MOC Exam Preparation - Therapy
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Overview

- MOC Exam Requirement
- Available Guidance
- What I did
- What I wished I did
MOC Exam Requirement

• Rolling Window of 10 years
• Must pass one exam in this window
• You can take it in any year
• You can take it multiple times

<table>
<thead>
<tr>
<th>'06</th>
<th>'07</th>
<th>'08</th>
<th>'09</th>
<th>'10</th>
<th>'11</th>
<th>'12</th>
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</table>

3/15/16 – lookback – must have passed one in years ‘06 to ‘15

Schedule Recommendation

• Take it in year 9
• If you fail:
  • you have year 10 to take it and still remain in compliance.
  • You have taken it once and can better prepare for year 10.
• If you pass:
  • The 10 year clock starts over.
  • You lose a year on the rolling window.
• Personal Impression: The exam is easy, but there is new material. If you fail, you shouldn’t fail it a second time.
Exam Length

“In 2014, the number of questions in the MOC exam will increase from 100 to 125. Due to the increased number of exam questions, the MOC exam will be lengthened from 3 hours to 3.5 hours.

In 2015, the number of questions in the MOC exam will increase from 125 to 150. Due to the increased number of exam questions, the MOC exam will be lengthened from 3.5 hours to 4 hours.

No further changes in the exam are anticipated in the near future. “ (from Med. Phys. MOC Brochure)

When I took the exam in 2014, I had an hour to spare. I think these increases are reasonable.

Available Guidance – 1 : ABR

• The website could be improved, not easy to find things.
• Instead of hunting around, go here:
  • www.theabr.org/moc-rp-comp3
• It seems the study guides are updated every April?
  • A list of AAPM TG, NCRP, and ICRU reports
  • Selected journal articles
  • A list of articles dealing with QA and Quantec
  • Standard Reference Texts
  • Sample Questions
Available Guidance – 2 : Pearson

- Exam taking logistics
- Exam Calculator – the interface is quirky, do practice using it!
- Practice exam is only for the mechanics of the test, not the content.
- Do go over the practice exam so you don’t lose time dealing with the interface.

ABR Study Guide - Reports

- NCRP Report No. 151 (SHIELDING**)
- AAPM Report 51 and updates (Task Group 43)
- AAPM Report 62 (Task Group 53)
- AAPM Report 67 (Task Group 51)
- AAPM Report 76 (Task Group 61)
- AAPM Report 83 (Task Group 66)
- AAPM Report 87 (Task Group 62)
- AAPM Report 91 (Task Group 76)
- AAPM Report 95 (Task Group 75)
- AAPM Report 101 (Task Group 101)
- AAPM Report 106 (Task Group 106)
- AAPM Report 142 (Task Group 142)
- AAPM Report 148 (Task Group 148)
- AAPM Report 166 (Task Group 166)
- AAPM Report 179 (Task Group 179)
- ICRU Reports No. 50 and 62
ABR Study Guide – Journal Articles

• Study articles **such as**:
  • Georg et al. Correct Status and future perspectives of **flattening filter free photon beams**. Med Phys 2011; 38:1280.2

ABR Study Guide – Standard Reference Texts

• Hall and Giaccia: **Radiobiology** for the Radiologist, 7th Ed, Lippincott Williams & Wilkins, 2011.
Content

• 30% standard practice – core therapeutic medical physics, technology and safety.
• 70% recent advances in the field
• NOTE: new knowledge always builds on established fundamental concepts.

Sample Question 1

• A linear accelerator is calibrated to deliver 1 cGy/MU at 100 cm source-to-surface distance (SSD). What is the approximate dose per monitor unit at an SSD of 400 cm used for total-body photon irradiation?
  • A. 16 cGy/MU
  • B. 4 cGy/MU
  • C. 1 cGy/MU
  • D. 1/16 cGy/MU

My take: standard stuff you can do in your sleep. MU calc, implant times, attenuation, etc. all fall into this category.
Sample Question 2

• Which of the following statements regarding wedge orientation is true?
  • A. For breast tangents with supine setup, the heels are typically posterior.
  • B. For a 90° pair treating the parotid, the toes are directed toward each other.
  • C. When used on an anteroposterior (AP) field to compensate for the slope of the superior chest, the heel is superior.
  • D. For a three-field treatment to the rectum, the heels are typically anterior.

My take: Still standard stuff. If you haven’t been checking plans or planning, you may want to refresh your memory. IN GENERAL – if you haven’t done something fundamental in a while, refresh your memory.

Sample Question 3

• According to the American Association of Physicists in Medicine (AAPM), multileaf collimator (MLC) leaf position accuracy should be maintained at no more than:
  • A. 1 cm
  • B. 2 mm
  • C. 1 mm
  • D. 0.5 mm

My take: Be intimately familiar with the tables in the Task Group Reports. This type of question showed up a lot.
What I did

• A week before my test, I opened the study guide.
• I panicked.
• How do I study and still work in the clinic?
• I read what I could. Mainly NCRP 151 Shielding.
• Crammed in the rest of the material over the weekend with marathon reading sessions.
• No time to memorize anything. Conceptualization was very important.

Collect all your reading material

Binder for my TG reports (17 reports)  Quantec (24 articles)  QA (45 articles)

And the article on FFF. And an assortment of NCRP slides from the web. And ICRU 50 and 62.
Try to read. Find a place without distractions.

I did not read all of it ... not possible in a weekend.

• Read all the TG reports.
• Found patterns in TG tables.
• Browsed through QA abstracts (IJROBP 71 S1 2008).
• Read the Summary Quan tec Paper:
What I should have done

• Open the study guide back in April!
• Read an article a day.
• Make notes while reading the article.
• Review my notes every evening for two weeks before the test.

How do you sift through all that?

• **Concepts are important.**
  - You can always reason your way to a logical answer and eliminate choices.
• **Tables are important.**
  - Sometimes, reasoning just doesn’t cut it. At some level debates ensue, and a TG has to make a decision and put some value in a table.
  - Memorize.
  - Use patterns.
  - Group items with the same tolerance.
  - Find differences between tables.
Make your own cliff notes

- Write down concepts as you read reports, articles.
- This requires daily discipline over an extended time period.
- Start in April for the November test.
- Updates to study guides come out in April.
- As you read, if you come across something that sounds like a good multiple choice question, write it down.

FFF cliff notes...

1. FF scatter photons - major source of head scatter, causes:
   - Variation of the head-scatter factor or factor in an with field size
   - The scattered exchange effect

2. If the FF is removed, the electron fluence at the level of the monitor chamber is different and it is out of its usual mode of operation.

3. To use the monitor chamber for the same system and to steer the beams, different plates have been tested, and are in use, to remove electrons. 
   PREVENT CYCLED MEASUREMENT
   - 1.5 mm Al
   - 1.5 mm Cu
   - 1 mm aluminum vs 2 mm Cu substitution
   - 1 mm Steel plate
   - 6 mm Cu
   - 15 mm Cu - thinner plates provide safety in case target breaks.
   - Cyberknife: this lead filter at lower end of primary collimator.
   - Toms: after this target, an electron stopper and a beam hardener.

4. 1 or 2 mm Cu sufficient for beam steering but thicker plates for safety against target breaks.

5. In the FF mode, deviations in beam steering and bending currents exhibited only half of the position variation of a filtered beam.
   - The beam does not change shape
   - Field center position is important for beam fault measurement

6. 6 cm scatter - by Monte Carlo. Softer beams. Minimal off axis spectral differences. Slightly softer off-axis. Makes it easier for dose calculations.

7. Contaminating scatter - greatly reduced in FFP
   - Method used here to calculate the dose in the beams under these circumstances.
4 down, only 86 to go....

How would I write the questions?

• Categorize and think through the information
  • Devices – how to use, caveats, conditions
  • Processes – important steps, sequences
  • Definitions – critical items, e.g. point of measurement
  • Calculations – correction factors, dosimetry factors, etc.

• What do you think you would ask on the test?
  • **Gut reaction**
    • As you read through material, if you find something that looks like a good question, it will probably be asked.
  • IT WON’T BE OBSCURE...for the most part.
Organize tables “mnemonically”

- Put like tolerances together
  - Group by tolerance since the multiple choice item is most likely the tolerance number
  - NOTE: questions, in general, are prepared such that you should be able to answer them without choices
- Organize items in decreasing tolerance
- Compare/contrast, e.g. daily to monthly
  - Note the principles involved, usually tighter tolerance on monthly, more things tested
    - E.G. Output constancy goes from 3% Daily to 2% Monthly.
    - Monthly adds beam profile constancy.

Daily QA from TG-142

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Non-IMRT</th>
<th>IMRT</th>
<th>SRS/ SBRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>rtakae343</td>
<td>rtakae343</td>
<td>rtakae343</td>
<td>rtakae343</td>
</tr>
<tr>
<td>Break down the table into rules and concepts</td>
<td>Reorganize lines to see patterns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Daily QA from TG-142

1. All Daily Output constancy is 3%.
2. Most Daily Mechanical is 2 mm. Exceptions – see the pattern.
   a) Laser drops by 0.5 mm as technique requires more accuracy.
   b) Collimator size drops only for SRS to 1 mm
3. All Safety – Functional. Stereotactic interlock only if SRS/SBRT
### Monthly QA, TG-142

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Non-IMRT</th>
<th>IMRT</th>
<th>SRS/SBRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-ray, electro, backup monitor, respiratory gating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>output constancy</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dose rate constancy at technique DR</td>
<td>NA</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Electron energy constancy</td>
<td>2%/2mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessory trays</td>
<td>2 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wedge placement</td>
<td>2 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw position symmetric</td>
<td>2 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light/rad field coincidence (Symmetric)</td>
<td>2 mm/1% on a side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment Couch position indicators</td>
<td>2 mm/1°, 2 mm/1°, 1 mm/0.5°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localizing lasers</td>
<td>±2 mm, ±1 mm, &lt; ±1 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gantry/collimator angle indicators, cardinal angles, digital</td>
<td>1°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance check device for lasers compared w/ front pointer</td>
<td>1 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross hair centering</td>
<td>1 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensator placement accuracy</td>
<td>1 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaw, asymm</td>
<td>1 mm</td>
<td></td>
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<tr>
<td>Light/rad - asymm</td>
<td>1 mm/1° on a side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photon/elect profile constancy</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latching of wedges, trays; laser guard-interlock</td>
<td>Functional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gating phase/amplitude beam control, gating interlock, in-room respiratory monitoring system</td>
<td>Functional</td>
<td></td>
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</tr>
</tbody>
</table>

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**West Virginia University**

Department of Radiation Oncology
TG-142 Monthly QA more condensed

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>X-ray, elect, backup monitor, respiratory gating output constancy, Dose rate constancy at technique DR</td>
<td>2% (3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electron energy constancy</td>
<td>2%/2mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessory trays, wedge placement, jaw position (symmetric)</td>
<td>2 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light/rad field coincidence (symmetric)</td>
<td>2 mm/2% on a side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment Couch position indicators</td>
<td>2 mm/1°</td>
<td>2 mm/1°</td>
<td>1 mm/0.5°</td>
</tr>
<tr>
<td>Localizing lasers</td>
<td>±2 mm</td>
<td>±1 mm (1.5mm)</td>
<td>±1 mm</td>
</tr>
<tr>
<td>Gantry/collimator angle indicators, cardinal angles, digital</td>
<td>1°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance check device for lasers compared w/ front pointer (D01 2mm); cross hair centering; compensator placement accuracy, jaw position (asymmetric)</td>
<td>1 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localizing lasers, asymmetric</td>
<td>1 mm/1% on a side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photon/elect profile constancy</td>
<td>1%</td>
<td></td>
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<td>Latching of wedges, trays, laser guard-interlock, Gating phase/amplitude beam control, gating interlock, In-room respiratory monitoring system</td>
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</table>

* Note differences from daily in red

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TG-142 Annual

- I leave that exercise to you
- Organizing your own material also builds your memory of the material
- Another exercise – compare this to the tables in the other TG reports. What do they have in common? What are the differences?
If you implemented TG-142...

• Then you live these numbers, daily and monthly. Review the annual items.
• Several items on the test revolved around common clinical tasks.
• You need to keep your hands in the clinic to remember these.

On Test Day (1)...

• If you don’t know the answer
  • eliminate choices
  • pick the best remaining one.
  • Don’t leave blanks.
  • There is no penalty for “guessing”.
  • Go with your gut.
  • Mark this as an item for review.
  • Don’t get stuck, keep moving.
On Test Day (2)...

• With your left over time
  • make sure you have no blanks
  • The answer you need in one question might actually be available in another question or might prompt your memory. Mark it.
• Go back and review the items you marked

• If you have a lot of left over time
  • Make a quick distribution count of your answers—how many As, Bs, Cs, Ds...
  • If you are flipping a coin on an answer, choose a letter that hasn’t been chosen as much.

Some philosophizing...

• Studying for the exam = a hoop to jump through
  • Cramming was a way to get through it quickly.
  • How does that make me a better medical physicist?

• Take the long view.
  • Read the TG reports to do your job better, not to pass the test.
  • Passing the test will be a natural by-product.

• We should study TG reports as they come out.
• We should consider this as part of Continuous Improvement. Turn TG report into a PQI, SDEP. - 2 for 1.
Results...

• Despite the last minute cramming, I passed on the first try.
• I took the exam Nov. 10, got results on Nov. 24.

To view your results, log in to your ABR account.
You don’t get a score.
You don’t know how many you got right.
You only know if you passed or failed.

Content...

• No one can give you exam questions.
• But I can tell you the study guide was fair.
• Be sure you know how to do all the standard clinical activities.
• TG tables dealing with frequency of tests and tolerance values. It’s easy to write questions for such items – the answers suggest themselves in the table.
• TG dealing with devices – understand how the devices work.
Parting words...

• The exam was easy.
  • I either knew the answer or could narrow the choices to two items.
• BUT you do need to read the TG reports at a minimum.
• Many, many questions came from the reports listed in the study guide.
• START PREPARING NOW for Nov. 2015.
• Study TG Reports as they come out and implement improvements in your clinic.