



وصف المقرر الدراسي

قسم تقنيات الأشعة والسونار

المرحلة الثالثة

التشريح الشعاعي 2

Radiologic anatomy2

الانكليزية

Theoretical syllabus

	Details
	The abdomen: Anterior abdominal wall Stomach
	Duodenum Small intestine
	Ileocaecal valve Appendix
	Large intestine
	Liver
	Biliary system
	Pancreas

practical syllabus

	Details
	The abdomen: Anterior abdominal wall Stomach
	Duodenum Small intestine
	Ileocaecal valve Appendix
	Large intestine
	Liver
	Biliary system
	Pancreas
	Spleen
	Portal venous system

	The kidneys
	The ureter
	The adrenal glands
	The abdominal aorta
	The inferior vena cava Veins of the posterior abdominal wall
	The peritoneal spaces of the abdomen
	Cross-sectional anatomy of the upper abdomen
	The pelvis: The bony pelvis, muscles and ligaments The pelvic floor
	The sigmoid colon, rectum and anal canal Blood vessels, lymphatics and nerves of the pelvis
	The lower urinary tract The male urethra
	The male reproductive organs
	The female reproductive tract
	Cross-sectional Pelvic anatomy
	The upper limb: The bones of upper limb
	The joints of upper limb The muscles of upper limb
	The arteries of upper limb The veins of upper limb
	The lower limb: The bones of lower limb
	The joints of lower limb The muscles of lower limb
	The arteries of lower limb The veins of lower limbs
	The breast: General anatomy Lobular structure Blood supply Lymphatic drainage
	Radiology of the breast Age changes in the breast

تقنيات التصوير الشعاعي 2

Radiographic Techniques 2

الانكليزية

Theoretical syllabus

Title
Lines & planes of projection of the skull
Skull AP , Lateral ,townes and basal view
Sinuses, face , and nose PA and lateral projection , shown structure
Paranasal sinuses, waters view & lateral view, shown structure main finding
Mandible PA and oblique projection, shown structure, main finding
Chin ventro- dorsal , TMJ view, maxillary bone
Main skull pathology, image interpretation of special cases
Cases for skull and facial bones
Cervical spine ,AP , lateral , AP for C1-C3 , AP view for C3- C7, shown structure
Cervico-thoracic region lateral waterskiing position, oblique view
Main cervical spine finding , image interpretation of cervical fractures
Cases review for cervical spine
Midyear exam
Thoracic spine , AP , Lateral, lateral decubitus , shown structure
Image interpretation and main pathology of the thoracic spine
Lumber spine , AP , Lateral ,oblique projection, shown structure
Main finding ,fractures , pathology, image interpretation of the lumber spine
Sacrum and coccyx , AP , lateral , shown structure, main finding
Cases review for the spinal column
Second terms exams
Abdomen , AP, PA erect , lateral view, Urinary tract KUB, shown structure
Pediatric imaging,
Mammography , main position, finding, image interpretation
Cases review,
Final exam

practical syllabus	
	Title
	Skull AP , Lateral ,townes and basal view
	Sinuses, face , and nose PA and lateral projection , shown structure
	Paranasal sinuses, waters view & lateral view, shown structure main finding
	Mandible PA and oblique projection, shown structure, main finding
	Chin ventro- dorsal , TMJ view, maxillary bone
	Main skull pathology, image interpretation of special cases
	Cases for skull and facial bones
	Cervical spine ,AP , lateral , AP for C1-C3 , AP view for C3- C7, shown structure
	Cervico-thorasic region lateral waterskiing position, oblique view
	Main cervical spine finding , image interpretation of cervical fractures
	Cases review for cervical spine
	Midyear exam
	Thoracic spine , AP , Lateral, lateral decubitus , shown structure
	Image interpretation and main pathology of the thoracic spine
	Lumber spine , AP , Lateral ,oblique projection, shown structure
	Main finding ,fractures , pathology, image interpretation of the lumber spine
	Sacrum and coccyx , AP , lateral , shown structure, main finding
	Cases review for the spinal column
	Second terms exams
	Abdomen , AP, PA erect , lateral view, Urinary tract KUB, shown structure
	Pediatric imaging,
	Mammography , main position, finding, image interpretation
	Cases review,
	Final exam

فحوصات شعاعية خاصة

Special radiological procedures 2

الانكليزية

Theoretical syllabus

	Details
	Methods of imaging of the heart and angiocardiology.
	Coronary arteriography & cardiac C.T including coronary angiography.
	Methods of imagings the arterial system &introduction to catheter techniques.
	Femoral ,brachial &axillary punctures for catheterization .
	General complications of catheter techniques.
	Ascending aortoraphy and lower limb arteriography.
	Balloon angiography .
	Vascular emolization .
	C.T &MRI angiography .
	Methods of imaging the venous system &peripheral venography.
	Central venography.
	Portal venography.
	Position emission tomography imaging .
	18f-FDG PET scanning .
	Lymph node imaging .
	Imaging modalities of bones & joints.
	Musculoskeletal MRI –general points .
	Arthrography –general points .
	Arthrography of the knee & hip .
	Arthrography of the shoulder &elbow .
	Arthrography of the wrist & ankle .
	Radionuclide bone scan .

Theoretical syllabus	
	Details
	Method of imaging the brain .
	C.T &MRI of the brain .
	Cerebral &lumber myelography.
	Methods of imaging the spine.
	Cervical &lumber myelography.
	Methods of imaging of the salivary glands .
	Methods of imaging the thyroid &parathyroid glands with C.T & MRI of the thyroid and parathriod glands .
	Methods of imaging of the breast & mammary glands .

practical syllabus	
week	Details
1	Methods of imaging of the heart and angiocardiology.
2	Coronary arteriography & cardiac C.T including coronary angiography.
3	Methods of imagings the arterial system &introduction to catheter techniques.
4	Femoral ,brachial &axillary punctures for catheterization .
5	General complications of catheter techniques.
6	Ascending aortoraphy and lower limb arteriography.
7	Balloon angiography .
8	Vascular emolization .
9	C.T &MRI angiography .
10	Methods of imaging the venous system &peripheral venography.
11	Central venography.
12	Portal venography.
13	Position emission tomography imaging .
14	18f-FDG PET scanning .
15	Lymph node imaging .
16	Imaging modalities of bones & joints.
17	Musculoskeletal MRI –general points .
18	Arthrography –general points .
19	Arthrography of the knee & hip .
20	Arthrography of the shoulder &elbow .
21	Arthrography of the wrist & ankle .
22	Radionuclide bone scan .

23	Method of imaging the brain .
24	C.T &MRI of the brain .
25	Cerebral &lumber myelography.
26	Methods of imaging the spine.
27	Cervical &lumber myelography.
28	Methods of imaging of the salivary glands .
29	Methods of imaging the thyroid ¶thyroid glands with C.T & MRI of the thyroid and parathriod glands .
30	Methods of imaging of the breast & mammary glands .

علم الامراض
Pathology
الانكليزية

Theoretical syllabus	
	Details
	Necrosis –cell death
	Inflammation
	Repair process
	Infection
	Body response to infection
	Carcinogenesis
	Radiation effect –early
	Radiation effect – late
	Homodynamic disorders
	Blood disorders- WBC, RBC
	Blood disorders -coagulation
	Diseases of bones & joints
	Bone fracture
	Pathological diseases of the kidneys
	Pathological diseases of the ureters& Urinary bladder
	Pathological diseases of the esophagus & stomach
	Pathological diseases of the small & large bowel
	Pathological diseases of the liver
	Pathological diseases of the lung & pleura
	Pathological diseases of the upper respiratory tract
	Pathological diseases of the brain
	Pathological diseases of the spinal cord
	Pathological diseases of the gall bladder & biliary tract
	Pathological diseases of the cardiovascular system
	Pathological diseases of the endocrine system
	Pathological diseases of the pituitary gland & adrenals

	Pathological diseases of the lymphatic system
	Pathological diseases of the female reproductive system
	Pathological diseases of the breast

Pathology – practical syllabus	
	Details
	Slide examination of different normal cells
	Slide examination of abnormal cells
	Slide examination of genetic diseases
	Slide examination of acute inflammation
	Film about repair mechanism, discussion
	Slide examination about connective tissues , normal & abnormal
	Mechanism of body defense to infection
	Film about body response to infection
	Mechanism by which the organism overcome the body defense mechanism
	Slide examination of hemorrhage
	Slide examination of abnormal white blood cells
	Some examples of irradiation effect on the tissues
	Report discussion
	Slide examination about irradiation effect on the tissues
	Report discussion
	Report discussion with slide examination of carcinogenesis
	Report discussion
	Slide projector about bone types
	Report discussion
	Types of fractures & stages of healing
	Types of joints with report discussion
	Slide examination about renal failure
	Renal agenesis , renal hyperplasia, horseshoe kidney, congenital polycystic kidney
	Film about temperature regulation with report discussion
	Slide examination about respiratory failure
	Slide examination about hepatic failure
	Disturbances of endocrine function
	Disease of thyroid gland
	General revision

RADIATION PHYSICS (2)

DETAILED CURRICULUM

Week	Theoretical	practical
1-3	<p>PHYSICS OF ULTRASOUND</p> <p>Definition</p> <ul style="list-style-type: none"> •Physical Definition •Medical Definition <p>Properties of Ultrasound</p> <ul style="list-style-type: none"> •Type of Waves Depends on the Medium •Phase Velocity–Group Velocity <ol style="list-style-type: none"> 1. Phase velocity 2. Group Velocity 3. Wavelength and Speed of Propagation 	1. Determination of the velocity of sound (sonar principle)
4,5	<p>Diagnostic Ultrasound</p> <p>Piezoelectric Materials</p> <ul style="list-style-type: none"> •Historical •Piezoelectric Crystals or Materials <p>Piezoelectric Effect</p> <p>Reverse Piezoelectric Effect</p> <p>Detection of Ultrasound</p>	
6-8	<p>ULTRASOUND IMAGING SYSTEMS</p> <p>Ultrasound Transducers</p> <ul style="list-style-type: none"> •Ultrasonic Transducer Structures •Types of Ultrasound Transducers <ol style="list-style-type: none"> 1. Linear Transducer 2. Sector Transducer 3. Convex Transducer <p>Amplification</p> <p>Scan Generator</p> <p>Scan Converter</p> <p>Image Processor</p> <p>Display</p>	2. Stationary ultrasonic waves, determination of wavelength
9,10	<p>Things to Consider</p> <ul style="list-style-type: none"> •Thickness Range •Geometry 	

		<ul style="list-style-type: none"> •Accuracy Ultrasound Modalities <ul style="list-style-type: none"> •Ultrasound Pulse Generator •Short Pulse •Continuous Wave Mode 	
	11,12	Ultrasound Characteristics <ul style="list-style-type: none"> •Frequency •Velocity •Wavelength •Amplitude Intensity and Power <ul style="list-style-type: none"> •Temporal Characteristics •Spatial Characteristics •Temporal/Spatial Combinations Interactions of Ultrasound with Tissue <ul style="list-style-type: none"> •Attenuation •Refraction •Reflection •Scattering •Absorption 	3. Interference of two identical ultrasonic transmitters
	13-15	Acoustic Impedance Ultrasound Contrast Agents Spatial Resolution <ul style="list-style-type: none"> •Lateral resolution •Axial resolution Beam forming and transducers <ul style="list-style-type: none"> •Ultrasound Field Transducer Focusing <ul style="list-style-type: none"> •Dynamic Receive Focus •Ultrasonic Phased Arrays •Unfocused Transducers •Fixed Focus •Adjustable Transmit Focus Time Gain Compensation (TGC)	
	16-18	ULTRASOUND TECHNIQUES Modes Ultrasound <ul style="list-style-type: none"> •A-mode •B-Mode •M-mode or TM-mode •B-scan, Two-dimensional •Three- and four-dimensional techniques •B-flow Doppler Effect Basic principles The Doppler Equation Spectral Doppler	4. Absorption of ultrasonic in air
	19-20	Pulsed and Continuous Wave Doppler	5. Ultrasonic Doppler

	<ul style="list-style-type: none"> •Continuous Wave Doppler •The advantage of CW Doppler •The disadvantage of CW Doppler <p>High PRF Color Flow Mapping Pulsed Wave Doppler Nyquist Limit HPRF Doppler Angle of Incidence Aliasing</p>		
21-23	<p>CHAPTER ELEVEN: MAGNETIC RESONANCE IMAGING</p> <p>Historical introduction The Hardware Magnet Types <ul style="list-style-type: none"> •Permanent Magnets •Resistive Magnets •Superconducting Magnets RF Coils <ul style="list-style-type: none"> •Volume RF Coils •Surface Coils •Quadrature Coils •Phased Array Coils </p>	6. Basic principles in nuclear magnetic resonance (NMR)	
24,25	<p>Other Hardware Atomic Structure Magnetization Magnetic Moments Excitation Relaxation <ul style="list-style-type: none"> •T1 Relaxation •T1 Relaxation Curves •T2 Relaxation Phase and Phase Coherence <ul style="list-style-type: none"> •T2 Relaxation Curves •T2* Relaxation </p>	7. Magnetic moment in the magnetic field	
26	<p>Acquisition Computing and Display Gradient Coils</p>		
27,28	<p>Signal Coding <ul style="list-style-type: none"> •Slice Encoding Gradient •Phase Encoding Gradient •Frequency Encoding Gradient Gradient Specifications MRI Image Quality, Artifacts, and Imaging Parameters Signal to Noise and Contrast Resolution</p>	8. Magnetic resonance imaging (MRI)	

	<ul style="list-style-type: none"> •Pixel, Voxel, Matrix •Slice Thickness •Receiver Bandwidth •Inter-slice gap •Size of the (image) matrix 	
29,30	<p>Scan parameters (TR, TE, flip angle) Number of acquisitions Selection of the transmit and receive coil (RF coil) Field of View Number of Excitations MRI Contrast Agents K-Space Filling k-Space K-Space Symmetry</p>	

**"CURRICULUM OF RADIATION PROTECTION (2) FOR
"MEDICAL TECHNICIAN"**

DETAILED CURRICULUM		
Week	Theoretical	practical
1	<p>Review</p> <ul style="list-style-type: none"> - Structure of the Atom - Radiation Units - ALARA principles 	
2,3	<p>Diagnostic X-Ray Room Measurement of Area Radiation Levels Leakage Radiation In-room Scattered Radiation Measurement Protective Barrier/Shielding Assessment Area Radiation Level Checklist</p>	
4,5,6	<p>Medical Sources: Occupational and Patient Doses Ionizing radiation interactions with tissue Radiobiological effects at the cellular and whole body level genetic and somatic effects of ionizing radiation</p> <ul style="list-style-type: none"> • deterministic effects • stochastic effects • probability coefficients for tissues at risk • effective dose 	<p>1. Equipment used for radiodiagnosis and treatment.</p>

	Threshold and non-threshold effects.	
7	Radiation protection principles <ul style="list-style-type: none"> • Justification • Optimization • Limitation 	
8,9,10	Radiation protection principles applied to medical diagnostic procedures Radiation protection of patients who are or might be pregnant Practical measures for the reduction of patient dose Some dose-saving equipment Some dose-saving techniques High-risk examinations	2-Measurement of the half-life of thorium emanation
11,12 13	Risks from radiological examinations Explaining radiation risks to patients Personal protection and personal monitoring - how, why, when, where dose limits typical doses to staff and associated risks protection of staff and members of the public protection of patients	2. Ultrasonic Doppler effect
14	physical factors affecting radio-sensitivity <ol style="list-style-type: none"> 1. Linear energy transfer 2. Relative biologic effectiveness 3. Fractionation and protraction 	
15,16	Biologic factors affecting Radio sensitivity <ol style="list-style-type: none"> 1. Oxygen effect 2. Age effect 3. Sex effect 4. Recovery 5. Chemical agents 	3-Estimation of maximum energy of a β -ray stream.
17,18	Early effects of Radiation Acute radiation syndrome <ul style="list-style-type: none"> • Hematologic syndrome • Gastrointestinal syndrome • Central nervous system syndrome Local tissue damage <ul style="list-style-type: none"> • Skin • Gonads • Extremities Hematologic depression Cytogenetic damage	4-Linear and mass absorption coefficients for γ -ray.

19,20	<p>Late effects of radiation</p> <ul style="list-style-type: none"> • Leukemia • Other malignant disease <p>Effect of fetal irradiation</p> <ul style="list-style-type: none"> • Prenatal death • Neonatal death • Congenital malformation • Childhood malignancy <p>Fetuses irradiated in utero</p>	
21,22 23	<p>Radiation dose-response relationships</p> <p>Linear dose-response relationships</p> <p>Non- Linear dose-response relationships</p> <p>Constructing a dose-response relationships</p> <p>Linear, quadratic dose-response relationships</p> <p>Radiolysis of water</p> <p>Direct and indirect</p>	
24,25	<p>Maximum permissible dose</p> <p>whole body non-occupational exposure</p> <p>Partial-body occupational exposure</p> <p>X-ray and pregnancy</p> <ol style="list-style-type: none"> 1. The pregnant technologist 2. Management principles 3. The pregnant patient 	
26	<p>Designing for radiation protection</p> <p>Design of X-ray apparatus</p> <p>Design of protective barrier thickness</p>	
27	<p>Factors affecting barrier thickness</p> <p>Occupational Exposure</p>	
28,29 30	<p>Patient dose</p> <p>Patient dose in special examinations</p> <p>Reduction of occupational exposure</p> <p>Reduction of unnecessary patient dose</p> <p>Unnecessary examinations</p>	