

NMTCB Computed Tomography Examination Content Outline



- I: System Operations and Instrumentation - 14%**
- II: Data Acquisition and Post Processing – 12%**
- III: Image Quality and Quality Assurance – 13%**
- IV: Patient Management – 6%**
- V: Medications and Contrast Agents – 14%**
- VI: CT Procedures: Anatomy, Elements, Indications, & Pathology – 25%**
- VII: Radiation Safety – 16%**

I. Domain I: System Operations and Instrumentation (14%)

- A. Identify Characteristics of the operator's console/acquisition station
- B. Recognize the essential design and function of CT equipment
 - 1. Host computer/reconstruction station
 - 2. CT Radiographic tube
 - 3. Gantry/table features
 - 4. Detectors
 - 5. Data acquisition system
 - 6. Array processor
- C. Classify filtration applications
- D. Illustrate the effects and usage of collimation
- E. Distinguish safe operation of power injectors with consideration to their limitations
- F. Utilize image archiving principles within the communication system
- G. Apply equipment quality assurance measures prior to usage

II. Domain II: Data Acquisition and Post Processing (12%)

- A. Explain the process of digital CT image production
- B. Differentiate among scanning methods
 - 1. Conventional serial CT scan
 - 2. Step and shoot scanning

- 3. Shielding (shielding equations)
- C. Identify the characteristics of localizer scans
- D. Recognize principles of image reconstruction
- E. Apply principles of post-processing techniques
- F. Differentiate among slice plans
- G. Recognize how to set and confirm landmarks

III. Domain III: Image Quality and Quality Assurance (13%)

- A. Recognize influences on parameter selection
- B. Distinguish factors that impact image quality and apply problem solving techniques
 - 1. Image noise
 - 2. Reconstruction interval
 - 3. Reconstruction algorithm/kernel
 - 4. Matrix
 - 5. Magnification
 - 6. Windowing
 - 7. Artifacts
 - 8. Slice thickness
 - 9. Partial volume effect
 - 10. Field of view
 - 11. Patient related
- C. Apply knowledge of linear attenuation coefficient usage
- D. Differentiate between CT number and Hounsfield units
- E. Define interscan spacing and its application
- F. Apply quality assurance process to evaluating images

IV. Domain IV: Patient Management (6%)

- A. Provide patient education and preparation
- B. Perform patient screening and assessment
 - 1. Contraindications (e.g., renal insufficiency)
 - 2. Medication and results of laboratory testing
- C. Perform an ongoing assessment and respond to changes in the patient's condition
- D. Utilize patient positioning and immobilization devices
- E. Identify principles of patient documentation, record keeping, and confidentiality
- F. Verify physician orders

V. Domain V: Medications and Contrast Agents (14%)

- A. Identify intravenous contrast agents and their properties/usage
 - 1. Contraindications
 - 2. Adverse reactions and events
 - 3. Viscosity/osmolality

4. IV size
 5. Volume
 6. Flow duration
 7. Flow rate
- B. Identify other contrast agents and their properties/usage/routes
 1. Gastrointestinal contrast agents
 2. Intrathecal contrast
 3. Rectal contrast
 4. Vaginal contrast
 5. Intraarticular contrast
 - C. Identify bolus parameters, timing, and tracking
 - D. Recognize common medications for managing contrast reactions

VI. Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology (25%)

- A. Demonstrate fundamental parameters of head CT
 1. Routine brain
 2. Trauma
 3. Internal auditory canals
 4. Pituitary
 5. Orbits
 6. Sinuses
 7. Maxillofacial
 8. Temporomandibular joint
 9. Angiography-Circle of Willis
- B. Demonstrate fundamental parameters of neck CT
 1. Routine soft tissue neck
 2. Trauma
 3. Larynx
 4. Parathyroid
 5. Angiography-Carotids
- C. Demonstrate fundamental parameters of spine CT
 1. Cervical spine
 2. Thoracic spine
 3. Lumbosacral spine
 4. Trauma
 5. Post-Myelography spine
- D. Demonstrate fundamental parameters of musculoskeletal CT
 1. Shoulder
 2. Elbow
 3. Wrist
 4. Hand

5. Hips
 6. Knee
 7. Ankle
 8. Foot
 9. Long bones
 10. Arthrogram
- E. Demonstrate fundamental parameters of chest CT
1. Routine chest
 2. Lung
 - a. High resolution
 - b. Low dose screening
 - c. Respiratory gating
 3. Angiography-Thoracic aorta
 4. Angiography-Pulmonary vessels/PE exam
- F. Demonstrate fundamental parameters of abdomen CT
1. Routine abdomen
 2. Tri-phase liver
 3. Pancreas
 4. Kidneys
 5. Renal calculi
 6. Adrenals
 7. Ureteral calculi/urogram
 8. Angiography – abdomen
 9. Trauma
- G. Demonstrate fundamental parameters of pelvis CT
1. Bladder
 2. Trauma
 3. Angiography – run-offs
- H. Demonstrate fundamental parameters of cardiac CT
1. Angiography – cardiac
 2. Calcium scoring
 3. Cardiac gating
- I. Recognize characteristics of special procedures
1. Biopsy
 2. Drainage
- J. Recognize characteristics of PET/CT
1. Anatomy
 2. Physiology
 3. Organ systems
 4. Attenuation correction
- K. Recognize characteristics of SPECT/CT
1. Anatomy
 2. Physiology

3. Organ systems
 4. Attenuation correction
- L. Recognize procedural differences for patient populations (e.g., pediatric, body habitus)

VII. Domain VII: Radiation Safety (16%)

- A. Recognize biological effects of ionizing radiation
- B. Recognize elements of dose reporting and measurements/units
- C. Apply dose optimization techniques
 1. Hardware factors
 2. Scan parameters
 3. Reformat
 4. Repeat scans
 5. Radiation penumbra
- D. Recognize dosing modifications for patient populations (e.g., pediatric, body habitus, pregnancy)
- E. Recognize elements, types, and applications of shielding (e.g., PPE, ALARA)

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