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Hygienic Importance of Solar Radiation

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Abstract: This article discusses the impact of solar radiation on human health, its hygienic importance, beneficial and negative aspects, role in health care, exposure limits for different age and occupational groups, based on modern scientific approaches.

Keywords: sun radiation, ultraviolet rays, hygiene, vitamin D, skin diseases, safety, environmental factors.

INTRODUCTION.

Ultraviolet radiation (UVR) makes up only a few percent of the total solar radiation flux reaching the earth's surface, but its impact on the environment and human health is very high. Ultraviolet radiation has the highest biological and photochemical activity in the solar radiation spectrum. The high efficiency of UVR is explained by the high energy of incoming radiation photons in the short-wave region of the spectrum. This energy increases with decreasing wavelength from 0.49 10"18 J at 400 nm (the long-wave limit of UVR) to 18

0.68 10"° J at 290 nm (the short-wave limit of the UV spectrum at the Earth's surface). As a result, the biological activity of UV radiation increases with decreasing wavelength. According to [299], according to the degree of its biological impact, UVR is usually divided into three regions: the UV-C region (100<X<280 nm), the UV-B region (280-315 nm), and the UVA region (315-400 nm). (In some countries, the wavelength of 320 nm is taken as the boundary between the UV-B and UVA regions). The UV-C region is completely absorbed in the upper layers of the atmosphere by oxygen and ozone; the UV-B region is also significantly weakened by stratospheric ozone: only a small part of it reaches the Earth's surface. Thus, under natural conditions, UV radiation from regions A and B reaches the Earth's surface.

Sun light human life and health for necessary was important natural is a factor. From the sun coming radiation - sun radiation - human to the body positive and negative impact shows. Positive side as Vitamin D in the body synthesis provide, microbes disappearance characteristic, mood lift and psychic the situation stabilize such as factors to bring possible. With this together, wrong and too much more than impact when to health damage burn, skin diseases and even cancer to the disease take arrival This is possible. in the article sun radiation hygienic importance, safe standard, protection methods, and scientific research based on cited recommendations discussion will be done.

The problem of interaction between man and his environment is especially acute in regions with a dry hot climate, which include Uzbekistan. Solar radiation is a combination of solar matter and energy coming to the Earth. Energy spreads in the form of electromagnetic waves at a speed of 300 thousand kilometers per second, passes through the atmosphere and reaches the Earth in 8 minutes. The Earth's surface is exposed to both direct and scattered solar rays by the Earth's atmosphere. It is the scattering of blue-blue rays in the atmosphere that explains the blueness of

the sky on a clear day. The yellow-orange color of the solar disk is due to the fact that the waves corresponding to it pass almost without scattering. The electromagnetic spectrum of solar radiation consists of infrared (50%), visible (41%) and ultraviolet (9%) parts. Since their quanta have different energies, they have a variety of effects on humans. The hygienic significance of solar radiation is also extremely great. Its regulation is carried out in accordance with SNiP, which for solar radiation are compiled taking into account the light and climate characteristics of various geographic zones and are taken into account in the design and construction of various objects.

Biological action of UVR. Mechanisms and types of UVR impact on living objects. Biological impact of UVR occurs through absorption of light quanta by various molecules - chromophores, which are present in the integumentary tissues of the skin and eyes. These unsaturated molecules can pass into a higher energy state. Components of the molecule containing conjugated double bonds freely absorb energy in the UV region. Benzene rings with one or two nitrogen atoms exhibit high absorption in the UV-B region. The bimolecular reactions occurring in this case are quite numerous; the most important among them are those resulting in the formation of thymine dimers. Thus, in deoxyribonucleic acid (DNA), which is the carrier of genetic information, upon absorption of a quantum of light, a rupture of the double bond between the 5th and 6th carbon atoms in thymine (nitrogen formation) occurs. If such a break occurs in adjacent formations, then valence bonds can close between them and form a thymine dimer - the main photoproduct of DNA irradiation. The number of dimers is proportional to the UVR dose and changes with a change in wavelength with a peak with a maximum in the region of 280 nm. In the UV-B region (up to 315 nm), the sensitivity of most chromophores decreases sharply with increasing wavelength. However, the destruction of DNA molecules can also be observed under the influence of large doses of UVA in the presence of certain substances called photosensitizers (for example, acridine), when "cross-links" occur between DNA and proteins. Damage to the DNA molecule does not allow it to perform its functions and serves as a signal for the entry into action of other biological processes, which, in turn, can lead to cell death, genetic recombination, mutagenesis and even carcinogenesis [86]. As for DNA recovery processes, they are quite complex. Among them, we note the process of photoreactivation, as a result of which, under the influence of visible light and under certain conditions, the photo reactivating enzyme monomerizes the dimer and can restore the molecule to its original state [86]. However, studies of the process of DNA photoreactivation in mammalian cells have yielded ambiguous results.

UVR has a direct effect on ribonucleic acids (RNA), but since the RNA molecule exists in many copies, very large doses of UVR are needed to cause serious damage.

Let us consider in more detail the negative and positive effects of UVR on human health and biota. The negative effects of UV radiation can be acute and chronic. UV radiation mainly affects the eyes, skin, and the body's immune system. Acute effects of UV radiation on the skin are expressed in its reddening and the occurrence of erythema and tanning. Severe reddening can lead to the formation of blisters and damage to the skin with secondary infections and phenomena characteristic of first- and second-degree burns. The negative chronic impact of UVR on the skin is expressed in its aging (solar elastosis), the appearance of non-malignant changes (actinic keratosis) and malignant skin tumors - the occurrence of non-melanoma skin cancer (NMSC) and cutaneous melanoma (SMM). Every year, 500 thousand residents of the USA are diagnosed with NMSC [143]. Evidence that non-melanoma skin cancer is associated with UV radiation is confirmed by the fact that it usually occurs in people with fair skin on the areas of the body most exposed to sunlight; in 80-90% of cases, it occurs on the head, neck, hands and forearms, and in women - on the legs. In addition, NMSC is almost never found in blacks, and in Australia, skin cancer is a disease of immigrants from northern Europe, although the local population practically does not suffer from it [86]. The influence of direct UVR exposure is also confirmed by the high correlation between annual UV doses and non-melanoma skin cancer incidence rates obtained by Gordon and Silverstone [86]. Apparently, the occurrence of NMSC is determined by the radiation dose accumulated during life. It is more common in

people who spend a lot of time outdoors or whose occupation is associated with artificial UV radiation. The most life-threatening disease, malignant melanoma (MMM), also correlates positively with UV radiation [297]. A significant risk factor for MMM is sunburn, especially in childhood. Rare periods of intense UV exposure (vacation, etc.) are more dangerous than cumulative doses. [110]. An abundance of freckles and birthmarks are considered to be precursors of melanoma [18].

MATERIALS AND METHODS.

In the study hygiene science modern approaches, international hygiene standards, environmental monitoring results, Health storage organizations instructions and last scientific articles analysis The sun radiation types (ultraviolet A, B and C), their atmosphere through to go level, human to the body impact to do methods studied. As a method statistic analysis, comparison, analogy, model building and criteria according to assessment methods was applied.

RESULTS.

Sun radiation following main from components consists of :

1. Ultraviolet rays (UVA, UVB, UVC)
2. Light waves (visible) rays)
3. Infrared rays

UVA and UVB rays human to your health the most many impact UVB rays produce vitamin D. in synthesis main role plays, but too much outside in quantity if, skin burns, photogerontology (skin aging) and cancer diseases the risk increases. Research this shows that every 15-20 minutes a day sun in the light to be enough amount of vitamin D working release for It is sufficient. Also, children, pregnant women women, elderly and open in the air worker people (builders, villagers) farm for employees) sun radiation dangerous to the level shortage important.

DISCUSSION.

Sun from the rays right use health for useful. But, most people in the population from the sun protection culture unformed. Protection creams, glasses, hats, special clothes - these main are tools. From this outside, the sun of the rays the most strong time from 11:00 to 16:00 to be, exactly this in between open in the air far time not staying recommendation Cities and industry in the zones ecological factors, ozone layer thinning, dust and aerosols sun radiation spectrum This changes the human to your health more harmful impact shows.

CONCLUSION.

The Sun radiation - human health for necessary, but caution with in a relationship demanding is a factor. Hygienic in terms of his/her impact circles clearly to be given, every one young and profession groups for standards determined and given to the population wide explanation necessary. Healthy marriage style in the formation of ecological and sanitation and hygiene at events sun from the rays correct use important is considered.

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