ABR Initial Certification: Preparing for the ABR Nuclear Medical Physics Exams Part II & III

2018 AAPM 60th Annual Meeting Nashville, TN

Ken Lewis, Ph.D., DABR, CHP Diagnostic/Nuclear Medical Physicist Department of Radiology & Radiological Sciences Vanderbilt University Medical Center, Nashville TN



Topics

- ABR Medical Physics Exam statistics
- Brief discussion about Part II
- Brief discussion about Part III
- Suggested reference material

ABR Examination Statistics

Average pass rates for residents taking the exam for the first time (2014-2016)

	Ave # Examinees	Ave Pass Rate	Ave Fail Rate
Part 1 General	192	69%	31%
Part 1 Clinical	185	73%	27%
Part 2	143	79%	21%
Part 3 Oral	230	67%	13%

ABR Examination Statistics

SPECIALTY CERTIFICATES ISSUED 2008-2017

Total 200	204									
	204	204	315	263	266	279	248	242	217	2,438
Ther: 181	169	181	263	232	213	217	211	196	155	2,018
Diag: 14	28	22	41	29	45	54	30	41	52	356
Nuc: 5	7	1	11	2	8	8	7	5	10	64

https://www.theabr.org/wp-content/uploads/2018/02/AR-2017.pdf



ABR Initial Certification for Medical Physics

Part 2 Exam

Last verified on June 19, 2017

The second exam you will take is the Part 2 computer-based exam, which is specific to a particular specialty: diagnostic medical physics, therapeutic medical physics, or nuclear medical physics.

The Part 2 exam is based on material that would be learned during a CAMPEP-accredited medical physics residency. The material represents the broad subspecialty-specific knowledge across the discipline.

The Part 2 Exam is administered at Pearson VUE Testing Centers throughout the country.

Next: Requirements and Application

https://www.theabr.org/medical-physics/initial-certification/part-2-exam

ABR AMERICAN BOARD OF RADIOLOGY	About Us News Verify Certification Exam Details Contact Us myABR Login				
Home Public Diagnostic Radiology In	terventional Radiology Medical Physics Radiation Oncology Search				
Initial Certification for Medical Phy	sics				
Overview	- Requirements and Application				
Certification Requirements	Last verified on March 6, 2018				
Part 1 Exam	On this page Requirements Conditions who applied for portification after live 1, 2012				
Part 2 Exam					
Overview	 Candidates who applied for certification after July 1, 2013 Candidates who applied for certification prior to October 31, 2012 				
Requirements and Application	Footnotes Application				
Diagnostic Content Guide	Exam Application Schedule				
Nuclear Content Guide	Requirements				
Therapeutic Content Guide	- New applicants should review the ABR Audit Standards Policy for Initial Certification in Medical Physics.				
Exam Results	Candidates who applied for certification after July 1, 2013 • You must have passed the Medical Physics Part 1 exam (general and clinical).				
Part 3 (Oral) Exam					
International Medical Graduates	 You must have completed a CAMPEP-accredited residency by August 31 of the year in which the Part 2 exam is to be taken. 				
Conditions and Reapplications	 If you completed a CAMPEP-accredited residency prior to the year that you are applying for the Part 2 exam, you must also provide documentation of current employment as a medical physicist 				
Now Question Types: Parts 1 and 2	Jou mus and provide documentation of current employment as a metical physicist.				
https://ww	w.theabr.org/medical-physics/initial-certification/part-2-exam				

ABR Nuclear Medical Physics Clinical Experience Attestation

- Nuclear QMP must attest to candidate's completion of:
 - Annual survey of a scintillation camera (including SPECT acceptance testing of a scintillation camera [including SPECT])
 - Annual survey of a PET or PET/CT imager
 - Acceptance testing of a PET or PET/CT imager
 - CT system performance evaluation of a CT scanner that is part of a PET/CT imaging device

https://www.theabr.org/sites/all/themes/abr-media/pdf/NMP%20Supervisor%20Clinical%20Experience%20Attestation.pdf

ABR Nuclear Medical Physics Clinical Experience Attestation

- Dose calibrator/uptake probe/well counter performance evaluation
- Radiation safety audit of a nuclear medicine facility
- Shielding design for a PET/CT imaging device
- Evaluation of a diagnostic workstation
- Participation as a medical physicist in the administration of a therapeutic radionuclide.
- Participation in radionuclide dose calculations for patients (including fetal dose calculations).
- Performance of release calculations for patients receiving radionuclide therapies.

https://www.theabr.org/sites/all/themes/abr-media/pdf/NMP%20Supervisor%20Clinical%20Experience%20Attestation.pdf

Nuclear Content Guide – Part II

<u>Content Guide</u>

- 1. Radiation Protection, Safety, Professionalism and Ethics
- 2. PET & Hybrid
- 3. Single photon imaging systems including scintillation cameras, solid state cameras and hybrids
- 4. Radiation measurements including dose calibrators, well counters, survey meters, thyroid probes
- 5. Clinical Procedures

https://www.theabr.org/medical-physics/initial-certification/part-2-exam/part-2-nuclear-content-guide#content

Nuclear Content Guide – Part II Question Type: Simple

- Simple
 - 1. Traditional multiple choice question with a single answer.
 - 2. New Items:
 - Multiple Correct Options
 - Fill-in-the-Blank
 - R-Type
 - Point-and-Click

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Nuclear Content Guide – Part II Question Type: Simple

- Example: Fill-in-the-Blank
- If the field of view of a scintillation camera is 20 cm and the matrix is 128 × 128, what is the pixel size of the image? ______ mm (Round to two decimal places.)

Answer: 1.56, (1.54, 1.55, 1.56, 1.57, and 1.58 will also be accepted.)

https://www.theabr.org/medical-physics/initial-certification/part-2-exam/part-2-nuclear-content-guide#content

8/1/18

Nuclear Content Guide – Part II Question Type: Simple

• Example: R-Type

1.

• For each question, choose the correct radiopharmaceutical from the drop-down list. Each option can be used once, more than once, or not at all. Please advance to the next screen.

a)	111In leukocytes	Answers:
b)	111In pentetate (DTPA)	1 1
c)	123I ioflupane	1. A
d)	123I Nal	2. D
e)	99mTc MAA	2 5
f)	99mTc MDP	3. E
g)	99mTc sestamibi	
Th	is radiopharmaceutical is used primarily for the diagnosis of infection.	
Th	is radionharmaceutical is used primarily for the diagnosis of thyroid function	

This radiopharmaceutical is used primarily for the diagnosis of thyroid function.
 This radiopharmaceutical is used primarily for the diagnosis of pulmonary embolism.

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Nuclear Content Guide – Part II Question Type: Complex

Example: Complex

 A generator is eluted and yields 300 mCi of 99mTc. For clinical studies to be done up to 6 hours after elution, what is the maximum acceptable number of microcuries of ⁹⁹Mo allowable at the time of elution?

Answer: C

- a) 5.6 μCi
- b) 12 μCi
- c) 24 μCi
- d) 30 µCi
- e) 45 μCi

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ABR Initial Certification for Medical Physics

Part 3 (Oral) Exam

Last verified on June 19, 2017

The third exam you will take is the Part 3 oral exam. This exam is designed to test your knowledge and fitness to practice applied medical physics in your specified specialty. You will be examined by five physics examiners, each of whom will ask one question from each of the five physics categories of the exam.

The Part 3 oral exam includes the same material as the Part 2 computer-based exam, but with a strong emphasis on practicing clinical medical physics, clinical judgment, and communication. Successful completion of Parts 2 and 3 demonstrate a level of achievement that is necessary for a medical physicist to practice independently.

This exam is currently conducted annually in late May or early June at a hotel in Louisville, Kentucky.







- PET & Hybrids:
 - Radionuclide production and characteristics;
 - QC procedures, including ACR/TJC/NEMA and acceptance testing, artifacts;
 - System principles, image fusion, random coincidences, scattered radiation, dead-time;
 - Quantitative PET, including SUV;
 - Image reconstruction, including attenuation correction, iterative reconstruction, filtered back projection

https://www.theabr.org/medical-physics/initial-certification/part-3-exam/content-guide







Useful Reference Material for Parts II & III



Simon R. Cherry James A. Sorenson Michael E. Phelps



SAUNDERS

<u>Cost</u>:

• \$\$

sevier.com/books/physics-in-nuclear-medicine/9781416051985

Comments:

- Need to know the material in this book for both exams.
- Covers fundamental concepts & topics.
- Review figures & plots.



















ACR-AAPM Radiation Safety Officer Resources

Essential information for radiation safety officers at medical imaging facilities.

 American College of Radiology
 American Association of Physicists in Medicine

 Jessica B. Clements, MS, Chair
 Steven H. King, MS

 Richard A. Geise, PhD, FACR, FAAPM
 Ralph P. Lieto, MS, FACR, FAAPM

 Brove E. Hasselquist, PhD
 Melisas C. Martin, MS, FACR, FAAPM

 Priscilla F. Butler, MS, FACR, FAAPM (Staff)
 Melisas C. Martin, MS, FACR, FAAPM

 Braina M. Keefer (Staff)
 Braina M. Keefer (Staff)

 Elizabeth G. Yarboro (Staff)
 Braina M. Keefer (Staff)

Committee on Education of the Commission on Medical Physics, American College of Radiology—Chair, Mahadevappa Mahesh, PhD, FACR, FAAPM Professional Council, American Association of Physicists in Medicine—Chair, Douglas E. Pfeiffer, MS, FACR, FAAPM

Updated May 7, 2015 (Originally published April 23, 2015) American College of Radiology, Reston, Va.

Cost:

Free

Comments:

- Practical information • useful for RSO's.
- Spells out requirement • to become a RSO on a radioactive material license for medical use.

https://www.acr.org/-/media/ACR/Files/Radiology-Safety/Radiation-Safety/ACRAAPM-RSO-Resources.pdf?la=en

AAPM Task Group 108: PET and PET/CT Shielding Requirements Mater, T. Mindean Jon A. Andenson Jon B. Andenson Materiag, University of Texas Southwest Texas Medical Center at Dallas Jarmes R. Halarna Jarde R. Halarna Jardie R. Halarna Jardie J. Shiphin Douglas J. Shiphin Douglas J. Shiphin John R. Yolaw Medical Center John R. Yolaw	<u>Cost</u> : • Free
Bichard E, Wendt III Diversity of You MD Anderson Cause Cause Lawrence E, Williams Cause Cause Lawrence E, Williams Diversity of Alabama at Diversity Bick Cause Marken M, Yoate Diversity of Alabama at Diversity Cause Marken M, Yoate Diversity of Alabama at Diversity Cause Diversity Cause Diversity Cause Diversity Cause <td> Need to know this material. Should have experience in performing shielding calculations definitely before Part III. </td>	 Need to know this material. Should have experience in performing shielding calculations definitely before Part III.
4 Med. Phys. 33 (1), January 2006 0094-2405/2006/33(1)/4/12/523.00 © 2006 Am. Assoc. Phys. Med. https://www.aa	pm.org/pubs/reports/detail.asp?docid=107

CONTINUING EDUCATION

Routine Quality Control of Clinical Nuclear Medicine Instrumentation: A Brief Review*

Pat Zanzoni

Departments of Medical Physics and Radiology, Memorial Sloan-Kettering Cancer Center, New York, New York

This article reviews routine quality-control (QC) procedures for current reviews routine quality-control (QC) proceedures for proceedure quality-control (QC) proceedures for current respective frequencies are presented only a general diodomine. Net (QC) scenner, savey meter, 0000 proceedures for this article should be particularly useful for residents, follows, and ther trainees in nuclear medicine, nuclear cardiology, and miciology. Aptimit-1455

Nuclear medicine is critically dependent on the scati-tar, neproducible performance of clinical radious is recommended. (*μ*-*μ*). In the scatter of clinical radious is recommended to the scatter performance of the scatter of the

1114 THE JOURNAL OF NUCLEAR MEDICINE • Vol. 49 • No. 7 • July 2008

Cost:

Free

Comments:

- Excellent summary of various QA tests for nuclear medicine instruments.
- Know the material in this document.
- The link below will take you to the free NCBI version of the paper.

International Journal of Biomedical Imaging Volume 2011, Article ID 693795, 14 pages doi:10.1155/2011/609205 Cost: Free **Review** Article **Filtering in SPECT Image Reconstruction** Maria Lyra and Agapi Ploussi Department of Radiology, Radiation Physics Unit, University of Athens, 76, Vas. Sophias Ave., Athens 11528, Greece Comments: ondence should be addressed to Maria Lyra, mlyra@med.uoa.gr Received 25 January 2011; Accepted 5 April 2011 Academic Editor: M'hamed Bentourkia Concise summary of • Copyright © 2011 M. Lyra and A. Ploussi. This is an open access article distributed under the Creative Commons Attribution .cense, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly me, which permits unstructed une, dustribution, and reproduction in any measure, provided the original work i A hybro encursions compared to mongaphy (SPE-CT) integring in which programments in nutricer medicine in all of photon encursions compared to mongaphy (SPE-CT) integring in which programments in nutricer in a list of SPE-CT images are degreded by several factors und in a noise because of the limited number of comma, interastication bottoms. This approximation is a structure of the limited number of comma, structure of the photon encursion of the surgest number of the limited number of comma, structure of the photon encursion of the surgest number of the structure of the limited number of comma, structure of the structure of the determination of the mostly used (Burst encurs) to preverse spatial results in a structure of the photon encursion of the structure of t filters used in tomographic reconstruction for 1. Introduction Tomography is a noninvasive imaging technique that is use to generate cross-sectionals images of a three dimensional (30) object without superimopsing itemases. Tomography and be categorized in transmission temography the computed tomography (CT) and emission temography the paratime emission temography (CT) and emission temography the paratime emission temography techniques and a patient to create images of actions (diles) of the patient section of the collimators, the detection efficiency and scatter of gamma ray photons, the detection efficiency and scatter of gamma ray photons, the detection efficiency and scatter of gamma ray photons, the detection efficiency and scatter of gamma ray photons, the detection efficiency and scatter of gamma ray photons, the detection efficiency and scatter of gamma ray photons, the detection efficiency and scatter of gamma ray photons, the detection efficiency and scatter of gamma ray photons, the detection efficiency and into monography provide 3D image information in engon. In tomography is techniques, projections are scattered from mary different mages around the body you one or more rotating detectors. These data are then reconstructed and phy the scattered during reconstruction and gamed the scattered from and the formation of the formation in tempor. The tomography is techniques, projections are scattered from mary different mages around the body you one or more rotating detectors. These data are then reconstructed and phy the images of the lifeting is the term used during reconstruction and applied to the information of the scattered or during terostruction and applied to the information of the formation is the images and the body you one or more rotating detectors. These data are then reconstructed and phy the information of the formation is the comparison of the information is SPECT. 1. Introduction Should know this material.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2703015

https://www.hindawi.com/iournals/iibi/2011/693795/







- NRC Medical Uses Licensee Toolkit

 https://www.nrc.gov/materials/miau/med-use-toolkit.html
- 10CFR35
 - <u>https://www.nrc.gov/reading-rm/doc-collections/cfr/part035/</u>
- 10CFR20
 - <u>https://www.nrc.gov/reading-rm/doc-collections/cfr/part020/</u>
- Yttrium-90 Brachytherapy Source Licensing Guidance
 - https://www.nrc.gov/docs/ML1535/ML15350A099.pdf

SNMMI Resources

- Nuclear Medicine Radiation Dose Tool
 - <u>http://www.snmmi.org/ClinicalPractice/doseTool.aspx?</u>
 <u>ItemNumber=11216&navItemNumber=11218</u>
- Procedure Standards
 - <u>http://www.snmmi.org/ClinicalPractice/content.aspx?</u>
 <u>ItemNumber=6414</u>

Miscellaneous Resources

- IAEA-NMQC Toolkit
 - <u>https://humanhealth.iaea.org/HHW/MedicalPhysics/</u> <u>NuclearMedicine/QualityAssurance/NMQC-Plugins/index.html</u>
 - Free ImageJ plugins to support nuclear medicine physics equipment quality control examinations.
- WePassed!
 - https://www.wepassed.com/sites/home
 - Exam prep site, more geared towards Therapy Medical Physics.

Advice for Part II

- Study as much as you can, especially on what the ABR stated are the fundamental topics.
- Know the material in Cherry's Book: Physics of Nuclear Medicine.
- Both Part II & Part III focus on one major area: nuclear medicine so, great depth of knowledge is expected.
- Know the fundamental academic material & be familiar with the clinical aspects.
- Helpful to have a general understanding about common nuclear medicine exams.

Advice for Part III

- Get in the clinic! Hands-on experience is expected! You will have a difficult time answering questions without actual clinical experience.
- Participate in a wide variety of nuclear medicine and PET related activities as possible.
 - Machine QA, Instrumentation QA, Patient dose calcs, Technologists education, radiation safety, audits, etc...
- Experience facilitates the integration and application of didactic knowledge.
- Be familiar with common nuclear medicine exams.
- Be familiar with 10CFR35 and 10CFR20.

