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Conflict of interest: None declared. Received: 15.07.2013. Revised: 15.10.2013. Accepted: 31.10.2013.

THE PRINCIPLES OF SANITARY AND EPIDEMIOLOGICAL RESTRICTIONS OF ARTIFICIAL ULTRAVIOLET RAYS EMANATION IN SUN PARLORS

**Zasady Sanitarно-Epidemiologiczna ograniczenia sztucznych emanacją
promienie ultrafioletowe Solaria**

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**Key words: artificial ultraviolet emanation, sun parlors, beauty
medicine, hygienic restrictions, social establishments which provide everyday
services to the public.**

Słowa kluczowe: sztuczne emanacją ultrafioletowe, salony przeciwsłoneczne, medycyna estetyczna, ograniczenia higieniczne, zakłady świadczące społeczne usługi codziennego użytku publicznego.

Annotation

Was conducted analytical overview of existing principles regulating the usage of artificial ultraviolet emission in solariums in Russian Federation, Republic of Belarus, and also of the integrating recommendations of the WHO, in comparison with the results of our own research. This allows to define key directions of scientific-research activities in the sphere of evaluating the influence of this harmful factor on the organism of solariums visitors. Was proved the necessity of developing methodological recommendations and sanitary-epidemiological requirements to the operation of solariums.

Streszczenie

Przeprowadzono analityczny przegląd istniejących zasad regulujących wykorzystanie sztucznej emisji ultrafioletowej w solariach w Federacji Rosyjskiej, Republiki Białorusi, a także z zaleceniami włączenia WHO, w porównaniu z wynikami badań własnych. Pozwala to na określenie głównych kierunków działalności naukowo-badawczej w dziedzinie oceny wpływu czynnika szkodliwego na organizm solarium odwiedzających. Wykazano konieczność opracowania zaleceń metodologicznych i wymogów sanitarno-epidemiologicznych dla funkcjonowania solariach.

Timeliness. Intensive implementation of European methodologies in the area of health-improving and beauty medicine leads to a sufficient increase in

demand for procedures connected with the influence of electromagnetic emanation including ultraviolet band. While evaluating the functioning of sun parlors in Desnyanskyi district in Kiev (as of 01.01.2011) it was found that there were 31 sun parlors using powerful sources of ultraviolet emanation (lamps from 80-100 to 400-500 W) [1].

In connection with the above mentioned beauty salons and parlors, which use healing and aesthetic effects of ultraviolet emanation, attract much attention of medical and scientific specialists. As it is known from scientific medical literature, including our own scientific research, ultraviolet emanation as well as any other hygienically important factor can cause both positive and negative photochemical effect of influence to a human's body [2-4]. There can be various negative consequences such as a wide range of skin reactions as well as pathological changes in the organs of sight e.g., photokeratitis, photoconjunctivitis, pterygium, cataract, according to the area of ultraviolet emanation exposure. The main concern is an oncogenic and mutagenic effects which most scientists connect with a constant excessive exposure of a human body to emanation [4,5]. Therefore, it is possible to assume, that the only way to regulate this risk factor effectively, and to provide preventative measures against its harmful effects is to set up appropriate hygienically restricted levels of influence of ultraviolet emanation at the establishments which provide health-improving and beauty services, and where artificial ultraviolet emanation is used.

First of all, the topicality of this problem in Ukraine is connected with the absence of the unified sanitary and epidemiological requirements as for the restriction of influence and evaluation criteria of ultraviolet emanation concerning the non-manufacturing establishments, including safety rules for sun parlors. The only regulatory document in existence designed to control the implementation of hygienically restricted rates of ultraviolet emanation is SN №4557-88, created for industrial premises [6]. From our point of view, the experience of the leading countries in the world, including Europe must be taken into consideration while solving this problem. In most such countries the majority of hygienic criteria of

evaluation of ultraviolet emanation have already taken effect and are the most appropriate regulatory instrument of this factor of influence on a human body.

The objective. To conduct analytical expert comparative analysis of the criteria of hygienic evaluation and restrictions of artificial ultraviolet emanation at the social establishments, which provide everyday services to the public.

The results of research. According to the existing classification of ultraviolet emanation and on the basis of scientific data concerning biological effect of this factor, waves of different range have different level of absorption into tissues, therefore, they influence biological systems of an organism in different ways. According to the WHO data, ultraviolet emanation should be used only in small doses while treating such illnesses as rachitis, psoriasis, eczema, jaundice etc [7]. The main effects of influence of ultraviolet emanation of different range on human's body as well as the ways they are used are stated in the chart 1.

Chart 1.

Biological influences of ultraviolet emanation of different range on human's body[8, 9]

Type of ultraviolet emanation	Implementation in sun parlor	Usage in medicine, biological influence	Negative influences
Ultraviolet-A, long-wave; frequency range, THz - 750-952; wave length, nm - 400-315	The most favorable	Treatment of sunlight deficiency, neurotic, skin diseases. Onset of vitamin D synthesis, anti-rickets influence, metabolism improvement, heart work optimization, pigmentation, sensitization	Ultraviolet-A is considered to be the least harmful. In case of overdose: the reaction of the organs of sight (photoconjunctivitis, photokeratitis, photochemical cataracta of crystalline lens, dystrophy and dimness of retina, a decrease in acuity of sight etc.); skin (burn, photoageing, remoted consequences – induced oncogenesis, melanoma, changes in DNA structure etc..)
Ultraviolet-B, medium wave, frequency range, THz - 952-1070; wave length, nm - 315-280	Possible in the area of 0,280-0,400 mcm coverage	Therapeutic effects: vitamin formation, trophostimulation, immunomodulation (suberythermal doses), anti-inflammatory, analgesic effect. Vitamin D synthesis, normalization of phosphoric and calcic exchange, an increase in mechanical density of bones, stimulation broken bone tissue restoration, an increase in skin resistance to harmful influences, a decrease in allergic reactions, an increase in performance efficiency	
Ultraviolet-C, short-wave, frequency range, THz - 1070-2000; wave length, nm - 280-200	Inadmissible	Therapeutic effects: used for the treatment of acute and subacute skin diseases, nasopharynx, inner ear, the treatment of wounds with a possibility anaerobic infection, skin tuberculosis, suppurative inflammations (abscess, carbuncle, trophic ulcers), chronic bronchitis. Bacteriostatic influence on microorganisms	

Analyzing data from the chart 1, it is possible to assume that excessive uncontrolled exposure to ultraviolet emanation of any range may cause not only therapeutic effect but also a variety of diseases. Also, while analyzing various scientific sources of information it was discovered that there are different attitude towards the usage of ultraviolet emanation for aesthetic (beauty) purposes in different countries. Its usage is restricted at the governmental level [4]. In particular, Brazilian legislation prohibits the usage of sun parlors. There is a prohibition (or restriction) for going to sun parlors by the underage or young people in Latvia, Germany, Holland, Finland and Austria.

According to the data of WHO's experts, the usage of devices for artificial tanning may lead to the development of skin cancer. The main risk group is individuals who are less than 18 years old [11]. According to recommendation of WHO, heliotherapy can not be used to certain categories of people:

- with melano-compromised type of skin which belongs to I and II phototype [11];
- underage individuals;
- with pigmentation, moles, and other neoplasmas;
- prone to having freckles;
- individuals who used to have problems with tanning in childhood;
- those who have benign tumor and malignant tumor;
- those who have sun burns
- those who use particular cosmetics (it intensifies influence of ultraviolet emanation);
- use certain medication.

Irrespective of this, nowadays only few countries take into consideration the above mentioned restrictions. In particular, there are laws, which limit the maximum dose of ultraviolet emanation of B-range, and ultraviolet emanation in general to 1,5% (what corresponds to an oncogenic of ultraviolet emanation of the Sun) in Belgium, France and Sweden. In accordance with the current legislation in

France all devices which emanate ultraviolet radiation must be declared at health care departments. Underage individuals are not allowed to use them. In addition to this specially trained personnel should inspect all commercial sun parlors. It's prohibited to declare the usefulness of such procedures for health [10].

Unlike the above mentioned data, there are no unified sanitary and epidemiological requirements for the usage of sun parlors, no unified methodologies in alignment with the Agency for Disease Control and Prevention. It leads to a lot of violations in the usage of the overdue sources of ultraviolet rays emanation, the usage of lamps with power capacity to 500 W, voluntary uncontrolled exposure to ultraviolet emanation by the clients of sun parlors by their own order, the absence of the initial skin check-ups before tanning procedures.

After evaluating one of the samples of "Sun parlor passport", it was determined that the form of the document had a free-hand content without clearly stated terminology and methodology at the same time the procedure was described in an advertising manner, which attracts customers including pregnant women to buying this service. Besides, the vendor doesn't take into consideration a wide range of sanitary and epidemiological measures, there are no requirements stated concerning classification and labor safety rules for staff, disinfection of premises, a range of physical, chemical and biological factors. There are no warnings stated as for excessive exposure to ultraviolet rays. the requirements for the exposure to ultraviolet rays are stated as desirable. There are also the requirements which go against current regulatory documents, which in our country are represented as recommendations [12, 13].

Arguments about the necessary legislative requirements for the usage of ultraviolet emanation and the absence of them for non-manufacturing sector lead a scientific thought in Ukraine towards the creation of the appropriate principles of bringing this risk factor to a norm. Probably, it is possible to combine the results of our own scientific research with the experience of those countries, where the usage of the maximum doses of ultraviolet emanation is scientifically justified on the

basis of experiments. It will give an opportunity to achieve appropriate parameters for the evaluation and restriction of a given factor (Chart 2) [4, 7, 14-16].

Chart 2.

Acceptable levels of electromagnetic radiation in solariums

Допустимые уровни электромагнитного излучения в соляриях

Country/ organization	Controlled parameters				Regulatory documents
	Intensity of ultraviolet rays emanation, W	Intensity EMF, W/m	Strain EF 50 Hz, W/m	Strain TEF, kW/m	
Russia	> 1,9 for the range of 280-315 nm; > 10 for the range of 315-400 nm	> 25	>0,5	-	SanRaN 2.1.2.2631-10 [15]
Republic of Belarus	-	> 25	>0,5	<15	SanRaNaHN №175-28.10.2008 [16]
Ukraine	-	> 25	>0,5	<15	The others SanRaN 2.2.2.022-99 [17]
Recommended by WHO	The major limit of influence on citizens and workers – 30 kJ/m ² . The main criteria: biological influence, effective dose, level, frequency range, daily exposure (chap. 13 WHO)				World Health Organization [7]

The analysis of the regulatory documents (Chart 2) allows to state that the main parameter of safety in sun parlors is electromagnetic emanation. Thereby the intensity of ultraviolet rays emanation isn't restricted by setting up the allowed exposure level in certain countries (Belarus). However, the advantages of regulatory documents in Russia and Belarus are the existence of sanitary and epidemiological norms as well as methodological requirements, which restrict safety rules concerning the usage of sun parlors, hygienic requirements to architecture and planning, gear and equipment, and to anti-epidemiological regime. There is also the list of counter-indications for the usage of ultraviolet emanation stated in the legislation of both countries [15, 16]. As for WHO recommendations

– there is a restricted intensity of an effective dose, which takes into consideration various biologic effects of ultraviolet rays emanation with different lengths of waves.

Despite set up norms and by Russian Federation scientists there are a lot of unsolved issues in the domain of ultraviolet emanation usage, which indicates the necessity of further research [18]. There are no criteria for ultraviolet emanation evaluation by biological effect in Russia in comparison to the norms created by WHO. There has been found certain inconsistency concerning terminology, and restricted diapason (according to the standard EN 60335-2-27 the boundary interval between ultraviolet-A and ultraviolet-B is not a wave length of 315 nm, but of 320nm) etc. It has been also stated that ultraviolet-C emanation is allowed by the EU standards. Besides, the researchers pay attention that when locating sun parlors not only important hygienic risk factors should be taken into consideration, but also thermal emission, microclimate, brightness, illumination, noise, EMF, possible ozone emissions, ergonomic parameters of a booth. The methodological requirements as for conducting measurements and calculations also require improvements. The classification of sun parlors by risk level remains an unsolved issue as well [18].

The analysis of the criteria of ultraviolet emanation recommended by WHO allows to state the a given risk factor is to be calculated in terms of an effective dose by such parameters as effective irradiance $W\ m^{-2}$, spectral irradiance from measurements in $W\ m^{-2}\ nm^{-1}$, relative spectral effectiveness factor (unit-less), bandwidth of the calculation or measurement in nm etc. Various safety measures for protecting eyes and skin are undertaken for the minimization of risk of ultraviolet emanation. Thereby it is recommended to use sun parlors with minimal exposure to ultraviolet emanation of ultraviolet-A range.

Therefore, the conducted analysis of the problem of hygienic standardization of ultraviolet emanation usage in sun parlors allows giving considerations to

prospectus directions in research of a given factor. Relying on Russia's and Belarus's experiences, taking into consideration EU's experience, and WHO's recommendations as well as the results of our own research of this problem in Ukraine (Kiev), it is possible to direct further scientific and practical measures taken to solve the following issues:

1. To set up the allowed intensity of ultraviolet emanation of different range and time of exposure for the visitors of sun parlors;
2. To set up the limitation concerning categories of visitors and accept the unified safety requirements for being in parlors;
3. To give methodological recommendations concerning arrangement and organization of work in sun parlors;
4. To set up the main criteria for hygienic evaluation of sun parlors taking into consideration recommendations given by WHO;
5. To set up hygienic norms to the other risk factors while using sun Parlors.

Conclusions. Conducted scientific and expert analysis of the existing approaches to the evaluation of harmful influences of ultraviolet emanation from the artificial sources allows considering a given factor as a source of risk for the health of a part of population in Ukraine. In particular, for that part that uses the services of sun parlors. The growing demand for this service testifies for it. The absence of the unified requirements to sanitary and epidemiological restrictions concerning hygienically important factors, and methodological rules of usage of such establishments leads to the increase in diseases caused by ultraviolet emanation.

The comparative analysis of the approaches to the evaluation of ultraviolet emanation allows to set up appropriate directions for the further scientific and practical research taking into consideration WHO's recommendations, as well as

the recommendations of countries which have already implemented hygienic standardization of a given factor, in particular in Russian Federation and Belarus.

The main task for solving the problem of hygienic standardization of ultraviolet emanation usage is to develop the unified sanitary and epidemiological as well as methodological requirements concerning the usage of sun parlors by the population of Ukraine.

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