ISSN NO: 2770-2936
Date of Publication:07-06-2023

Description of the Field of Radiology in Medical Imaging

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Abstract. In medicine, the role of medical images in the field of radiology is very important. Accuracy of medical images and high quality of images are very important to the attending physician in making an accurate diagnosis of the patient. Processing, storage, transformation of medical images, conversion from analog to digital form.

Keywords: Medical images, analog form, digital forms, pixels, their main advantages when switching to a matrix form system.

Introduction

Medical imaging is the creation of visual images of the internal structures of the body for clinical analysis and medical intervention, as well as some. Medical imaging allows you to visualize the internal structures hidden by skin and bones, the method and process of visual representation of the functions of organs or tissues, as well as to diagnose diseases.

Main Part

Methods of obtaining medical images consist of radiation diagnostic methods - X-ray, magnetic resonance, radionuclide and ultrasound. Medical images can be divided into two groups: digital and analog. Analog images are images that contain continuous data. Like all analog images, medical images have their drawbacks. Analogue medical images are more blurred and sharper than digital ones. This is due to the fact that doctors have a high level of error in diagnosis. Analog images include images that contain information of a continuous nature. These images are presented to the doctor to diagnose diseases. All analog images, including medical images, have flaws. In particular, it is difficult to store them, process them according to diagnostics, and transfer them from computer to computer. In analog form, the images have a lot of unnecessary signals, as well as noise that degrades their quality. All these disadvantages are not found in digital images. They are based on a cellular structure (matrix) derived from signals from diagnostic devices and containing information (in digital form) about body parts [1].

Medical imaging is the creation of visual images of the internal structures of the body for clinical analysis and medical intervention, as well as some. Medical imaging allows you to see the method and process of visual representation of the functions of organs or tissues of the internal structures hidden by the skin and bones, as well as to diagnose diseases. The medical imaging industry has a number of technological devices that provide doctors with various images in their diagnostic processes.

We will briefly describe the above image processing devices.

Radiography - Medical practice divides two forms of radiography - radiography and fluoroscopy. This 2D technique is still widely used today due to its low cost, high accuracy and low radiation doses, leading to the development of 3D tomography. This imaging technique uses a wide range of X-rays to create an image and is considered the first imaging technique used in modern medicine [2].

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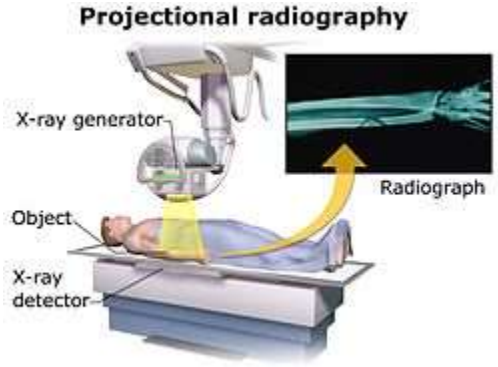

Pic.1 Projectional radiography

Magnetic Resonance Imaging - Magnetic resonance imaging uses powerful magnets to target the hydrogen nuclei (ie, protons) of water molecules in human tissue, producing a spatially encoded, detectable signal, resulting in images of the body. The MRI machine emits a radio frequency (RF) pulse at the resonance frequency of hydrogen atoms in water molecules. Radio frequency antennas send pulses to target areas of the body.

Ultrasound - Ultrasound uses high-frequency sound waves that bounce off tissue in different directions to create an image. It is usually used to image the fetus in pregnant women, but ultrasound is much more widely used. Other important applications include imaging of the abdomen, heart, chest, muscles, tendons, arteries, and veins [3].

Elastography is a relatively new imaging technique that shows the elastic properties of soft tissues. This method has been around for twenty years. Elastography is useful in medical diagnostics because elasticity can distinguish between healthy and unhealthy tissue for specific organs. For example, cancer is often larger than the surrounding tissue, and a diseased liver is larger than a healthy one. There are several medical techniques based on the use of ultrasound, magnetic resonance imaging and tactile tomography. We can expect to see widespread clinical use of ultrasound elastography as a new technology and implementation in clinical ultrasound machines. In recent decades, the continuous growth of elastography activity has shown the successful application of the technology in various fields of medical diagnosis and treatment monitoring.

Tactile imaging is a digital medical imaging technique. The tactile image is a function of R (x,y,z), where R is the pressure on the soft tissues of the surface when the deformation is applied. The tactile image is similar to hand palpation, because the device with a set of pressure sensors installed on it works like human fingers that slightly deform soft tissues. This procedure is used to visualize the reproductive structures and muscle trigger points of the prostate, breasts, vagina, and pelvis [4].

Thermography - It is mainly used to image the mammary glands. There are three approaches: telethermography, contact thermography and dynamic angiothermography. These digital thermographic infrared imaging techniques are based on the principle that metabolic activity and turnover are almost always elevated in precancerous tissue and in the area around breast cancer compared to normal breast tissue. Malignant tumors increasingly require copper nutrients and therefore increase the supply of minerals to the cells of the existing vascular wall, as well as open "dormant" vessels and create new ones (neoangiogenesis theory).

Echocardiography - When ultrasound is used to image the heart, the procedure is called echocardiography. Echocardiography allows you to see detailed structures of the heart, including the size of the chambers, how the heart works, its valves, and the pericardium (the sac around the heart). Echocardiography uses 2D, 3D, and Doppler imaging to create images of the heart and visualize the flow through each of the four heart valves. Echocardiography is widely used in a variety of patient populations, from patients experiencing symptoms such as dyspnea or chest pain to those undergoing cancer treatment.

Conclusion

In this article, we will discuss the importance of medical images in medicine, as well as the fact that they can be used as an aid to doctors in making accurate diagnoses for patients. In addition, we can see that all over the world, due to the mistakes of doctors, patients become disabled or die. The accuracy of the

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images and the high quality of the images in the diagnosis make the attending physician not to make mistakes. In order to solve this problem, all medical devices should be in modern condition, all medical specialists should have high qualifications, and there should be no errors in diagnosing patients.

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