# 2010 Radiation Oncology Exam Cases

**Radiation Biology and Related Topics**

Shown below are multi-target survival curves for low and high LET radiation.

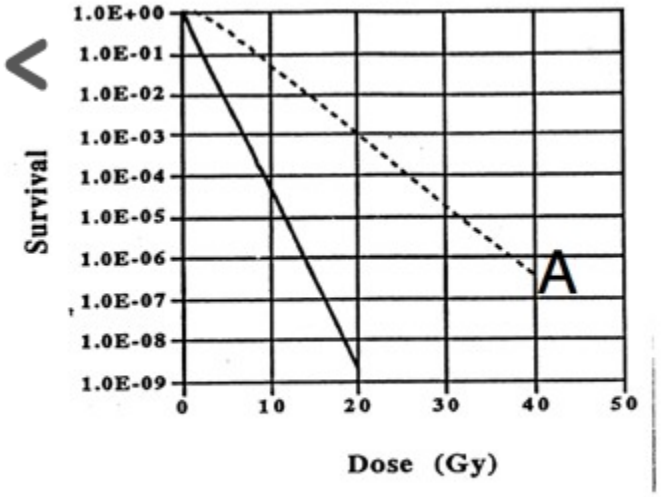


Image 1
Image 1 of 2

(a) The curve labeled A represents high LET radiation. TRUE or FALSE. (1 point)

(b) Which one of the following is the calculated RBE for these curves at an isoeffect of 10-2? (1 point)

A) 5

B) 10

C) 1

D) 3

E) 7

The answer to (a) is FALSE and (b) is D) 3.

Objective: Linear energy transfer and relative biological effectiveness. Reference: Primer of Medical Radiobiology, Travis, p 33.

**Physics and Dose Calculation**

In the treatment of feline hyperthyroidism using 131I, the absorbed thyroid tissue dose is related to which one (1) of the following?

A. The amount of 131I given in MBq.

B. The fraction of 131I deposited in the thyroid tissue.

C. The duration of retention of 131I by thyroid tissue.

D. B & C only

E. A, B & C

The correct answer is E.

Objective: The terminology, principles, and units used in radiation dosimetry. Reference: Forrest

LJ, Baty CJ, Metcalf MR, Thrall DE. Feline hyperthyroidism: Efficacy of treatment using volumetric analysis for radioiodine dose calculation. Vet Radiol Ultrasound 1996;37:141-145.

**General, Basic and Clinical Knowledge**

Which one (1) assay is used to detect phosphatidylserine residues on the outer surface of the plasma membrane and what is it looking for? (1 point)

A. Annexin V/Apoptosis
B. H2AX/Oxidative stress
C. Comet Assay/Apoptosis
D. Caspase Assay/Oxidative stress
E. TUNEL Assay/Apoptosis
Answer: A
Objective: Basic cancer related immunology and molecular biology.
Reference: Tannock and Hill. The Basic Science of Oncology, 4th edition, 2005. Page 201

**Clinical Aspects of Radiation Oncology Including Image Interpretation**

Which one (1) of the following statements is TRUE regarding this schematic drawing of a treatment plan for irradiation of a neoplasm (hatched lines) of one mandibular body (no bone lysis present) with parallel opposed fields of orthovoltage radiation. (2 points)

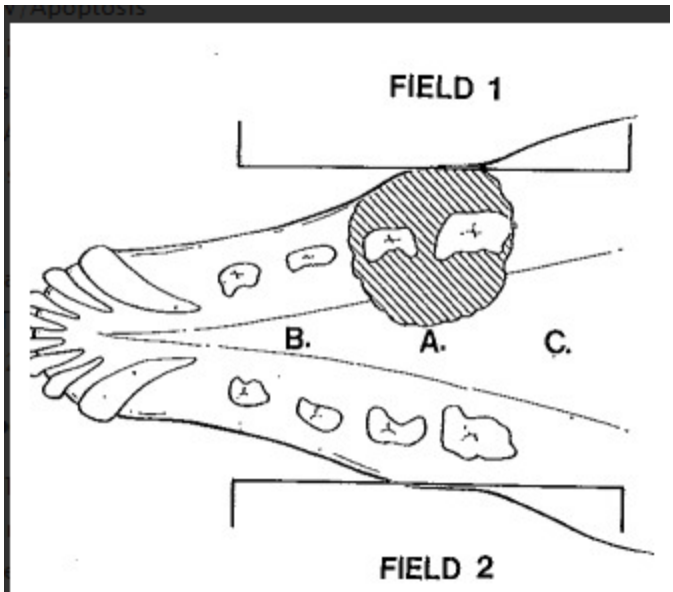

Image 2
Image 2 of 2

A. Dose at A will be greater than dose at B.
B. Dose at B will be approximately equal to dose at C.
C. Dose at A will be less than prescribed.
D. Bone receives a higher dose than adjacent soft tissue because of its lower f-factor.
Answer: C
Objective: Evaluation of radiation therapy plans (including traditional plans, 2-D plans, and 3-D

plans) regarding adequacy for treatment of tumors and effects on normal tissue. Candidates must be able to recommend improvements to inadequate plans.

Reference: Thrall DE et al. A Review of Tx Planning and Dose Calc in VRO. VRUS 30(5), 1989, pp 194-221.