factors – Two Week Mark

Observe and demonstrate an understanding of daily linac QA.

Signature / Date	
Signature / Date	
Signature / Date	
Signature / Date	

Perform daily QA checks in Argus.

Signature / Date	

Practical Factors – One Month Mark

Observe monthly linac QA

Signature / Date	
Signature / Date	
Signature / Date	
Signature / Date	

Observe daily CT QA

Signature / Date	
Signature / Date	
Signature / Date	
Signature / Date	

Observe monthly CT QA

Signature / Date	

Practical Factors – Two Month Mark

Independently perform monthly linac QA (non-OBI)

Signature / Date	

Successfully performed TG-51 hand calculations - photons

Signature / Date	

Successfully performed TG-51 hand calculations - electrons

Signature / Date	

Demonstrate an understanding of machine malfunction management and QA checks to release the machine for clinical use.

Signature / Date	

Complete linac safety and competency

Signature / Date	

Cleared for clinical coverage shifts

Signature / Date	

Practical Factors – Three Month Mark

Demonstrate an understanding of the CT scanning protocols

Signature / Date	

Successfully scan a phantom

Signature / Date	

Under the supervision of faculty, able to set/adjust output on a linac

Signature / Date	

Independently perform monthly linac QA on unit with OBI

Signature / Date	

Perform progressive annual tasks under direct or general supervision of faculty

Signature / Date	

Practical Factors – Six Month Mark

Successfully complete CT sim competency test (minus the contrast injection)

Signature / Date	

Practical Factors – One Year Mark

Independently setup blue phantom scanning tank

Signature / Date	

Acquire and analyze all tests required for annual linac QA

Signature / Date	

Able to identify energy problems; beam on target position and angle problems from scan data

Signature / Date	

Practical Factors – Two Year Mark

Independently perform progressive annual

Signature / Date	