

Lecture.

Hygienic characteristic of harmful factors of environment and reactions to their impact.

Occupational diseases and poisonings and its prevention.

Plan

1. Harmful and dangerous factors of working conditions and production environment.
2. The influence of physical factors of the production environment on the health of workers.
3. Chemical factors of the production environment.
4. Carcinogenic, mutagenic, allergenic factors in production, prevention of their harmful effects.
5. Industrial dust, its classification, prevention of harmful effects.
6. Industrial toxicology.
7. Biological factors in production, prevention of their adverse effects.
8. Occupational poisoning and its prevention.

Actuality

Hygiene of work is the section of hygiene which studies influence process of work and harmful professional factors on an organism of the working person and developing preventive actions for decrease and prevention occupational diseases.

The basic sections hygiene of work:

- Physiology of work is study of influence on an organism various kinds of work, estimation its weight and intensity, prevention exhaustion.
- Hygiene of work with adverse physical professional factors is study of influence on an organism noise, vibration, electromagnetic fields.
- Radiation hygiene is study of influence radiation on an organism, development actions of antiradiation protection.
- Hygiene of work with industrial poisons is industrial toxicology.
- Hygiene of work in agriculture with agrochemicals is agricultural toxicology.
- Hygiene of work in conditions dust pollution of air is prevention of professional dust pathology (phneumoconiosis).

There is also division on industries (chemical, mining, metallurgical, building etc) and in agriculture.

PROFESSIONAL HARMFUL FACTORS AND OCCUPATIONAL DISEASES. PREVENTION PROFESSIONAL PATHOLOGY.

Professional harmful factors (PHF) are the factors influencing on working people and capable to cause violations of health -occupational diseases.

Primary tasks of hygiene of work in the relation of PHF;

1. Study sources, conditions of occurrence and parameters of PHF on manufacture.
2. Study action of PHF on organism and its systems in experiment with laboratory animals.
3. Investigation cases occupational diseases on manufacture.
4. Development prevention measures occupational diseases.

Classification of PHF.

In hygiene of work allocate the following groups PHF:

- 1) Connected to violations hygienic conditions on manufacture (not optimum microclimate, action harmful professional factors etc.)
- 2) Connected to the wrong organization of work (excessively intensive, heavy, long work, monotony of work etc.)
- 3) Connected to lacks of working conditions (the small area of the workplace, the compelled position of a body etc.)

According to State Standard "Dangerous and harmful professional factors. Classification" all PHF are divided on:

Dangerous professional factor - can cause sharp violation of health or death of the person

Harmful professional factor - can cause chronic violation of health - occupational disease.

Classification PHF in State Standard:

1. Psycho-physiologic and physical factors in the organization of work, the lacks of a workplace and the equipment (the psychological and physical overloads, the compelled position of body, overstrain of separate bodies and systems)
2. Physical professional factors (not optimum microclimate, illumination, increased noise level, vibrations, radiation, electromagnetic fields)
3. Chemical professional factors (industrial poisons) - chemical substances, used on manufacture.
4. Biological professional factors (microbes, substances protein nature, allergens)
5. Industrial traumatism (mechanical, thermal, electric traumas).

Diagnostics and prevention professional pathology.

There is order of Ministry of Health of Ukraine N 45 in basis of diagnostics and prevention professional pathology , which contains:

- 1) The list of manufactures and trades for which preliminary and periodic physical examinations working are obligatory.
- 2) The order of realization such surveys, structure medical commission for surveys.
- 3) The list of medical contra-indications for reception at various kinds of manufactures.
- 4) The list of diagnoses of occupational diseases and poisonings.

Purpose, kinds and the organization physical examinations working.

Preliminary physical examinations are for again acting for work with harmful and dangerous working conditions with the purpose:

- a) To admit to work only those which state of health completely meets the requirements of a given trade,
- b) To not admit to work the persons having deviations in health which can amplify under influence of working conditions, and also those who can be a source of infectious or parasitic illnesses.

Periodic physical examinations are regular medical inspection working in harmful or dangerous conditions. Periodicity of them is determined by the order N 45. Tasks of these physical examinations;

- a) To reveal early attributes of occupational diseases
- b) To reveal the general diseases interfering the further work
- c) To appoint individual treatment-and-prophylactic actions.

Concept and classification occupational diseases.

The occupational disease (poisoning) is disease for which is proved connection with action

professional factors. It is given in the order N 45:

1) Names of occupational diseases are 27 diagnoses (phneymoconiosis, noise illness, vibrating illness etc., sharp and chronic poisonings);

2) Dangerous and harmful production factors, that action can result in occurrence of occupational diseases;

3) The list of works and trades at which the given occupational disease meets mainly or as exception.

The basic directions prevention occupational diseases.

1. Law-legislative measures. CLW (the code of laws on work). State Standards, Sanitary rules, etc.

2. Hygienic measures: preventive and current sanitary inspection.

3. Medical-preventive measures: preliminary and periodic physical examinations, preventive nutrition.

4. Sanitary education of workers about harmful and dangerous professional factors and professional diseases.

5. Technological measures on decrease or elimination of PHF.

6. Individual means of protection.

HYGIENE of WORK AT ACTION PHYSICAL PROFESSIONAL HARMFULL FACTORS.

Concept about harmful physical professional factors.

Many physical PHF can operate on workers: adverse microclimatic factors, not optimum illumination or surplus of its components, laser radiation, noise, vibration, electromagnetic fields (EMF), high or low pressure radioactive radiation etc.

NOISE as PHF, its characteristics.

On the data the WHO, noise is universal problem for mankind, one of main physical factor of pollution of environmental and industrial environment.

CONCEPT "NOISE":

- In physics noise is the chaotic sound fluctuations, which are not having regularity,

- In hygiene noise is any sounds, preventing recognition useful sound signals, violation the rest, rendering negative action on organism of the person and lowering his work ability.

Classification noise by sources: Industrial, Transport, Household.

Classification noise by frequency:

1) Heard sounds (16 - 20000 Gertz)

- Low-frequency - up to 350 Gz,

- Middle-frequency (350-800 Gz),

- High-frequency (more than 1000 Gz) - most harmful for CNS - it is perceived as louder noise, it is especial at person;

2) Infrasound has frequency up to 20 Gz - the expressed action on internal bodies since its frequency can coincide with frequency fluctuations of internal bodies - is most dangerous frequency 8 Gz -violations of alpha - rhythm of a brain, 1-3 Gz - violations of breath etc ,

3) Ultrasound is more than 20000 Gz - mechanical and chemical action - cavitation (making cavities in interstitial tissues), destruction molecules, their ionization, thermal action - heating fabrics (used in physiotherapy, at the big levels - local defeat of peripheral nervous and blood system violation CNS etc).

Classification noise by duration:

- Stable - fluctuations level of noise in time no more than 5 dB,

- Non stable - fluctuations level of noise in time more than 5 dB,
- Impulse - changeable, most harmful (pressure of acoustical adaptation).

Units of its measurement.

Action of noise depends not only on frequency, but also from a level. In acoustics loudness of sound is sound pressure in N/m^2 (difference between atmospheric and sound pressure). Unit level of sound is logarithmic unit, shows excess of sound pressure above a sound threshold 0-14 Bell, or 0-140 dB.

Sound threshold

Sound threshold = threshold of recognition - $2 \times 10^5 \text{ N/m}^2 = 0 \text{ dB}$. Painful sound threshold 14 Bell = 140 dB. Another unit of sound is FON (sound with frequency 1000 Hz at a level 1 dB).

Action noise on organism.

Distinguish specific and nonspecific action of noise.

SPECIFIC action: Violation of function of acoustic analyzer owing to a long angio(vessel)spasms, in result - degenerate changes in the nervous terminations and neuritis acoustical nerve (professional deafness).

3 STAGES NOISE ILLNESS at audiometry (estimation level of hearing):

- Acoustical adaptation - at action noise acoustical threshold grows on 10-15 dB, but through 1-3 mm comes to norm (physiologic phenomenon);
- Acoustical exhaustion - decrease of hearing on 15-20 dB during hours or days after finishing noise,
- Progressing deafness - gradual loss of hearing (noise more 80 dB quickly causes decrease of hearing and development deafness at the experience till 5 years).

NONSPECIFIC action: Excitation brain, hypothalamus and a spinal cord, quickly develops braking of CNS, then - exhaustion nervous cells - irritability, emotional instability decrease attention, memory, work ability, through vegetative nervous system change functions different systems and bodies.

As a result of long action of intensive noise NOISE ILLNESS develops -the general disease with defeat of an ear, CNS and other systems.

Struggle against noise on manufacture and in the occupied places.

1 Administrative - legislative measures.

2 Architectural - planning (functional zones in cities, sanitary - protective breaks, transport highways).

3 Hygienic.

a) preventive sanitary control - normalization noise - establishment MPL by different criteria for hospitals wards and sanatorium - silence, for inhabited rooms - violation of dream, for educational audiences - violation recognition of the information, irritating action, decrease work ability, for manufacture - violation function of an acoustic analyzer MPL noise: in wards - 25 dB, in inhabited rooms at night - 30, in territory of inhabited quarters - 45dB, in educational audiences - 50, on manufacture - up to 85 dB (low frequency), 65 dB (high frequency).

b) Current sanitary control - the control noise levels and restriction it

4 Medical-preventive - preliminary and current survey workers at noisy manufactures

5 Technological decreasing noise linings, coverings of walls, automatization etc.

6 Individual headphones, are higher 100 dB-flannel helmets.

Hygienic characteristic vibration.

Vibration it is fluctuations of elastic matter. It is characterized by amplitude, frequency, direction. Distinguish the general and local vibration, on direction - vertical and horizontal, on frequency - low-frequency (2-4 Gz), middle - 8-16 Gz and high-frequency (32-63 Gz).

Local vibration of small intensity gives a positive effect (vibrating massage); at the general vibration of high intensity - changes CNS, through vegetative nervous system - changes of internal bodies.

Local vibration causes long angiospasmes and mechanical trauma of periphery nerves in hand fingers - violations trophics in fabrics, polyneuritis, arthrosis - VIBRATION ILLNESS of a various degree of weight. Prevention harmful action vibration - it is similar to struggle against noise.

Hygienic characteristic of EMF.

EMF (electric-magnetic fields) are the special form of a matter, created by moving or motionless electric charges. Key parameters: length of a wave, frequency of fluctuations. EMF consist from electric (EF) and magnetic fields (MF).

During life the person constantly treats to action of natural MT by intensity 400 Amper / m, which depends on geography, time of day, year and solar activity ("magnetic storms").

Anthropogenic EMF:

- electrostatic field (ESF) - is created by motionless electric charges
- in the industry, near energy lines of ultrahigh voltage. It operates on CNS and causes functional shifts of vegetative nervous system.
- electromagnetic field (EMF) different frequencies (industry frequencies, radio frequencies, etc.)

Spectrum EMF of radio frequencies:

- Radio waves low, middle, high frequency (LF, MF, HF);
- Ultrahigh frequencies (UHF)
- Above high frequencies (AHF - Microwave)
- Hyper high frequencies (HHF)

Microwave is widely used in a radio communication, TV, a radar-location, physiotherapy, in the industry, for preparation of food (Microwave oven).

Action EMF on the organism.

Biological effect of EMF depends on frequency, intensity, time exposition, character of radiation (continuous, modulated) and a mode of irradiation (constant, periodic, intermitting). Mechanisms of biological action:

- 1) Not thermal action (at low intensity) - influence on substrata of organism with formation bioactive substances. At chronic action the cumulative effect is marked;
- 2) Thermal action, destruction bodies and fabrics - at the big intensity -microwave oven.

Microwave-syndrome: asteno-vegetative syndrome, cataract (dimness of crystalline lens), defeat of hair follicles (baldness), pains in heart, hypotension, bradycardia (decrease of cardiac contractions), endocrine violations, change in the formula and biochemistry of blood etc.

Protection workers from EMF:

Protection by distance, time, screens, levels (MPL for premises 0,5 kiloVatt/m, in territory of inhabited quarters in 1kV).