ABR Diagnostic Physics Exam:

How to prepare for Part 1 in One week

Sarah E. McKenney, Ph.D.
8.1.16

Outline

- Exam Overview
  - ABR website
  - Important dates
  - Results
- Hints & Strategies
  - Exam format
  - Exam resources
  - Exam content
- Resources

Slides available here:
http://www.aapm.org/meetings/2016AM/PRAbs.asp?mid=115&aid=32226

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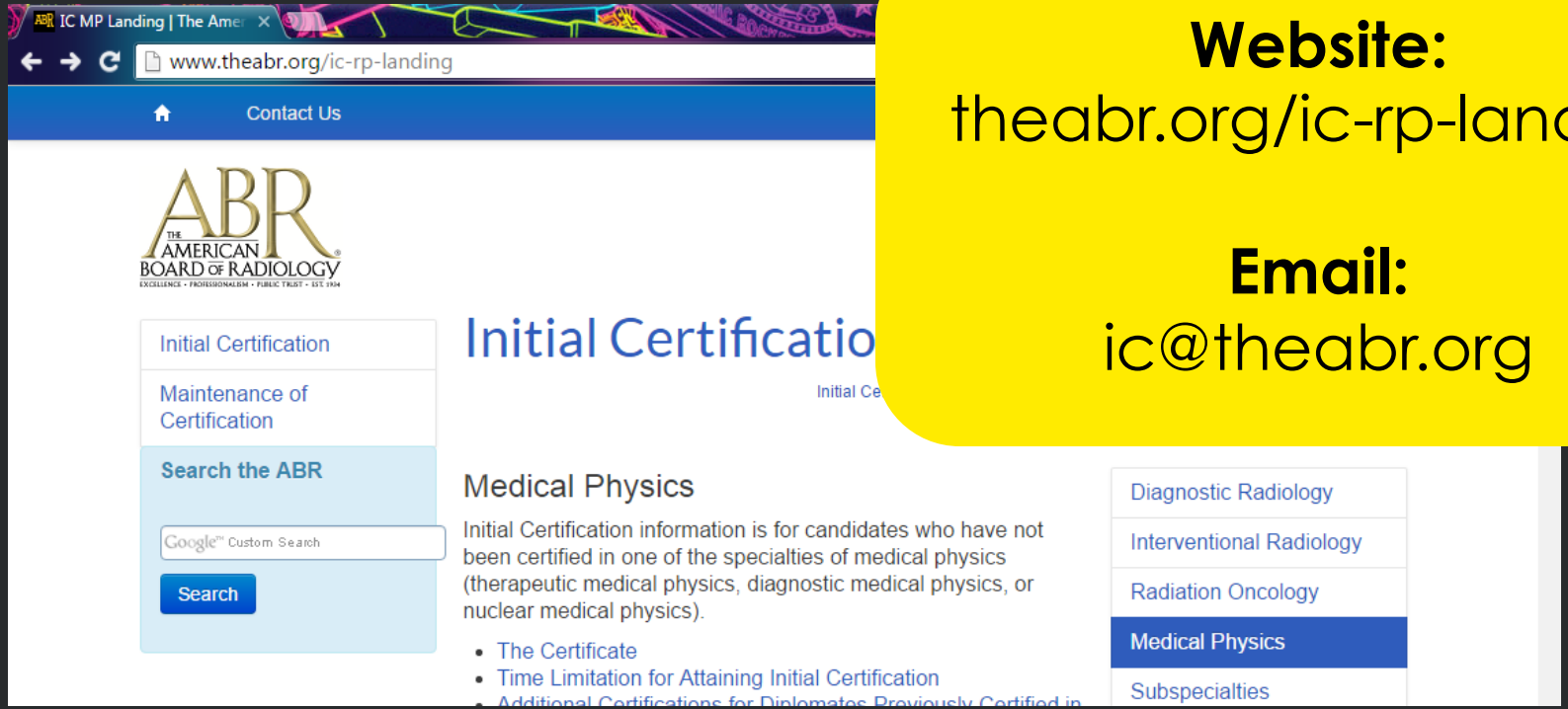
Online: goo.gl/bGjS86

ABR Website

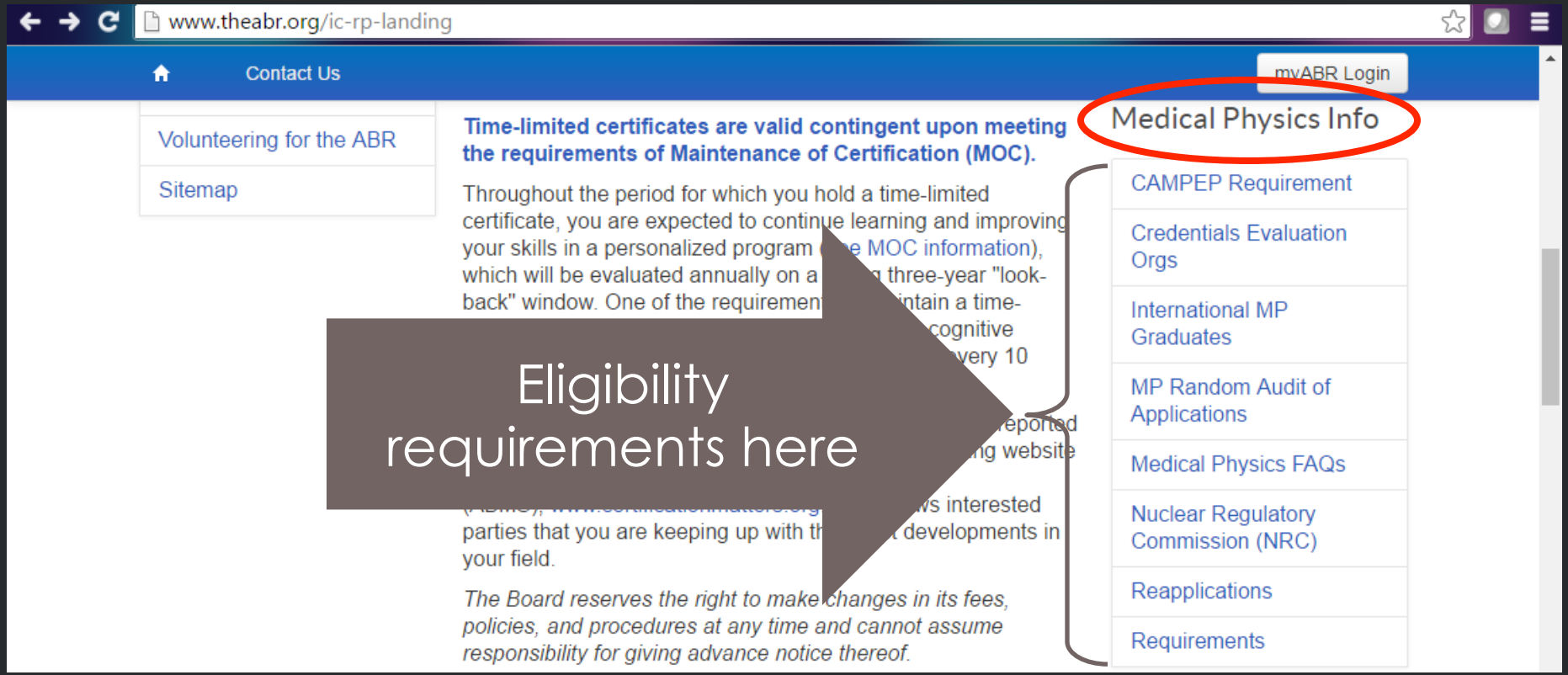


Website:
theabr.org/ic-rp-landing

Email:
ic@theabr.org

Online: goo.gl/bGjS86

ABR Eligibility Requirements



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Part 1 Eligibility

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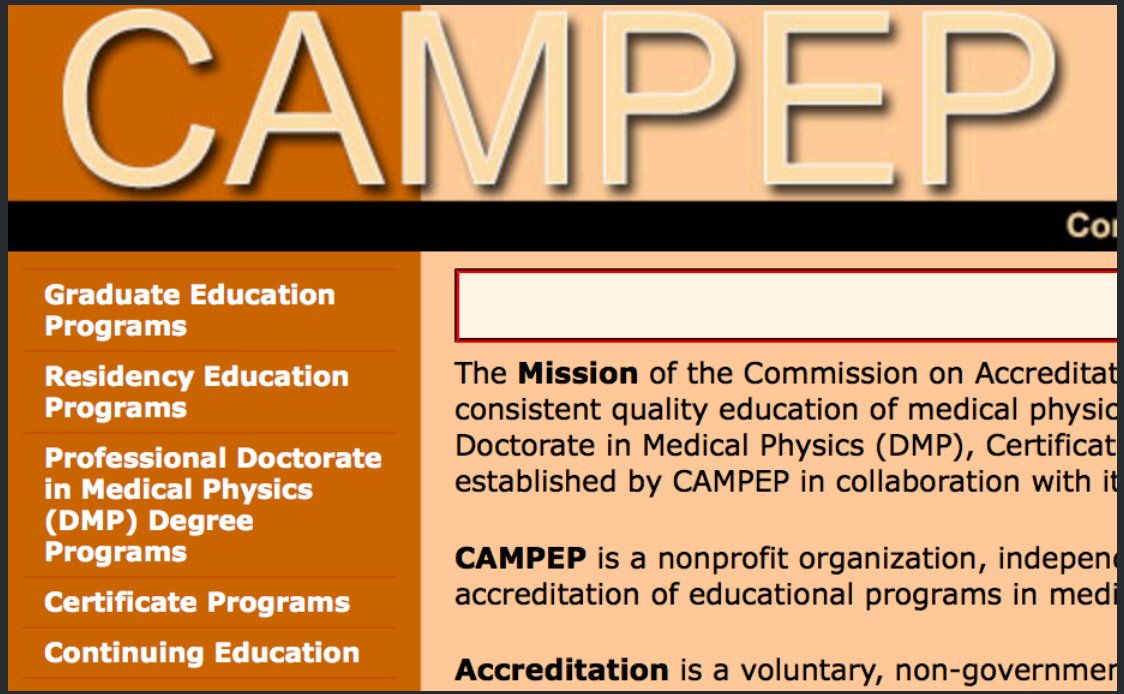
4. When am I eligible to apply for certification?

You can apply to take Part 1 of the computer-based examination anytime after you are officially enrolled in a CAMPEP-accredited medical physics graduate program, DMP program, certificate program, or residency. Enrolled means that you have been accepted into the program and have begun coursework or residency duties. Please see the website: http://www.theabr.org/ic-rp-process#part1, for application process and dates.

http://www.theabr.org/ic-mp-faq

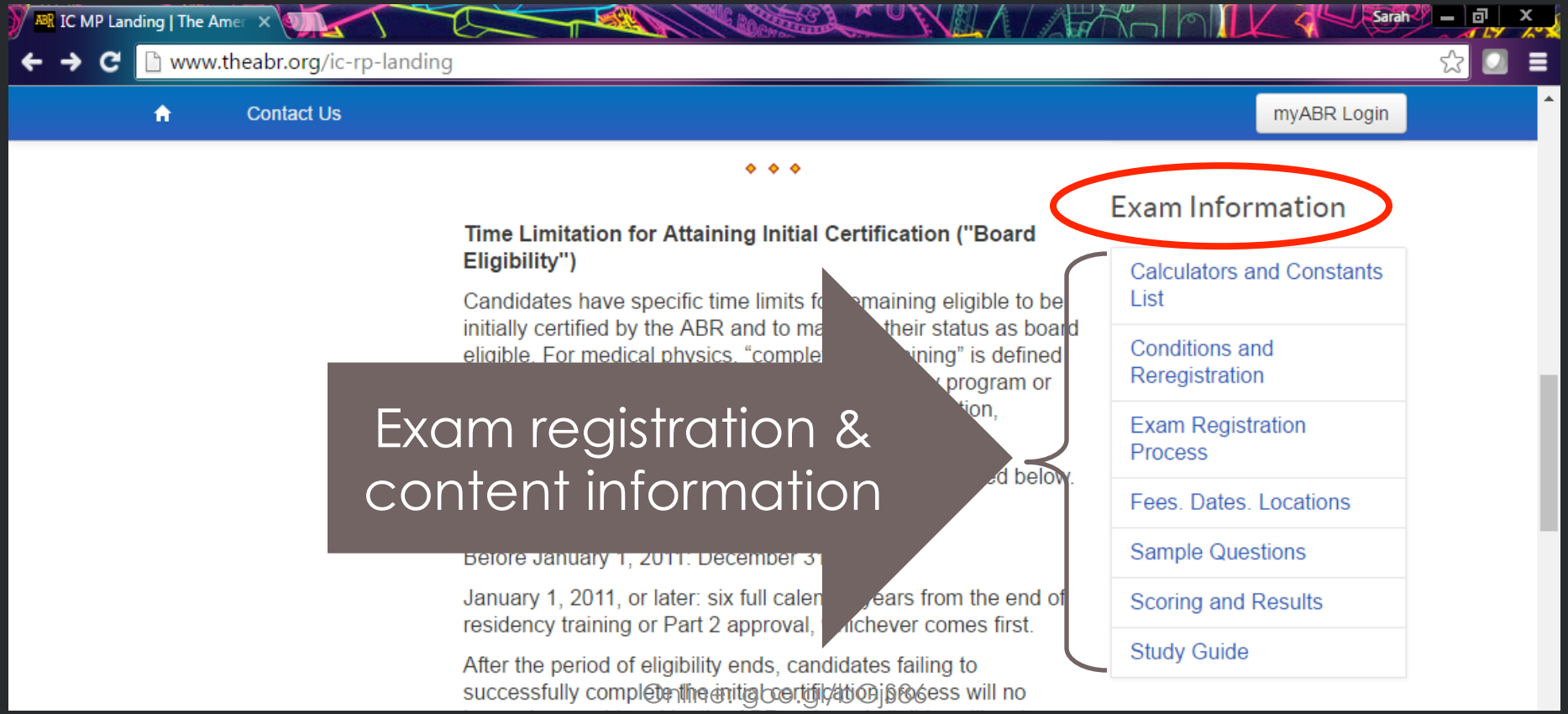
CAMPEP Eligibility

More eligibility requirements here!



http://www.campep.org/

Exam Content



Important Dates & Fees

- Exam Registration window:
  9/1-10/31
- Notification of eligibility:
  11/30
- Location Registration:
  Months leading up to exam
- Exam:
  Early August

Fees

- Registration: $505
- Cancellation: $300

Tips

- Your application may be audited
- Schedule location at the earliest possible time
- It is possible to change exam location

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Content

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PART 1: General

The nature and sources of radiation
Radioactivity
Ultrasound
Nuclear magnetic resonance
Interactions of radiation with matter
Spatial distribution and transmission of radiation
Concepts of dosimetry
Instrumentation and measurement techniques
Principles of safety
Methods of quality control and quality assurance
Radiobiology
Radiation protection
Basic atomic and nuclear physics
Mathematics relevant to medical physics
Statistics

PART 1: Clinical

Physiology
Anatomy
Biochemistry
Radiation effects
Medical uses of radiation sources
Radiochemistry
Medical terminology
Ethical principles

Format

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General Questions

- 237 minutes for 80 questions
  - 27 Complex [3 pts ea]
  - 53 Simple [1 pt ea]

* 30 min Break (optional)*

Clinical Questions

- 90 minutes for 75 questions

Pearson VUE

- Computer-based exam
- Cubicles
- Headphones
- Wet-erase laminated sheets
  - no erase option
  - need to request more

http://www.acclaimmotorschool.co.uk/wp-content/uploads/ukcat-pearson-vue-test-room.jpg

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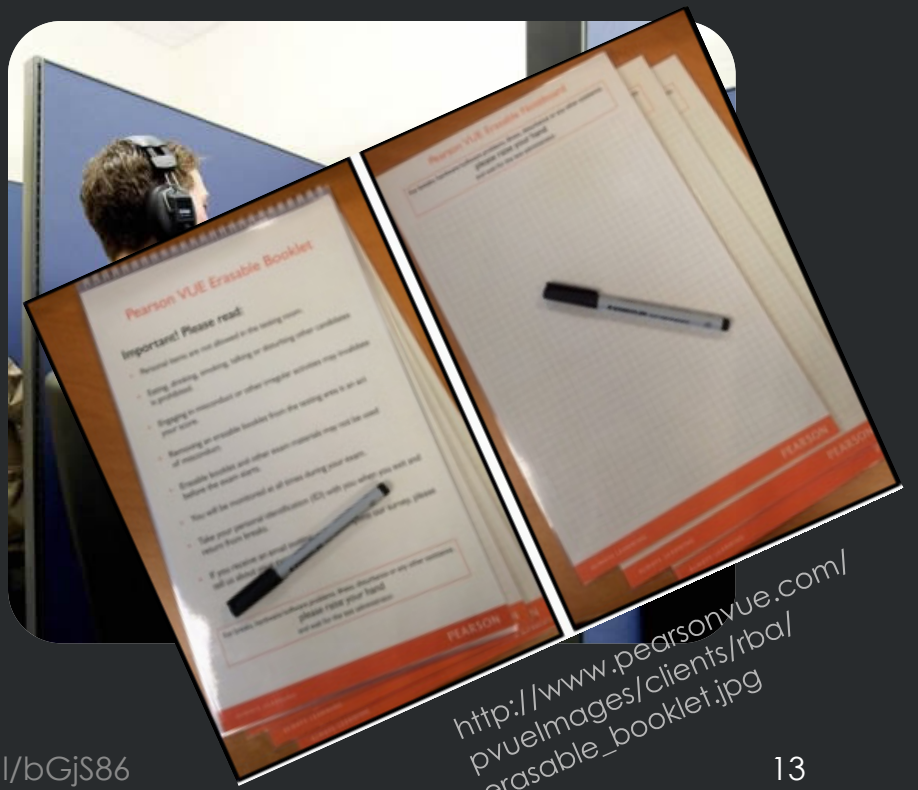

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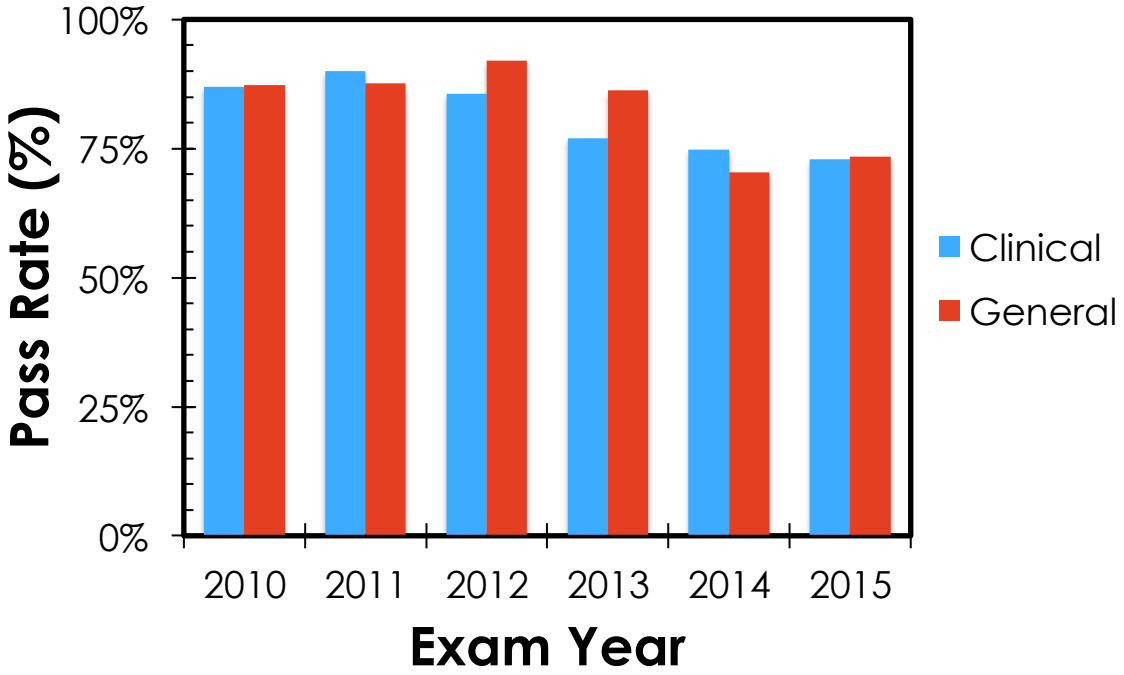
First Time Takers Enrolled in a CAMPEP Program



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Outcomes

- Pass both parts – Eligible for Part 2 upon completion of residency

- Pass general – Repeat clinical
- Pass clinical – Retake the exam
- Fail both parts – Retake the exam

Complex vs. Simple Questions

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- Simple: (1) Zero calculational steps or (2) relatively minor arithmetic

- Complex: Requires some advanced reasoning and 2+ calculational steps.

Example: Simple Question

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From the ABR:

Beyond the depth of maximum dose, what is the relative behavior of dose and kerma?

A. Dose and kerma fall off equally.

B. Kerma falls off faster than dose.

C. Dose falls off faster than kerma.

D. Dose falls while kerma rises.

E. Dose rises while kerma falls.

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Example: Simple Question

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Another example:

The HVL of shielding material is 1 mm. What thickness will attenuate the beam by 90%?

A. 1.1 mm
B. 2.2 mm
C. 3.3 mm
D. 4 .4 mm
E. 5.5 mm

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Example: Complex Question

From the ABR:

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%

$$I = I_0 e^{-\left[\frac{\mu}{\rho}\right]\rho x}$$

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Example: Complex Question

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Another Example:

We collected some data, what is the standard error?

A. 18.3

B. 34

C. 5.9

D. 1.5

E. 4.8

$$\mathrm{SEM} = \frac{\sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(x_i - \mu\right)^2}}{\sqrt{N}}$$

21
12
15
25

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Example: Clinical Question

From the ABR:

A fetus receives a dose of 2 Gy during weeks 20 to 39 of pregnancy. After birth, the child has an increased risk for what condition?

A. Trisomy 21

B. Leukemia

C. Microcephaly

D. Neonatal death

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Example: Arcane Clinical Question

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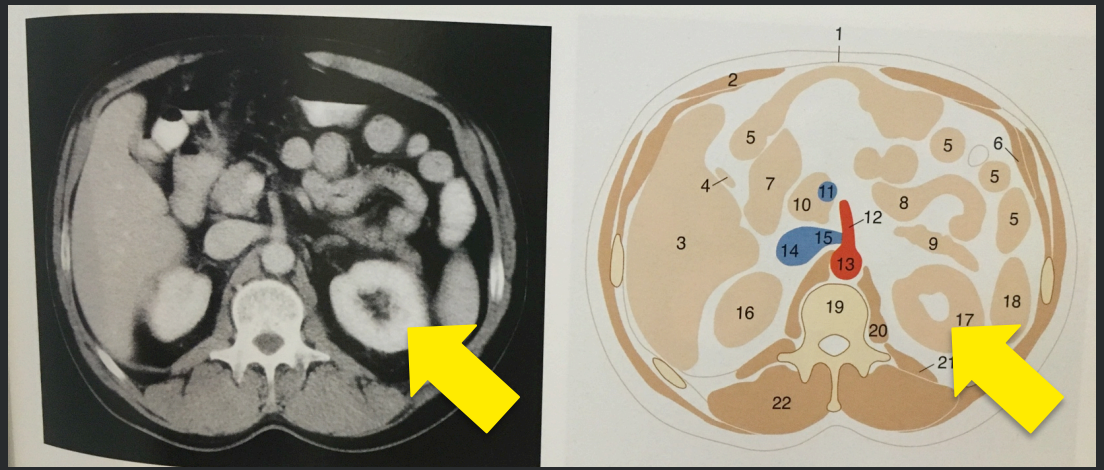
Another Example:

What is a physiological element is contained within organ #17?

A. Bowman's Capsule
B. Hepatocytes
C. Red pulp
D. Ampulla of Vater



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The TI-30XS Calculator

- Practice before exam
- Stop using excel or any other calculator TODAY
- Use unit analysis
- Ball-park solutions

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Exponential Decay

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Accounts for ~ 30% of the math

- Other options
  - Base 2

$$A = A_0 2^{-\frac{t}{T_{1/2}}}$$

  - Taylor series

$$e^{-ax} = 1 - ax + \frac{(ax)^2}{2} - \frac{(ax)^3}{3!}$$

$$A = A_0 e^{-\frac{0.693t}{T_{1/2}}}$$

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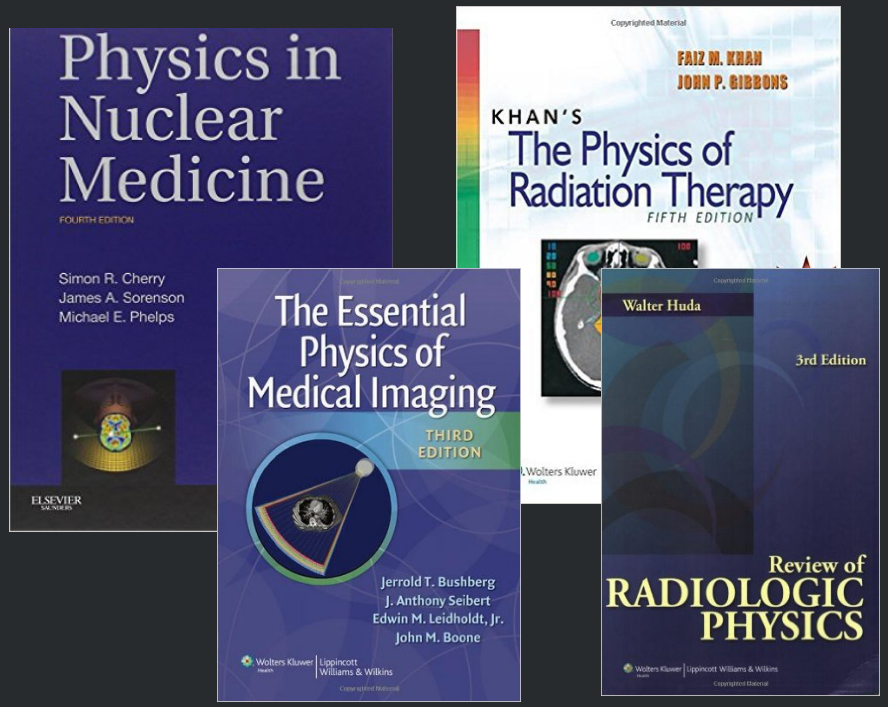
Study Material: General

- **General**
  - Essential Physics of Medical Imaging
  - The Physics of Radiation Therapy
  - Physics in Nuclear Medicine
  - Review of Radiologic Physics



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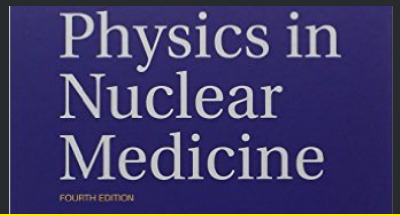

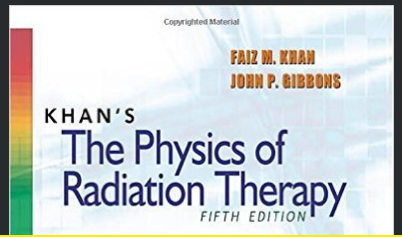

Tips

1. Do all example problems
2. Review all figures
3. Read cover-to-cover

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Study Material: Clinical

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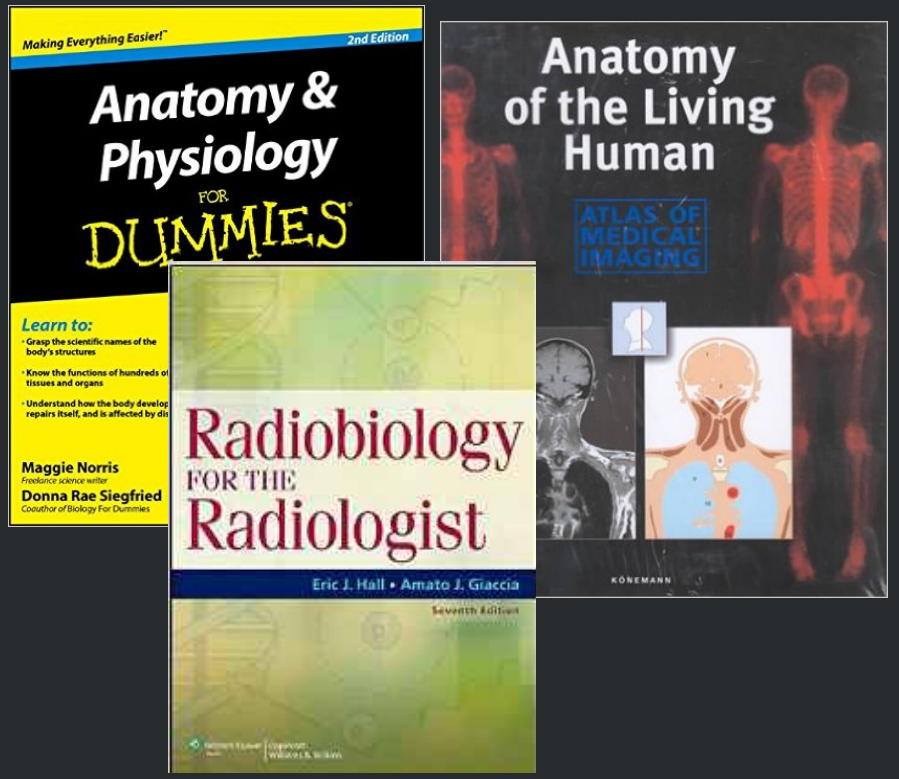
Clinical

- Radiobiology for the Radiologist
- Anatomy for Dummies
- Imaging Atlas of Anatomy

- Online anatomy quizzes
  - http://www.free-anatomy-quiz.com



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Additional Resources

ABR Medical Physics: http://www.theabr.org/ic-rp-landing

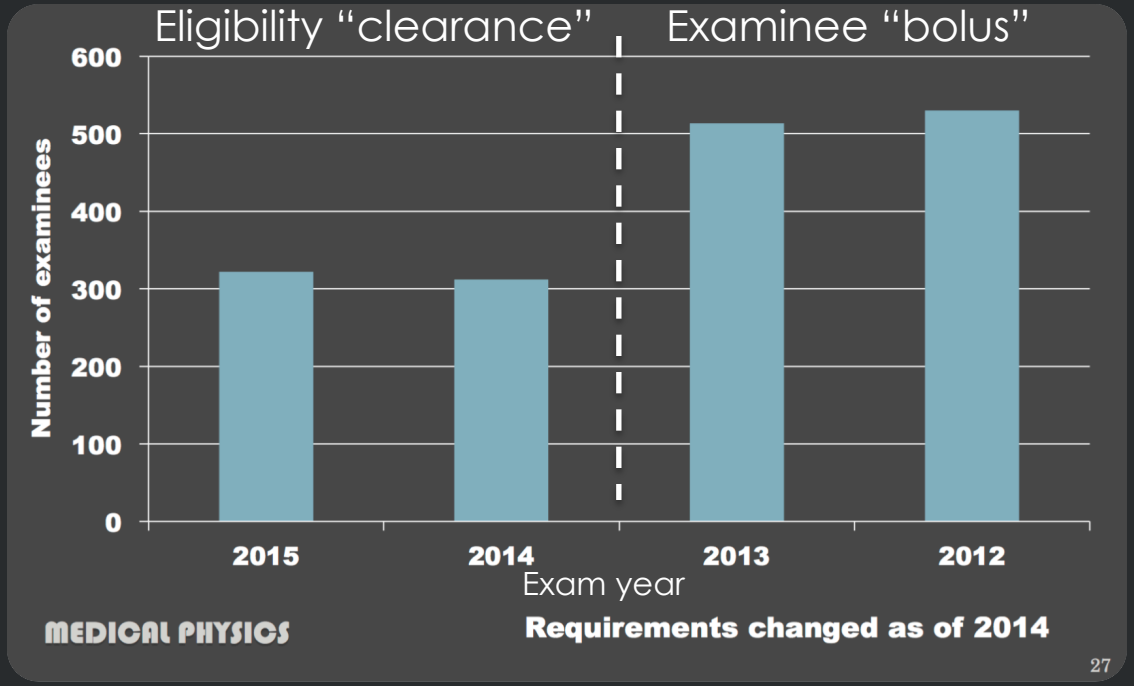
- Registration timeline: http://www.theabr.org/ic-rp-process
- Pearson VUE: http://www.pearsonvue.com/ABR/
- Tutorial: http://www.pearsonvue.com/athena/athena.asp
- Calculator & Constants: http://www.theabr.org/ic-rp-calc
- Exam length and question types: http://www.theabr.org/ic-rp-req
- Test categories: http://www.theabr.org/ic-mp-study-guide
- Sample questions: http://www.theabr.org/ic-rp-sample

“Well, tests ain't fair. Those that study have an unfair advantage.”
— Allan Dare Pearce, Paris in April

More Resources

- Medical Physics: An Update of the ABR Requirements and Processes [https://www.aapm.org/meetings/webinars/ABRUpdateWebinar2015.pdf]

Part 1 General Enrollment



Medical Physics: An Update of the ABR Requirements and Processes
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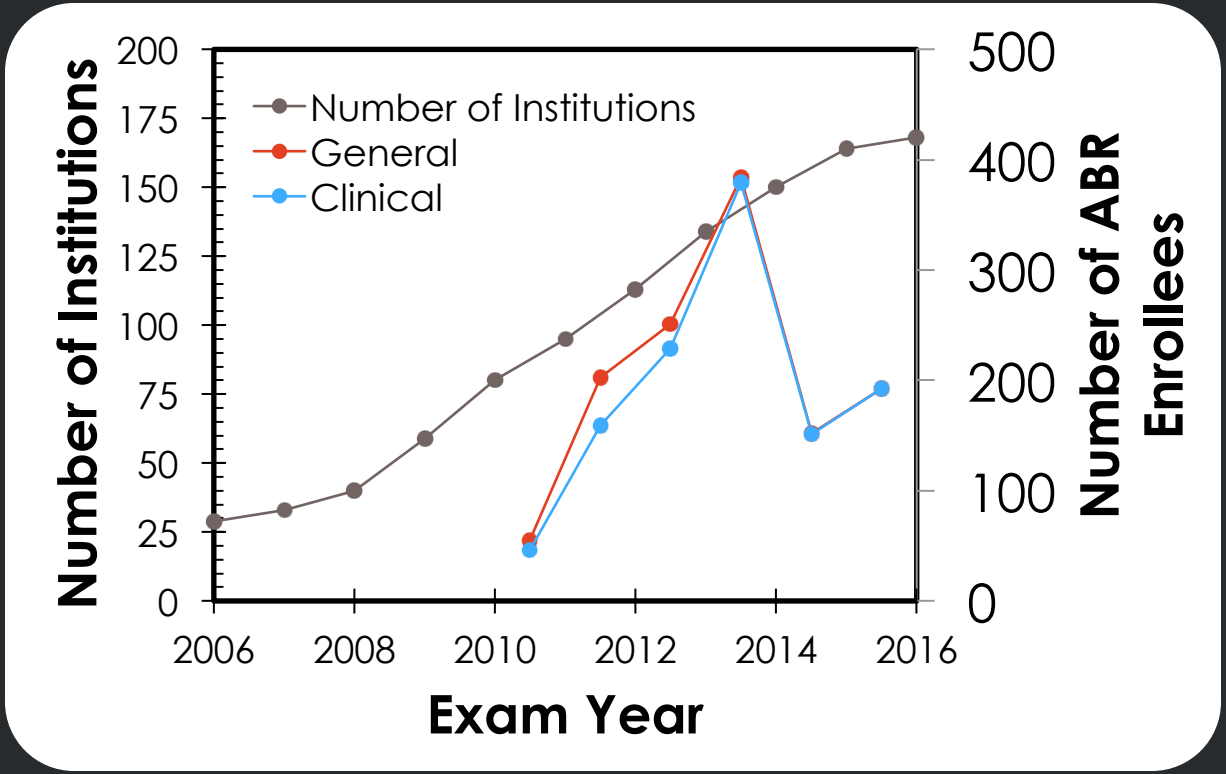
Where is the bottle neck?



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