



**American College of Veterinary Radiology  
Radiation Oncology Board Certification Examination Program**

**3. Clinical Radiation Oncology  
Examination Content Outline**

**10. Tumor Biologic Behavior, Tumor Staging and Imaging: 30 items** (Recall: 6, Application: 18, Analysis: 6)

- A. Identify and measure target lesions for monitoring.
- B. Recommend, evaluate, and interpret appropriate diagnostic laboratory tests for diagnosis, staging, prognosis, treatment, and follow-up:
  - 1. bloodwork.
  - 2. urinalysis.
  - 3. cytology.
  - 4. histopathology.
  - 5. molecular testing.
  - 6. immunostaining.
- C. Understand the underlying principles of diagnostic imaging modalities (e.g., radiographs, ultrasound, NM, CT, MRI, PET).
- D. Recommend and interpret diagnostic imaging modalities for diagnosis, staging, incidental findings, comorbidities, treatment, and follow-up (e.g., radiographs, ultrasound, NM, CT, MRI, PET).
- E. Describe the use of contrast media used for CT and MRI and potential toxicities.
- F. Apply clinical stage and its implications for making treatment recommendations.
- G. Apply a working knowledge of tumor biologic behavior to each clinical case.
- H. Apply principles of a CT simulation of a tumor site for RT treatment planning.
- I. Register CT to CT and/or other imaging modalities.
- J. Describe the indications for diagnostic radioisotopes.
- K. Describe the use of markers to delineate a surgical field intra-operatively and the use of tissue markers for excised tissue to assist with radiation treatment planning.

**11. Planning, Plan Evaluation, and Delivery: 30 items** (Recall: 6, Application: 18, Analysis: 6)

- A. Describe the indications for low dose and high dose rate brachytherapy.
- B. Define intent of treatment including definitive and palliative radiation therapy options as well as medical management or no treatment.
- C. Explain the technique and application of TBI and HBI and toxicities.
- D. Explain the techniques, advantages, and disadvantages of IGRT and adaptive radiotherapy.
- E. Devise a radiation prescription.

- F. Determine advantages and disadvantages of manual or computer plan for a particular clinical case.
- G. Define the geometry and setup of a manual electron or photon plan.
- H. Review and critique portal images obtained at setup for a manual plan.
- I. Position patient for RT-planning and treatment using positioning aids and immobilization devices for different areas that may be treated.
- J. Identify and contour GTV, CTV, PTV, ITV and OAR.
- K. Recognize and apply beam modification devices (e.g., bolus, wedge, compensator, block, multi-leaf collimators, cones) to radiation therapy plans.
- L. Describe and apply the principles of manual, forward, and inverse radiation treatment planning (e.g., 3-D photon plan, IMRT, SBRT, SRT, arc, electrons) and their clinical applications, advantages and disadvantages.
- M. Evaluate quality of treatment plans and ways to improve them:
  - 1. DVH.
  - 2. dose distribution statistics.
  - 3. isodose lines/surfaces.
  - 4. point doses.
  - 5. conformity index.
  - 6. heterogeneity index.
  - 7. dose gradient index.
  - 8. doses to organs at risk.
- N. Apply dose constraints for organs at risk.
- O. Recognize and correct for dosimetric errors and deviations in treatment delivery.
- P. Verify and adjust patient position based on setup and portal imaging (e.g., kV, CBCT, MV).
- Q. Describe the indications for therapeutic radioisotopes.

**12. Statistics and Clinical Trials: 5 items** (Recall: 2, Application: 2, Analysis: 1)

- A. Understand levels of evidence within the scope of literature.
- B. Interpret basic biomedical statistics.
- C. Explain censoring and how it impacts a clinical trial.
- D. Design and implementation of a clinical trial.
- E. Apply reporting standards for radiation oncology studies.

**13. Patient Management, Prognostic Factors, and Patient Outcomes: 35 items**

(Recall: 5, Application: 21, Analysis: 9)

- A. Obtain patient history.
- B. Perform clinical examination.
- C. Devise a list of differential diagnoses.
- D. Describe risk factors for the development of specific tumor types.
- E. Assess the patient and its underlying disease(s) to determine suitable sedation/anesthesia protocols, including those for multifractionated radiotherapy (e.g., drug choices, venous access, monitoring).
- F. Understand the basic principles of surgical oncology.
- G. Predict, recognize, and manage relevant acute and late radiation-associated side effects.
- H. Recognize and manage paraneoplastic syndromes that may impact prognosis, therapy, follow up and anesthetic risk.

- I. Discuss advantages, disadvantages, and prognosis of therapeutic options for specific oncological diseases based on the known literature:
  - 1. chemotherapy.
  - 2. radiation therapy.
  - 3. surgery.
  - 4. immunotherapy.
  - 5. targeted therapy.
  - 6. medical management.
  - 7. photodynamic.
  - 8. electro-chemotherapy.
- J. Understand mechanisms of action and side effects of chemotherapy, immunotherapy, and targeted therapies as related particularly to oncological diseases treated with radiotherapy.
- K. Understand mechanisms and potential clinical implications of radiation recall.
- L. Have a general knowledge of oncologic diseases not treated with RT.
- M. Assess and manage anesthetic complications that may arise during treatment.
- N. Use radiosensitizers and radioprotectors.
- O. Discuss the rationale and evidence for using radiation therapy to treat non-neoplastic diseases.
- P. Evaluate and manage the patient for comorbidities.