Diagnostic Part 1 and General Overview of CAMPEP/Residency

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Overview

- CAMPEP
  - New enrollees in the ABR Medical Physics Initial Certification must complete part of training at a CAMPEP institution before becoming board certified
  - CAMPEP imaging residencies have limited space
- Part 1 preparation

CAMPEP and ABR

- 2012/2014 Initiatives
  - Required CAMPEP program enrollment/completion as part of ABR certification
- Where are we today?
  - To register for Part 1, you must be enrolled in or have completed a CAMPEP program (graduate, residency, certificate, DMP)
  - If you took (or will take) Part 1 in 2014 or later, you MUST complete a CAMPEP residency to sit for Part 2
  - If you took Part 1 before 2013, you only need 3 years clinical experience to become "Board Eligible" for Part 2

CAMPEP Residencies

- Currently 17 CAMPEP-accredited imaging residencies
  - Six offer nuclear medicine option
  - Majority take one resident per year
  - 11 CAMPEP "slots" in 2017 Medical Physics Match
    - Applications from ~October through January
    - Results in late March
    - Several non-CAMPEP imaging slots
    - List of dates, programs at natmatch.com/medphys/

CAMPEP Residencies

- Prospective applicants should be aware of requirements
  - Many programs prefer CAMPEP degree holders (Ph.D. or M.S.)
    - Not required by CAMPEP!
    - Six core courses must be completed


AAPM REPORT NO. 197S

The Essential Medical Physics Didactic Elements for Physicists Entering the Profession through an Alternative Pathway: A Recommendation from the AAPM Working Group on the Revision of Reports 44 & 79

Supplement to Report 253, 197: Academic Program Recommendations for Graduate Degrees in Medical Physics

- http://www.aapm.org/pubs/reports/RPT_197S.pdf

CAMPEP Residencies

- Six core courses:
  - Radiological Physics and Dosimetry
  - Radiation Protection and Safety
  - Fundamentals of Medical Imaging
  - Radiobiology
  - Anatomy and Physiology
  - Radiation Therapy Physics
- Four options:
  - CAMPEP Graduate Program
  - CAMPEP Certificate Program
  - Residency Director Approval
  - CAMPEP Review Committee Approval

Only 4 of the 6 courses must be completed before the beginning of a 2-year residency

http://campep.org/ProspectiveApplicants.asp

CAMPEP Residencies

- Coursework and background at the discretion of the CAMPEP residency program director
- Individual programs may or may not accept the minimum background (80% of incoming residents are from CAMPEP)
- Knowing the rules and policies is helpful for anyone without a CAMPEP degree
- Clearly state in your cover letter how you satisfy (or plan to satisfy) background requirements

Be your own advocate!

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Preparing for Part 1

- Apply for Part 1 after enrollment in a CAMPEP program (graduate, certificate, residency, DMP)
- Apply September 1 through October 30 in the prior year
- Complete Part 1 within 5 years of approval
  - If not completed, must complete additional year at CAMPEP institution
- Part 2 approval must come within 10 years of passing Part 1
  - Part 2 approval comes at the completion of residency
  - If you're in a Ph.D. program, don't take too early!

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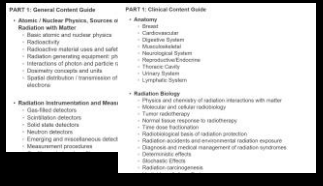
Preparing for Part 1

- Not specific to any of the sub-specialties (DI, NM, RT)
- Content guide
  - https://www.theabr.org/ic-rp-sample-part1


PART 1: General Content Guide

- Atomic / Nuclear Physics, Sources of Radiation with Matter
  - Basic atomic and nuclear physics
  - Radioactivity
  - Radioactive material uses and safety
  - Radiation-generating equipment: ph
  - Interactions of photon and particle r
  - Dosimetry concepts and units
  - Spatial distribution / transmission of electrons
- Radiation Instrumentation and Measu
  - Gas-filled detectors
  - Scintillation detectors
  - Solid state detectors
  - Neutron detectors
  - Emerging and miscellaneous detect
  - Measurement procedures

PART 1: Clinical Content Guide

- Anatomy
  - Breast
  - Cardiovascular
  - Digestive System
  - Musculoskeletal
  - Neurological System
  - Reproductive/Endocrine
  - Thoracic Cavity
  - Urinary System
  - Lymphatic System
- Radiation Biology
  - Physics and chemistry of radiation interactions with matter
  - Molecular and cellular radiobiology
  - Tumor radiotherapy
  - Normal tissue response to radiotherapy
  - Time dose fractionation
  - Radiobiological basis of radiation protection
  - Radiation accidents and environmental radiation exposure
  - Diagnosis and medical management of radiation syndromes
  - Deterministic effects
  - Stochastic Effects
  - Radiation carcinogenesis

Content guide is based on exam "blueprint"

Focus on breadth, not depth

Weighting not equal!

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Part 1 Question Types

3. The mass attenuation coefficient of bone (density of 1.8 g/cm³) is 0.2 cm²/g for an 80-keV gamma ray. What percentage of 80-keV photons is attenuated by a slab of bone 4 cm thick under conditions of narrow beam geometry?

A. 36%
B. 45%
C. 55%
D. 64%
E. 76%

Fill-in-the-Blank
The candidate must type in the correct response:

1. For a pressure of 756 mm Hg and a temperature of 21°C, the temperature-pressure correction factor for an unsealed ion chamber is _____. (Round to the third decimal place.)

Answer: 1.002

How to get to the answer: ((273.15 + 21)/295.15) x 760/756 = 1.0019. Round to third decimal = 1.002

Multiple Correct Options
The candidate must select all of the correct options for each item:

1. A charged particle is in a vacuum. Under which two conditions will it emit electromagnetic radiation? (Please select two options.)

A. Linear with constant speed
B. Circular with constant speed
C. Linear with constant acceleration
D. No motion

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Part 1 Question Types

3. Eighty-five percent of an injection of ^{99m}Tc sulfur colloid is cleared from the blood by the liver. What is the time-integrated activity coefficient in the liver? (Assume a biological half-life of 3 hours.)

A. 1.4 hours
B. 2.5 hours
C. 3.1 hours
D. 4.3 hours

Answer = B
Comments:
Lamda_eff = 0.693/3 h + 0.693/6 h = 0.3465/h (2 h)
0.85*2 h/0.693=2.5 h

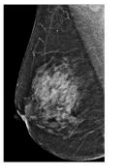
4. Given an administered activity of 2.8 mCi, a time-integrated activity coefficient of 2.5 hours, and an S factor [liver←kidney] of 3.9 × 10^{-6} rad/μCi-h, what is the absorbed dose to the kidney from the liver?

A. 18 mrad
B. 21 mrad
C. 27 mrad
D. 34 mrad

Answer = C
Comments:
2800 uCi*2.5 h*3.9 x 10^-6 rad/uCi-h = 27 mrad

Point and Click
The candidate must identify a region on an image:

1. Point and click on the pectoralis muscle.



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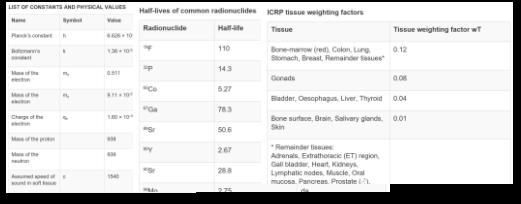
Provided Constants

- ABR provides common values


LIST OF CONSTANTS AND PHYSICAL VALUES

Name	Symbol	Value
Planck's constant	h	6.626 × 10
Boltzmann's constant	k	1.38 × 10^{-1}
Mass of the electron	m_e	0.511
Mass of the electron	m_e	9.11 × 10^{-3}
Charge of the electron	q_e	1.60 × 10^{-1}
Mass of the proton		938
Mass of the neutron		939
Assumed speed of sound in soft tissue	c	1540

Half-lives of common radionuclides

Radionuclide	Half-life
^{18}F	110
^{32}P	14.3
^{60}Co	5.27
^{67}Ga	78.3
^{89}Sr	50.6
^{90}Y	2.67
^{90}Sr	28.8
^{99m}Tc	2.75

ICRP tissue weighting factors

Tissue	Tissue weighting factor w_T
Bone-marrow (red), Colon, Lung, Stomach, Breast, Remainder tissues*	0.12
Gonads	0.08
Bladder, Oesophagus, Liver, Thyroid	0.04
Bone surface, Brain, Salivary glands, Skin	0.01

* Remainder tissues: Adrenals, Extrathoracic (ET) region, Gall bladder, Heart, Kidneys, Lymphatic nodes, Muscle, Oral mucosa, Pancreas, Prostate (♂), Small intestine, Spleen, Thymus, Uterus/cervix (♀)

- https://www.theabr.org/ic-rp-constants-physical-values

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Calculator

- Emulator version of the TI-30XS

- Practice!

https://www.theabr.org/ic-rp-calc

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Results

- Exam results posted approximately 4 weeks after exam
  - Pass rates around 70%
- Must pass both clinical and general exams
  - Fail clinical only -> retake only the clinical
  - Fail general only -> retake whole exam

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Final Tips

- Keep track of dates
  - Sign up for exam center as soon as possible
    - Limited seats, not guaranteed to be at nearest site
- Become familiar with test format
  - Know when you can skip, go back (and when you can't)
  - http://www.pearsonvue.com/athena/static/started/index.asp
- Practice with the calculator

Study early, study often

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Thank you

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