

RANZCR Part 1 Course

Auckland, NZ
February 29th 2008



Radiophysics Outline

- Resources
- The Right Mindset
- Examination Preparation
- Examination Construction
- Examination Marking
- Examination Questions
- an example

Resources

- Books

- there are a good number!
- **Khan**
- **Podgorsak [2005]** to purchase paper or here for the electronic version
- Hende, Shuler [2006], Bentil [1995], Selman [1990], Webb [1993], Bevelacqua [1999], Alpen [1998], Jayaraman [2004], Berman [2000], Blackburn [1989], Bomford [2002], Smith [1999], Khan - planning [2006], Johns & Cunningham [1983]

- Website

- <http://radonc.wikispot.com/>

The Right Mindset

- its all about YOU unfortunately
 - MY role is discussed later
 - YOUR examination
 - YOUR learning
 - form of ADULT learning
 - who's responsibility?
- eventually ends with a specialty qualification
 - YOUR management of patients
 - but MY family
 - so how good do I expect you to be? AND visa versa!
- this is not a walk in the park, this is hard

What is my role?

- set the examination
 - according to syllabus
 - according to professional expectations
 - determined by review
- all examinations are barriers
 - this one is no exception
 - it is our role to see that you get what you deserve

All examinations are barriers

- expectation of fairness
 - provision of a syllabus
 - it is fair that we cover it all
 - make sure you have the one that the examiners use
 - provision of courses
 - it is fair that we define our expectation
 - it is fair that we warn of the difficulty
 - provision of an fair examination
 - covers the major issues, delves into minor issues
 - matches expectations of the public
 - caters to the present, future, history & culture of the profession

Examination preparation

- be responsible for your education
- do your bookwork
 - cover the whole syllabus
 - have a set of summaries
 - review often and completely
- get hands-on experience

Get hands-on experience

- spend time
 - on the machines
 - with RTs asking “why?”
 - with RPs asking “why?”
 - in simulator watching what RTs do
 - make masks (experience one)
 - make blocks
 - on planning computer
 - learn how to use
- spend time with physicists
 - do machine QA
- what you do here this weekend is INSUFFICIENT

Examination preparation

- you are employed as a TRAINING REGISTRAR
 - clinical work has to serve that aim
 - it is not your *raison d'État*
 - you are responsible for your education
 - breach of contract
 - if we are not provided with training opportunities & time
 - if you are not partaking of training opportunities

Examination Construction

- Physics Panel

1. Roadmap deficiencies
(aim to cover whole syllabus with major & minor topics)
 2. Examiner 1
sets Q & A & Marking Schema
 3. Examiner 2
answer Q to cross check A
 4. Group finalise Q & A & Marking Schema
(necessary v additional)
- Guest Examiner involved

- College

- Review of paper
 - expect justification
 - request alterations

Examination Marking

- 2 Examiners per question
- during marking
 - try to make out writing
 - watch closely for misinterpretation
 - alternate has to be clear and answer has to be good
- at end of marking
 - great differences identified and impact on overall outcome estimated
 - if yes, further review
 - if no, review at leisure to identify problems
- marks collated and recommendations presented to College mechanism

Examination Marking

- some common problems
 - a textbook answer
 - WYWIWYM [what you write is what you mean]
 - what we can't read,
 - when we tell you to “attempt all questions”,
 - when the question contains the word “linac”,
 - all answers must be 5 pages long
 - plans are a waste of time
 - lessons of HSC, were you trained to
 - plan essays?
 - write essays?

“What is the Pass Mark?”

- why is this relevant?
 - what happens if you don't know
 - presupposes you can judge when you are over the line
- what is the standard?
 - “Q1 *write your full name and birth date.*”
 - pass mark is 50% or 100%
 - “Q5 *deal with a radiation accident*”
 - pass mark is 50% or 100%
 - “Q6 *describe the mechanics of hitting a cancer repeatedly day after day*”
 - pass mark is 50% or 100%
- what does this demonstrate?
 - deep learning
 - shallow learning

Examination questions

- YOUR problem
 - read the question
 - go for the answer
 - learn how to do this
 - learn how to use your own words
 - display your understanding

Sample Questions

2007b Question 1

A megavoltage linear accelerator is commonly used in external beam radiation therapy. Draw separate schematic diagrams for each of the following, with sufficient labelling and captions to explain:

- a) how a linear accelerator produces a photon beam suitable for therapeutic use. (5 marks)
- b) the changes required in the treatment head to produce an electron beam suitable for therapeutic use. (3 marks)
- c) the location of the MLC in the treatment head, the structure of a multi-leaf collimator and how it generates different field shapes. (2 marks)

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- sets the scene
 - linacs!
 - don't start writing yet!

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- this is what you will have to do
 - DRAW
 - 3 schematic diagrams
 - with labels
 - with captions
 - TO EXPLAIN ...

The point here is that you are trying to explain what you understand about some aspects of the linac.

Sample Questions

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- c) the location of the MLC in the treatment head, the structure of a multi-leaf collimator and how it generates different field shapes. **(2 marks)**

- Now look at the marks and work out how long you have to apportion
 - 5 min/Q for planning
 - 2.5 min/mark
 - thus
 - a. 12.5 min
 - b. 7.5 min
 - c. 5 min

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- the **DIAGRAM** has to include with labels & captions:
 - electron gun, vacuum, klystron/magnetron, wave guide, bending magnet, target
- **also consider**
 - thyatron, ionic vacuum pump, collimators, ion chambers
- **briefly describe the processes in each place, e.g.,**
 - electron gun (produces a stream of electrons)
 - vacuum (very high vacuum needed as air particles slow down e- by collision)
 - klystron (produces microwaves tuned to the frequency of electrons to provide energy for transfer into e-'s kinetic energy increase)
 - etc

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- read the question!
 - it says “*in the treatment head*”, so don't waste time on anything else
 - it says “changes” so don't repeat yourself
 - DIAGRAM will include labels & captions for:
 - scattering foil
 - electron cone
 - length?
 - electron cut-out
 - distance to patient?

Sample Questions

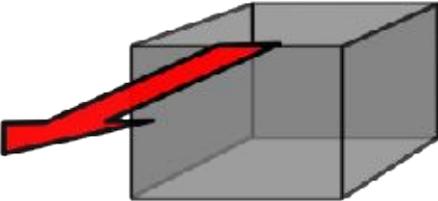
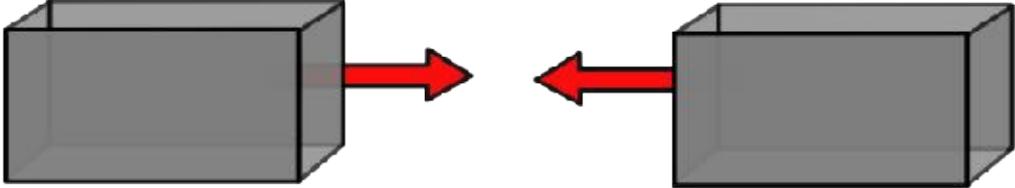
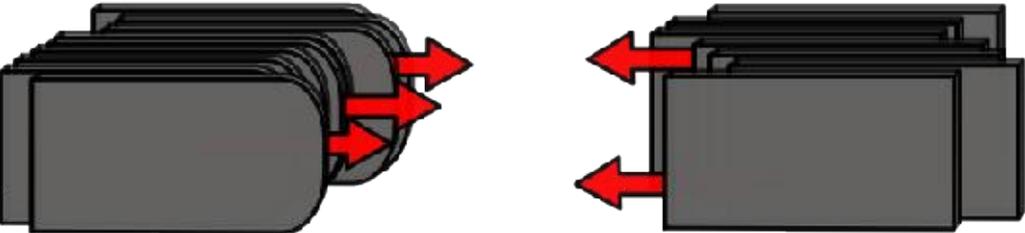
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- there are three possible answers here – Elekta, Varian & Siemens!
- you have to know your machine, ergo, start by looking at it.

The Differences

		ELEKTA	SIEMENS	VARIAN
1° Primary Collimator		✓ MLC	✓	✓
2° Secondary Collimator		✓	✓ MLC	✓
3° MLC Multi-leaf Collimators		X	X	✓ MLC
unfocused straight tracking		X	X	MLC
focused curved tracking		2° /MLC	1° /MLC	1°/2°