

Course No: DENT 3210
Course Title: Radiology 1
Date: 12/01/2015
No. of Questions: (2)
Time: 2 hours
Using Calculator (No)

University of Palestine



Final Exam
1st Semester 2014/2015
Total Grade: 60

Instructor Name: Dr.Kamal Jaber
Student No.: _____
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College Name: _____
Dep. / Specialist: _____
Using Dictionary (No)

Question One: Choose one best answer from five:

1) Concerning modalities available in radiology, all the following are true expect one:

- a) Plain film X-Ray.
- b) Fluoroscopy.
- c) C.T.
- d) Endoscopy.
- e) MRI.

2) Concerning X-Ray, one of the following is false:

- a) Discovered in 1865.
- b) Most widely performed imaging exam.
- c) X Rays are emitted and detected in cassette.
- d) Cassette can generate either a film or a digital image.
- e) Films are kept 'on file' or in a digital archive.

3) Concerning Fluoroscopy, all the following are true except:

- a) Utilizes X-Rays.
- b) Real-time imaging.
- c) Require sedation.
- d) Utilizes image intensifier.
- e) Use contrast agents.

4) Concerning single and double contrast, all the following are true except:

- a) Single contrast generally uses just thin Barium
- b) Distends lumen with high density material in single contrast.
- c) Single contrast is easier for patient but less mucosal detail.
- d) Double contrast, use thick barium coats lumen.
- e) Single contrast produces good mucosal detail

5) Concerning gastrografin study, one of the following is false:

- a) Poor mucosal coating..
- b)Not cause chemical pneumonitis if aspirated.
- c) Therapeutic enema in constipation
- d) Water soluble material.
- e) Basically used to R/O obstruction.

6) Concerning upper gastro-intestinal (GI) exams, all the following are correct expect one:

- a) Evaluates esophagus, stomach and duodenum
- b) Double or Single Contrast
- c) Gastrographin is preferable
- d) Can be combined with small bowel series
- e) Largely replaced by endoscopy and cross-sectional imaging.

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7) Concerning computed tomography C.T, one of the following is false:

- a) Cross Sectional imaging modality
- b) Mobile X-ray tube that rotates around a patient
- c) Slices of X-ray transmission data reconstructed to generate image
- d) Data displayed in multiple window settings.
- e) Density measurements/Hounsfield Units analyze chemical component of tissue. HU: -1000 -0 = calcium, 0 = water, 0-20 = serous fluid and 0-100 = fat.

8) Concerning C.T applications (indications), one of the following is false:

- a) Acute head trauma, acute intracranial hemorrhage
- b) Low sensitivity for early ischemic stroke,
- c) Pulmonary nodules.
- d) Lower limbs joints, looking for injury of ligaments.
- e) Soft tissue of neck.

9)Concerning magnetic resonance imaging MRI, one of the following is false:

- a) Multi-planar scanning
- b) Field strength of magnets 0.3-7.0 Tesla
- c) Without ionizing radiation
- d) Images generated using powerful magnets and pulsed radio wave passing through the body
- e) Data from patient's body used to generate image

10) Concerning MRI applications, all the following are true except:

- a) Excellent tool due to high soft tissue contrast resolution
- b) Abundant water content of CNS allows for imaging soft intracranial tissue.
- c) Lungs lesions.
- d) Differentiating subtle soft tissue lesions of head and neck.
- e) Potentials for cardiac MRI with coronary MR angiography.

11) Concerning excitation and ionization, one of the following is false:

- a) In the excitation, a fraction of the energy of the radiation is transferred to the electrons of the absorbing material.
- b) IN excitation, the K-shell electron is raised to L-shell as the positive charge passes the atom
- c) In the excitation, electrons respond to radiation by jumping to another orbital level farther away from the nucleus
- d) In the ionization, the amount of energy of radiation is greater than the binding energy of the electron.
- e) Ionization occurs when the radiation has low energy to eject the electron completely from the atom.

12) Concerning X-ray tube component, what is the false answer?

- a) Housing molybdenum cup.
- b) Cooper filaments.
- c) Target.
- d) Lead glass housing.
- e) Unleaded glass window.

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13) Concerning cathode structure, all the following are true expect:

- a) Modern tube have a long filament with higher current/lower resolution.
- b) Another short filament with lower current/higher resolution.
- c) Focalization of electrons is not needed.
- d) Large area of target is used.
- e) Filaments are composed of tungsten.

14) Regarding radiation emitted by X-Ray tube, choose the correct answer:

- a) Primary radiation, is the radiation after interaction of photons.
- b) Scattered radiation is a radiation happen after at least one interaction.
- c) Leakage radiation is the absorbed by the X-ray tube housing shielding.
- d) Transmitted radiation is emerging in contact with matter.
- e) All of above.

15) Effect of scattered radiation and it's protection, what is the correct answer?

- a) Increasing of blurring of image.
- b) Loss of contrast.
- c) Increasing of superficial and deep dose of patient.
- d) Protected by using grid.
- e) All of above.

16) Concerning anti-scattered grid, all the following are true except:

- a) Grid between tube and patient eliminates most scattered radiation.
- b) Stationary grid.
- c) Moving grid give better performance.
- d) Focus grid.
- e) Potter-Bucky system

17) Regarding object contrast, choose the correct answer:

- a) Density (air, bone)
- b) Atomic number
- c) kVp
- d) The higher the energy, the higher the penetrating power of X-rays.
- e) All of above.

18) Concerning dental radiography, choose the false answer:

- a) Dental X-ray in indicated to find hidden dental structures, malignant or benign masses and cavities.
- b) A radiographic image is formed by a controlled burst of X-ray, which penetrates oral structures at different levels, before striking the film or sensor.
- c) The dosage of X-ray radiation received by a dental patient is typically small (around 0.150 mSv for a full mouth series, according to the American Dental Association website).
- d) Dental restorations (fillings, crowns) may appear always darker.
- e) Once photographic films has been exposed to X-ray radiation, it needs to be developed.

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19) Concerning intra-oral radiological views, choose the correct answer:

- a) The objective of periapical view is to capture the tip of the root on the film.
- b) The periapical view is taken of both anterior and posterior teeth
- c) The periapical view is helpful in determining the cause of pain in a specific tooth, because it allows a dentist to visualize the tooth as well as the surrounding bone in their entirety.
- d) The bitewing view is taken to visualize the crowns of the posterior teeth and the height of the alveolar bone in relation to the cemento-enamel junction .
- e) All of above.

20) Concerning extra-oral radiographic views, all the following are correct expect:

- a) Placing the radiographic film or sensor outside the mouth.
- b) Placed on the opposite side of the head from the X-ray source.
- c) Lateral radiograph provides a face-forward view.
- d) A lateral cephalogram is used to evaluate dentofacial proportions.
- e) A lateral cephalogram is used to clarify the anatomic basis for a malocclusion.

21) Concerning views of face, one of the following is false:

- a) Lateral view of face demonstrates sphenoidal and maxillary sinuses and ethmoidal air cells.
- b) High anterior view demonstrates well frontal sinuses.
- c) Lateral view of nasal bone is indicated to rule out their fracture.
- d) Walter's view demonstrate well ethmoidal air cells.
- e) Transmaxillary oblique rays are used to rule out dislocation of temporo-mandibular joints.

22) Concerning cone beam computed tomography (CBCT), one of the following is false:

- a) Is a medical imaging technique consisting of X-ray computed tomography where the X-rays are divergent, forming a cone.
- b) During dental imaging, the CBCT scanner rotates around the patient's head, obtaining up to nearly 600 distinct images.
- c) CBCT has become increasingly important in treatment planning and diagnosis in implanted dentistry.
- d) A single 360 degree rotation over the region of interest acquires a volumetric data set.
- e) It's clinical applications include dental implant planning, visualization of abnormal teeth, cleft palate assessment and diagnosis of dental caries.

23) Concerning risks and benefit of CBCT, one of the following is false:

- a) Total radiation doses from dental CBCT exams are generally equivalent other C.T exams.
- b) Dental CBCT exams deliver more radiation than other conventional dental X-ray.
- c) Properly shielded CBCT scan expose patient to many times the radiation of digital dental x-rays.
- d) There commended standard of care is to use the smallest possible FOV.
- e) X-ray imaging, including dental CBCT, provides a fast, non-invasive way of answering a number of clinical questions.

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24) Regarding the methods of imaging of oral cavity and maxilla-facial region, all the following are correct expect:

- a) C.T.Scan permits the visualization of anterior facial bones, the roof and floor of maxillary and frontal sinuses.
- b) For detecting maxillary lesion, Walter's view is demanded.
- c) C.T is better for exploration of sphenoidal sinuses than X-Ray.
- d) Sialography of sub mandibualr gland is done by injection of Water soluble contrast (telebrix) inside the opening of it's duct.
- e) MRI demonstrates chronic sinusitis less than C.T.Scan.

25) Concerning principals of radiation protection, all the following are correct expect:

- a) Radiation protection in diagnostic radiology is concerned with the physical, technical and procedural factors.
- b) Radiation protection is involved in protecting both patient and personal from unnecessary radiation exposure.
- c) Radiation protection requires an understanding of the biological effects of radiation because recommendation for the safe of radiation are based on the risks of radiation exposure.
- d) Patient receives radiation from diagnostic examination similar to any other source of radiation.
- e) Radiation is harmful not only for exposed individuals but to their descending.

26) Concerning radiation protection, choose the correct answer:

- a) No dose of radiation is safe.
- b) Somme radiation procedures deliver high dose of radiation.
- c) Radiological technologist is responsible for the technical aspects of examination.
- d) Sources of radiation protection is based on Early radiation workers who were exposed to high doses, such as physicists and radiologist
- e) All of them.

27) Concerning essential physics for radiation protection, all the following are true expect:

- a) How radiation is absorbed in tissue?
- b) Topics addressed from atomic structures.
- c) The nucleus is the only interested part of the atom, in measures of radiation protection and radiobiology.
- d) Interaction of radiation with matter.
- e) Biological effectiveness of radiation.

28) Concerning atomic nucleus, one of the following is false:

- a) Forms the focal point around which the rest of the atom is gathered.
- b) Positively charged and consists of two particles, protons and neutrons.
- c) The nuclear particles are known as nucleons.
- d) Protons and neutrons are similar electrically charged.
- e) When the number of protons equals the number of orbital electrons, the atom is said to be electrically neutral.

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29) Concerning electrons of atom, all the following are correct expect:

- a) Electrons are the negatively charged particles that orbit the central nucleus.
- b) Depending on the atom, electrons orbit the nucleus at fixed distances in different orbital levels.
- c) The number of electrons contained in each shell is given by the expression $2n^2$.
- d) The levels or shells are represented by letters K, L, M, N, O, P...
- e) These shells are also assigned corresponding QUANTUM NUMBERS (1, 2, 3, 4, 5.....) with the K shell being assigned the quantum number of 1.

30) Concerning electromagnetic radiation, One of the following is false:

- a) Consists of both an electric and a magnetic field, which propagate through space at the right angles to each other.
- b) These fields are capable of energy transfer from point to point and have physical properties that are similar to those of visible light.
- c) Includes cosmic rays.
- d) Includes also gamma rays, X rays, ultraviolet radiation, visible light and infrared
- e) X-rays and gamma rays show similarly penetrating as ultraviolet light.

31) Concerning physical facts of radiation, choose the false answer:

- a) Radiation is an energy from electromagnetic waves.
- b) Cosmic ray in high-altitude flights: 0.001–0.01mSv/year.
- c) Their wavelength is 15–0.01 nanometer (nm)
- d) Their frequency is 2.5×10^{17} – 6×10^{19} Hz
- e) Their energy is 1 eV–250 keV.

32) Concerning cells component, all the following are correct expect:

- a) Mammalian cells consist of a nucleus and cytoplasm.
- b) The nucleus contain most of the cell's genetic material.
- c) The cytoplasm contains many structures of the cells which are essential to metabolism and protein synthesis.
- d) There are approximately 50.000 genes in a human cell.
- e) The ribosomes are particular interest through the many structures with the cytoplasm, in term of radiation protection application.

33) Choose the correct answer concerning the nucleus of the atom:

- a) The chromosome itself is composed of organic long-chain molecule.
- b) Human cells contain 23 matched pairs of chromosomes.
- c) The DNA molecule is a double stranded in a manner similar to a rope ladder with cross connections.
- d) The DNA is analogous to a rubber band to propeller of a model airplane.
- e) All of above.

34) Concerning direct and indirect-Hit theory, choose the correct answer:

- a) If two direct hits occur in the same rung of the DNA rope ladder, the molecule itself is broken in half.

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- b) If the abnormality cleaved chromosome divides, each new daughter cell will receive a incorrect amount of genetic material.
- c) A free radical is a chemical molecule is a resulting from water ionization.
- d) Free radicals are non oxidizing agents
- e) In the direct-hit theory, the initial interaction must occur at or near a DNA strand.

35) Concerning mechanisms of repair of cells from radiation, one of the following is false:

- a) The existence of repair mechanism for mammals in is obvious in that they do recover from symptoms of acute radiation exposure.
- b) Ever injury is rapidly repaired at first, but there is an accumulated irreparable component.
- c) Approximately 90% of injuries caused by ionizing radiation is repaired.
- d) Only 20% residue of accumulated irreparable damage.
- e) The effect of oxidization may become manifest almost immediately if enough DNA is destroyed.

36) Concerning biological effects of ionizing radiation,all the following are true expect:

- a) Somatic effects are determined by dose, that appear in the individual exposed to radiation.
- b) Early somatic effect is radiation sickness from 500–1000 mSv.
- c) 45% of papillary carcinomas are radiation induced.
- d) Carcinogenic dose of radiation to induce thyroid carcinoma equal to 100 mSv.
- e) Radiation induced injuries from fluoroscopy are generally not immediately apparent.


37) Concerning dose limits, choose the false answer:

- a) In 1900s, the dose limiting, labeled the *skin erythema* dose by Mutscheller and Sievert,
- b) It was defined as a dose of x-ray strong enough to produce a reddening of the skin 10 to 14 days following the exposure.
- c) At 1900s, the dose limit for occupational exposed individuals was 6000mSv (600 rem) per year.
- d) In 1977, the ICRP recommended a new term to replace the MPD. This was the dose equivalent limit.
- e) In 1991, the ICRP reduced the dose limits for occupationally exposed individuals from 50 to 20 mSv (5 to 2 rem).

38) Concerning the ways of protection of individuals from excessive radiation exposure, choose the correct answer:

- a) Time.
- b) Distance.
- c) Shielding.
- d) Half value layer is an important concept for protection, must be understood by technician radiologist.
- e) All of above.

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Question Two: Short Notes Questions:

(22 points)

1. What are the categories of exposed individuals (category and it's signification) ?(4 points)
2. Describe briefly the X-Ray tube filtration? (3 points)
3. What are the units of measurement of radiation (name of unit and it's signification).
(3 points)
4. What is the direct-Hit theory? (Brief description). (4 points)
5. Enumerate the mechanism of mammalian death from acute irradiation and give brief idea of their dose and duration. (4 points)
6. Enumerate biological effects of ionizing radiation and give brief definition of them.
(4 points)

End of Questions
Good Luck