Examination for Diploma, Part 1

Clinical Radiobiology

Time allowed : 3 hours

ALL QUESTIONS ARE TO BE ATTEMPTED.

All questions are of equal value. Clearly labeled diagrams should be drawn wherever relevant.

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1. Describe the specific toxicities observed in lung, kidney and heart following treatment with certain chemotherapeutic agents and the additional complications that may arise when radiation is included in the treatment schedule.

2. Describe the biological effects of ionising radiation on the mammalian cell, ranging from the macromolecular level and subcellular components to the whole cell.

3. Your advice is sought on the choice of an intracavitary brachytherapy system. The options are:

   A) A continuous low dose rate system delivery dose rates similar to "conventional" radium/radon systems of approximately 0.5 Gy/h at the prescribed distance.
   B) A low dose rate system delivering between 0.5 and l .5 Gy/h at the prescribed distance.
   C) A high dose rate system delivering approximately 100 cGy/min at the prescribed distance.
   D) A pulsed brachytherapy system that can deliver pulses of 6.0 Gy in IO minutes everv hour at the prescribed distance.

   In RADIOBIOLOGICAL TERMS discuss the advantages and disadvantages of each of the four options.

4. Discuss the meaning of the concept of radiation repair. How has this concept been modelled and of what relevance are these models to multiple fractions per day treatment regimes?

5. In RADIOBIOLOGICAL TERMS write short notes on THREE of the following:

   A) Tumour clonogens.
   B) LET and radiosensitivity.
   C) Shrinking field technique.
   D) Genetics of radiosensitivity.

6. This Question is of multiple choice format and is to be answered on the separate QUESTION 6 DOCUMENT provided, according to the instructions of the document itself.

JANUARY 1996