



# The American Board of Oral & Maxillofacial Radiology

## Study Guide for Candidates (Revised 2010)

### Purpose

The purpose of this study guide is to provide candidates with information on topics that may be covered on the certifying examination of the American Board of Oral and Maxillofacial Radiology. It is by no means a complete listing of topics that will appear on the examination, nor is it to be implied that any topic not listed here will not appear on an examination. The document is not intended to be used for evaluating radiology programs or as a curriculum guide for oral and maxillofacial radiology programs. Its sole purpose is to give candidates guidance when preparing for the examination.

### TOPIC LIST

#### Radiation Physics and Imaging Techniques

##### I. Physics

- A. General characteristics and properties of various energies
  - 1. Electricity
  - 2. Magnetic fields
  - 3. Electromagnetic radiation
  
- B. Properties of ionizing radiation
  - 1. Natural
    - a. Principles of radioactivity and radionuclides
    - b. Alpha, beta, neutron and gamma radiation
    - c. Principles of exponential decay, half-life, specific activity
  - 2. Man-made
  
- C. X ray production
  - 1. Components of an x-ray machine and their function(s)
    - a. X-ray tube
    - b. Operating panel
    - c. High voltage components, transformers
    - d. Tube rating, wave form, rectification
  
  - 2. X ray generation
    - a. Electron-target interactions
    - b. X ray emission spectrum
      - i. Factors affecting x-ray beam intensity
      - ii. Factors affecting x-ray beam quality
    - c. Beam restriction and scatter reduction

- D. Interaction of ionizing radiation with matter
  - 1. Five basic interactions
  - 2. Differential attenuation
  - 3. Exponential attenuation
- E. Radiographic film
  - 1. Components and their function(s)
  - 2. Film types
    - a. Film characteristics
    - b. Intensifying screens
  - 3. Handling and storage
  - 4. Formation of the latent image
- F. Processing the latent image
  - 1. Processing chemistry
  - 2. Automatic vs. manual processing
  - 3. Quality assurance
  - 4. Statutory regulations for working with and disposal of chemical hazards
- G. Image quality
  - 1. Geometric factors
  - 2. Subject factors

## II. Imaging Technology

- A. Plain film techniques, including conventional tomography
  - 1. Intraoral
  - 2. Extraoral
- B. Computer technology
  - 1. Components and their function(s)
  - 2. Terminology
  - 3. Information processing
    - a. Image processing
    - b. Image archiving
    - c. Image transmission
    - d. Networking technology
- C. Digital imaging
  - 1. Components and their function(s)
  - 2. Image acquisition
  - 3. Image characteristics
  - 4. Storage phosphor technology
- D. Computed tomography
  - 1. Basic principles
  - 2. Components and their function(s)
  - 3. Operational modes
  - 4. Image characteristics
  - 5. Factors affecting image quality

- E. Magnetic resonance imaging
  - 1. Basic principles
  - 2. Components and their function(s)
  - 3. Image characteristics
  - 4. Signal parameters
  - 5. Basics of pulse sequencing
  
- F. Ultrasound imaging
  - 1. Basic principles
  - 2. Components and their function(s)
  
- G. Nuclear Medicine imaging
  - 1. Properties of radiopharmaceuticals
  - 2. Basic principles of imaging
    - a. Gamma camera
    - b. Single photon emission computed tomography (SPECT)
    - c. Positron emission tomography (PET)
  
- H. Contrast studies
  - 1. Indications and basic techniques
  - 2. Properties of contrast agents
  - 3. Complications or adverse reactions to procedures

## **Radiation Biology, Protection, and Safety**

### **I. Radiation Biology**

- A. Molecular and cellular radiobiology
  - 1. Effects of radiation on macromolecules
  - 2. Effects of radiation on water
  - 3. Direct vs. indirect effects
  - 4. Target-hit models
  - 5. Dose-response relationships
  - 6. Repair mechanisms
  
- B. Factors affecting radiosensitivity
  - 1. Physical factors
    - a. LET
    - b. RBE
    - c. Fractionation
  - 2. Biological factors
    - a. Oxygen effect
    - b. Age
    - c. Gender
    - d. Cell cycle
    - e. Law of Bergonie and Tribondeau

- C. Basic principles of radiation oncology
  - 1. Indications
  - 2. Goals
  - 3. Usual doses
  - 4. Consequences and complications
  
- D. Early effects on organisms
  - 1. Acute radiation syndrome
  - 2. Lethal doses
  - 3. Local tissue damage
    - a. Reproductive effects
      - i. Germ cells
      - ii. Cytogenetic effects
    - b. Somatic effects
      - i. Hematological effects
      - ii. Gastrointestinal effects
      - iii. CNS effects
  - 4. Effects on skin
  
- E. Late effects on organisms
  - 1. Carcinogenesis, mutagenesis
  - 2. Growth and development
  - 3. Biological risk estimates for ionizing radiation
  - 4. Stochastic vs. non-stochastic effects
  
- F. Biological effects of ultrasound
  
- G. Biological effects of magnetic fields and radio waves

### III. Radiation Protection and Safety

- A. Radiation detection and measurement
  
- B. Exposure and dose in radiology
  - 1. Basic terminology
  - 2. Risk assessment
  - 3. Comparison of risks among oral and maxillofacial imaging procedures
  - 4. Maximum permissible dose
    - a. Occupational
    - b. Nonoccupational
  - 5. Patient doses in oral and maxillofacial imaging
  - 6. Analysis of techniques
    - a. ROC curves (Az)
    - b. Sensitivity, specificity, positive predictive value, negative predictive value, accuracy
  
- C. Minimization of occupational exposure
  
- D. Minimization of patient exposure
  - 1. Selection criteria
  - 2. Technical excellence

- E. Office/clinic design for safety
  - 1. Statutory responsibilities
  - 2. Design parameters
  - 3. Protective barriers

F. Quality Assurance

## **Pathophysiology**

- A. Developmental Abnormalities of the Jaws
  - 1. Dental
  - 2. Craniofacial structures
- B. Acquired Abnormalities of the Jaws
  - 1. Cyst
  - 2. Benign neoplasia
  - 3. Malignant neoplasia
  - 4. Inflammatory lesion
  - 5. Bone dysplasia
  - 6. Vascular anomaly
  - 7. Metabolic disease
  - 8. Trauma
    - a. Teeth
    - b. Facial bones

## **Image Interpretation**

- A. Normal anatomy and development
- B. Description of the radiographic features of diseases, conditions or abnormalities as they appear on various types of images
- C. Analysis of radiographic features of diseases, conditions or abnormalities so that a differential diagnosis/interpretation can be developed
- D. Recommend additional studies, tests or investigations, radiographic or otherwise, and why such information would be useful.
- E. Recommend treatment options, and comment on disease prognosis.

An attempt is made to evenly distribute the interpretive cases among the following categories:

- 1. Neoplastic diseases
- 2. Inflammatory diseases
- 3. Reactive diseases, trauma
- 4. Developmental disorders
- 5. Systemic diseases
- 6. Odontogenic cysts and tumors

