

Ministry of Public Health of Ukraine
Ukrainian Medical Stomatological Academy

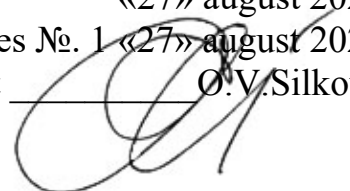
“APPROVED”

at the meeting of the Department
of Medical Informatics, Medical Biophysics

«27» august 2020

Minutes №. 1 «27» august 2020

Head of department _____ O.V.Silkova



METHODICAL INSTRUCTIONS
FOR INDEPENDENT WORK OF STUDENTS DURING PREPARATION
TO PRACTICAL (SEMINAR) CLASSES AND IN CLASS

Academic subject	Safety of Vital Functions. Bioethics
Module No 1	Safety of Vital Functions. Bioethics
Topic	The system "man - living environment" and its components
Year of study	I
Faculty	Dental, Medical
Number of academic hours	2

1. Relevance of the topic:

Problems of safety of vital functions in professional activity of modern doctors have increasing practical significance in connection with global tendencies of deterioration of environmental conditions, worsening of person health and occurrence of a large group of ecologically caused diseases.

2. The aims of the training course:

- To have general knowledge of the topic studied;
- To understand, to remember and to use the knowledge received;
- To learn the knowledge of environment and environmental factors;
- To form the professional experience by reviewing, training and authorizing it.

3. Materials for the before-class work and self-preparation work;

3.1 Basic knowledge, experience, skills necessary for studying the topic in connection with other subjects:

	To know	To be able to
Previous disciplines	Determination of homeostasis, stress.	To identify environmental conditions. To identify environmental factors.

4. Tasks for independent work during preparation for the lesson.

4.1. A list of the main terms, parameters, characteristics that a student should take when preparing for the class

Term	Definition
1. Health	is the state of complete physical, spiritual and social well-being, and not just the absence of illness and physical disabilities
2. Analyzers	is a collection of interacting entities of the peripheral and central nervous system, which carry out the perception and analysis of information about the phenomena that occur both in the environment and in the middle of the organism itself

4.2. Theoretical questions to the class:

1. Negative factors of environment of vital functions and their influence on the health of man. Classification of factors.
2. Description of physical negative factors.
3. Description of biological and chemical negative factors.
4. Dependence of the state on the level of external and internal factors. Role of receptors, in providing of safety of vital functions of man.
5. Natural physiology systems of defense, backlogs of organism.
6. Influence of biorhythms on the level of individual risk. Immunity. Adaptation.
7. Typical models of psychological reactions of organism are in extreme situations.

5. The contents of a theme

Concept of "environment":

There are 3 kinds of environment:

- 1) The internal environment of organism is the internal maintenance, nervous and humoral mechanisms regulation and maintenance homeostasis.

2) The external environment is everything, that is outside of organism and operates on his environments and receptors. From the point of view physiology, internal and an external environment are very individual and dynamical for each person.

3) The environment is everything, which surrounds and influences at the person. It is not individual, and general for a population, in hygiene the basic objects of an environment are: atmospheric air, water of reservoirs, ground and food stuffs.

The term "Human environment" means natural habitant and production activity of the mankind, which comprises the elements of natural and artificial character, which by means of constant influence a human body predetermine physiological processes in the organism, level of health and capacity for work. Human environment comprises two components. These components act differently. They are external environment and production environment.

External environment is a range of factors of organic and inorganic nature which influence the organism and predetermine its health. These factors are external to the organism. These factors are conditions of dwellings, public transport, educational and medical establishments. Production environment is a part of human environment formed by natural-climatic and professional factors. Production environment is manifested only during human labor activity. Besides, there is internal environment. Internal environment of the organism is totality of the liquids (blood, lymph, spinal liquid). This liquid washes the cells of the organism and takes part in metabolism. Internal environment is the medium of the organism, which is delimited from external environment by corneous layer of skin, epithelium of respiratory organs, alimentary canal, urine-genital system, extra- and intrareceptors.

Ecology is a science which studies interaction of the organism and the environment. Ecology comprises general ecology and human ecology. World Health Organization also singles out a subdivision called medical ecology, because more and more human illnesses are connected with ecology. Now there exist about 20-30 % of such illnesses and this percentage is increasing. Medical ecology studies the influence of the factors of human environment and ecological situation on the origin, development and spread of illnesses. In natural conditions development, formation of health and morbidity take place under continuous influence of human environment.

Health is a natural condition of the organism when the functions of all its organs and systems are in accordance with human environment and any morbid changes are absent. Illness is a disruption of physiological functions of the organism which appear due to inadequate balance of the organism with human environment and which are accompanied by inadequate reactions of the organism. Human health is preserved only when human environment is adequate to the physiological needs of the organism and homeostasis of the organism is preserved. Homeostasis is maintenance of a constant composition, structure and characteristics of internal environment and stability of physiological functions. Homeostasis is the physiological basis of health. Both therapy and preventive measures are directed preservation of homeostasis. Dependence of the organism on external environment is so great that it cannot be ignored. More than 50 % of death cases are related to external environment and human behavior.

The influence of factors of the external environment is manifested in 3 forms: indifferent (optimum) influence, pathogenic influence and sanogenic influence. An interval of the factor activity and its intensity which are the most favorable for the organism and under which no disruption of homeostasis arises are called optimum, e.g.: optimum temperature is 15-25 degrees. Beyond optimum limits the impact of the environmental factors causes essential changes of the physiological functions, disruption of vital functions and development of illnesses. In this case human environment is inadequate. Inadequacy can be quantitative (large or small) and qualitative. Example of quantitative inadequacy: the temperature below the hygienic norm (-5) causes overcooling and the temperature above the norm (+35) causes overheating.

The term "qualitative inadequacy" means influence of an unusual factor of human environment, to which the human organism produces no preventive ferment systems, systems of neutralization, and so on, e.g. some chemical substances and pest-killers, antibiotics. They are xenobiotics. Xenoses means strange alien. Biotics are constantly present in the organism (e.g.: protein, fat, etc.). Moreover there is a temporal inadequacy of human environment. It is linked to extremely continuous impact of usual factors to which protective systems do exist. For example,

quantity of oxygen in atmospheric air is 20.9%; if the concentration of oxygen is 16-17 % an organism survives for one hour this concentration lasts for 24 hours, an organism dies.

The same factors can render both positive (sanogenic) and pathological influence. This influence depends on the dose of the factor. Exposure to ultra-violet rays can be indifferent (ultra-violet rays influence 3-5 minutes), favorable (ultraviolet rays influence 10-15 minutes) and unfavorable (ultraviolet rays influence 60 minutes). Beyond the optimum values a complex of human environment, is formed, which has an extreme character. In this case the influence of the factors of human environment causes stress reactions. Four types of stress are distinguished: physical, chemical, biological type and psychological type of stress. Physical stress is caused by the following factors of human environment: noise, vibration, and light impulse, high or low temperature, ionizing radiation. Chemical type includes influence of chemical substances on the human body (for example, chemical burn). Infectious disease is an example of biological stress. Psychological stress is caused by the influence of the psychological factors of external or production environment: information overload or deficiency of information, psychoemotional tension, and lack of time, interpersonal psychological contact at home and at work.

So called geopathogenic zones are of great significance. Geopathogenic zones are limited territories within which a complex of unfavorably influencing factors is formed. These factors promote high morbidity. Canadian doctors were the first to find out endocrine diseases in certain zones of Canada. In St. Petersburg in certain buildings the cancer rate is 70 times higher than in other parts of the city. In certain geopathogenic zones involuntary muscular contractions occur. This factor is responsible for a 50 % higher rate of road accidents.

In terms of safety of vital functions three types of the environment can be distinguished: healthy environment, unhealthy environment and extreme one. Human environment is considered to be healthy if interrelations of the organism and the environment are developing normally; there is no disruption of homeostasis, illnesses are absent and the man fulfils all his biosocial functions. This sort of the environment is called healthy, if interrelations of the organism and the environment are accompanied by deviations in health, this sort of the environment is classified as unhealthy. Extreme environment is one in which human life is impossible or some illnesses prevent the human from fulfilling his biosocial functions.

In practice of safety of vital functions special measures have been developed. They are directed to the prevention of diseases. They are preventive and sanitary measures. Preventive measures are preservation of the environment, its improvement, formation of the optimum environment at work, in educational and medical establishments and rate setting of harmful and dangerous factors of the environment. Sanitary measures are usage of sanogenic factors promoting an increase in bioresistance of the organism to dangerous factors of the environment. During the rate setting 4 levels of influence are taken into account.

1. Optimum level is the one under which the preservation of health and capacity for work are guaranteed given the influence of a certain factor lasts for a long time. This level is set for the whole population.

2. Permissible level. This level of influence of the factor, which guarantees preservation of health and capacity for work, it influences of an unfavorable factor during a limited period of time (during a shift). These norms are set for industrial enterprises.

3. Maximum permissible level (MPL) is the level which allows some reduction in the capacity for work and temporal worsening of health. Such norms are set at industrial enterprises in case of emergencies.

4. Maximum endurable level. It is the level which preserves life under condition of the minimum labor activity. The time of exposure to such conditions is strictly limited. For example, emergency at the Chernobyl Atomic Station in 1986. The time of work of each man was strictly limited, namely 5-10 minutes. After this time the man was changed by another man. Optimum conditions of human environment, their correspondence to physiological needs of the organism are the necessary condition of health, because human can live and survive only under the conditions of being in balance with nature.

The factors determining health of the population.

If all complex of the factors influencing health of the population accept for 100 % they are distributed so:

- 48-53 % — social and economic conditions and a way of life;
- 18-20 % — the genetic factor;
- 17-20 % — quality of an environment;
- 8-10 % — quality of medical aid.

On the various data, occurrence 70 % of all diseases, 60 % defects of physical development and more than 50 % cases of death are caused by environmental contamination.

In Safety of vital functions all variety factors of the environment influencing the person, shares on:

- Physical factors (noise, vibration, radiation),
- Chemical (various chemical substances),
- Biological (microbes, viruses, biological agents etc.),
- Psychogenic (information — high level negative information can give illness or even death of the person),

Kinds of influence quality of environment on health of the population.

1. Direct negative influence:

1) Sharp action:

a) Specific (failures) — at people arise sharp specific intoxications owing to action the big concentration concrete pollutant

b) Nonspecific (provoking) influence (toxic fogs — murderers — in London, photochemical could Los- Angeles type, flashes of a bronchial asthma during the big air pollution);

2) Chronic action:

a) Specific — accumulation in the environment small amounts proof pollutants, bringing in occurrence specific ecologic pathology:

b) Chronic nonspecific action pollution biosphere on health -deterioration all parameters of health of the population, nonspecific diseases, their aggravations etc.

3. The remote and specific effects pollution of biosphere. Allergenic, gonadotrophic, embryotrophic, mutagen, cancerogenic effects of environmental contamination which arise at the population in many years after influence pollutant or in the subsequent generations.

INDIRECT NEGATIVE INFLUENCE of POLLUTION ENVIRONMENT ON HEALTH of the POPULATION

The indirect negative influence pollution expressing in influence on health of the population or a condition of its life through ecological interrelations in a nature (for example, at pollution of an atmosphere the level of a ultra-violet irradiation is reduced — growth a rickets at children, acid rains — destruction a crop, transition pollutant from one object of environment in another etc).

Degrees biological answers of organism of people at influence of polluted environment:

1 — death rate, 2 — disease, 3 — functional attributes of illness without clinic (prepathology), 4 — functional shifts unknown aethiology (a pressure adaptive opportunities), 5 — asymptomatic accumulation pollutant in organism of the person.

Tasks for self-check:

1. What three types of environment are there:

- A. external, production, internal
- B. biological, chemical, physical
- C. specific, nonspecific, chronic
- D. geopathogenic, sanogenic, ecological
- E. atmospheric, biological, ecological.

1. What is the external environment:

- A. everything, that is outside of organism and operates on his environments and receptors.
- B. the internal maintenance, nervous and humoral mechanisms regulation and maintenance homeostasis.
- C. natural habitant and production activity of the mankind

D. natural condition of the organism when the functions of all its organs and systems are in accordance with human and any morbid changes are absent

E. part of human formed by natural-climatic and professional factors

1. What is the internal environment:

A. is totality of the liquids.

B. the internal maintenance, nervous and humoral mechanisms regulation and maintenance homeostasis.

C. natural habitant and production activity of the mankind

D. natural condition of the organism when the functions of all its organs and systems are in accordance with human and any morbid changes are absent

E. part of human formed by natural-climatic and professional factors

2. How many human illnesses are connected with ecology:

A. 20-30 %

B. 15-20 %

C. 40-50 %

D. 35-40 %

E. 10-15 %

2. Ecology is a science which studies:

A. interaction of the organism and the environment

B. illnesses connected with ecology

C. morbidity take place under continuous influence of human environment

D. ecological situation on the origin, development and spread of illnesses

E. influence of the factors of human environment

2. What is Homeostasis:

A. maintenance of a constant composition, structure and characteristics of internal environment and stability of physiological functions

B. natural condition of the organism when the functions of all its organs and systems are in accordance with human environment

7. Literature

Basic:

1. Гігієна та екологія. - Підручник для студ. / За ред. В. Г. Бардова / Англ. мовою. - Вінниця: Нова книга, 2009. - 688 с. Іл.
2. Vladimir A. Korobchanskiy, Michael P. Vorontsov, Alisa A. Musulbas. - Hygiene and Ecology. - Kontrast Publishing Enterprise, Kharkov, 2006. - P. 162-165.
3. David E. Hunt. Person-Environment Interaction: A Challenge Found Wanting before It Was Tried/ Review of Educational Research, Vol 45(2), 1975, 209-230
4. James B. Rounds, Terence J. Tracey. From Trait-and-Factor to Person-Environment Fit Counseling: Theory and Process. – 1990. – 44 p.
5. Susan P. Kemp, James K. Whittaker, Elizabeth M. Tracy. Person-Environment Practice: The Social Ecology of Interpersonal Helping. – 1997. – 267 p.

Additional:

1. Dr. John Everett Park. Preventive and social medicine. Text-book m/s Banarsidas Bhanot. Publishers 1167 PREM Nagar. Jabalpur, 482001 (India) 1997.
2. Brett I. Cassens, M.D., M.B.A., EA.C.P. Preventive medicine and Public health. Harwal Publishing. (Philadelphia. Baltimore, Hong Kong, London, Munish, Sydney, Tokyo). A. Waverly Company-1992.
3. English-Russian Glossary of selected terms in preventive toxicology. United Nations environment programme. Centre of international Project, GKNT. M.: 1982 (Interim Document).
4. O.John M.Zast. Public health and human ecology. - 2nd ed. -Me Graw- Hill, 1987.

The methodical guidance has been compiled by Lienkova O.O.