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

• 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
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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The point here is that you are trying to explain what you understand about some aspects of the linac.
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- 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**
    - thyratron, 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

2007b Question 1

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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