Navigating the Board Exam Process

Parts 1 & 2

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Conflicts of Interest

- License royalties from IBA

Disclaimer

- Coming to this seminar will not guarantee that you pass.
Millennials...

3 BIGGEST FEARS OF OUR GENERATION

Millennials...

4 BIGGEST FEARS OF OUR GENERATION

Agenda

- Timeline of exams
- Part 1 & 2
  - Structure
  - Survey results
- Summary and Recommendations
Part 1 (typically offered in August, $505)
• Requirement: Must be enrolled in or have completed a CAMPEP-accredited program (graduate program, DMP program, certificate program, or medical physics residency)
• Apply between September 1 and October 31 of the year before the exam

Part 2 (typically offered in August, $650)
• Requirement: Must pass part 1, must complete a CAMPEP-accredited residency by August 31 of the year in which part 2 is to be taken
• Apply between December 1 and January 31 of the year before the exam

Part 3 (typically offered in May, $765)
• Requirement: Must pass parts 1 and 2
• Will be invited after passing part 1 and part 2

Cost and dates: [https://www.theabr.org/icrp-dates](https://www.theabr.org/icrp-dates)
Requirements: [https://www.theabr.org/icrp-req](https://www.theabr.org/icrp-req)
When to apply: [https://www.theabr.org/icrp-process](https://www.theabr.org/icrp-process)

*Number of questions likely to increase with conversion to new question types*
ABR provides constants for Part 1 & 2

- Physical values
  - Planck’s constant, mass of electron, speed of light, speed of sound, gyromagnetic ratio, flux capacitor ratio, etc
- Half-lives of common radionuclides
- Radiation and tissue weighting factors
- Dose rate constants and T1Vs

New question types

- Four new types of questions
  - Fill in the blank
    1. For a pressure of 760 mm Hg and a temperature of 21°C, the pressure correction factor for an evacuation chamber is _____________. (Round to the third decimal place.)
      Answer: 1.002
      
      Way to get to the answer: 10273.15 + 15139.11/4761756 = 1.002
      
      New question types: [link]
      
      New question type: [link]
      
      Fill in the blank:
      
      New question types: [link]
      
      New question type: [link]

- Multiple correct options

  A charged particle is in a vacuum. Under which two conditions will it emit electromagnetic radiation? (Please select two options.)
  - Linear with constant speed
  - Circular with constant speed
  - Linear with constant acceleration
  - No motion

New question types: [link]

New question types: [link]
New question types
• Four new types of questions
  • Fill in the blank
  • Multiple correct options
  • Point and click

Part 1 example questions:
https://www.theabr.org/ic-rp-new-question-types

New question types
• Four new types of questions
  • Fill in the blank
  • Multiple correct options
  • Point and click

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New question types
• Four new types of questions
  • Fill in the blank
  • Multiple correct options
  • Point and click
New question types

- Four new types of questions
  - Fill in the blank
  - Multiple correct options
  - Point and Click
  - Case-based questions
  - Two or more (typically three) sequentially related questions on a single topic.
  - These questions are intended to replace the "complex" type questions in Part 1.
  - The questions are linked in a one-way direction that does not allow the examinee to go back to change an answer after moving to the next question.

Case based questions

- Example

  1. For a 2D ultrasound image that contains 100 A-mode lines resolving an
     echo with a depth of 10 cm and an acquisition time per each line of 12 pixels,
     what is the total time per frame?
       - A. 3.0 ms
       - B. 12.6 ms
       - C. 15.0 ms
       - D. 27.7 ms
     There will be a clock between the questions that permits the candidate to review
     previous question, but not to change the answer.

  2. If the time per frame is 10.5 ms, what is the frame rate?
       - A. 90 Hz
       - B. 57 Hz
       - C. 150 Hz
       - D. 700 Hz
       - E. 3000 Hz
     Answer: 1. C, Answer 2. B.

Good news, this style of question allows partial credit! This is better than a
single "complex" type question worth 3 points.

What is the pass rate?

- Annual report archives: https://www.theabr.org/news-landing#annual-report-archive
I know, you guys want statistics...

Statistics by Stephen Graves, PhD

So what happened? *Dan's hypothesis

Exclusive: Doctors cheated on exams

* "For years, doctors around the country taking an exam to become board certified in radiology have cheated by memorizing test questions, creating sophisticated banks of what are known as 'cheats,' a CNN investigation has found."

So how can we help? Survey!

- Blake and I took the exam a long time ago (cause we're old), so we wanted some fresh data!
- Survey was sent out seeking advice from recent test takers
  - MedPhys/USA listserv
  - Med Phys Board Preparation Yahoo Group
- Received 107 responses!
- Answers from those that passed and those that failed were categorized
Inconclusive

- 52% of people that passed studied 80+ hours, while 59% of those that failed also studied 80+ hours

Recommendation: Studying in groups for part 1 may not be advantageous

- Potential reasons: Hard to stay focused due to breadth of potential topics

Most effective study materials

<table>
<thead>
<tr>
<th>Subject</th>
<th>Number of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Physics of Radiation Therapy (Irwin)</td>
<td>10</td>
</tr>
<tr>
<td>WebBoard.com</td>
<td>8</td>
</tr>
<tr>
<td>General Anatomy &amp; Physiology textbook</td>
<td>7</td>
</tr>
<tr>
<td>The Essential Physics of Medical Imaging (Buchberg, Jakobovitz)</td>
<td>5</td>
</tr>
<tr>
<td>Radiology for the Radiologist (Hed, Williams)</td>
<td>5</td>
</tr>
<tr>
<td>Review of Radiological Physics (Hude, Stone)</td>
<td>5</td>
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<tr>
<td>Introduction to Radiological Physics and Radiation Delivery (Sinha)</td>
<td>4</td>
</tr>
<tr>
<td>Physics in Nuclear Medicine (Chern, Sjovold, Phillips)</td>
<td>4</td>
</tr>
<tr>
<td>Radiation Therapy Physics (Hendel, Staff, Hendel)</td>
<td>3</td>
</tr>
<tr>
<td>Write's Lectures (Irwin)</td>
<td>3</td>
</tr>
<tr>
<td>General Physics textbook</td>
<td>3</td>
</tr>
<tr>
<td>Radiation Detectors and Measurements (Irwin)</td>
<td>2</td>
</tr>
<tr>
<td>...</td>
<td></td>
</tr>
</tbody>
</table>
Comments from exam takers

- Study by doing actual questions!
  - "Study more calculation problems"
  - "Practice as many example problems as possible, and do them with the exam calculator"
  - "I found the use of RAPHEX exams invaluable. The ability to test and assess your command of the topics was invaluable. Furthermore, I could time myself on how long it took answer a complete set of questions.
  - RAPHEX: Radiological Physics Examinations – useful as a practice test or advanced study guide
- I agree, some resources where you can practice questions:
  - Raphx
  - Online (WebPassed, Quietly, etc)

Tips for success

- DO NOT
  - Study recalls
- DO
  - Start early, you need to dedicate a SIGNIFICANT amount of time to exam preparation
  - Practice questions — In my opinion, this is the most efficient use of your time
  - You have already had the coursework, just need to "freshen" up your skills
- MAYBE
  - Study in a group, but you need a way to stay focused
    - On the flip side, if you find yourself surfing the internet every 5 minutes while studying by yourself, maybe a group would help

Part 2

Navigating the board exam process
Part 2 specifics

- Questions are specific to your subspecialty (therapeutic physics)
  - Bc to 10 questions (range of questions is to account for the conversion of complex items to multi-part questions)
- 4 hours
- What if you fail?
  - You can take it again next year @
- Information
  - https://www.theabr.org/Exam-information/Exam-breakdowns

What is the pass rate?

GIVE US THE STATISTICS!
According to these results, studying more actually decreased your chance of passing!

Recommendation: Studying in groups for part 2 may not be advantageous.

Written test? No need to say answers out loud?
**Comments from exam takers**

- **Books:**
  - "Explains was very helpful for the short answer questions."
  - "Helped me score the q.m. examination."
  - "Did several practice exams and helped me with confidence and knowing the material."

- **Online materials:**
  - "The test is a lot easier than the practice exams. For that, the rabbits hung through and did all the practice questions."
  - "The questions are not as complicated as the exams, you will be seeing for the exam."
  - "Contains a lot of previous questions, which helped me with the types of questions."

- **Rules of thumb:**
  - "The test was easy to do; you have to do some calculations, but otherwise, it was a lot easier."
  - "The exam is multiple choice and you can do it faster than the previous exam."

- **Calculator:**
  - "I was able to use the calculator and it helped me with the calculations."
  - "The calculator was being formatted and was not effective."

**Rules of thumb**

- **Electrons**
  - $(Q = E / B)$
  - $(R_n = E / 2)$
  - $(R_{sh} = E / n)$
  - $(E_{ph} = n / 2)$

- **Ion Chambers**
  - $G = 0.3 \text{ mrad/Gy}$
  - **Tolerance (for almost everything)**
  - $0.25\%$
  - **Answer to almost every radiation interaction question**
  - **SCATTER!**

**Tips for success**

- **This is the easiest of all three tests**
  - Narrower scope than Part 2, not as high pressure as Part 3.
  - You should be well prepared for this after graduate school and residency.

- **With this being said, start your studies EARLY!**

- **Focus on your weaknesses**
  - You will have been working for a minimum of 2 years, you should know your weaknesses.
  - Get extra help in these areas / spend more time on them.

- **Good luck!**
Navigating the Board Exam Process

Part 3

Blake Dirksen, MS, DABR

Conflicts of Interest

• None applicable to this talk

Outline

Why certification?
The oral exam
Study tips
Resources
Why become certified?

- About more than money
  - But the raise is nice
  - Don't keep asking me, "what raise?"
- Only non-physician profession certified by a physician certification body. Provides professional credibility.
- Our work carries great responsibility and we owe it to our patients to ensure that we are up to the task.

We are professionals

Six components of a profession

1) A commitment to the interest of clients in particular, and the welfare of society in general.
2) A body of theory of special knowledge.
3) A specialized set of professional skills, practices, and performances unique to the profession.
4) The developed capacity to render judgments with integrity under conditions of ethical uncertainty.
5) An organized approach to learning from experience, both individually and collectively, and thus of growing new knowledge from the context of practice.
6) The development of a professional community responsible for the oversight and monitoring of quality in both practice and professional education.

The Content

- Dan and I do not know content, in fact, it is unethical to disclose the content so don't trust anyone who claims they know the content of the exam.
- Five examiners will each ask you one question from each of five categories (examples on their.org):
  - Radiation protection and patient safety
  - Patient-related measurements
  - Image acquisition, processing, and display
  - Calibration, quality control, and quality assurance
  - Equipment
Format

- One on one oral exam
- Five examiners with 25 minutes each
  - Approximately five minutes per question
- Held at a hotel in Louisville
- Get assigned five hotel rooms and you rotate through the five examiners over 2.5 hours
- In each room is an examiner with a computer screen with a question on it. The examiner will read the question to you out loud and then you can proceed.

Pro’s

- Can further explain reasoning
- Mention references
- Talk through problems

Con’s

- Cannot BS your way through
- Cannot rote memorize
- No multiple choice (no chance with a guess)

How do I improve my odds?

<table>
<thead>
<tr>
<th>2012 Oral Exam Results (CAMPEP)</th>
<th>Medical Phys 2012 Oral Exam Results (CAMPEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Takers</td>
<td>First-Time Takers</td>
</tr>
<tr>
<td>Total</td>
<td>418</td>
</tr>
<tr>
<td>Pass</td>
<td>214 (51%)</td>
</tr>
<tr>
<td>Condition</td>
<td>65 (15%)</td>
</tr>
<tr>
<td>Fail</td>
<td>133 (32%)</td>
</tr>
</tbody>
</table>
Part 3: How much should I dedicate to studying?

- Inconclusive, but short answer is A LOT!

Part 3: Should I study with others?

- Recommendation: Unlike the written tests, there appears to be an advantage to group study for Part 3.

Most effective study materials

- The Physics of Radiation Therapy
- Lea's
- Radiation for the Radiographer (2nd, Ciusco)
- The Essential Physics of Medical Imaging (Ritchey, Selker, et al.)
- Introduction to Radiological Physics and Radiation Eecutometry (2nd, Ritchey)
- Radiation Detection and Measurements (3rd, Ritchey)
- General Anatomy & Physiology handbook
- Radiation Therapy Physics (Hendee, West, Anderson)
- Larson's Lectures (Shive)
- QuickRef.com
- General Physics handbook
- Physics in Nuclear Medicine (Cherry, Sorensen, Phelps)
- Introduction to Biomedical Imaging (West)
- Review of Radiological Physics (Hendee, West)
Other Resources to Consider

- Classic texts
- AAPM TG and MPPG reports
- ADCL calibration sheets
  - The "extra" paper you get with your calibrations is a good source of how things are calibrated and related uncertainties.

Comments from exam takers

- Practice
  - "It was nice to practice answering questions in timed test, you can see what you know and what you need to work on."
  - "I think group work was more useful than individual thinking. I learned a lot from watching others think and had a better idea of the thought process."  
  - "I found group work much more effective than individual work."
  - "Overall, the practice was helpful. I felt it was very similar to the actual exam."

- Early preparation
  - "Take early, take thorough, think through what you might be asked."
  - "Exam is very similar to the practice exams."
  - "I found the practice exams very helpful in preparing for the actual exam."
  - "The practice exams were very similar to the actual exam."

Tips for Preparation

- Start by reading the ABR website (theabr.org) to best understand the process.
- Organize a schedule—Est of knowledge areas and timelines of when to complete
- Work through your answers out loud, preferably with someone else
- Mock exams are very helpful but won’t save you
  - Many AAPM chapters hold events each year
  - There are other organizations that host ABR prep events. These are typically more expensive but chapter events are put together by volunteers
- Learn the content AND the references
  - We cannot know everything but you should at least know where to look
Things to avoid during the exam

• Do not "just wing it" on an answer
• Avoid bluffing out everything you think you know about a topic. Simply answer the question.
• Do not rush through memorized answers
  • In an oral exam it is easy to tell what is memorized and what is understood
• Lastly, do not panic

Tips to help during the exam

• Be slow and deliberate
• Ok to refer to a reference
• Be ready for no reply from the examiner — very unnerving
• Be ready for wacky follow up questions
• Reference "your clinic" or "your experience" in a positive
  • Good: "In my clinic we achieve that tolerance by calibrating the system prior to each patient case."
  • Bad: "In my clinic we don't do that so I have no idea what you are talking about."
Best of Luck

• Questions?

• Please take a minute to network with those around you. This is a good time to find study partners.