Reading exercise - Recap Assessment 1

Modern Diagnostic Imaging Technique Applications and Risk Factors in the Medical Field: A Review

Abstract

Medical imaging is the process of visual representation of different tissues and organs of the human body to monitor the normal and abnormal anatomy and physiology of the body. There are many medical imaging techniques used for this purpose such as X-ray, computed tomography (CT), positron emission tomography (PET), magnetic resonance imaging (MRI), single-photon emission computed tomography (SPECT), digital mammography, and diagnostic sonography. These advanced medical imaging techniques have many applications in the diagnosis of myocardial diseases, cancer of different tissues, neurological disorders, congenital heart disease, abdominal illnesses, complex bone fractures, and other serious medical conditions. There are benefits as well as some risks to every imaging technique. There are some steps for minimizing the radiation exposure risks from imaging techniques. Advance medical imaging modalities such as PET/CT hybrid, three-dimensional ultrasound computed tomography (3D USCT), and simultaneous PET/MRI give high resolution, better reliability, and safety to diagnose, treat, and manage complex patient abnormalities. These techniques ensure the production of new accurate imaging tools with improving resolution, sensitivity, and specificity. In the future, with mounting innovations and advancements in technology systems, the medical diagnostic field will become a field of regular measurement of various complex diseases and will provide healthcare solutions.

1. Introduction

Medical imaging is the process of visual representation of the structure and function of different tissues and organs of the human body for clinical purposes and medical science for detailed study of normal and abnormal anatomy and physiology of the body. Medical imaging techniques are used to show internal structures under the skin and bones, as well as to diagnose abnormalities and treat diseases. Medical imaging has changed into healthcare science. It is an important part of biological imaging and includes radiology which uses the imaging technologies like X-ray radiography, X-ray computed tomography (CT), endoscopy, magnetic resonance imaging (MRI), magnetic resonance spectroscopy (MRS), positron emission tomography (PET), thermography, medical photography, electrical source imaging (ESI), digital mammography, tactile imaging, magnetic source imaging (MSI),

medical optical imaging, single-photon emission computed tomography (SPECT), and ultrasonic and electrical impedance tomography (EIT).

Imaging technologies play a vital role in the diagnosis of abnormalities and therapy, the refined process of visual representation which contributes to medical personnel access to awareness about their patient's situation. Electroencephalography (EEG), magnetoencephalography (MEG), and electrocardiography (ECG) are recording and measurement techniques that are not responsible to produce images, but these represent the data as a parameter graph vs. time or maps which shows the susceptible information with less accuracy. Therefore, these technologies can be said to form medical imaging on a limited scale. Worldwide, up until 2010, approximately 5 billion medical imaging techniques studies have been shown.

In the United States, approximately 50% of total ionizing radiation exposure is composed of radiation exposure from medical imaging. Medical imaging technologies are used to measure illnesses, manage, treat, and prevent. Nowadays, imaging techniques have become a necessary tool to diagnose almost all major types of medical abnormalities and illnesses, such as trauma disease, many types of cancer diseases, cardiovascular diseases, neurological disorders, and many other medical conditions. Medical imaging techniques are used by highly trained technicians like medical specialists, from oncologists to internists.

Medical imaging technologies are mostly used for medical diagnoses. Medical diagnosis is the process of identification of patient disease and its symptoms. The medical diagnosis gives the information about the disease or condition needed for treatment that is collected from patient history and physical checkups or surveys. Due to no specificity of the many signs and symptoms of a disorder, its diagnosis becomes a challenging phase in medical science. For example, the case of erythema (redness of the skin) gives a sign of many diseases. Thus, there is a need for different diagnostic procedures the determination the causes of different diseases and their cure or prevention.

Reading Comprehension Questions

A. Multiple choice (6 questions)

1. What is medical imaging mainly used for?

2. Which of the following imaging techniques is mentioned in the text?

3. Advanced medical imaging techniques help professionals to:

4. According to the text, medical imaging techniques have:

5. In the United States, medical imaging is responsible for:

6. Who mainly uses medical imaging technologies?

B. True or False (2 questions)

7. EEG, MEG and ECG produce detailed medical images of the human body.

8. Medical imaging is only used for diagnosing diseases.

C. Short answer (2 questions)

9. Name **two diseases or medical conditions** that can be diagnosed using medical imaging.

10. Why can medical diagnosis be difficult according to the text?