2009 Radiation Oncology Exam Cases

General, Basic and Clinical Knowledge

1. Which one (1) stain could help to best differentiate a mast cell tumor from other round cell tumors? (1 point)

A. Cytokeratin
B. Vimentin
C. Methylene blue
D. Toluidine Blue
E. Chromogranin A
Answer: D
Objective: Basic cancer related immunology and molecular biology
Reference: Withrow and MacEwen, 3rd ed. Chapter 2

Physics and Dose Calculations

2. For equally weighted parallel-opposed 6 MV photon fields treating the lumbar spine of a large breed dog, lateral thickness 18 cm, the maximum tissue dose occurs at:

A. The skin surface
B. A depth of 5.0 cm
C. A depth of 1.6 cm
D. A depth of 0.5 cm
E. The isocenter
Answer: C. A depth of 1.6 cm
Objective: The physical principles regarding calibration and quantification of radiation output by therapy machines, radiation dose in tissue (SSD and SAD), and all dose units and terminology that apply.
Reference: The Physics of Radiation Therapy, Faiz M. Khan, Lippincott, Williams & Wilkins, Philadelphia, 2003 p 162-163

Radiation Biology and Related Topics

3. Which one (1) of the following is NOT a radiobiologic factor known to be involved in the dose-rate effect? (1 point)

A) Repair of sublethal damage
B) Reassortment in the cell cycle
C) Repopulation or cell proliferation
D) Reoxygenation of cells
E) Redistribution of cells
Answer: D. reoxygenation of cells
Objective: The radiobiologic aspects of variations in dose rate.
Reference: Radiobiology for the Radiologist, Hall 6th ed., Chapter 5 Repair of Radiation Damage and the Dose-Rate Effect, p 71-74.

Clinical Aspects of Radiation Oncology

4. You are prescribing 180 cGy daily (normalized to the 80% isodose line) on a chest wall at 3 cm deep with an area at risk of 10 x 17 cm. Which of the following correctly describes the energy beam, cone size, and cutout size you should use? (3 points)

a. 6 MeV, 20 x 20 cone, 18.5 x 11.5 cutout
b. 9 MeV, 20 x 20 cone, 18.5 x 11.5 cutout
c. 9 MeV, 15 x 15 cone, no cutout
d. 6 MeV, 20 x 20 cone, no cutout
e. 9 MeV 20 x 20 cone, 10 x 17 cutout
Answer: B. 3 cm x 3 = 9.
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.
References: Bentel, GC. Treatment Planning and Dose Calculation in Radiation Oncology, 1989, p. 152-153.
Bentel, GC. Radiation Therapy Planning, 1996, pp. 229-230, 53.