

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.

1. Pioneering radiotherapists achieved measurable cure rates in treating tonsillar carcinoma. They employed external beam techniques, utilising machinery with low outputs (1-10 Gy per hour), poor depth dose characteristics and using hyperfractionated regimes with prolonged overall treatment times. Explain in RADIOBIOLOGICAL terms how these cures might have been achieved.
2. What is carcinogenesis? Describe the types of neoplasms most often induced by ionising radiation, the dose relationship presently employed by radiological protection authorities for risk estimates and the doses commonly involved in cancer induction. List the various groups of individuals in whom such neoplasms have been observed.
3. Define and discuss the operational basis for the linear quadratic (L-Q) equation and discuss each individual term in the equation.
4. From a RADIOBIOLOGICAL viewpoint, discuss the advantages and disadvantages of high LET radiation therapy and appraise the available clinical data using high LET radiation therapy for cancer treatment.
5. Write short notes on THREE of the following with an emphasis on radiation effects where appropriate:
 - a) X-ray effects on the testis
 - b) The p53 gene/protein
 - c) Chromatid aberrations
 - d) Flow cytometry (include a diagram, appropriately labeled, of a normal DNA histogram and a histogram from a tetraploid tumour)
6. This Question is of multiple choice format and is to be answered on the separate QUESTION DOCUMENT provided, according to the instructions on the document itself.

AUGUST 1997