TELEVISION SYSTEMS FOR MEDICAL PURPOSE

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Annotation. *Computer technologies have penetrated almost all spheres of modern society: education, politics, economics and much more. Medicine was no exception. In the context of the dynamic development of modern society, the growth of requirements for the quality of services provided, the formation of an information system of society and the ever-increasing importance of the spheres of healthcare and education, information is becoming one of the most important resources.*

Key words: *medical television, remoteness, diagnostics, indicators, device, laser, analysis.*

Television in medicine is a method of scientific research, diagnostics, training and carrying out sanitary educational work, associated with the transmission over a distance of images of stationary and moving objects using radio-electronic devices. The use of Television in medicine helps to increase the productivity of doctors and laboratory assistants, creates the opportunity for them to work outside the zone of harmful influence, provides remote monitoring of patients, communicates with them without direct contact, improves the educational process, influences the creation of automated management systems for treatment and preventive work, expands scientific research opportunities, etc.

In medicine, as a rule, special narrow-purpose television equipment is used, made in the form of closed (without broadcasting) systems. The simplest television system consists of a transmitting television camera, a communication line for transmitting an electrical video signal over a distance, and a video control device for surveillance (TV). In a television camera, there is a sequential line-by-line conversion of the image projected using a lens onto the transmitting television tube into a video signal. In a video control device, an image is formed on the screen from the video signal transmitted over the communication line. More complex television systems are complemented by image processing devices for the purpose of reproducing it in a form convenient for interpretation and highlighting the most diagnostically significant details, as well as automatic devices for quantitative and qualitative analysis of the video signal based on information characteristics.

Systems operating in the visible region of the spectrum include television equipment for demonstrating surgical operations, including those performed under a microscope, which is especially important for training. In this case, color transmitting cameras are used, structurally combined with the lamp. Stereo television installations are used to perform operations under a microscope. Television systems in combination with flexible fiber light guides increase the information content of studies of internal hollow organs, increasing the color image by 10-40 times. The use of television improves the ability to examine the internal parts of the eye, while simultaneously providing objective measurements of the parameters of the retinal vessels and ocular media.

Video phones have become widespread in clinics, making it possible to talk with patients without direct contact with them. The use of television in medicine and biology in the analysis of microparticles is effective. Television microscopes, coupled with special analyzers, provide a quick quantitative count of microparticles in a given volume of the drug, and also analyze their shape. Television systems used in space and aviation medicine also operate in the visible region of the spectrum. They provide a visual study of the life activity of astronauts and pilots located in extreme conditions at large distances from the observation and control center. With the help of television, physical training of cosmonauts and pilots is monitored on special equipment (thermobaric chambers, centrifuges, etc.), as well as in soundproof chambers. In addition, modeling of possible options for video information appearing in flight is used for the purpose of training and training.

Systems operating in the radiation spectrum invisible to the eye include honey. X-ray television.

Visualization of infrared (thermal) radiation from the surfaces of the human body using a thermal imager ensures the identification of various inflammatory processes and their localization, the boundaries of burns, malignant formations, etc. Infrared television systems allow one to obtain valuable diagnostic information.

Television methods for visualizing ultrasonic echo signals (see Ultrasound diagnostics), the use of which in medical practice. practice is expanding, becoming an indispensable means of diagnosing lesions of soft tissues and organs, when details on x-ray films are difficult to distinguish (gall bladder, spleen, heart, etc.).

As television technology improves, color, volumetric, and spectrozonal television is increasingly used in medicine. Particular attention is paid to the development of digital television equipment, its use for educational and health education purposes, and the operation of such tools as video recording and large-format matrix display screens.

X-ray television allows you to reproduce an X-ray image on a TV screen using special optoelectronic devices and communication channels. Its formation is associated with the introduction in 1948 of khmed. practice of electro-optical intensification of X-ray images. The first X-ray television studies date back to 1955, when the French. radiologist M. Noix demonstrated the movement of the hand and the process of swallowing, and R. Truchot and co-authors in the same year showed the movement of the kidney using X-ray television. In 1959, R. J anker reported at the IX International Radiological Congress on the development and establishment of X-ray television and its introduction into clinical practice.

To obtain an X-ray television image, the X-ray image must undergo a series of physical transformations: first it is converted and amplified using an electro-optical amplifier, then the resulting optical image is projected onto the photosensitive surface of the transmitting television tube, where it is converted into an electrical video signal. This signal is transmitted via a wired communication line to the receiving device, where the amplified video signal acts on the electron beam of the kinescope and changes its intensity. The electron beam of the kinescope, modulated by the incoming video signals, draws the transmitted picture on the fluorescent screen in the form of dots of varying brightness. The picture unfolds so quickly

that the human eye perceives it as a solid image. In this case, the transmission of motion is carried out, as in cinematography, through frame-by-frame reproduction of the image.

The circuit of an X-ray television installation is a closed circuit, the components of which are an X-ray source, an X-ray electro-optical amplifier, an image transfer lens, a transmitting television camera, a communication line and a receiving video control device (Fig.).

X-ray television has expanded the scope of use of X-ray scanning. The use of television in medicine has increased the possibility of diagnosing diseases, reduced radiation exposure during x-ray examination, made it possible to transmit images over a distance and perform fluoroscopy in a darkened room, making the doctor’s work easier, and improving the teaching process.

The use of video recording on magnetic tape for the purpose of documenting X-ray television images increases the reliability and information content of radiological data, reduces radiation exposure to examinees and radiologists, helps to save photographic materials, and creates the possibility of multiple viewing of research results by many people during consultations and in teaching work.

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