Lecture 4

SOLAR RADIATION, ITS GENERAL BIOLOGOCAL AND HYGIENIC VALUE

Solar radiation is integral flow of radiation, emitting by Sun

From the physical point of view solar energy is a flow of electromagnetic radiation characterized by a various wave-length

Solar radiation is a great medical and prophylactic factor

It influences on all physiological processes in the organism, changing metabolism, general tone and efficiency

Reactions of organisms depend on:

- the type of radiation
- the length of electromagnetic waves
- the absorption of these waves by tissues

Ultra-violet part of the solar spectrum

it is a wave flow in the range from 200 up to 400 nanometers

General biological influence of ultra-violet rays

- local changes in the colloidal state of cellular and tissue proteins
- Образование cleavage product of protein molecules such as hystamin, choline
- influence on protein, fat, carbohydrate and mineral metabolism
- increase in the organism protection

Ultra-violet radiation with the wave range:

- from 400 up to 320 nanometers – range A, UV-A
- from 320 up to 275 nanometers – range B, UV-B
- from 275 up to 180 nanometers – range C, UV-C

Specific biological influence of ultra-violet rays typical of a certain wave range

- range A, UV-A – leads to erythematous-suntan influence
- range B, UV-B – antirachitic and low bactericidal influence
- range C, UV-C – causes a damaging influence on a biological tissue, skin, eyes

UV-A

The mechanism of origination of ultra-violet erythema is connected with the vasodilating effect of histamine and the histamine-like substances formed under ultra-violet radiation.

UV-B

- Revealed in participation of UV radiation of this range in the synthesis of vitamin D
- The result of UV-irradiation on the skin is the transformation of 7-dehydrocholesterol in vitamin D_3

UV-C

Under the influence of natural ultra-violet irradiating of a bactericidal spectrum sanation of the atmosphere, water, soil takes place

Visible part of the solar spectrum

- The visible part of the solar spectrum is a wave range from 400 up to 760 nanometers
- The special hygienic value of light is its influence on the vision function

Infra - red radiation

According to the biological activity infra-red rays are divided into short-wave with the wave range from 760 up to 1400 nanometers and long-wave with the wave range from 1500 up to 25000 nanometers

Absorption of IR rays by the skin is determined by the wave length

- Rays with the length from 1500 to 3000 nm are absorbed by superficial skin layer
- Rays with the length 1000 nm passes through the epidermis, shorter IR waves reach the subcutaneous fat

During prolonged radiation by infra-red radiation the temperature of pulmonary tissue, brain, kidneys and muscles increases. Irradiation by infra-red rays influences on the immunobiological reactivity of the organism

The most marked unfavorable influence of IR radiation is observed in industrial conditions

In glass-blowers and other workers, contacting with intensive flows of IR radiations, there is decrease in electric sensitivity of eyes, weakening of the conditionally reflex vascular reaction. Infra-red radiation if the wave-length is less than 1400 nanometers leads to serious changes in cornea as cataract