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3-D Image Postprocessing

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Human Structure and Function

Content is designed to establish a knowledge base in cross-sectional anatomy, physiology and medical terminology. Components of the cells, tissues, organs and systems will be described and discussed.

Patient Care in Radiologic Science

Content is designed to provide the basic concepts of patient care, including consideration for the physical and psychological needs of the patient and family. Routine and emergency patient care procedures are described, as well as infection control procedures using standard precautions. The role of the radiographer in patient education is identified.

Pharmacology and Drug Administration

Content is designed to provide basic concepts of pharmacology. The theory and practice of basic techniques of venipuncture and administration of diagnostic contrast agents and/or intravenous medications is included. The appropriate delivery of patient care during these procedures is emphasized.

Radiation Protection

Content is designed to present an overview of the principles of radiation protection including the responsibilities of the radiographer for patients, personnel and th

2-D (Planar) and 3-D (Volumetric) Anatomy

Description

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Content

I. Head and Brain

A. Cranial bones

1. Frontal
2. Ethmoid
 - a. Nasal conchae (turbinates)
 - b. Nasal septum
3. Parietal
4. Sphenoid
 - a. Lesser wings
 - 1) Tuberculum sellae
 - 2) Sella turcica
 - 3) Dorsum sellae
 - 4) Anterior and posterior clinoid process
 - 5) Optic canals
 - b. Greater wings
 - 1) Foramen rotundum
 - 2) Foramen ovale
 - a) Foramen spinosum
5. Occipital
 - a. Foramen magnum
 - b. Internal and external occipital protuberance
 - c. Jugular foramen
6. Temporal
 - a. Zygomatic process
 - b. External auditory meatus (EAM)
 - c. Internal auditory canal
 - 1) Bones/structures of inner ear
 - d. Mastoid process
 - e. Petrous portion or ridge

B. Facial bones

1. Mandible
2. Maxillae
3. Zygomas
4. Nasal bones

C. Sinuses

1. Frontal
2. Maxillary
3. Ethmoidal
4. Sphenoidal

D. Facial muscles

1. Masseter

2. Frontalis
 3. Temporalis
- E. Surface anatomy of the brain
1. Fissures (sulci)
 - a. Longitudinal cerebral
 - b. Lateral (Sylvian)
 - c. Central (of Rolando)
 2. Convolutions (gyri)
 - a. Precentral
 - b. Postcentral
- F. Lobes of the brain and midline cerebral hemisphere structures
1. Frontal
 2. Parietal
 3. Occipital
 4. Temporal
 5. Insula (island of Reil)
 6. Cerebellum
 7. Corpus callosum (genu, rostrum, body and splenium)
 8. Septum pellucidum
 9. Sella turcica
 10. Pineal gland
 11. Falx cerebri
 12. Septum pellucidum
- G. Cranial nerves
1. Olfactory
 2. Optic
 3. Oculomotor
 4. Trochlear
 5. Trigeminal nerve
 - a. Mandibular nerve
 - b. Inferior alveolar nerve
 6. Abducens
 7. Facial
 8. Vestibulocochlear
 9. Glossopharyngeal
 10. Vagus
 11. Accessory
 12. Hypoglossal
- H. Brainstem and adjoining structures
1. Diencephalon
 - a. Thalamus
 - b. Hypothalamus

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- 2) Falx cerebelli
- 3) Tentorium cerebelli
- 4) Diaphragma sellae

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4. Carotid sheath

D. Musculature

1. Anterior triangle
2. Posterior triangle
3. Sternocleidomastoid
4. Sternohyoid
5. Scalene
6. Trapezius

III. Chest and Mediastinum

A. Situs

1. Solitus
2. Inversus
3. Ambiguus
 - a. Asplenia (right sidedness)
 - b. Polysplenia (left sidedness)

B. Bony thorax

1. Thoracic vertebrae
 - a. Arterial supply to spine
 - b. Parts of vertebrae
2. Sternum
3. Ribs
4. Costal cartilages
5. Scapulae
6. Clavicles

C. Pulmonary

1. Apices (lung)
2. Diaphragm
3. Angles
4. Hilum
5. Lobes (lungs)
6. Trachea
7. Carina
- 8.

IV. Abdomen

- A. Diaphragm and openings
 - 1. Aortic hiatus
 - 2. Caval hiatus
 - 3. Esophageal hiatus
- B. Surface landmarks and regions
 - 1. Quadrants
 - a. Upper left
 - b. Upper right
 - c. Lower left
 - d. Lower right
- C. Addison's planes (regions)
 - 1. Left hypochondriac
 - 2. Epigastric
 - 3. Right hypochondriac
 - 4. Left lumbar
 - 5. Umbilical
 - 6. Right lumbar
 - 7. Left iliac
 - 8. Hypogastric
 - 9. Right iliac
- D. Abdominal organs and structures
 - 1. Bony structures
 - a. Lumbar vertebrae
 - 2. Abdominal cavity
 - a. Peritoneum
 - b. Peritoneal space
 - c. Retroperitoneum
 - d. Retroperitoneal space
 - 3. Liver
 - a. Hepatic arteries
 - b. Portal venous system
 - c. Liver segments
 - 1) Liver lobes
 - 2) Couinaud classification
 - d. Variant vascular anatomy of living related liver donors
 - 4. Gallbladder and biliary system
 - 5. Pancreas
 - a. Pancreatic ducts
 - b. Parts of pancreas
 - 6. Spleen
 - 7. Adrenal glands

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- 1) Axillary artery
 - 2) Thoracodorsal artery
 - 3) Lateral thoracic artery
 - 4) Subscapular artery
 - 5) Thoracoacromial artery
 - 6) Axillary vein
2. Elbow
- a. Bony anatomy
 - 1) Humerus
 - 2) Radius
 - 3) Ulna
 - b. Muscles and tendons
 - 1) Anterior group
 - 2) Posterior group
 - 3) Lateral group
 - 4) Medial group
 - c. Ligaments
 - 1) Ulnar collateral
 - 2) Radial collateral
 - 3) Annular
 - d. Neurovasculature
 - 1) Brachial artery
 - 2) Radial artery
 - 3) Ulnar artery
 - 4) Basilic vein
 - 5) Cephalic vein
 - 6) Median cubital vein
 - 7) Ulnar nerve
3. Hand and wrist
- a. Bony anatomy
 - b. Phalanges
 - c. Metacarpals
 - 1) Carpal bones
 - 2) Radius
 - 3) Ulnar
 - d. Tendons
 - 1) Palmar tendon group
 - 2) Dorsal tendon group
 - 3) Triangular fibrocartilage complex
 - e. a.

B. Lower extremities

1. Hip/thigh

- a. Bony anatomy
- b. Labrum and ligaments
- c. Muscle groups
 - 1) Hamstring muscles
 - 2) Abductor/adductor
- d. Neurovasculature
 - 1) Femoral nerve
 - 2) Sciatic nerve

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- a. Bony anatomy
- b.

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- 5. MPR and CPR artifacts
 - a. Partial volume
 - b. False stenosis
 - 6. MPR applications
 - a. Anatomically corrected datasets
 - b. Fast anatomical segmentation
 - c. Noise reduction in standard displays
 - d. Improvement in spatial resolution
- B. 3-D surface rendering (shaded surface display [SSD])
- 1. Principles
 - a. Illumination with virtual light sources(s)
 - b. Shadowing effect
 - c. Color encoding
 - 1) Orthographic vs. perspective rendering
 - d. Threshold selection and size representation
 - e. Image rotation and viewing angle

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- i) F
 - ii) c
 - 4) Trauma
 - a) Laceration
 - b) Dehiscence (post-lung transplant)
 - b. Diffuse disease
 - 1) Increased density
 - a)

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Analog
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1. Prosthetic joints
 - a. Preoperative planning
 - 1) Deformities
 - 2) Bone stock
 2. Surgical hardware
 - a. Postoperative heterotopic bone
 3. Chronic joint deformities
 - a. Perthes disease
 - b. Achondroplasia
 - c. Loosening
 4. Bony impingement
 - a. Femoroacetabular impingement
 5. Joint bodies
- C. Anatomical anomalies
1. Hand malformations
 2. Foot malformations

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- a. Aorto-iliac runoff
 - b. Lower extremity
 - c. Upper extremity
 - d. Lower extremity/vena cava venogram
- 4. CT head and neck angiogram
 - a. CT brain perfusion
- B. CT body
 - 1. CT airway
 - 2. CT intravenous pyelogram (IVP)
 - 3. CT Bowel
 - a. CT rectum
 - b. CT enterography
 - c.

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Content

I. Purpose of 3-D Quality Assurance

- A. Definition of quality assurance/quality control
- B. Impact of imaging errors on patient care

II. Components of 3-D Quality Assurance Program

- A. Methods for interdepartmental and intradepartmental communication
 - 1. Ensure proper requirements are met for CT/MR source images
 - 2. Ensure all personnel are aware of protocol changes
- B. Checklist of core competencies for novice 3-D technologists
- C. Continuous training and updates for 3-D technologists
- D. Consistent quality control measures integrated into workflow
- E. Use of 3-D clinical software with Food and Drug Administration (FDA) medical device 510(k) approval
- F.

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Basic Principles of Computed Tomography

Description

Content is designed to provide entry-level radiography students with principles related to computed tomography (CT) imaging.

Objectives

Describe the components of the CT imaging system.

Differentiate between conventional and spiral/helical CT scanning.

Explain the functions of collimators in CT.

List the CT computer data processing steps.

Name the functions of the array processor used for image reconstruction.

Define the term "algorithm" and explain its impact on image scan factors and reconstruction.

Define the terms "raw data" and "image data."

Explain the difference between reconstructing and reformatting an image.

Describe the application of the following terms to CT:

- Pixel.
- Matrix.
- Voxel.
- Linear attenuation coefficient.
- CT/Hounsfield number.
- Partial volume averaging.
- Window width (ww) and window level (wl).
- Spatial resolution.
- Contrast resolution.
- Noise.
- Annotation.
- Region of interest (ROI).
- Standard vs. volumetric data acquisition.

Name the common controls found on CT operator consoles and describe how and why each is used.

Identify the types and appearance of artifacts most commonly affecting CT images.

Explain how artifacts can be reduced or eliminated.

List and describe current data storage techniques used in CT.

Name the radiation protection devices that can be used to reduce patient dose in CT and describe the correct application of each.

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Demonstrate competency in the principles of radiation protection standards.
Apply the principles of total quality management.
Report equipment malfunctions.
Examine procedure orders for accuracy and make corrective actions when applicable.
Demonstrate safe, ethical and legal practices.
Integrate the radiographer's practice standards into clinical practice setting.
Maintain patient confidentiality standards and meet Health Insurance Portability and Accountability Act (HIPAA) requirements.
Demonstrate the principles of transferring, positioning and immobilizing patients.
Comply with departmental and institutional response to emergencies, disasters and accidents.
Differentiate between emergency and nonemergency procedures.
Adhere to national, institutional and departmental standards, policies and procedures regarding care of patients, providing radiologic procedures and reducing medical errors.
Select technical factors to produce quality diagnostic images with the lowest radiation exposure possible.
Critique images for appropriate anatomy, image quality and patient identification.
Determine corrective measures to improve inadequate images.

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Human Structure and Function

Description

Content is designed to establish a knowledge base in anatomy and physiology. Components of the cells, tissues, organs and systems are described and discussed.

Objectives

Discuss the basics of anatomical nomenclature.

Describe the chemical composition of the human body.

Identify cell structure and elements of genetic control.

Explain the essentials of human metabolism.

Describe the types and functions of human tissues.

Classify tissue types, describe the functional characteristics of each and give examples of their location within the human body.

Describe the composition and characteristics of bone.

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List the normal ranges for specific laboratory studies.

Define terms related to infection control.

Describe the importance of standard precautions and isolation procedures that includes sources and modes of transmission of infec

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Krupinski EA, Kallergi M. Choosing a radiology workstation: technical and clinical considerations. *Radiology*. 2007;242(3):671-682.

Lane JL, Lindell EP, Witte RJ, DeLone DR, Driscoll CL. Middle and inner ear: improved depiction with multiplanar reconstruction of volumetric CT data. *Radiographics*. 2006, 26(1): 115-124.

Lawler LP, Jarret TW, Corl FM, Fisher EK. Adult ureteropelvic junction obstruction: insights with three-dimensional multi-detector row CT. *Radiographics*. 2005;25(1):121-134.

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