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EFFECT OF ELECTROMAGNETIC FIELD ON HUMAN ORGANISM

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Abstract
In this article, mainly, the issues of the tune are considered. The permissible levels of radiation established in our republic are very few units. Therefore, even if the organism is exposed to radiation for a long time, there may be no change. The effect of various radioactive rays on living organisms depends on their ionizing and penetrating properties. Different rays have different biological effects when absorbed in the same dose.
Keywords. Electromagnetic field, vibration frequency, electromagnetic, energy flow intensity, radiation, atom, molecule, negative, pole, range.

Main part
The effect of the electromagnetic field on the human body depends on the voltage of the electric and magnetic fields, the intensity of the energy flow, the vibration frequency, the concentration of radiation on a certain surface of the body, and the personal characteristics of the human body. The main reason for the impact of the electromagnetic field on the human body is that the atoms and molecules in the human body begin to divide into positive and negative poles under the influence of this field. Polarized molecules begin to move in the direction of electromagnetic field propagation.

As a result of the impact of the electromagnetic field on the human body, ionized currents are generated in the blood and intercellular fluids due to the influence of the external field. The alternating electric field heats the cells of the human body due to the alternating dielectric polarization, as well as the generation of conduction currents. The heat effect is due to the energy absorption of electromagnetic fields. Energy absorption and generation of ionized

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currents have a special effect on biological cells, this effect is due to disruption of the work of delicate electrical potentials in human internal organs and cells and changes in fluid circulation functions.
A changing magnetic field causes a change in the directions of the magnetic moments of atoms and molecules. Although this effect is weak in terms of impact on the human body, it cannot be said to be indifferent to the body.
The higher the voltage of the field and the longer the duration of its effect, the greater the effect it has on the body.
An increase in vibration frequency increases the ratio of body conductivity and energy absorption but decreases the penetration depth. It has been experimentally confirmed that most of the waves shorter than 10 cm are absorbed by skin cells. Radiations in the range of 10-30 cm are poorly absorbed by skin cells (30-40%), and mainly their absorption corresponds to human internal organs. Such radiations are extremely dangerous.
Excess heat generated in the body can be lost due to the thermoregulation of the human body up to a certain limit. Starting from a certain amount called the thermal limit (I>10 mW/cm2), a person will not be able to remove the heat generated in the body, and the body temperature will rise, which in turn will cause great damage to the body.
Heat absorption occurs better in water-permeable parts of the human body (blood, muscles, lungs, liver, etc.). But heat release is very harmful to organs with poorly developed blood vessels and low thermoregulatory effect. These include the eyes, brain, kidneys, digestive organs, gall bladder, and urinary bladder. Irradiation of the eye causes clouding of the pupil (cataract). Pupil opacification usually occurs days or weeks after radiation, rather than developing suddenly.
The electromagnetic field not only has a thermal effect on the cells as a dielectric material with a certain permeability to the human body but also affects these cells as biological objects. They directly affect the central nervous system, change the direction of cells or change the molecular chain to the direction of electric field voltage lines, and blood composition affects the biochemical activity of protein molecules. The function of the vascular system is disturbed. It changes the metabolism of carbohydrates, proteins, and minerals in the body. But these changes are functional, and when the radiation exposure is stopped, their harmful effects and pain sensations disappear.
"Sanitary norms and regulations for those who work at sources of high, very high and extremely high-frequency electromagnetic fields" provided for by the sanitary standards define the following permissible norms and limits: electromagnetic field in workplaces radio frequency voltage in the frequency range of 100 kHz-30 MHz 20 V/m should not exceed 5 V/m in the frequency range of 30-300 MHz. According to the magnetic composition, it should be 5 V/m in the frequency range of 100 kHz-1.5 MHz.
In the SVCh range of 30-300,000 MHz, the maximum radiation current voltage allowed during the working day is 10 μW/cm2, and the radiation during no more than 2 hours of the working day should not exceed 100 μV/cm2. In this case, protective glasses must be worn. During the rest of the working time, the radiation intensity should not exceed 10 μW/cm2.

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In the range of extremely high frequencies (VHF), the radiation flux density for people whose profession is not related to radiation and permanent residents should not exceed 1 μW/cm2. The method of protection achieved by extending the distance is the simplest and most effective. This method can be used by workers whose workplaces are outside electromagnetic fields, and also in cases where radiation devices can be remotely controlled.

Electromagnetic field normalization and protection from it.

The permissible levels of radiation established in our republic are very few units. Therefore, even if the organism is exposed to radiation for a long time, there may be no change

According to SN 848-70 "Sanitary norms and regulations for those who work at sources of high, very high and extremely high frequency electromagnetic fields" defines the following permissible norms and limits: electromagnetic field in workplaces radio frequency voltage electrical composition 20 V/m in the frequency range of 100 kHz-30 MHz, not exceeding 5 V/m in the frequency range of 30-300 MHz. According to the magnetic composition, it should be 5 V/m in the frequency range of 100 kGs-1.5 MHz. In the range of SVCH 30-300,000 MHz, the maximum radiation current voltage allowed during the working day is 10 μW/cm2, for more than 2 hours of the working day. radiation during absence should not exceed 100 μV/cm2. Be sure to wear safety glasses. During the rest of the working time, the radiation intensity should not exceed 10 μW/cm2. In the SVCH range, the radiation flux density should not exceed 1 μW/cm2 for people whose profession is not related to radiation and permanent residents. Analyzing the formulas mentioned above, placing workplaces further away from the electromagnetic field and changing the distance between the antennas that direct the currents of electromagnetic fields and the workplaces, reducing the radiation voltage of the generator, installing absorbing and reducing screens between the workplaces and the antennas that transmit the radiation currents. installation, as well as the use of personal protective equipment are the main means of protection from electromagnetic fields in the workplace. The method of protection achieved by extending the distance is the simplest and most effective. This method can be used for workers whose workplaces are outside electromagnetic fields, and also in cases where radiation devices can be controlled remotely. Another way to reduce radiation is to replace a strong radiation generator with a weaker radiation generator. But in this method it is necessary to take into account the technological process.

Another way to reduce radiation power is to use attenuators, radiation absorbing or reducing devices equivalent to an antenna, which can eliminate or reduce the radiation power in the distance from the generator to the radiating device. Radiation-absorbing devices can be coaxial and wave-reflecting. The scheme of these devices is presented in Fig. 1. Graphite or other carbon alloy is used as an energy absorber. Some dielectric materials can also be used.
Such materials include rubber, podevorirol, and others

Taking into account the heating of such energy-absorbing devices under the influence of energy, cooling surfaces are created in them (ribbed surfaces. Fig. 1, b, c), as well as the

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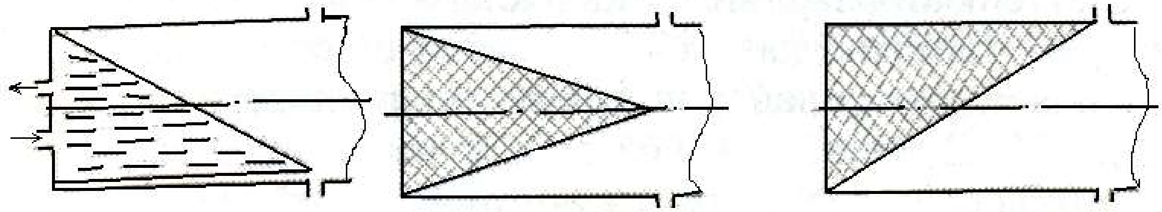
movement of water currents is used (Fig. 1, a).



a b s

Fig. 1. Radiation-absorbing devices: a-water cooling; Cooling using b, s-ribbed surfaces.

In order to coordinate coaxial and wave-reflecting and absorbing devices, they can be made with a curved surface, pin-shaped and stepped, as well as dielectric washers.

Attenuators used to reduce radiation power can be constant or variable. Permanent attenuators are made of materials with a high absorption coefficient of electromagnetic waves. The blades and plates of these attenuators are made of dielectric material and the top layer is covered with a thin metal plate. They are installed parallel to the linear field of electromagnetic force. The attenuation power of attenuators can be increased or decreased by sinking the blade deeper into the waveguide or by bringing the plates closer together. Proper use of radiation absorbing devices and attenuators can reduce the emission of electromagnetic energy into the external environment by more than 60 dB. provides a reduction in the amount, and it will be possible to provide an amount of beam voltage less than 10 μW/cm2. One of the main methods of protection against electromagnetic radiation is the method of screens. The screen can be installed directly on the source or workplaces that are emitting electromagnetic waves. Reflective screens are made of materials that conduct electricity well. The protective feature of the screens is based on the formation of Foucault current on the surface of the screen under the influence of the electromagnetic field. In turn, the Foucault current creates a charge that has an opposite charge to the electromagnetic field. As a result, the addition of two fields is observed, and a field with less power than both fields remains. The lost energy on the surface of the screen and the thickness of the screen where a certain amount of radiation can be lost can be calculated. We define the power and density of the light flux passing through the screen by Ro and Io, and the power and density of the light flux without the screen by R and I. In this case, the weakened radiation is determined by the following formula:

L=101g=101g, (1)

Based on the strength of the screen, they are made of solid materials with a good electrical conductivity and a thickness of not less than 0.5 mm. The open spaces left for observation and from the point of view of technology should be fenced with a metal mesh with a cell of not less than 4x4 mm. The screen must be grounded. Mesh and screen elements are well welded together. Because the decrease in electrical conductivity leads to a sharp decrease in the screen effect. The degree of weakening of the electromagnetic field with the screen is conditionally determined by the fact that the depth of penetration of electromagnetic waves into the screen material is less than the thickness of the screen. When the depth of penetration of the magnetic

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field into the screen is d, the attenuation in it is e=2.718 times, it is determined by the following formula:

$$\delta = 1/\sqrt{\mu\sigma\rho}\,f \quad (2)$$

Here: - the absolute magnetic resistance of the screen material g/m; - relative conductivity of the screen material, Sm/m; f-frequency, Gs. In this case, the effectiveness of screen protection must satisfy the following inequality:

E>jd/ , (3)

Here: thickness of d-screen material, mm; , the larger f is, the smaller the depth of penetration of the field into the thickness of the screen; which allows you to thin the screen. Usually, the penetration depth of electromagnetic fields of high and medium high frequency is very small (much smaller than mm), so the choice of such screens is considered from the point of view of construction.

Summary
Analysis of the above-mentioned points, placement of workplaces away from the electromagnetic field and changing the distance between the antennas that direct the currents of the electromagnetic fields and the workplaces, reducing the radiation voltage of the generator, installing absorbing and reducing screens between the workplaces and the antennas transmitting the radiation currents, as well as personal protective equipment use is the main means of protection from electromagnetic fields in workplaces.

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