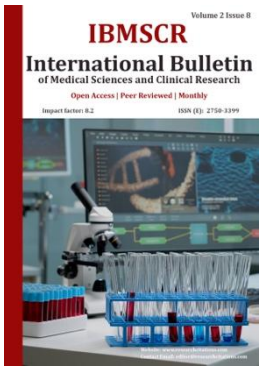

PHYSICAL PROPERTIES OF X-RAYS AND THEIR APPLICATION IN FLUOROGRAPHY

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Annotation

This article discusses the history of the creation of fluorography, its physical foundations, operating principles, and importance in medicine. The properties of X-rays, the structure of the fluorography apparatus, the procedure for conducting the examination, the advantages of traditional and digital fluorography, and radiation doses are analyzed. The role of fluorography in the early detection of tuberculosis and other respiratory diseases, and the need to comply with radiation safety rules during diagnostic examinations are also described.

Annotation

V state review of the history of the creation of fluorography, its basic physics, principle of operation and significance in modern medicine. Proanalizirovany svoystva rengentovskogo izlucheniya, ustroystvo fluorograficheskogo apparata, osobennosti provedeniya obsledovaniya, preimushchestva tsifrovoy fluorografii i urovni luchevoy nagruzki. Special attention is paid to the role of fluorography in the early diagnosis of tuberculosis and other diseases of respiratory organs, as well as the observation of radiation safety rules.

Annotation

This article discusses the history, physical principles, operating mechanism, and medical significance of fluorography. The properties of X-rays, the structure of fluorography equipment, examination procedures, advantages of digital fluorography, and radiation dose levels are analyzed. Special attention is given to the importance of fluorography in the early diagnosis of tuberculosis and other respiratory diseases, as well as the necessity of observing radiation safety standards.

Keywords : fluorography, X-rays, diagnostics, lung diseases, tuberculosis, digital fluorography, radiation dose, radiation safety, medical imaging, X-ray machine.

Keywords : Fluorography, x-ray, diagnosis, lung disease, tuberculosis, digital fluorography, radiation load, radiation safety, medical visualization, x-ray apparatus.

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One of the greatest discoveries in the history of mankind was the discovery of X-rays. When WILHELM CONRAD RONTGEN discovered unknown rays in 1895, he could not have imagined that this technology would save the lives of millions of people in the future. It was on the basis of this discovery that the method of fluorography was created. Fluorography is a method of imaging the internal state of the human lungs and chest using X-rays. Fluorography plays a particularly important role in diagnosing tuberculosis, pneumonia, bronchitis and other respiratory diseases. The chest organs are imaged on fluorograms measuring 70x70 or 90x90. The method of fluorography is determined based on the high energy of X-rays, their wavelength and basic biological properties. In particular, the wavelength of X-rays is approximately 80 nm

to 10^-5 nm. Its main properties are penetration, absorption, scattering, illumination of certain substances, i.e. luminescence, photochemical, biological substances and the formation of ions. X-rays are electromagnetic rays whose effects cannot be seen by the naked eye. These rays act in the same way as odorless, colorless light radiation and have the same effect as gamma rays, which themselves are part of quantum rays. The naked eye cannot see the internal organs of the human body, but X-rays pass through body tissues and allow you to detect hidden diseases. Therefore, fluorography is one of the most important diagnostic methods in medicine. These rays are absorbed to varying degrees by different tissues as they pass through the human body. For example , bones absorb X-rays strongly, while soft tissues absorb them less. Since there is a lot of air in the lungs, X-rays pass through them easily , resulting in a clear image. The fluorography method is determined by a fluorography apparatus and consists of several main parts. It includes an X-ray tube, an anode, a cathode, a device that accelerates electrons, and an image-receiving screen or digital detector. When the apparatus is working, electrons are emitted from the cathode and hit the anode at high speed. As a result, X-rays are formed. These rays pass through the person's chest and images are displayed on a special film screen. A fluorography examination is very simple and quick. The patient stands in front of the apparatus, places his chest towards a special screen and holds his breath for a few seconds. During this time, the X-rays pass through the body, and an image of the lungs is obtained. The examination is painless and usually takes a few minutes.

Currently, there are two types of fluorography:

- Traditional (film) fluorography
- Digital fluorography

Traditional (film) fluorography is a method of recording an image of the lungs using X-rays on a special photographic film, which has long been used as one of the main tools in medical diagnostics. Since the image obtained in this method is produced by chemical processing, it takes a certain amount of time to prepare the result. Although the technology of film fluorography is simple and reliable, it has a relatively high radiation dose and limited image storage and processing capabilities.

Digital fluorography is a modern diagnostic method in which the image obtained using X-rays is transmitted directly to a computer through a special electronic detector. This method allows you to obtain high-quality and clear images and provides the convenience of quick viewing, saving and sending the result via the Internet. The most important advantage of digital fluorography is that the radiation dose to the human body is significantly lower than in the traditional film method.

Digital fluorography is considered a modern method and is distinguished by its high image quality. Therefore, digital fluorography is used in many hospitals. Fluorography is also widespread in Uzbekistan and is used in regional and district clinics, tuberculosis dispensaries, central hospitals, and private diagnostic centers. This method is especially important for the early detection of tuberculosis. When performing diagnostic examinations with this method, it is necessary to comply with safety rules and use protective equipment correctly.

IMPROPER use of this method can lead to some negative consequences. Because X-rays are ionizing radiation that lies between ultraviolet and gamma rays. Excessive radiation can damage cells, damage DNA and cause various biological changes in the body. These changes are called MUTATIONS . MUTATION is a change in the genetic information in a cell , which disrupts

the normal functioning of the cell. If an organism receives a lot of repeated and short-wave rays from X-rays , some cells may begin to divide incorrectly. This increases the risk of developing various diseases over time , including tumors or incurable diseases such as cancer. Therefore, fluorography is used only in cases of necessity and with full compliance with safety rules. In this method, a very small amount of X-rays is injected into the human body. The amount of radiation depends on the type of device:

- The amount of X-rays emitted by a conventional (film) x-ray machine is approximately 0.3-0.8 mSv (millisievert).
- The amount of X-ray radiation in a digital fluorograph is approximately 0.02-0.06 mSv.

The digital method is considered much safer, since the radiation dose is several times lower. Fluorography cabinets are portable and stationary.

MOBILE fluorography cabinet is a mobile X-ray room mounted on a special bus or truck. It serves to examine the population on-site. For example, it is used to conduct mass medical examinations in remote villages, factories, construction sites or schools. The mobile cabinet will have a digital X-ray machine, power supply, computer and protective equipment. It is possible to examine hundreds of people in a day.

INSTITUTIONAL fluorography office is a special x-ray room permanently installed in a hospital or polyclinic. Patients are examined in it on a turn-by-turn basis. These offices are equipped with thick protective walls, a modern x-ray machine, a control panel and a computer system . For example, in regional hospitals, tuberculosis dispensaries and private diagnostic centers, stationary offices operate continuously. Due to the high image quality, there is a greater chance of accurately diagnosing diseases.

on average 2-3 mSv per year . This means that a single digital fluorograph gives a very small dose compared to the natural background radiation.

During fluorography, X-rays affect cells and molecules in the human body. Since X-rays are ionizing radiation, they break down water molecules inside cells. As a result, FREE RADICALS begin to form. Free radicals are very active particles that can affect cell membranes, proteins and DNA. If the radiation dose is high, biological changes and damage occur in the cells. Therefore, the amount of radiation in fluorography is strictly controlled.

Conclusion: X-rays allow us to see the internal parts of the human body, such as bones, mammary glands, and chest organs, which cannot be seen with the naked eye, without any complicated surgeries. They are also important in preventing millions of people from contracting life-threatening diseases. However, since these rays have ionizing properties, they can affect atoms and molecules inside cells and destroy the structure of DNA, that is, the genetic structure. Their large doses and long-term exposure break down water molecules inside cells and form free radicals. These active particles can damage cell membranes and genetic material. Therefore, it is very important to provide protective equipment and radiation control when working with X-rays. Strict adherence to radiation safety rules during diagnostic examinations is an important factor in maintaining the health of patients and medical personnel. In the future, the widespread introduction of modern digital technologies will further increase the diagnostic efficiency of fluorography..

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