

- V. EQUIPMENT AND MATERIAL
 - A. Computer, TV monitor, and Internet access
 - B. See IV: Visual Aids
- VI. SAFETY
 - A. Basic classroom procedures
 - B. Follow Standard Precautions
 - C. When working in an area where you may be exposed to radiation, wear a film badge
- VII. PREPARATION
 - A. Arrange for visual aids equipment.
 - B. Collect materials.
 - C. Review Chapter 32 in the text, the Study Guide, and the Instructor's Manual.
- VIII. INTRODUCTORY REMARKS/ACTIONS
 - A. Read Learning Outcomes in the text with students to introduce the chapter.
- IX. PRESENTATION
 - A. Radiation Safety
 - 1. Powerful, dangerous
 - a. Harmful to fetus (discuss the Critical Thinking box)
 - 2. Dosimeter
 - 3. Lead aprons
 - B. X-ray machine
 - 1. Three main parts
 - C. Contrast Media
 - 1. Radiopaque
 - 2. Radiolucent
 - 3. Types
 - a. Barium sulfate
 - b. Iodine compounds
 - c. Air
 - d. Carbon dioxide
 - D. Patient Preparation
 - 1. Proper preparation essential
 - E. Positioning the Patient
 - 1. Basic views
 - F. Fluoroscopy
 - 1. Views internal organs in motion
 - 2. Contrast medium given
 - G. Diagnostic Imaging
 - 1. Positron Emission Tomography (PET)
 - a. Uses computer and radiopharmaceuticals
 - 2. Computerized Tomography (CT)
 - a. Radiation beams produce cross-sectional images
 - b. Noninvasive
 - 3. Magnetic Resonance Imaging (MRI)
 - a. Noninvasive
 - b. Cylinder-shaped machine contains electromagnet
 - 4. Flat Plates
 - a. Plain films
 - (1) No special technique or contrast medium
 - 5. Ultrasound
 - a. High-frequency sound waves used to image
 - b. Transducer emits sound waves
 - c. Oscilloscope displays visual picture
 - d. Noninvasive

6. Mammography
 - a. Highest resolution and contrast
 - b. Fully regulated by the U.S. government
 - c. Digitalization
7. Filing Films and Reports
 - a. Part of patient's permanent record
 - b. Store in special envelopes in a cool dry place and in the electronic medical record
 - c. Property of hospital/facility
 - d. Written report by radiologist sent to patient's provider
- H. Radiation Therapy
 1. General use to treat tumors
 - a. Tumors that are inaccessible for surgery and treatment
 - b. Shrinks tumor
 - I. Stereotactic Radiotherapy
 1. Beams of radiation from different directions meet at a specific point
 2. Uses computerized imagery
 - J. Nuclear Medicine
 2. Radioactive compounds (radionuclides) used for:
 - a. Diagnosis
 - b. Therapy
 - c. Research
 3. Uses a camera and nearby computer
- X. APPLICATION
 - A. Use the Learning Outcomes at the beginning of Chapter 32 in the text as the basis for questions to assess comprehension.
 - B. See the Classroom Activities section below for numerous application activities.
 - C. Assign students to complete Chapter 32 in the Study Guide.
- XI. EVALUATION
 - A. Evaluate any assigned application activities.
 - B. Evaluate student participation during class.
 - C. Grade responses to Chapter 32 in the Study Guide.

Classroom Activities

1. Instruct students on the importance of wearing a dosimeter in clinics that have X-ray equipment.
2. Have students identify different types of contrast media and precautions to take with iodine-sensitive patients.
3. Have students complete a list of procedures to be performed in the X-ray department and the detailed instructions (preparations) to be given to patients.
4. Have students demonstrate the basic positions in placing patients to obtain the best-quality X-ray.
5. Discuss the uses of ultrasonography, PET, CT, MRI, MRA, and flat plates.
6. Explain the differences among radiology, radiation therapy, and nuclear medicine.
7. Assign students to research the side effects of radiation and what assistance can help curtail them.
8. Invite the radiation safety officer from the local hospital to speak.
9. Arrange for students to tour the radiology department at the local hospital.
10. Assign students a short essay on any personal experience with a radiologic procedure. Have them focus on elements of the procedure that they did not understand and have them find a medical rationale for each.

Answers to Critical Thinking Boxes

What are the effects of radiation on a fetus or an embryo?

A pregnant woman, exposed to radiation, especially in the first trimester, also exposes the embryo or fetus to radiation. When an X-ray has been ordered, women are routinely asked whether or not they are pregnant. Severe congenital anomalies can result if the embryo or fetus is exposed to radiation.

What do some state laws require of personnel who take X-rays?

Some state laws require licensure to take radiographs because of the possibility of unlicensed individuals causing severe injury to themselves and/or their patients. Most states require a license to take radiographs. Education, training, and licensure in radiologic techniques are of utmost importance for patients and medical assistant safety.

Describe how radiation therapy helps to destroy malignant neoplasms.

The aim of radiation therapy is to shrink malignant neoplasms and interfere with cell growth to disrupt the DNA. The object is to destroy as many malignant cells as possible without harming healthy cells surrounding the neoplasm.

Stereotactic radiotherapy is the name given to radiation therapy in which a number of precisely aimed beams of ionizing radiation coming from different directions meet at a specific point, delivering the radiation treatment to that spot. There is less harm to healthy cells using this technique. It is an important treatment option for many patients, but it is limited to neoplasms that are well defined and no larger than 3 to 4 centimeters. It uses computerized imaging to target a narrow X-ray beam. Both a surgeon and a radiation oncologist work together to evaluate and treat the patient.

Answers to Case Studies

Case Study 32-1

Refer to the scenario at the beginning of the chapter.

1. What is the patient preparation for excretory urography (IVP)?

The preparation for an excretory urography (also known as an intravenous pyelogram [IVP]) is:

- Light supper the night before
- Laxative taken after dinner
- Nothing to eat or drink (NPO) after midnight
- Cleansing enema in the morning

2. What should Wanda tell Mr. Waite about what to expect as he begins to have his procedure?

Mr. Waite should be told he may experience a flush of warmth in his chest and head when the dye is injected and that he may have a metallic taste in his mouth. These are common and are temporary.

Case Study 32-2

Gloria McDermott is scheduled to have a GI series of X-rays next week because of persistent episodes of stomach pain that is unrelieved by the medication Dr. King has prescribed for her.

1. How will you explain to her the purpose of the test?

The purpose of the GI series is to study the esophagus, stomach, and small intestine for ulcers, tumors, hiatal hernias, and esophageal varices.

2. What will you tell her about how to prepare for the examination?

Preparation for GI series consists of:

- The day prior to X-ray: light evening meal, NPO after midnight.
- The day of test: NPO preprocedure; postprocedure, increase fluid intake, take a laxative as prescribed.

Case Study 32-3

Raymond Brunnelle has had a series of X-rays, a GI series, a cholecystogram, and an MRI of his abdomen. He has scheduled an appointment with a gastroenterologist and asks you to get all of the films for him.

1. What is your response to his request?

Mr. Brunnelle is told that the actual X-rays belong to the hospital where they were taken and processed and that although he has paid for them, they are not his. He can, however, have a copy of the radiologist's reports of the results of all of the X-rays.

2. Explain why they should be kept on-site.

X-rays are best left on-site so that they are accessible for future use to be compared with more recent films of the same body part. This also eliminates the possibility of their being lost if they were allowed to be taken away from the facility where they were processed. Electronic filing of X-rays safeguards against their being lost.

Answers to Certification Review

1. b. Mammogram
2. b. Tablets
3. c. bile ducts
4. c. Posteroanterior
5. c. magnetic resonance imaging
6. a. utilize a camera and microphone to communicate with patient during exam
7. c. through the body from the right to the left
8. d. both b and c
9. d. both b and c
10. c. X-rays that are viewed in motion

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