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INTERACTION OF MICROORGANISMS WITH THE ENVIRONMENT

Learning guide on the subject "Microbiology" for the 2nd and 3rd year English media students of the International Faculty

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Microecology a new scientific and practical fields of biology and medicine, located at the intersection of microbiology, ecology, epidemiology and hygiene, which is important for the further study of clinical microbiology.

The data symbiotic relationships between organisms themselves and with the human body. Paid much attention to positive and negative effects on human health microbiota different environmental habitats and habitats of various human body. The basic methods of sanitary microbiology and virology.

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THE RELATIONSHIP OF MICROORGANISMS AMONG THEMSELVES AND WITH THE ENVIRONMENT

The relationship of organisms with each other and with the environment ecology studies (greek. oikos - house, logos - concept, doctrine). This term suggested in 1866 by E. Haeckel. Microecology examines the relationship between man and the environment of microorganisms and symbiotic relationship with their own microbiota. Range of interests is at the crossroads microecology microbiology, ecology, epidemiology those hygiene.

Sizes microbial ecosystems are very diverse. This could be, for example, pond, lake or root system of the tree. There are some small ecosystems as oral cavity or portion of the intestine. Within each species for ecosystem can describe his residence. This notion of "ecological niche" reflects not just a place of microorganisms in space, and its function or population of microorganisms in the community of organisms. Each species or population in this community performs a specific function, which is caused by the need for food, mobility, modes of reproduction, biochemical, structural features, beyond tolerance to environmental conditions. It may or may not be any kind to perform a specific function in a particular ecosystem depends on the totality of its properties. The degree of adaptability of species to changes in environmental conditions called ecological valence. Environmental valence type of microorganisms also called its ability to colonize environment that is characterized by certain changes in environmental factors. With a variety of mechanisms recycling power supplies and energy and pronounced adaptation to external influences, micro-organisms can live where other forms of life possible. The natural habitat of most of the microorganisms - water, soil and air. The number of microorganisms that live on plants and in humans and animals, much less. Widespread microorganisms associated with them move easily through the air and water; including surface and bottom of freshwater and salt water, and a few centimeters of topsoil are full of microorganisms that destroy organic matter. Fewer microorganisms colonizing the surface of plants, skin and hair, as well as some internal cavity of animals (gastrointestinal tract,

upper respiratory tract). In areas of residence microorganisms form microcenosis. Each microbial community in a particular form cenosis autohtonnye specific microorganisms (from the greek. autos - one, chthon - country), usually they occur. In natural biocenoses (soil, water, air) and rozmnozhayutsya survive only those microorganisms, which contributes to the environment; their growth stops as soon as environmental conditions change. When the favorable conditions they give rise to new clones of microorganisms.

Microorganisms as symbiotic partners

Since time immemorial, have developed complex relationships between microorganisms with higher organisms flora and fauna, on the one hand, and the environment - on the other. Some of coexistence of two different organisms, including microorganism microorganism called symbiosis. Participants called symbiosis symbyontamy. Symbiosis is characterized by different types of biotic relationship with respect to the cells of their host and to each other.

Mutualism – is a form of coexistence when both symbionts - host microorganism and get mutual benefit. In mutualism coexistence creates favorable conditions for both partners, that is mutually beneficial symbiosis. Bacteria produce many kinds of vitamins B6, B12, and vitamin C. An example is the coexistence mutualizmu plants with rhizobia, which feed on plant juices with substances (such as legumes - peas, vetch), and plants, in turn, use nitrogenous compounds, synthesized by rhizobia that are retainers nitrogen.

Commensalism – is a form of cohabitation when one of symbionts (in this case the microbe) lives at the expense of the owner, uses his protection, but the owner does not cause any harm. In commensalism partnership can be beneficial to one of the organisms without harmful effects on the other. Commensal microbes (staphylococci, streptococci) inhabiting as normal microbiota skin and mucous membranes of humans and animals. However, we must admit that commensalism in this case is a relative concept, because among the pathogenic microbiota is such that under certain conditions can cause severe disease.

Parasitism – is a form of coexistence when mikroorhanizmy- parasites feed on host tissue components, thus causing him harm, causing an infectious disease and can not exist without it. Such organisms are called pathogenic. Thus, the environment of the parasite is host organism to which the parasite adapts during evolution. This environment directly affects the parasites as well as parasites affect host. Environment in the usual sense influences such parasites are mediated through the host. Many micro-organisms entering the human body, can not influence each other, ie the interaction between them, such a situation is called neutralism. When neytralizme partners (microorganism and microorganism) can not give each other any effect.

Antagonism – is the opposite effect, mutual opposition. Antagonism of microorganisms - is a complex relationship, when the joint development of bacteria populations of one species or within the same species suppress the development of other, sometimes completely destroying them. Antagonism of microorganisms is widely used to prevent and treat various diseases, especially gastro-intestinal diseases. For example, many strains of E. coli can inhibit growth and kill streptococcus, staphylococcus, salmonella. Antagonistic relationships between organisms are of great practical interest. Antagonism of microbes in the soil have watched L. Pasteur (1870), I. I. Mechnikov (1905) observed antagonism between lactic acid bacteria and putrid. Merit II Mechnikov is that he laid the foundations of the doctrine of antagonism of microorganisms, which now developed into a doctrine of antibiotics.

Synergy – is identical physiological processes of different microbial associations, which resulted in an increase in end products.

Satellizm - a stimulation of the growth of a microorganism products other life, which then becomes his companion.

Among the various representatives of the world of microorganisms have evolved different forms of symbiotic relationships. Mutually beneficial relationships developed between aerobic bacteria that live in the soil, in the department of colon and other substrates. Aerobic bacteria use the oxygen present

in the soil, thereby creating favorable conditions for the development of anaerobes. In turn, anaerobes decompose cellulose to form organic acids, which are the source of energy for aerobic bacteria. With a huge number of microorganisms that live in nature, only a small portion of disease. During the centuries of evolution some species of microbes adapted to extract resources from food inanimate nature, this time remain svobodnozhyvuschymy, other gradually adapted to coexistence with animals or plants and through their get nutrients. In the evolution of parasite adaptation to the host was through specialization, including through the acquisition of the ability parasite in certain tissues, such as the causative agents of brucellosis parasitized in the placenta, salmonella - in the lining of the small intestine. In this case the tropyzme parasites, ie, the ability to selectively affect mainly certain organs and tissues. The variable can be spatial relationship between symbyontamy. If one symbiote is out of another cell, then talk about ektosimbioze, and if within cells - the endosymbioz. Called symbionts of larger host. In infectious diseases, the interaction of different types of microorganisms causes the development of so-called associated infections. Associated infections caused by two or pain pathogens. Association microorganisms - a community of different species existing in natural or artificial conditions.

SANITARY MICROBIOLOGY

Sanitary microbiology - direction of medical microbiology, studying the flora of the environment and its impact on human health. The main tasks of sanitary microbiology:

study microbiocenosis, in which there are microorganisms pathogenic to humans;

development of methods of microbiology external environment, microbiological standards and measures to improve the health of the environment.

Practical sanitary microbiology uses two main methods of evaluation of sanitary-epidemiological status of the environment: direct detection and identification of pathogens indirect signs of their presence in the environment.

Microorganisms which can indirectly judge the possible presence of pathogens in the environment called sanitary and demonstration (SDM). Main characteristics of sanitary-indicative microorganisms:

SDM must constantly live in the human or animal and always stand out in the environment;

SDM should not breed on environmental objects;

Duration of survival SDM in the environment must meet the length of survival of pathogens;

Methods of identification and differentiation of SPM must be simple and reliable.

The presence of MS is determined by two methods:

• direct count of the number of bacteria;

• sowing on nutrient media.

Number of SDM expressed in credits and indices.

Title SDM – the smallest amount of test material (in ml) or number of weight (in grams), which is present at least one individual MS.

SDM index - the number of MS, found a certain extent or amount of the object.

To identify the general microbial contamination determine the overall microbial count (OMC) by counting all microorganisms (grown on nutrient media) in 1 g or 1 ml substrate.

The estimation of population microbiota carried out by determining the level of bacterial contamination in the unit studied habitats:

+ - very weak growth (growth of single colonies - 10 on the cup with the environment) that is less than 10^3 colonies / units;

++ - poor growth (10-25 colonies), which is 10^3 - 5 • 10^3 colonies / units;

+++ - moderate growth (from 50 to 100 colonies), which is 10^4 - 106 colonies / units;

++++ - a massive growth (continuous lawn colonies, beyond counting) which is 10^9 colonies / units.

Calculate the ratio of quantitative dominance microbiota (d) using the formula:

$$d = Pi \times 100\%$$

where Pi - the fate of species (strain) bacteria, calculated as ni / N, ni - the number of bacteria of this type, N - total number of bacteria in the sample is washed away.

Expect index constancy of microorganisms in the composition of the microbiota, as the ratio of the number of microorganisms of this strain to the total number of samples tested. Depending on the value of the index constancy microorganisms distributed constant (index of permanence within which 50% or more), more (the value of the index constancy within 25 - 50%) and casual (index constancy which are within 25% and below).

Soil microbiota.

The soil consists of inorganic chemicals and organic compounds that result from the death and decomposition of living organisms. Soil living organisms in the soil together constitute biocenose. Contained in the soil living organisms (including bacteria) are living a phase of soil. It includes microorganism and microorganisms, both animal and vegetable origin.

Microorganisms that live in the soil are divided into two types:

- autochthonous microorganisms (bacteria resident, resident microbiota), ie germs that are unique to a particular type of soil;

- allochthonous microbes (transient microbiota), ie microorganisms which under normal conditions do not occur in the soil.

Microorganisms in the soil and water in developing colloidal films covering solid particles, especially in the capillary and gravitational water that fills the pores between the mineral particles of the soil and contains dissolved organic and inorganic materials.

In the living soil:

1. Algae (green, blue-green and diatoms). They are ubiquitous, especially in the surface layers of soil. The most important environmental factor governing the spread of algae is moisture, although they are able to withstand long periods of drought. Morphological diversity of algae is very large, but they are microscopic in size, thread-like form and are composed of a single cell. The most numerous blue-green and green algae. Their number in 1 g soil can reach 100 thousand.

2. Mushrooms. They can be divided into three groups: yeasts and yeast, mold, including filamentous fungi, basidiomycetes. Yeast and yeast-like fungi was common in ordinary soil, so their role and importance in the life of the soil are small. Mold and basidiomycetes more numerous in the soil, especially in basidiomycetes forest soils, where they cause the formation of mycorrhizae. Fungi can live in conditions of partial anaerobiosis, but aerobioz stimulates their development. The number of fungi in the soil surface layer of 8 thousand. 1 million. 1 g, and biomass - from 1000 to 1500 kg / ha. The most favorable reaction medium for mushrooms - acidic (pH 4.0).

3. The bacteria (spore-forming bacteria, spirochetes, mycobacteria, psevdomonady, azotfyksuyuchi and nitrifying bacteria, archaea). At the bacteria cultivated soils surpass all other groups of microorganisms, both in number and in their diversity. The number of bacteria in 1 g soil ranges from 300 thousand. To 95 mln. And even up to 4 billion. In the fertile soil total biomass of bacteria reaches 500 kg / ha and more. Bacteria are divided into heterotrophs and autotrophs. Heterotrophs energy use and carbon enclosed in complex organic substances. Autotrofy use the energy released by the oxidation of minerals, extracting carbon from carbon dioxide and nitrogen - mineral compounds. Most of the soil bacteria belonging to heterotrofsd, that demand for its existence hotovs orhanichns rechovynb.

In relation to oxygen soil microorganisms are divided into aerobic (requiring for their existence free oxygen) and anaerobic (not requiring for its existence oxygen free). The greatest value in soil with nitrogen-fixing bacteria able to

assimilate molecular nitrogen (*Azotobacter*, *Nitrobacter*, *Mycobacterium* and others), and spore-forming bacillus genera *Bacillus* and *Clostridium*.

Soil microorganisms involved in the process of soil formation, soil purification, circulation in the nature of nitrogen, carbon and other elements. In the soil there are all conditions for microbial growth, a sufficient number of organic and mineral substances for their food, suitable humidity and reaction medium, protection from direct sunlight, oxygen. Quantitative and species composition of microorganisms in the soil due to it containing organic matter, moisture, pH, temperature, weather conditions, method of treatment. As the number of organic matter in the soil, usually increases and the number of microorganisms. Organic matter is a breeding ground for most soil bacteria. The total stock of soil organic matter reaches 1 400 tonnes per hectare, of which most of the surface layer is in (30 cm) of soil. Main part of soil organic matter - the remains of animal and plant tissues. The live weight of microorganisms in 1 hectare of soil (fertilized) exceeds 5.6 tons. The richest microorganisms black, chestnut soils sirozemy and specially treated soils. The number of bacteria in 1 g of soil sometimes reaches several tens of billions. Poor microbiota sand, rocks and soil devoid of vegetation. The most numerous organisms in the upper 5-15- cm layer, at a depth of less than 20-30 cm and the minimum number at a depth of 30-40 cm. However, the bacteria were found in the soil even at a depth of 5 m. Soils rich in bacteria, biologically active pain . Between the fertility of soil and content in it of microorganisms is a definite relationship. Calculations showed that for every hectare of marginal soils account for 2.5-3 tons of microbial mass vysokorodyuchyh - up to 16 tons. The number of microorganisms in 1 g soil can range from 1-3 • 20-25 • 10^6 to 10^9.

The maximum number of microbes found in the soil at a depth of 10-20 cm. Since the depth of 1-2 m, their number is declining dramatically. This is because with the deepening of the soil organic matter content decreases and oxygen necessary for life aerobic bacteria. The number of microorganisms in the soil increases in the direction from north to south, and in the spring of their number increases significantly, peaking before the summer, fall; winter - dramatically

reduced. Typical soil bacteria include *Bacillus subtilis, Bacillus mycoides, Bacillus mesentericus, Bacillus megatherium*, and thermophilic bacteria and other microorganisms that are sometimes 80-90% of the soil microbiota.

Pollution and soil purification.

Soil populated areas contaminated solid and liquid garbage, human and animal secretions, their dead bodies, the remains of plants, domestic and industrial wastewater. Together with organic contamination in the soil gets a lot of microorganisms. Especially dangerous in epidemiological sewage slaughterhouses, meat processing plants, companies in processing leather, wool, which may contain pathogenic bacteria. In this connection, the soil may be a factor of transmission of infectious agents. Because the soil contamination can occur saprophytic and pathogenic microbes raw food, feed. Therefore scum entering the soil shall be subjected to purification and disposal. The duration of survival of pathogenic bacteria in the soil depends on biological characteristics and habitat conditions. The longest living spore-forming bacteria - pathogens tetanus, botulism; bacilli of anthrax spores may persist for decades. Under favorable conditions micro-organisms in the soil not only survive, but for a long time (weeks, months or even years) retain virulence properties.

Classification of soil pathogens:

- Pathogenic microorganisms live permanently in the soil (eg, the agent of botulism). The bacteria into the soil with feces of humans and animals, their spores stored in it indefinitely.

- Pathogenic spore-forming microorganisms for which the soil is secondary reservoir (eg, anthrax). The bacteria into the soil with feces and other secretions of sick animals, and with the corpses of dead animals.

- Pathogenic microorganisms into the soil with secretions of humans and animals and are kept for weeks or months. In this group are not different microorganisms form spores. The main factors that lead to rapid death of microorganisms - inability to sporogonic and antagonistic properties of soil microbiota (competition for energy and food).

The duration of survival of pathogens in soil depends on the biology of the pathogen, moisture content and appropriate nutrients, pH, temperature, presence of microbes-antagonists, bacteriophages. In wet soils survival 2-4 times longer than dry. Asporogenous bacteria killed rather than sporoobrazuyuschye. Pathogenic microbes asporogenous survive in the soil little time dysentery pathogens - from 10 days to 9 months; vibrio cholerae - from 10 days to 4 months; typhoid bacteria - from 14 days to 10 months; tularemia bacteria - from 10 days to 2.5 months; Mycobacterium tuberculosis - from 3 to 7 months or more; Brucella - 2 to 3 months. Nesporoobrazuyuschyh survival in the soil promotes microbial agent, along with getting enough nutrients (faeces, sputum, pus and so on. D.) The favorable physical and chemical environmental conditions, lack of microbes-antagonists. The most dangerous is soil contaminated with feces of patients with intestinal infections. Pathogens dysentery, cholera, typhoid fever, salmonellosis, enterovirus diseases enter the body with contaminated ground vegetables, fruits and other foodstuffs. A direct correlation between the level of morbidity with intestinal infections and poor sanitary conditions of the soil caused by its poor clearance. We describe a number of water outbreaks of intestinal infections caused by contaminated soil had runoff and sewage. In the soil home to many fungi. Some of them, such as fungi of the genus Fusarium, falling on crops and other plants in its development process, produce toxic substances. When used bread baked from grain threshing and later affected the fungus Fusarium sporotrichiella, there toxicosis in humans, known poisoning "drunk bread". Mushrooms of the genus *Aspergillus* (*A. flavus, A. fumigatus*), parasitic on ground nuts, cereals and fodder, may also form toxic substances - aflatoxin. When eating foods contaminated aflatoksynov there is severe poisoning, characterized by necrotic liver, kidney, hemorrhagic inflammation of the digestive tract.

Soil health assessment for microbiological parameters.

In assessing the sanitary soil into account the results of chemical, microbiological and helmyntolohycheskoho research. Microbiological studies conducted for the health assessment of soil characteristics purification processes,

assessment methods biotermal soil and waste disposal, in determining the suitability of land for construction, as well as epidemiological and epizootic surveys to determine ways of soil contamination, duration of survival of pathogenic microbes in it and t. e. Depending on the task using short or full sanitary-bacteriological analysis of soil. Short sanitary and microbiological analysis involves determining GMC, titles bacteria of Escherichia coli, enterococci, *Cl. perfringens*, thermophilic bacteria, nitrifying bacteria. The results indicate the presence and extent of fecal contamination. A brief analysis of the soil carried out during the current sanitary surveillance of soil.

Full sanitary-microbiological analysis includes identification of all parameters of a short analysis and total saprophytes, OMCH and percentage of spore microorganisms, aerobic bacteria that destroy tissue, bacteria ammonyfykatorov. Also, examine the toxicity to soil microorganisms. Full analysis carried out in the implementation of preventive sanitary inspection, initial inspection when choosing a site for the placement of individual objects.

Sanitary value of soil microbial number can not be considered without taking into account the features of different types of soil. For example, black soil microorganisms contain much more than podzol. Therefore, when determining the total number of bacteria in the soil is necessary to compare the results of unpolluted soil microbial count of the same type. Research on the direct detection of pathogenic microbes in soil is carried out only in the investigation of outbreaks of infectious diseases. As indirect indicators of possible soil contamination by pathogenic bacteria use sanitary indicative microorganisms: bacteria of *Escherichia coli*, *CI. perfringens*, bacteria of the genus *Proteus*, thermophilic bacteria. The presence of soil bacteria of *E. coli* indicates faecal contamination it. Detecting *CI. perfringens* in the soil as it indicates faecal contamination. The soil layer once enriched bacteria of *E. coli* and *CI. perfringens*. After 4-5 months marked dying *E. coli*, a *CI. perfringens* is found in titer of 0.01. Consequently, *CI. perfringens* have sanitary indicative value only if the titer is determined in conjunction with the circle captions and other indicators. Fresh or old faecal

contamination of the soil can be determined by the ratio of vegetative forms of *CI. perfringens* and spore forms of the microbe. Detection of soil bacteria of the genus Proteus indicates contamination of organic substances or animal feces of people. Thermophilic bacteria are indicators of contamination of soil with manure, compost. In pure soil thermophiles do not show.

Methods for determining the composition and activity of soil microorganisms.

To evaluate the use of soil biota indicator of biological activity of the soil. The biological activity of the soil is determined in the following ways:

- Estimates of the total number of soil microorganisms. Due to imperfect methods, this method gives conditional determination, rough characterization of the biological activity of the soil.

- Determination of the number of individual physiological groups of microorganisms, such as nitrifying bacteria.

- Determination of soil carbon dioxide is released - the main biochemical method for determining the biological activity of the soil. The more intense carbon dioxide from the soil, the more place it biological processes, better conditions for the cultivation of crops and their potential yields above.

Of carbon dioxide from the soil surface layer of the atmosphere called soil respiration. The intensity of soil respiration depends on the properties of hydrothermal conditions, nature of vegetation farming practices. Bold carbon dioxide in the soil increases its cultivated due to the activation of biological processes and improving the conditions of aeration. Reduction of carbon dioxide ground (reduced biological activity) may impair the flow of oxygen into the soil, which in turn promotes the formation of toxic substances. To examine soil health assessment tests to identify pathogens. To adequately assess soil has special significance selection indicator microorganisms.

Evaluation of fecal contamination of soil and its limitations is held on the following parameters:

- For bacteria group E.coli index (number of bacteria of *E. coli* in 1 g soil);

- For perfrinhens captions (least amount of soil, which turns *CI. perfringens*);

- For a titer *enterococci*.

All Enterobacteriaceae most long stored in the soil *E. coli*, because its content is judged by the presence in the soil of other Enterobacteriaceae. Thermophilic bacteria into the soil with rotted manure or compost, so they should exercise to ascertain the nature and limitations of organic soil contamination. Fresh manure, sewage usually contain many bacteria group E.coli, but few thermophilic bacteria. As the decomposition of organic matter increases the number of thermophiles. The appearance of nitrifying bacteria indicates the development of self-cleaning process, as they complete the cycle decomposition of nitrogen-containing compounds, converting ammonia into nitrogen. In fresh fecal contamination nitryfikatoriv will not, as a substrate for their development is missing. During the microorganisms that decompose organic matter, ammonia is formed, which stimulates the development nitryfikatoriv. In fresh fecal contamination of soil indicating high titers bacteria group *E.coli* nitryfikatoriv credits at low and relatively high content of vegetative forms of *CI. perfringens*.

Identification of enterococci always indicates fresh faecal contamination, whatever the other indicators. The purpose of the sanitary-microbiological study of soil:

sanitary evaluation of soil settlements and new areas for settlement and placement of buildings;

issues of water supply and wastewater settlements;

sanitary evaluation of soil contaminated with chemicals;

control processes of self-purification of soil that has undergone biological contamination;

Soil epidemiological survey to determine the ways of contamination.

Sampling was carried out with a square section (at least 5x5 m) with 5 points - from every angle and center square ("envelope method"). Sample number 1 kg taken in aseptic conditions with a depth of 20-30 cm. The frequency of monitoring

depends on controlled objects, but at least 1 time per year. In the study of the dynamics of self-purification of soil in contaminated areas taking samples during the first month after the contamination week, in the coming months - 1 once a month during the growing season to the active phase of self-purification.

Microbiota water.

In the seas, rivers, lakes and other bodies of water as well as groundwater contains a large number of species of microorganisms. The combination of all the microorganisms that inhabit ponds, denoted by the term "mykrobyalnoy plankton." Microbiota of natural waters largely depends on their origin. There are fresh and sea water. Fresh waters are divided into superficial, including flow (rivers, streams) and standing (lakes, ponds, reservoirs), groundwater (soil, groundwater, artesian) and atmospheric (rain, snow). Study groups engaged in Water Hydrobiology. The growing shortage of fresh water on Earth makes pay serious attention on the development of the ecosystem in the pond and processing of water pathogens entering the body of water contamination. Water - the natural habitat of microbes, the bulk of which comes from soil, dust settling from the air, waste, sewage and industrial livestock facilities and others. A lot of micro-organisms in open ponds and rivers, they are often found in muddy sediments of oceans, seas, swamps, mineral waters. Their invention as the surface layers, and to a depth of 10 thousand. Meters. Living organisms in hot springs. The process of photosynthesis occurs to them at 75^{O}C and alkaline waters bacteria survive at 100°C. Quality of living microorganisms in water depends mainly on the properties of the water flow to its wastewater and industrial waste. By constantly living microorganisms in water include *Azotobacter*, *Nitrobacter*, *Micrococcus*, *Pseudomonas*, *Proteus*, *Spirillum* and others. Deep groundwater, key, artesian water is almost free of microorganisms. Slightly soiled microbiota precipitation, as snow and water capture most germs the air with dust and after rainfall especially clean air. Character microbiota water features determined by the particular aquatic environment.

Microbiota water form two groups: autohtonous (actually water) and allochthonous (come outside at pollution) microorganisms. Autochthonous microbiota - a set of microorganisms that permanently live and breed in water. Microbial composition of water resembling soil microflora, which faces water (bottom and coastal soil). Allochthonous microbiota - a set of microorganisms that accidentally hit the water and kept it relatively short time.

The proportion of microorganisms in open water variyuyuye widely, depending on the type of reservoir, the degree of pollution, changing weather conditions, seasons. Water Microorganisms play an important role in the circulation of substances splitting organic products of animal and plant origin and providing nutrients other organisms living in the water. The source of water pollution in rivers often serve domestic and industrial waste water. In open water most of the bacteria comes from the soil. Therefore, in lakes, ponds, rivers highest content microbiota noted in the coastal zone. In the water live all known groups of microorganisms, but the most significant component of population water - bacteria. As you know, tsytoplazmatycheskaya membrane of bacteria has the ability to transfer active through the cell wall of nutrients. This bacteria can consume nutrient substrate present in minute concentrations (1-5 mg / d). Microbes mineral compounds to oxidize organic matter in large quantities fall into the water. The degree of contamination, including pathogens, may be an obstacle to the use of water. Therefore, any water source must expose sanitary microbiological assessment.

Self-cleaning water is caused by several factors:

fast current of water, leading to a decrease in the concentration of organic substances;

bactericidal action insolation;

mineralization of organic compounds by microbes;

existence food chain: bacteria - simple - insects - ryba- animals - man;

adsorption of solid particles of sludge;

adsorption of the plants;

the influence of volatile plants.

Water is a factor in the transmission of many infectious disease pathogens. In open water, especially in disadvantaged areas on infectious diseases, detect intestinal pathogens and natural focal infections. In the sediments of ponds and lakes often live pathogens botulism. Pathogenic microorganisms reservoirs may be included in the food chain and transferred them to different groups of animals, birds and fish. We know that waterway transmitted typhoid fever, bacterial and amebic dysentery, cholera, leptospirosis, polio, hepatitis A and E and other illnesses. When the sanitary-bacteriological analysis of water determined:

the total microbial count (total number of microorganisms in 1 ml);

pathogenic microorganisms;

number bacteria group *E. coli* as an indicator of the degree of fecal contamination.

Advanced determine titer *CI. perfringens*, index bacteriophage and Giardia cysts. The presence of pathogens determined by epidemiological indicators. Among the facilities subject to microbiological controls, the most important place is given to research water. In accordance with the existing regulations are subject to control:

drinking water (central and local supply);

water swimming pools;

water open water;

wastewater;

purified water to prepare drugs;

water for preparing injection solutions and eye drops.

The warning surveillance exercise:

1. in matters of water and sewage populated areas;

2. In assessing the sanitary pools, beaches, places of collective recreation.

Current sanitary inspection shall:

1. in assessing the quality of drinking water supply of settlements;

2. in assessing the health status of surface water to establish the impact of biological contamination on the ability of water to cleanse itself;

3. When controlling the disinfection of wastewater;

4. epidemic indications to identify the possible transmission of infectious diseases (sanitary spend detection demonstration and pathogens).

For water sampling is used as reusable and disposable sterile utensils. Multiple made from materials that can withstand dry heat treatment and autoclaving. Capacities for water intake closed tight plugs and protective cap foil or thick paper. Before taking samples of tap water wipe swab moistened with alcohol, and burn, and then 10-15 minutes drained stagnant water in the pipes and then selected a sample for study.

Analysis carried out immediately after sampling. If you need to transport water stored at 1-5º C and analyzed not later than 2-6 hours after its intake.

1. Determination of the total number of microorganisms in the water.

The total microbial count of water is determined by culturing bacteria contained in the samples on solid media. Depending on the alleged contamination of the reservoir before planting prepare Tenfold dilution of initial samples in sterile tap water. Table 1 shows recommended for crop breeding water depending on the degree of contamination (amount of each dilution for further planting in IPA is 1 mL).

Table 1.

Recommended for crop breeding water depending on the degree of contamination (each volume for crop breeding is 1 mL)

Type studied water	Recommended dilution water
Tap water and water from artesian wells	1 ml of water without dilution
Pure water (water wells, springs, etc., the water of swimming pools)	1 и 1:10
Open water, not contaminated effluents	1; 1:10 и 1:100
Pure water bodies in places of mass	1:10 и 1:100

bathing	
Open water contaminated with sewage	1:10; 1:100 и 1:1000
Heavily contaminated wastewater	1:10000; 1:10 0000 и 1:100 000

For dilutions are a number of tubes containing 9 ml of sterile water. Investigated water in volume of 1 ml are making the first tube, getting dilution of 1:10, then this transfer tubes 1 ml to the next, etc. To prepare each dilution using a new sterile pipette. From these dilutions made in 1 ml of water in 2 Petri dishes for calculating the average. and pour 15-20 ml of melted and cooled to 45ºS IPA. The content of the cups thoroughly mixed in a circular motion, moving them on the table surface. After solidification of agar, a cup is placed in an incubator for 24 hours at 37ºC. Colonies of bacteria grow on the surface of the culture medium (aerobes) and its depth (anaerobic). Calculates their total amount and calculate the total microbial count. If pre-diluted water, the resulting amount is multiplied by the degree of dilution and the result is the number of microorganisms in 1 ml of source water. The total microbial count in 1 ml drinking water should not exceed 50.

2. Identification of bacteria of Escherichia coli group.

Sanitary representative microorganisms in water, as well as in the soil, is a group of bacteria Escherichia coli. They also called koliformni. This group comprises facultative anaerobic members of the family Enterobacteriaceae. All have palochkovydnu form, do not form spores, Gram-negative, oksidazoonehatyvni, decompose lactose to acid and gas. Note the temperature at which the most actively manifested saccharolytic properties bacteria of Escherichia coli group. Most are lactose positive 24-48 hours at 37ºC. These bacteria include the general). A distinctive feature termotolerants bacteria is that they decompose lactose to acid and gas at a higher temperature - 44ºC for a short time - 24 hours. Detection indicates faecal contamination of fresh water. E. coli bacteria are a group of different methods. The most common method of membrane filters.

To determine bacteria of Escherichia coli group use this method Zeitz filter device, which before the research wipe swab dipped in alcohol, sterilize calcination and set on Bunsen flask.

Then the device is placed nitratsellyuloznyy or acetate cellulose membrane filter of pore diameter less than 0.45 microns. Such filters are pre-sterilized by boiling. Elected to study the volume of water passed through the filter attaching the device to the vacuum pump. If several water samples analyzed, for each use separate membrane filter. Before new tests filtration apparatus sterilized. After passing through these water filters is placed on the surface of Endo medium in petri dishes, placing them in a nutrient medium filter side up. Cups then incubated in a thermostat at 24 hours 37ºC. The structure of the environment Endo are lactose, indicator and therefore constitute bacteria of Escherichia coli group her red colonies with a metallic sheen. Count the number of colonies, prepare them smears and Gram stain and check oksydaznuyu activity. Oxidase-negative bacteria that decompose lactose to acid and gas discovered in the filter can give a positive response about the presence of water bacteria of Escherichia coli group. In the analysis of drinking water bacteria of Escherichia coli group calculate the amount contained in 100 ml.

For differentiation common bacteria of Escherichia coli group and termotolerants bacteria of Escherichia coli group each colony grown on the filter sown in two test tubes with lactose environment. One of the tubes is heated to 44ºC pre-order in order to inactivate bacteria general. Then this tube incubated at the same temperature for 24 hours. The second tube of sowing put in a thermostat at 37ºC 48 hours to verify the presence of common bacteria of Escherichia coli group.

The polluted water open water pre-diluted, as indicated in the table. 1 and is used to filter the amount of not less than 10 ml. Further research is carried out as described above.

To determine the range of water samples often use two-phase fermentation method.

The first phase (first day) - make crop on the environment Eykman (glucose-peptonne environment) with floats for gas collection and crops pose a thermostat (incubated) at 43^{O}C 24 hours.

For sowing small volumes of water used Eykmana diluted medium (1% peptone; 0,4% NaCl, 0,5% glucose). For sowing large volumes - Eikman concentrated medium containing 10-fold concentration of the main components. Concentrated environment Eikman used for analysis of water. Do took two water samples 100 ml flasks of 10 ml of medium and ten samples of 10 ml of water in tubes with 1 mL of medium. Therefore, the amount sown water - 300 ml: 2 flask of 100 ml and 10 tubes of 10 ml.

The second phase (2nd day) - make reseeding on Endo medium of the flasks and tubes where there is growth of the colonies. Symptoms of *E. coli* growth in the medium Eikman - diffuse turbidity and gas formation. Crops were incubated at 37^{O}C for 24 hours.

The third stage (3rd day) - see crops on the environment Endo. Signs of growth of *E. coli* on Endo medium - smooth formation of colonies of red color with metallic luster. Conduct microscopic confirmation of *E. coli*: from suspicious colonies make paint smears and Gram; gramme observed under the microscope "-" small sticks.

Carry out biochemical confirmation *E. coli* - cytochrome oxidase test. If there cytochrome oxidase - blue paper for 1 minute. E. coli - oksidazonehatyvna. Oxidase test to distinguish *E. coli* from gram but oksidazopozytyvnyh bacteria family Pseudomonadaceae. If detected in smears gram "-" small sticks that are oksidazonehatyvnymy, the analysis is considered positive (conclusion: detected *E. coli*).

Microbiota air

Air microbiota depends on the microbiota of soil and water, where bacteria with the dust and droplets of moisture in the atmosphere are captured. Air - unfavorable environment for the proliferation of microorganisms. Lack of

nutrients, sunlight and drying cause rapid death of microorganisms. Consequently, in the air constantly there are processes of self-purification. The composition of the microbiota air is very diverse - a pigment saprophytic bacteria (micrococci, sartsiny), actinomycetes, molds, yeasts, etc. The greatest number of air containing microorganisms major industrial cities. Air same fields, forests, meadows and expanses of water, the removal of settlements is different comparative purity. Undergoes significant changes microbiota air depending on the season. The maximum number of microbes found in the summer, and the minimum - in winter. Microbiota indoor air is more diverse and relatively stable. Among the microorganisms dominate human inhabitants of the nasopharynx, including pathogenic species that are released into the air by coughing, sneezing or talking. The main source of air pollution pathogenic species - bacteria. The level of microbial contamination depends on the population density, movement of people activity, the sanitary condition of the premises, ventilation, ventilation frequency, method of collection, and so the degree of illumination. D.

Microorganisms in the air in a state of aerosol. Aerosols - colloidal system consisting of air, liquid droplets or solid particles, and includes a variety of microorganisms. The size of aerosol particles ranging from 10 to 2000 nm. When sneezing may form up to 40,000 droplets. There are three main phases of bacterial spray:

drip phase consists of bacterial cells, surrounded by water and salt tablets. Diameter of about 0.1 mm. Length of stay in the air is a few seconds;

shallow nuclear phase particles formed by the drying of the first phase. In this phase particles have the smallest size, easily moving streams of air are continued in limbo. That's how most pathogens spread airborne infections;

phase "bacterial dust" consists of large bistro deposited particles forming dust that could rise into the air.

Pathogenic and opportunistic microorganisms in the air come from drops of human saliva or animals when talking, coughing, desquamation of epithelial cells in the skin. Transmitted through the air:

bacteria - *Mycobacterium tuberculosis*, diphtheria, pertussis, spore forms of bacteria etc.

viruses - pathogens of acute respiratory infections (varicella, influenza, parainfluenza, and others.);

mushrooms of the genus *Aspergillus*, *Mucor*, *Penicillium* and others.

To assess the sanitary condition of indoor air determine the total microbial count and the number of sanitary indicative microorganisms which are hemolytic staphylococci, α- and β- hemolytic streptococci. If necessary, for example, surgical hospitals, maternity hospitals additionally determine the presence and amount of *Pseudomonas aeruginosa* and others. Opportunistic gram-negative bacteria - pathogens of nosocomial infections.

The number of bacteria and the number of sanitary indicative microorganisms determine their quantitative content in 1 m3 (1000 liters) of air.
Currently, there are many methods and devices for air sampling and their research. The most simple and affordable for sanitary-bacteriological study is sedimentation and air aspiration techniques.

Koch sedimentation method based on spontaneous microorganisms settling under gravity on the surface of the culture medium open Petri dish.

To determine the total microbial number two petri dishes with sterile MPA left open for 10-30 minutes. Then they close, nadpysuyut and incubated in a thermostat at 37ºC within 24 hours. Then crops can withstand 24 hours at room temperature to detect fungi. Thus, after 48 hours count the total number of colonies that grew on the cups. Comes from the fact that for 5 min. the surface 100sm2 dense medium are deposited bacteria with 10 liters of air (Omelyanskiy V.L.), or use the data in Table 2.

Table 2

Calculation of microorganisms in 1 m3 of air

The diameter of the cup, sm	Area cups, sm^2	The coefficients for calculating the number of microorganisms in 1 m^3 of air

8	50	100
9	63	80
10	78	60
11	95	50
12	113	45

Example: in the cup with a diameter of 10 cm 40 colonies grew, so, the number of microorganisms in 1 m3 of air is 40 x 60 = 2400.

To identify sanitary-indicative microorganisms using special culture media: for staphylococci - yolk-salt agar (exposure 15 min) to hemolytic streptococci and staphylococci - blood agar (exposure 10-15 minutes) for mushrooms - medium Saburo (crops stand 3- 5 days at 20-22 ° C).

Aspiration method is based on the air stream of impact on the surface of the culture medium to which microorganisms settle. It is conducted using the apparatus Krotov or its modern versions. They consist of a hub for air sampling, micromanometer and electric motor. The phone Krotov node sampling is mounted in a metal casing and a centrifugal fan, ground clamps for installation of the Petri dish, cover with pleksyhlaza, which cut wedge gap for air intake. On the playground set open Petri dish with nutrient medium, close lid and include motor vehicle. Turning the centrifugal fan air is sucked through the gap wedge and force hits the surface of the culture medium in which microorganisms are deposited uniformly distributed on it. Rotation speed adjustable Petri dishes, allowing you to pass different amounts of air per minute, which is fixed micromanometer. After a specified exposure time turn off the engine, a petri dish with sowing air is removed, close and put in an incubator.

To determine the total microbial numbers using MPA, the speed of air passing through the apparatus 25 liters / min. 4 min of exposure, which ensures sedimentation of microorganisms on the amount of at least 100 liters of air. To identify Staphylococcus aureus using the yolk-salt agar, hemolytic streptococci and

staphylococci - 3-5% blood agar and exposure time increased to 10-15 minutes, providing bacteria with sowing 250-300 liters of air.

Sowing air spend two petri dishes with agar IPA and grow 48 hours (24 hours in a thermostat at 37ºC, then stand 24 hours at room temperature). Petri dishes with blood agar ynkubyruyut 37ºC in a thermostat at 24 o'clock. Count the number of colonies that grew and the data transfer for 1 m^3 studied air.

Example calculation: on one Petri dish with counting colonies detected 246, the second - 254, an average of 246 + 254 = 250 colonies. The device rotating Petri dish for 2 minutes at 25 l / min. There were missing 50 liters of air. Thus in 50 liters of air contains 250 microbes in the general microbial count in terms of 1 m3 of air (250 • 1000): 50 = 5000 bacteria.

The study of quality of the microbiota carried by conventional techniques: from the colonies make smears, Gram stain, isolated pure culture, which identify. In the study of air additionally determine spore-forming anaerobes. For this purpose, make planting air volume of 200-300 liters per petri dish with iron-sulphite medium is incubated in a thermostat at 37ºS 24 hours. To detect mold sowing air Saburo have on the environment and cultured 3-5 days at 20-22 ° C.
Acceptable levels of bacterial contamination of air environment of different areas of medical institutions and pharmacies are presented in Table 3.

Table 3

Acceptable levels of bacterial contamination of indoor air treatment facilities depending on their grade of cleanliness and functionality

Class of cleanliness	The total number of colonies of microorganisms in 1 m^3 of air	Number of colonies of S. aureus in 1 m^3 of air	Number of colonies of mold and yeasts 1 dm^3 air
Class A (Super purity)	No more 200	There should be	There should be
Class B (clear)	No more 500	There should be	There should be
Class C	No more 750	There should be	There should be

(conditionally clean)			
Class G (contaminated)	not standardized	not standardized	not standardized

Notes:

Class A - operating, delivery rooms, aseptic boxes wards for premature babies;

Class B - procedural, dressings, perioperative, intensive care wards and rooms, children's Chamber;

Class B - Chamber of patients, review, ordynatorski, material, barns clean linen;

Class D - hallways, stairways, sanitary rooms, toilet rooms, dirty laundry and temporary storage of waste.

Microbiota of the human body

In humans live about 500 species of microorganisms that form its normal microbiota. Microorganism and its microbiota in normal conditions in a state of dynamic equilibrium (eubioza), which has developed in the course of evolution. The open habitats, which communicate with the external environment is - skin located to the glottis respiratory tract, mouth, gastrointestinal tract, mucous membranes gas, nose, anterior urethra, vagina. They colonized by microorganisms, mostly bacteria.

Protozoa and viruses are far fewer species. Normally free from microorganisms - blood, cerebrospinal fluid, synovial fluid, bone marrow, abdominal cavity, pleural cavity, the uterus.

As already mentioned above the natural microbiota any habitat depending on the value of the index is divided into permanence resident (or constant), optional (or more) and transient (or random). If the permanent members of the microbiota contains specific to this habitat, it consists of random individuals listed outside.

Thus, in the gastrointestinal tract may be extraneous organisms caught from food or drink. Skin most commonly kontaminiruyutsya random microbiota from the environment. In the trachea, bronchi, lungs, esophagus can also occur transient microbiota.

Permanent microbiota particular habitat is relatively stable in composition. However, the structure and components of the physiological role of microorganisms is not equivalent. Therefore, regular microbiota distinguish two factions: oblyhatnuyu and optional. Obligate microbiota is the main component of any mykrobotsenozov, it prevents colonization habitat random microorganisms involved in the fermentation process, ymmunostymulyatsyy, that perform protective functions or normofiziolohicheskie. Share obligate microbiota in healthy biological community composition several times higher than the proportion optional fraction. For example, the concentration of bifidobacteria in the colon reaches 10^9-10^{12} colony forming units (CFU) - the number of colonies growing in a nutrient medium at sowing 1 g or 1 ml of the material. In determining the concentration of microorganisms take into account that each live bacterial colony forming cell).

Optional microbiota is less than residents of habitat, the maximum concentration of individual representatives not exceed 10^3-10^5 CFU / g. If permanent microbiota manifests itself mainly brodylnoy activity (ie splitting of carbohydrates with the formation of acid products) is optional fraction very active in putrid processes.

Composition normal microbiota of the human body

Microbiota of skin.

The skin is the biggest area of the human body, available for regular contact with environmental pathogens. The composition of the resident microbiota skin are Gram-positive saprophytic bacteria - staphylococci, micrococci, nonpathogenic corynebacteria. To include transient microbiota sartsiny gram, *Staphylococcus aureus*, fungi of the genus Candida, molds. Thus, the composition of the skin

microbiota represented as aerobic and anaerobic species. The main areas of colonization - surface dead cells of the epidermis, the mouth of the hair follicles, sebaceous glands. At one cm2 of skin can be 10 thousand. 1 million. The bacterial cells. Bacteria break down the secrets of the sebaceous glands to unsaturated fatty acids, with a shift towards the acidic pH. Acidic reaction medium and metabolic products of Representatives normal microbiota have unfavorable conditions for pathogenic bacteria that are on the surface of healthy skin die quickly (within 5 minutes). With the weakening of defense reactions of microorganism on the skin increases the number of Gram-negative bacteria, including Escherichia coli (E. coli).

Microbiota of the upper respiratory tract

Most colonized the upper respiratory tract, are anatomically adapted for deposition of bacteria from inhaled air. Rezydentnaya microbiota the nasal cavity and nasopharynx represented by gram-positive streptococci viridans and nehemolytycheskymy, peptostreptokokki, micrococci, staphylococci, lactobacilli. From here hramnehatyvnyhmikroorhanizmiv live non-pathogenic and anaerobic neyseriyi asporogenous sticks - bacteroides.

Microbiota of the gastrointestinal tract.

Mouth - one of the most populated areas of the human body, there appears some 300 species of microorganisms (Table 4). In the mouth living representatives of all morphological forms of bacteria: cocci, bacilli, spirochetes form and protozoa, fungi, viruses. High oral contamination promote its anatomical features - the presence of gingival pockets, folds mucosa, interdental spaces - a large number of nutrients, alkaline environment, sufficient supply of oxygen.

Table 4

Microbs landscape oral cavity healthy

Мікроорганизми	%
Streptococci	100

Lactobacilli	90,3
Staphylococci	40,7
Fungi genus Candida	25,7
Bacteroides	21,0
Corynebacteria	13,1
Neisseria	6,9
Veilonella	5,3
Lepthotrichia	4,5
Fusobacteria	3,5
Actinomycetes	3,0
Spirochaetes	2,7
Micrococci	2,0
Simplest	0,9

To obligate microbiota relates primarily bulk Gram-positive cocci, represented heterogeneous group streptococci. This group includes Str. salivarius, Str. sanquis, Str. mutans. They differ in their ability to ferment carbohydrates and form hydrogen peroxide. The shift towards the acidic pH leads to decalcification of the enamel. Important as the ability to synthesize streptococci from sucrose polysaccharides. This part of the molecule Glucose is converted to insoluble dextran, which promotes the formation of dental plaque. Streptococci found in the mouth in different proportions, depending on diet, oral hygiene, age and other factors.

Gram-negative anaerobic cocci are born Veilonella. They are well laid lactate, pyruvate, acetate and other carbohydrates to carbon dioxide and water. By catabolism of lactic acid formed streptococcus, veylonelly can provide protyvokaryoznoe action.

Gram-positive rods are in the mouth comes Lactobacillus. They decompose carbohydrates to form lactic acid, while maintaining viability at low pH. The most

commonly in the mouth of healthy individuals are L. casei, L. acidophylius, L. salivarius.

Gram-negative anaerobic and microaerophilic bacteria often belong to the family Bacteroidaceae. They ferment sugar to gas and peptone - with the formation amino acids. For this family includes three types: Bacteroides, Fusobacterium, Leptotrichia. The most common B. melaninogenicus and B. gingivalis. They are characterized by low saccharolytic activity, but glucose decompose to form a mixture of acids and pH is quite high. These types are permanent residents gingival pockets. The presence of proteolytic enzymes in bakteroydov is of great importance in the pathogenesis of periodontal diseases.

Reed presented Fusobacterium fusiform sticks. They form a peptone glucose or lactic acid. Fuzobakterii live in gingival pockets in association with the spirochete.

With family Actinomycetaceae oral most common genera Actinomyces and Bifidobacterium. The first fermented carbohydrates to form acidic products without gassing. The final products of glucose cleavage are acetic, lactic, formic and succinic acid. Have weak proteolytic activity. Actinomycetes are on the mucosa of the mouth, form the stroma of tartar and part of the plaque. Along with this, they are in the cavities of teeth in pathological gingival pockets in the ducts of the salivary glands.

In the mouth there are bacteria genus Corynebacterium. A characteristic feature is their ability to reduce the redox potential, thus creating conditions for the growth of anaerobes. If periodontal diseases are found in association with fuzobakteria and spirochetes.

Spirochetes that live in the mouth, belong to three families: treponemy presented oral species T. macrodentium, T. denticola and T. orale. They differ from each other in the formation of lactic, acetic and other acids and carbohydrate utilization. Boreliyi presented oral B. buccalis, often found in association with fuziformnymi bacteria.

In the mouth there mycoplasma - rale M. and M. salivarius. They hydrolyzuyut arginine, which does not ferment glucose and differ in some biochemical characteristics.

Of all the factors that determine the nature and state of the microbiota of the mouth, saliva is crucial. The most important factors in this respect saliva is the intensity of its formation, viscosity, content of mineral components, ion potency, buffer properties, pH, major metabolites, presence or absence of salivary gases, organic composition (particularly amino acids, polysaccharides, vitamins, purine, pyrimidine) , antibacterial properties (lysozyme, secretory antibodies, white blood cells).

At 1 mg of plaque, according to different authors, contains from 5 to 800 million. Microorganisms. Microorganisms plaque divided into two groups: 1 - acidophilus bacteria, which include species are able to grow in an acidic environment; 2 -proteoliticheskie microorganisms producing proteases.

The first group includes milk - sour streptococcus, lactobacillus, actinomycetes, leptotrihiy and Corynebacterium. Streptococci, Corynebacterium and actinomycetes may develop in basic environments. In this case, because of its ability to synthesize lactic acid they quickly neutralize the environment. Among acidophilus bacteria is atsidohennym that are able to synthesize sucrose with a large number of lactic acid (sometimes vinegar).

All of plaque streptococci are divided into groups: Str. salivarius, Str. mitis, Str.mutans. Str. salivarius easily determined morphologically form colonies that formed on the gelatin containing 5% sucrose: large slimy colonies that contain large amounts of Levante. These streptococci in plaque found in small quantities, but a lot of the mucous membranes and saliva.

Str. mitis make up the bulk of streptococci isolated from plaque. They are very heterogeneous, are a group of viridans streptococci and have weak biochemical activity. Only a few strains of Str. mitis able to synthesize extracellular polysaccharides. Str. sanguis is the second quantitative content in plaque.

The most interesting type of milk - sour streptococci are Str. mutans due to its pronounced kariyesohennymi properties.

Among acidophilus bacteria of dental plaque, 15% are filamentous form (actinomycetes, lactobacilli and leptotrihiy). Actinomycetes form levaniny; lactobacilli do not form extracellular polysaccharides, except Lactobacillus casei, which can form some capsular polysaccharides; leptotrihiy do not produce polysaccharides; the second group of bacterial plaque up anaerobes that use food proteins and amino acids. Number of anaerobic bacteria in plaque decreases in the use of sucrose and increases in the use of maltose.

In non-carious dental plaque make the most of veyllonelly, neyseriyi and lowest -spirohety. In carious dental plaque bacteria are the main proteolytic ristelly. In the above microbiota in dental plaque found and other microorganisms, particularly yeast-like fungi, difteroyidy, staphylococci. At all stages of the dental plaque it is dominated by streptococci.

The bacteria are found mainly in three areas:

1) in dental plaque on teeth crowns, and in case of caries - a cavity;

2) hinhivalnyh furrows;

3) on the back of the tongue, especially the back of its departments.

According to different authors, the number of bacteria in saliva range from 43 million to 5.5 billion in 1 ml, an average of 750 million to 1 ml. Microbial same concentration in the plaques and hinhivalniy furrow almost 100 times higher. About half of the residents are optional and obligate anaerobic streptococci, which includes in its membership Str. mutans, Str. mitis, Str. sanguis peptostreptokokky. R-hemolytic streptococci is not part of the resident flora. Different types of streptococci occupy a niche, such as the largest number of enterococci were found on the back of the tongue and hinhivalniy furrow, Str. mutans in plaque usually located on crown.

The other half of the resident flora consists of veyllonel (about 25%) and dyfteroyidiv (about 25%). Staphylococci, lactobacilli, flagellated bacteria, spirochetes, leptospira, fuzobakterii, bacteroides, neyseriyi, spiral shape, yeast,

other fungi, protozoa found in the mouth in much smaller quantities. Although these organisms are always present in the mouth, they are never so well represented as streptococci, veyllonelly, diphtheroids. These data indicate that it is necessary to distinguish between major and minor members of the resident microbiota.

Uneven microbial density different biotypes mouth, indicates the presence of space-reproductive groups of microorganisms. The greatest microbial density, high ecological significance pathogenic flora and smallest species diversity index suggests plaque most important in the epidemiological sense.

Among the resident microbiota composition of the oral microbiota dominant form Str.salivarius, Str.sanguis and lactobacilli. Their combination define individual tsenotip, and with it the distinctive features of a particular ecosystem. By number of dominant microbiota in tsenotypi divided into polidominantni, monodominant and adominantni. Individual tsenotyp microbiota form plaque streptococci (Str. Salivarius, Str. Sanguis) and lactobacilli, so their presence in tsenotypi is paramount.

Tsenotyp plaque healthy individuals, which is dominated Str. salivarius, Str. sanguis and lactobacilli normotsenozu refers to the first order, which is the most physiological.

The appearance in microbiocenosis Str. mitis and changing the proportions between the main representatives tsenotipa characterizes normotsenoz second order.

Tsenotypi presence in healthy individuals and opportunistic pathogenic species (Str. Mutans) staphylococci, fungi of the genus Candida) refers to normotsenozu third order, is regarded as dysbiotic reaction.

The characteristic allows oral microbiota present its structure in general and grasp the main trends in the considered states. In fact, this collective image of the oral microbiota, which can vary from individual to individual cases. Meanwhile, in practice there is a need of clinicians in the assessment of such individual ecosystems.

Since *Str.salivarius* prevails as the index of constancy, and on population levels of biotope and has a high antagonistic activity to most other bacteria of the oral cavity, its presence in tsenotypi biocenotic determines the nature of the relationship. Therefore tsenotipy, which include the salivary streptococcus, were attributed to tsenotipiv first order. The balance of the ecosystem observed at oral tsenotypi consisting of *Str.salivarius*, *Str.sanguis*, lactobacilli and often achieved at the expense of dominant. However microbiota met where found along with other dominant species within the taxonomic community structure. Their expression probably reflects the change in proportions between tsenotypa happens within normotsenoza because not accompanied domination unusual types and causes exceeding the threshold density of bacterial populations.

Options, which took place *Str.salivarius*, *Str.sanguis*, made up the second group - tsenotipom microbiota of the second order.

The indicators of decompensation microbiota or dysbiosis is or reduce species diversity index lower than 1,71 lg CFU / h, or the appearance of unusual microorganisms for plaque microbiota of healthy people, such as Str. pyogenus, enterobacteria, peptostreptokokki and others.

Study tsenotipa individual options and their ecological characteristics can create estimation algorithm oral microbiota. It can help you determine the five states of ecosystems eubioza first order designating quantitatively and functionally balanced normotsenoz to dysbiotic reaction - community compensated quantitative or qualitative imbalance. Two state normotsenoza first and second order reflects the effectiveness of substitution missing components tsenotipa. Existing options normotsenoza are gradations of violations biocenotical relations of harmony (normotsenoz first order) by discomfort (normotsenoz second order) to disharmony (normotsenoz third order or dysbiotic reaction). The criteria for the latter are not randomly selected species and the presence of unusual species diversity index below 1,71 lg CFU / h. These figures indicate a breach spatial and functional structure of ecosystems when homeostatic mechanisms lose their ability to return to its original level and it goes on controlled state.

The study of oral microbiota.

To study the qualitative and quantitative composition of the oral microbiota studied plaque, mucous cheeks, gums, palate, the surface of the tongue and oral liquid.

Plaque is going to study a sterile excavator. The resulting material is weighed on an analytical balance with subsequent dilution of 1: 100 to 1: 1000 and crop nutrient media.

Collecting the material from the mucous membranes of the tongue and held a sterile cotton swab from an area 1sm2 and subsequent hanging on nutrient media. Oral fluid collected in a sterile tube, 0.1 ml investigated.

To study the oral microbiota, the following nutrient medium: 5% blood agar for counting the total microbial contamination, the yolk-salt agar - for staphylococci, broth and sugar "Mitis Salivarius Agar" - for streptococci, vegetable -molochni environment for lactobacilli, Saburo with polimeksyn - for fungi of the genus Candida, Wilson - Blair for anaerobic, environment Endo - for Enterobacteriaceae. Crops stai 24 hours in an incubator, the medium Saburo about 5 days. Identification of selected strains carried on the basis of morphological, cultural and biochemical characteristics of bacteria according to the determinant D. Berg.

Quantifying the density of populations of various environmental groups carried out by counting CFU in one gram of plaque, 1 ml. oral liquid per 1 cm2 surface of the tongue and mucous membranes of the cheeks, gums and palate.

General characteristics of the population of different habitats microbiota of the oral cavity is presented in Table 5.

Esophagus and stomach in healthy people has no permanent microbiota. The esophagus of healthy people not contain microorganisms or very little (*Candida albicans, Actinomyces israelii*). In the stomach, got accustomed yeast (*C. albicans*, *C. tropicalis*); sarcine (*S. ventriculi*); campylobakteria (*Campylobacter fetus*, *H. pylori*); rarely find lactobacilli, staphilo- and streptococci.

Table 5

Population levels of oral microorganisms, CFU / units.

Biotope oral cavity	Microorganisms		Fungi genus Candida	CFU
	Gr+	Gr-		
dental plaque	$8,50x10^4$	$4,69x10^2$	$4,09x10^2$	$8,59x10^4$
Oral liquid	$7,52x10^4$	$3,12x10^2$	$3,17x10^2$	$7,53x10^4$
The surface of the tongue	$7,58x10^4$	$1,68- 10^2$	$4,80x10^2$	$7,64x10^4$
The mucous membrane of the cheek	$1,14x10^4$	$1,38x10^2$	$3,17x10^2$	$1,15x10^4$
Gums	$2,70x10^3$	$0,73x10^2$	$2,24x10^2$	$2,72x10^3$
Palate	$1,12x10^3$	$0,60x10^2$	$1,86x10^2$	$1,14x10^3$

In the small intestine is 10^5-10^8 organisms per 1 ml content. Here are bifidobacteria, lactobacilli, clostridia, enterococci. In the colon there is the largest number of microorganisms. 1 g of feces to 1012 contains microbial cells. About 95% of all microorganisms constitute asporogenous anaerobic bacteria. The main representatives microbiota of the colon are:

Gram-positive anaerobic bacillus (bifidobacteria, lactobacilli, eubacteria); Gram-positive anaerobic spore-forming bacillus (*Clostridium perfrinhens*);

Gram-negative anaerobic bacillus (bacteroides); Gram-negative facultative anaerobic bacillus (*Escherichia coli* and similar bacteria with them - *Klebsiella*, *Proteus*);

anaerobic gram-positive cocci.

In smaller quantities are fusobakteria, Proteus, veylonelly, staphylococci, *Pseudomonas aeruginosa* and yeast-like fungi.

The most numerous and diverse microbiota of the colon. The bulk of its weight up anaerobic microorganisms: Bifidobacterium spp., Bacteroides spp. The share of these two families account for 96-99% of all bacteria that inhabit the colon. Here vegetate significant number of Escherichia spp. , Enterococcus spp. , Lactobacillus spp. The residual flora of the colon up numerous species of Clostridium, Staphylococcus, Proteus, Candida, Enterobacter, Pseudomonas, Veillonella, Peptococcus, Peptostreptococcus, Actinomyces and others. Total more than 260 described species of bacteria. In some people in the gut are enteroviruses, which are in violation of the resistance of the organism can cause various diseases. In some cases, the stool can detect various types of protozoa.

Persistent disruption of normal microbiocenosis called dysbiosis. It is changing the very structure avtoflory and proportion of its individual representatives: a significant reduction of the normal microbiota species until their complete disappearance or appearance of a large number of those who normally rare. This is mainly staphylococci, gram-negative bacilli, fungi Candida and Clostridium.

The need to investigate intestinal dysbiosis occurs when long-term diarrhea, which do not emit pathogenic enterobacteria, after the transfer of intestinal infections with a long period of convalescence, prolonged antibiotic therapy, malignant tumors before surgery on abdominal cavity in premature newborns and in diseases difficult to treat (enterocolitis, ulcerative colitis, cholecystitis, etc.).
Material from the stomach and small intestine are using special probes or capsules that open in a certain department tract and closed after sampling. Recently for this purpose and widely used Fibergastroscopes hastroduodenoskopy that allow to the analysis not only of the stomach or bowel contents, but they mucosa biopsies. Material from the sigmoid and rectum are tampon tube Tsimana, kolonofibroskopom or rektoromanoskopom.

In the diagnosis of intestinal dysbiosis exploring cal. Its made of pre-weighed bottles in an amount of 0.5-1.0 g without preservative and transported to

the laboratory within 2 hours of collection. An appointed stool sample is diluted with a special buffer from 10^{-1} to 10^{-12}.

From 10^{-3}-10^{-6} dilutions on 0,1sm^3 sown on medium VSA (to identify staphylococci), blood agar (for enterococci and detection of hemolytic forms), Saburo (for mushrooms), Wilson-Blair (for clostridia).

From 10^{-5}-10^{-8} dilutions on 0,1sm^3 sown on Endo medium (for Enterobacteriaceae), MPC-2 and MRS-4 (for lactobacilli) and dilutions of 10-7-10-10 of 1.0 cm3 Blauroka sown on the environment, which is poured high column (for bifidobacteria), and special protection for Bacteroides.

For detection of pathogenic enterobacteria native liquid feces, or from dilutions 10-1, bacteriological loop wreaked on the environment Endo, Ploskyryeva and bismuth-sulfite agar. 1-2 10-1 sm^3 of breeding sow to enrich the environment (Muller, selenitovyy magnesium or broth). The composition and method of production of culture media is given in the instructions for diagnostics dysbacteriosis.

Crops for growing facultative anaerobic bacteria were incubated at 37 ° C for 24-48 hours, bifidobacteria - 48 h, anaerobic - 4-5 days in anaerostatah mushrooms - 96 hr at 28-30 ° C. After identification of isolated cultures carried out calculations of microorganisms of a group of 1 g of faeces.

Urinary tract microbiota.

Parenchyma of the kidneys, ureters, bladder, urine, uterine cavity and fallopian tubes in healthy people free of germs. In the outer part of the urethra and genitals of men and women are Mycobacterium smegmatis, a small amount of staphylococcus, streptococcus, peptokokki, peptostreptokokki, Corynebacterium, bacteroides, fuzobakterii, fungi genera Candida, Torulopsis, Geotrichum.

In the vagina of healthy women predominate lactic acid bacteria (bacillus Doderlayna) dyfteroyidy and gram Comma variabile. Much less show strepto-, stafilo-, peptokokki and Clostridium. In 15-20% of pregnant women found Streptococcus agalactiae, very dangerous for babies. The presence of Gram-negative bacteria are a consequence of fecal contamination.

Portia first morning urine (3-5 cm3) are in sterile dishes from the mid urination, and no later than 1 hour crop carried out to quantify the microbiota or calibrated platinum loop (diameter 2 mm) on agar in petri dish, or 30 cup capacity cm3, the walls of which are breeding ground area of 12.5 cm2. Environment pour a measured amount of urine, then it is poured (method Neycheva). After incubation count the number of colonies crops and determine the number of bacteria in 1 cm3 of urine. The critical (dangerous) level of bacteriuria - 105 or more.

The material for the study of vaginal microbiota and determine the degree of purity of vaginal contents are Volkmann spoon, spatula or zholobopodibnym probe from the rear vaginal vault and put a thin layer on a glass slide. Smear record 10 minutes in a mixture of Nikiforov, stained by the Gram method and examined under immersion system.

Pregnant women define four degrees of vaginal secretion purity:

first - single desquamated epithelial cells, many sticks Doderlayna no white blood cells;

second - epithelial cells, sticks and Doderlayna Comma variabile, isolated white blood cells;

third - rarely sticks or Doderlayna Somma variabile, many leukocytes available coccoid microbiota;

fourth - none Doderlayna sticks and Comma variabile, many leukocytes available hnoyeridna microbiota.

The first and second degree of purity found in healthy women considered the norm; third and fourth - a pathological condition characterized genitals and sanitation needs before delivery.

Age-related changes in the microbiota.

A child is born sterile, but passing through the birth canal, captures accompanying microflora. forming microbiota carried out through contact with microorganisms newborn and the mother of the environment and health as defined environment in which the child was born, the type of feeding. Up to 3 months of life the child is normal microbiota similar to the microbiota adult. First, after the

birth of the child mouth inhabit aerobes, which after teething replaced anaerobes. When breastfeeding gut microbiota basis of the child are bifidobacteria and lactobacilli. When artificial feeding in premature and weak children disturbed reproduction of bifidobacteria, and increasing the number of gram-negative bacteria (E. coli) and cocci. These children often get sick.

The value of the normal microbiota of the human body.

Normal microbiota performs important physiological functions and is involved:

in metabolism - regulation of intestinal gas in the cleavage of proteins, lipids, nucleic, fat and bile acids;

regulation of motor functions in the intestine;

the synthesis of vitamins B, C, nicotinic, folic acid;

in the detoxification of endogenous and exogenous toxic products;

in the process of formation stimulation of the immune system in infants and maintaining immune status in adults.

But the most important feature is its normal microbiota involved in colonization resistance. Colonization resistance - a combination of antagonistic properties of normal microbiota to prevent colonization of mucosal third party, including pathogenic or opportunistic microorganisms. Antagonistic activity of normal microbiota implemented through the following mechanisms:

1. The formation of acid products that inhibit the growth of competing microorganisms (lactic acid, acetic acid). Wednesday Acid prevents reproduction of pathogenic and putrefactive microbiota stimulates peristalsis;

2. Biosynthesis of substances with antibiotic activity (bactericins);

3. Competition bacteria in food substrates;

4. The competition area for adhesion to epithelial cells.

Violation of normal microbiota.

In various diseases disrupted quantitative and qualitative value of Representatives normal microbiota that promotes growth of pathogenic and

opportunistic microorganisms. In this case, developing pathological process called dysbiosis (dysbiosis).

Dysbiosis - a quantitative and qualitative change of the normal microbiota, leading to the development or worsening of the pathological process. Causes of dysbiosis:

gastro-intestinal tract infectious or non-infectious nature;

irrational use of antibiotics and chemotherapy;

inadequate (unbalanced) diet (especially in children 1 year of life)
malignant neoplasms;

surgery;

hormonal disorders;

immunodeficiency states.

Thus, dysbiosis - is not an independent disease, but a state body, which can occur in patients with different diagnoses.

Examples dysbacteriosis:

1. Candidiasis lesions of the mucous membrane of the mouth - often in infants.

2. Dysbiosis in infectious diseases - a condition in which sharply reduced the number of obligate anaerobes and facultative anaerobes population increases, resulting in the colon begin to dominate septic processes, increased flatulence, increased bowel motility. There bloating, tenderness, diarrhea.

3. Dysbiosis vagina (vaginosis) - developing bacterial vaginosis in women at lower production of estrogen. There lactic acid substitution resident flora Gardnerella, staphylococci.

For the treatment of intestinal dysbiosis using drugs normal microbiota (eubiotics) containing live bacteria - residents: bifidobacteria, lactobacilli, E. coli. For example: bifidumbacterin, lactobacterin, colibacterin, bificol, Bifilakt. Applied orally. Thus, the normal microbiota plays an important role in protecting the body against pathogens. At the same time, representatives of the normal microbiota under certain conditions also can cause inflammation of the microbial etiology. For

example, after suffering flu bacteria that live in the nasopharynx cock cause pneumonia.

The emergence of diseases caused by the normal microbiota may be due to the following reasons:

1. Penetration of microorganisms in unusual habitats for them - normally sterile (blood, abdominal cavity, lungs, urinary tract);

2. Reducing reactivity. In immunosuppressed individuals with normal microbiota representatives can cause severe disease with fatal consequences. For example: generalized candidiasis - in patients with end-stage AIDS.

3. Against the background of some systemic diseases can dramatically increase revenues into the systemic circulation endotoxin gram-negative intestinal microbiota. Developed endotoksinovyy shock, multiple organ failure. However, no microorganisms does not come from outside. Endotoksinemiya own microbiota associated with microorganism. Such a process is possible in the pathology of pregnancy, congestive heart failure, liver pathology. For example: hepatitis, cirrhosis of the liver.

4. As a result of lypopolysaharyda hramnehatyvnyhmikroorhanizmiv released additional amount of histamine, which can cause allergic conditions.

It should be noted also that some members of the normal microbiota used as sanitary indicative microorganisms that indicate environmental pollution (water, soil, air and food) discharge the person, which enables us to judge their epidemiological danger. These microorganisms are, for example reside in the colon Clostridium perfringens and Enterococcus faecalis.

Data on the pathogenicity of the bacteria to humans are presented in Table 6.

Table 6

Classes (Group) pathogenicity of bacteria

№	Species bacteria	Disease
Бактерії		

I group		
1.	Yersinia pestis	Plaque
II group		
1.	Bacillus anthracis	Anthrax
2.	Brucella abortus Brucella melitensis Brucella suis	Brucellosis
3.	Francisella tularensis	Tularemia
4.	Legionella pneumophila	Legionellosis
5.	Vibrio cholerae 01 Vibrio cholerae non 01	Cholera
III group		
1.	Bordetella pertussis	Pertussis
2.	Borrelia recurrentia	Relapsing fever
3.	Campylobacter fetus	Abscesses, sepsis
4.	Campylobacter jejuni	Enteritis, cholecystitis, septicemia
5.	Clostridium botulinum	Botulism
6.	Clostridium tetani	Tetanus
7.	Corynebacterium diphtheriae	Diphtheria
8.	Helicobacter pylori	Gastritis, peptic ulcer disease
9.	Leptospira interrogans	Leptospirosis
10.	Mycobacterium leprae	Leprosy
11.	Mycobacterium tuberculosis	Tuberculosis

	Mycobacterium bovis Mycobacterium avium	
12.	Neisseria gonorrhoeae	Gonorrhea
13.	Neisseria meningitidis	Meningitis
14.	Salmonella paratyphi A	Paratyphoid A
15.	Salmonella paratyphi B	Paratyphoid B
16.	Salmonella typhi	Брюшной тиф
17.	Shigella spp.	Dysentery
18.	Treponema pallidum	Syphilis
19.	Yersinia pseudotuberculosis	Pseudotuberculosis
20.	Vibrio cholerae 01	Diarrhea
21.	Vibrio cholerae non 01	Diarrhea, wound infections, septicemia
IV group		
1.	Aerobacter aerogenes	Enteritis
2.	Bacillus cereus	Food poisoning
3.	Bacteroides spp	Lung abscess, bacteriemiya
4.	Borrelia spp.	Tick-borne spirochetosis
5.	Bordetella bronchiseptica Bordetella parapertussis	Para-whooping cough
6.	Campylobacter spp	Gastroenteritis, periodontitis
7.	Citrobacter spp	Local inflammation
8.	CIostridium perfringens, CIostridium novyi,	Gas gangrene

	CIostridium septicum, CIostridium hiatolyticum, CIostridium bifermentans.	
9.	Escherichia coli	Enteritis
10.	Haemophilus influenza	Meningitis, pneumonia, laryngitis
11.	Klebsiella pneumoniae	Pneumonia
12.	Mycobacterium spp. Mycobacterium photochromogens Mycobacterium scotochromogens Mycobacterium nonphotochromogens Mycobacterium rapid growers	Mycobacteriosis
13.	Micoplasma hominis 1 Micoplasma hominis 2 Micoplasma pneumoniae	Local inflammation
14.	Proteus spp.	Local inflammation, food poisoning
15.	Pseudomonas aeruginosa	Sepsis, local inflammation
16.	Salmonella spp.	Salmonellosis
17.	Staphylococcus spp.	Food poisoning, sepsis, pneumonia
18.	Streptococcus spp	Pneumonia, tonsillitis, arthritis, septicemia

19.	Vibrio spp., Vibrio parahaemolyticus, Vibrio mimicus, Vibrio fluviales, Vibrio vulnificus, Vibrio alginolyticus	Diarrhea, food poisoning, ranova infection, septicemia
20.	Yersinia enterocolitica	Enteritis, colitis

If the deviation of quantitative and qualitative characteristics of microorganisms (microbiota) in our body beyond where they can be offset by their own physiological mechanisms of the body, developing a pathological condition called dysbiosis. The factors that give rise to dysbiosis, often act the tendency of stress, antibiotic and hormone therapy, allergy of the body, radioactive radiation and frequent changes in climatic conditions. Bacteriological analysis of feces shows the balance between the groups simbiontnyh (bifidobacteria, lactobacilli, etc..) And pathogenic (pathogenic species of Enterobacteriaceae and Escherichia coli, psevdomonad, microscopic fungi, etc.). Microorganisms. In some cases, if disrupted the ecosystem of the small intestine, it is "pollution" small bowel intestinal microorganisms have pathogenic properties. In severe cases, these pathogens can spread beyond the intestine and settle in internal organs. The next stage is accompanied by deep digestive disorders (splitting polysaccharides) and biosynthetic (production of vitamins, essential amino acids, etc.). Functions. Excluding these conditions under control and normalize the situation, will experience increased reproduction in high mortality and some other species of microorganisms. This could cause a negative impact on human activity by enhancing the formation of toxic products.

To avoid the situation described above, you should: Avoid unnecessary use of antibacterials; consume prebiotics that are substrates of their own food and stimulate the intestinal microbiota of reproduction (yogurt, kefir, etc.); encourage

local and systemic immunity; used functional and even food. This includes eating a large amount of dietary fiber (bran, vegetables, fruits) and foods fortified with living cultures of microorganisms (milk mixture), enabling reproduction of their own bifidobacteria in the gut (potato, rice broth, carrots, pumpkins, soybeans).

METHODS MICROBIAL DECONTAMINATION

Sterilization (from the Latin. Sterilis ~ sterile, free from bacteria) - the complete destruction of vegetative and spore forms of microorganisms on all subjects, materials in nutrient media.

Sterilize tools, dressing and stitching ma¬terial, operating clothes, medicines. In microbiological laboratori¬yah - culture media, test tubes, pipettes, flasks, Petri dishes and more.

Processing tools:

1. rinsed in running water;

2. soaked in detergent solution for 15 minutes;

3. washed in the same roz¬chyni 0.5-1 min;

4. rinsed with distilled water and running;

5. suhozharoviy dried in oven at 80-85 ° C to extinction moisture.

Test tubes, bottles, flasks close cotton plugs. Zahorta¬yut paper tubes in 25-30 pieces, and petri dish - 4-5 pieces or placed in steryli¬zatsiyni box (biksy). Pasteur pipettes and graduated from the wide end za¬tykayut cotton wool wrapped in paper or placed in cardboard or metal canisters 10-15 pieces. Nutrient medium in flasks, bottles, tubes plugs.

Types of sterilization:

a) physical (high temperature, radiation);

b) mechanical (cold);

c) chemical (dis. solutions and gases).

Physical methods

High temperature sterilization. Efectivity characterized by (D) - time is required at a given temperature to get a tenfold decrease in the population of bacteria (90%). The value is measured, usually in minutes.

Flambie in the flame - Bacterial loops, tweezers, subject and cover lenses. Boiling - 40 minutes in special sterilizers - surgical instruments, syringes, needles, rubber tubes. To increase the boiling point and removing water hardness add 1% sodium bicarbonate. The method does not provide complete sterilization, some survive (clostridia).

Dry heat (suhozharova wardrobe) 160 ° C, 120-150 minutes / 180 ° C, 45-60 minutes (after reaching the set temperature). Sterilize glassware. Advantage - not damaged glass, not metal corrosion vidbu¬vayetsya tools. Used for sterilization of heat-resistant po¬roshkiv other substances. Disadvantages - quite a long period of sterilization is charring and burning cotton jams and paper, which wrapped dishes. Couple under pressure - the complete destruction of bacteria and spores. Achieved action pairs, to which the pressure is higher than the boiling.

Flowing steam (100°C) is carried out in an autoclave with nezahvynchenoyu cover. When heated steam penetrates between embedded objects. In this way the medium is treated with carbohydrates. A single pair of action does not kill spores used fractional sterilization 3 days in a row for 30 minutes. Disputes that are not killed, to germinate next day and vegetative cells are killed by second and third processing.

For substances not withstand 100 ° C (liquid protein, vitamins, some medicines) - tindalisation - water bath 58-60 ° C for 5-6 hours consecutive days. Pasteurization - heating the material to a single T below 100 ° C, destroying vegetative forms microbs. The debate alive. Microorganisms remaining significantly weakened. Widely used in the food industry. The heat treatment of milk, beer, wine, various juices at 70 ° C for 30 min or at 80 ° C - 5-10 min. Pasteurized products stored in the cold.

Autoclaving. A more effective method of sterilization effect than dry heat. Structurally autoclave - Double-walled solid metal cylindrical pot with lid

(hermetically closed). The inner part - camera (for material). The air outlet valve and pressure gauge (determines the working steam pressure in the chamber) with a safety valve.

The irradiation. Apply different types of radiation. In the practice used for this, electrons, gamma rays, ultrafiole¬tovi rays, radio-frequency radiation.
Electronic accelerator allows focusing the electrons into a narrow beam of high power. Use for sterilization in industrial scale bandaging and surgical suture material at the production. Disadvantage - the low permeability rays.

By gamma radiation sensitive vegetative and spore forms of various bacteria, fungi, yeasts, viruses. Irradiation capacity of 2.5 Mrad - disinfection of antibiotics, vitamins, hormones, plastic disposable equipment (Petri dishes, syringes), bandaging and surgical suture materials, etc.

Ultraviolet radiation - neutralization of bacteria in the air of operating rooms, wards, boxes, microbiological laboratories, etc. - bactericidal lamps of different power - was 15, was 30 and others. Germs can be protected by numerous organic substances, dust and other factors. Vegetative forms of bacteria in 3-10 times more sensitive to UV radiation than disputes.

Methods intense radio frequency exposure. Difficulty - danger for staff (interference communication systems, different frequent exposure).

Mechanical methods

Do not destroy substrates. Liquid and liquid medium (containing protein, vitamins, antibiotics, carbohydrates, volatile substances etc). Used for treating bacterial toxins, bacteriophages from microorganisms.

Mechanical (cold) sterilization is performed by filtration through finely antibacterial or anti-virus filters. They provide with special materials permeated the pores which have a different shape and are throuw filter tortuous. Filters can be made with positively charged material, while bacteria have negative charge on the surface also interact electrostatically with him, not just mechanically different diameters due to bacteria and pores. To check the quality of filters using small test bacteria (Serratia marcescens, or Pseudomonas aeruginosa). The filtrate vysi¬vayut

in growth medium and maintained at optimum temperature pro¬tyahom 5 days. In the absence of growth of test bacteria can be used to filter sterilization. Membrane or colloidal filters which are made of nitrocellulose, representing up to 3 discs with a diameter of 5 mm. Filters Seitz - plates (discs or squares) thickness of 4-6 mm (a mixture of asbestos and cellulose).

Disadvantages:

1. filtrates possible contamination by foreign substances popada¬yut it from the filter (alkali, alkali metals, asbestos fibers);

2. asbestos because of its negative charge binds certain substances from the fluid that is filtered. In addition, you should carefully check the filters before work to not use those with mechanical deformation (cracks, nadlomy etc.).

Before the work affirms a special filter holder. In particular, azbes¬tovi plate is placed between the bearings and cylindrical metal cabinet Seitz. Both of the connecting screws. The collected filter is inserted into the rubber plugs Bunsen flask with a side shoot. Fully vmon¬tovanyy wrapped in filter paper and sterilized in an autoclave. The liquid for filtru¬vannya poured into metal cylinder side connecting process of vaccum bulb pump to create a vacuum in the flask and accelerate filtration. The filtrate in the flask is sterile.

Chemical methods

Sterilized products made of rubber and plastics - 6% hydrogen peroxide solution, which dipped products for 6 hours at 18 ° C and 3 h at 50 ° C. You can apply deksona solution with an exposure of 45 min at 18 ° C. After finishing products wash twice in sterile distilled water, each time changing it, and transferred to sterile forceps biks. Tools for endoscopy and automatic pipettes can also alcohol.

Sterilization vapors of formaldehyde, chloroform, ethylene oxide, propylene oxide, methyl bromide, ozone - disinfection of endoscopic instruments, electronic equipment, plastic products, catgut etc. Effectivity proven mixture of ethylene oxide and methyl bromide ratio of 1: 1.44. For sterilization use spetsi¬alni dense vapor chamber, which is hermetically closed. For each factor operating modes

designed their sterilization. Once the gas mixture is pumped from the chamber and replaced with sterile air. Subjects who were sterilized specified method is recommended to use no earlier than 24 hours - to vydalyvsya all gas.

To test the effectiveness of sterilization autoclaves zas¬tosovuyut reliability of chemical and biological control. There are chemicals with a specific melting point: benzonaftol - 110 ° C, -115 ° C antipyrin, sulfur -119 ° C, benzoic acid - 120-122 ° C, mannose and urea - 132-133 ° C. It is at such temperatures often perform sterilization. Chemicals placed in a glass tube, add a small amount of aniline dyes (safranine, fuk¬syn or methylene blue), sealed and placed between objects that sterylizu¬yutsya. Uniform color drug in color dye in the tube indicates the proper temperature in an autoclave and therefore reliability sterilization. For biolohich¬noho control sterilization in an autoclave containing special Biotest - strips of filter paper, gauze, etc., which are bacterial spores from vido¬moyu heat resistance, disputes the number of known and others. Decomposed in biksah to be sterilized. After the end of the tubes with strips pour culture medium and incubated at the optimum temperature. The lack of germination of spores of bacteria indicates effective sterilization.

Methods for sterilizing medical objects

Items sterilization method of sterilization

Dry heat glassware, oil, tools, needles, powders

Wet steam Solutions for parenteral administration tools, environment, rubber stoppers

Filtering medium, which can not withstand heat, with protein, some vitamins, amino acids, gases, liquids, ointments, oils with low viscosity

Ethylene oxide anesthesia equipment, catheters, diagnostic equipment, prosthetics, laboratory equipment, auxiliary surgical supplies, optical instruments, plastic products, packaging materials

Ionizing radiation powders, dressing material, blood collection tubes, brushes, ointments for burns, centrifuge cups, suture, surgical clothing

Disinfection - a set of measures for full, partial or selective destruction of potentially pathogenic to human pathogens in various environmental objects to prevent transmission of infection from a source to a susceptible organism.

There are four stages of disinfection (the difference in sensitivity to disinfectants): A, B, C, D.

Level A - destruction asporohennyh forms of microbes, rickettsia, mycoplasma.

Level B - the liquidation of fungi, some viruses, bacteria, with improved stability (staphylococci, mycobacteria).

Level C - causative agents of especially dangerous infections (plague, cholera, typhus, melioidosis, glanders).

Level D - spores of microorganisms and protozoa.

Events disinfection in clinics, microbiological, and other laboratory virusolgy include the effect of physical and chemical factors. It is activities such as the burning of used bandaging material, waste, garbage burning in the flame of the burner, the effect of dry heat, autoclaving at different modes using ultrasound boiling objects with surface active substances, desinfect air through UV exposure. Takes elementary events - wet cleaning, washing, cleaning, vytripuvannya blankets, sheets, etc. Moreover disinfection measures include the use of chemicals - disinfectants, which impose certain requirements:

1) antimicrobs broad-spectrum effect;

2) high water solubility, the ability produce with water or air active and stable suspensions, emulsions, aerosols;

3) the ability not to lose antimicrobial properties in the presence of contaminants in the environment organic;

4) low toxicity;

5) allergy lack of action;

6) absence of harmful effects on subjects which they are processed;

7) the availability of raw materials, which are produced disinfectants, its low cost and so on.

These disinfectants include alcohols, aldehydes, quaternary ammonium compounds. The most commonly found hallogen use drugs. These include 0,2-1,0% bleach, which produce ex tempore 10% illuminated solutions of the substance; 0,2-1,0% solutions hlo Ramin-V or T; 5% aqueous solution of calcium hypochlorite; 0.05-0.1% solution tryhloizotsyanurovoyi acid (dykonitu); 0.1-0.2% solution sulfohlorantynu.

Oxidizing represented 1-10% hydrogen peroxide solution, phenols and their po¬hidnymy - 3-5% solution of Lysol, carbolic acid, phenol.

The group prepa¬rativ of heavy metal salts include sodium mertyolyat, sublimate. 2-3% solution of formaldehyde, cresol 3-10% solution and others.

Usage gaseous disinfectants - 40% aqueous solution of formaldehyde, mixtures of ethylene oxide with carbon dioxide (1:10) and ethylene oxide with bromyidmetylom (1: 1).

Allocate current and final disinfection. Conduct current disinfection to reduce microbial contamination in the foci of infection (bed linen, underwear, towels, mattresses, pillows, furniture, rugs, dishes, tools, appliances, air separation, wastewater, etc.).

This surface tables, windows, ceilings, walls, furniture and wash wipe disinfectant solutions, bed linen and other washed in these solutions. Beds, mattresses, pillows treated in special kame¬rah thermochemical methods, upholstered furniture - by special aerosols dishes - disinfectant solutions. Treatment and discharge of wastewater pro¬vodytsya thermal and chemical methods. Indoor air can be disinfected by passing through special antibacterial filters, like they do in isolation wards hnotobiolohichnoyi or tanning ultraviolet pro¬menyamy it. Medical Instruments, appliances first cleaned, disinfected, and then, if necessary, sterilized by known methods.

The final disinfection is to destroy pathogens infektsiy¬nyh diseases in the room where the patient was infectious, and objects - after discharge from hospital infection, conversion of physical separation to infectious and so on. To ensure care holding dezinfikuyuchyhzahodiv should:

a) zabespechyty external and internal departments kon¬trol disinfection of sanitary and epidemiological stations and laboratories of medical institutions, which carried out a visual, biological, chemical and other methods;

b) to control bacteriological identifying the source of infection in indicator bacteria. When intestinal diseases - E. coli drop in infections, tuberculosis - staphilococi in health care settings - opportunistic mikroorhan¬izmy. Bacteriological control is 1 time in a month - once a quarter, depending on the rank of the laboratory;

c) conduct sampling control samples (10-30 pieces) not earlier than 30-45 minutes after disinfection; washings area shall not be less than 200 cm2;

d) take sterile wipes and cotton swabs zasiva¬ty on nutrient media with all the rules in order to aseptic prevention contamination outsider microbiota.

SANITARY VIROLOGY

The subject of health Virology is the study of various pathogenic viruses to humans in the environment (water, soil, air, food and so on.), Development of methods for identification and effective measures to sanitation facilities environment.

In nature, viruses occupied all ecological niches and are part of all ecosystems, ranging from a drop of water (microekosystem) to the biosphere (global ecosystem). Obviously, there is no cell in the genome which would no prophage provirus and mammals. In this regard, the isolation and identification of viruses difficult to find cell cultures free from viral genetic structures. In fact, the genetic material of viruses has become part of the genetic stock of all organisms. However, to identify it in eukaryotic cells is much harder than in prokaryotic, including the induction of lysogenic bacteria with ultraviolet rays or DNA-tropic substances.

By raising the issue of integration viruses should be noted that it has long gone beyond the scientific interests of individual researchers and received more practical. Viral conversion, such as bacteria zatrudnyaye identification and

diagnosis of infectious diseases associated with it malignant degeneration of cells, the occurrence of slow viral infections, autoimmune and some other pathological processes.

Temperate phages and viruses integration animals and humans, transferring alien genes play an important role in the evolution of their owners. They can inactivate genes of cells or promote their expression enter, delete or move vstavochni sequence (IS-elements), to facilitate recombination processes and recombine with masked defective viruses that are in the cellular genome. Integration viruses are transmitted to descendants of animals and humans transovarian way through the egg, and the subsidiaries of individuals bacteria - in amitotychnomu division. Turning to autonomous status, integration viruses get capacity for replication and the effect on the cells indistinguishable from infectious, ie have a cytopathic effect. Since then, however, we can not conclude that ecological systems infectious viruses violate the natural relationships of organisms. Instead, they stabilize the ecosystem. Situated in symbiosis with organisms, infectious viruses regulate populations at a level that emerged in the course of evolution. Virulent phages, such as purified water from excess bacteria and algae, and animal viruses align recurring bursts of excessive increase in the number of rodents and insects (voles, rats, locusts). In antagonistic symbiosis with the host viruses as pathogens purified populations of genetically defective individuals that are a powerful factor of natural selection, as well as antigens - provoking organisms to continuous improvement of mechanisms of immunity. The body is resistant individuals antigenic alteration viruses, parasites and honed their mechanisms of adaptation and survival.

Violation of established relationships in symbiosis virus-host based on the principle of unequal stability, can lead to the collapse of the system. It released the ecological niche which, as the comparative analysis of infectious diseases last 30 - 40 years, immediately filled by another, equally dangerous parasite.

Thus, the task of sanitary virological service is systematic virological examination sanitary wastewater in urban wastewater treatment plants, water,

water bodies used for drinking and household water supply, drinking water sources centralized water supply, soil zemlerobnyh fields of irrigation, air hospital, food and t. e. These studies to monitor the circulation of viruses pathogenic to humans in the environment.

Indication of viruses in the environment consists of several stages:

1) the concentration of viral agents of the environment;

2) transportation of samples to the laboratory;

3) identification of viruses using cell cultures and laboratory animal or chicken embryos;

4) identification of selected agents.

Transportation, isolation and identification of viruses carried by conventional virological techniques specific to health and virology problem is only the concentration of viruses from the environment, which requires the development of special instructional techniques.

Sanitary water Virology

The main reason for the availability of water for human pathogenic viruses is the contamination of human feces. In human faeces found more than 100 different viruses, some of them belonging to the family pikornavirusiv, Reovirus and adenovirus, have high thermal stability and a long time can remain viable. A number of viruses resistant to conventional disinfectants, including chlorination, and can be detected in wastewater at a great distance from the source of contamination. In water contamination at its human faeces found the same viruses in feces.

The largest allocation of intestinal viruses occurs in summer and autumn due to the increase in the number of intestinal diseases. However, outbreaks of gastroenteritis caused by rotavirus, usually occur in winter and early spring. Massive selection of enteroviruses intestines of healthy people and patients infected with HIV virus causes significant pollution of wastewater, and their their

resistance to adverse environmental factors causes prolonged survival in water. Thus, waste water is the main reservoir of enteroviruses in the environment.

The presence of enteroviruses in the water district water supply represent a danger polio epidemic and other enteroviral infections, gastroenteritis, hepatitis A and may lead to sporadic cases and outbreaks of these infections.

The duration of storage of viruses in water increases significantly with decreasing temperature. Thus, the polio virus remains viable in river and tap water 4OS at 90 days and at 37 and 20oC respectively 10 and about 49 days. The higher the initial concentration of the virus, the longer he is in the water. Terms viability of different viruses vary in wide limits. Most durable to external factors is Coxsackie virus group A, less hardy - the polio virus, the shortest term preservation of the viability of Coxsackie virus group B (30 - 50 days). Viruses ECHO 7 kept much longer in water than the polio virus. Adenoviruses are more resistant to external factors than the polio virus and ECHO. Adenoviruses serotypes some retain their viability in water at 4OS for two years or more. To adverse environmental factors most resistant group of enteroviruses is hepatitis A. This virus for a long time can survive in water - from a few weeks to months. There are outbreaks of hepatitis A in connection with the spread of infection through raw kolodyaznu water. In polluted waters viruses remain infectious ability much longer than in the net. Yes, seawater term viability viruses much shorter due to the high content of various salts and the presence of iodine, which has a virucidal effect. Certain virucidal effect produce different substances produced by microorganisms, and dissolved chemical substances found in seawater. With the number of microorganisms in experimental conditions longest term sustainability in water saving different degree of contamination detected in intestinal coli phage (over 10 months). It is a possible candidate for sanitary-indicative microorganisms. The main objects of sanitary virological research is sewage, waste water treatment and the stages of disinfection, water water bodies used as sources of water, tap water, underground water sources, drinking water tap wrenches network doochischennaya drinking water, drinking water Bottled water marine and fresh

water used for recreational purposes and water of swimming pools and water parks.

Hygiene and virological studies of water bodies is carried out during preventive and current state sanitary and epidemiological surveillance and epidemic indications. Hygiene and virological studies of water consists of the following stages:

• sampling for the study;

• preparation of samples for research (primary processing material);

• concentration of viruses in water samples;

• decontamination viral concentrate;

• virological study (virus isolation or detection of it antigens and fragments of the genome).

As for methods of concentration of intestinal viruses in the water, the water research be central water supply wells, open water and swimming pools. Research wastewater study carried out for the purpose of circulating virus in the population of the area, the degree of contamination of water with viruses, the efficiency of sewage treatment plants and so on. Study of water surface and groundwater conduct when any source of water for the central water supply, to assess the sanitary condition of places of recreation and epidemiological indicators. Research carried drinking water only epidemiological indicators.

Methods for concentration of viruses from water can be divided into 4 groups:

I. Physical (ultracentrifugation, filtration, ultrafiltration, flotation, electrophoresis and electroosmosis).

II. Physico-chemical methods (Precipitation ethanol, ammonium sulfate, aluminum sulfate, dvohvalentnymy cations Precipitation in isoelectric point viral protein concentration poliyetylenhlikolem).

III. Adsorption methods (adsorption on a gauze pad, charcoal, natural mineral sorbents - bentonite, askaninti and other ion exchange resins and adsorption on aminoetoksyaerosyli, polimetylksyloksani, macro-porous glass etc.).

IV. Biological methods (adsorption on yeast cells and other microorganisms).

The method the concentration of viruses in water samples depends on many factors: the degree of water pollution sensitivity methods, availability of standardized adsorbent, appropriate equipment (eg cooling Ultracentrifuges or special equipment for ultrafiltration) and the load on the lab. All work associated with concentration and release viruses are carried out subject to the rules in full compliance with the regulatory documents.

Sanitary-virologic monitoring of water pollution (sewage, surface and underground water, drinking), usually in practical labs conducted in several indicators (enteroviruses, rotavirus, adenoviruses, viruses hepatitis A, coliphage), so it is advisable to use this method of concentration and use only for reagent concentrations, which would allow the virus to determine several indicators simultaneously. The most reliable method is a method of virus concentration ultracentrifugation. Other methods are also used, including methods of ultrafiltration, concentration methods using viruses and polyethylene glycol adsorbtsionni methods - adsorption on a gauze pad and ion exchange resins. These methods are simple, fast and efficient enough.

To isolate the virus infecting a cell culture or laboratory animals. Drinking water is considered safe for viral infections if it contains at least one virus particle to 1 liter.

Sanitary Virology of soil

Intestinal viruses can adsorb podzolic soils, but as a result of a number of factors may desorbuvatysya and come back into the environment. In this way intestinal infection can be transmitted through the soil and vegetables using virus-infected sewage irrigation on the fields, orchards and gardens, sewage soil → → → vegetables man.

Intestinal viruses long kept on vegetables. Keeping their infectivity depends on the type of plants, vegetation conditions, the type of virus and its initial concentration. So at 6 - 10 ° C and polio virus type retained its infectivity for

radishes for 2 months. With vegetables fastest virus inactivation occurs on a cabbage in phytoncide result of its activity. Infection can occur vegetables not only by getting viruses on their surface, as well as by the virus of land in the land of vegetables through the root system. It is therefore necessary to systematically carry out sanitary-virologic research of water for irrigation, soil and field irrigation products for the presence of intestinal viruses. Due to the rapid absorption of intestinal virus particles of soil most likely localization of viruses in the upper layer (0 - 25cm), but sometimes is important to identify viruses in deeper soil layers (75 - 100cm).

Research carried out on soil epidemiological indicators. Samples of soil (10 - 20g) are taken from a depth of 0 - 20 cm in several points target areas. The samples are mixed and transported to the laboratory in a sterile plastic bag. Laboratory tillage involves desorption of viruses from the soil surface uridynnu phase (phosphate buffer, pH 8.2) and the concentration of liquid phase through filters or using ammonium sulfate precipitation. The same method and treated sewage sludge.

Sanitary Virology of air

Airborne transmission infentsiyi characteristic of respiratory diseases - the most widespread infectious diseases. Viruses get into the air in aerosol droplets phase as a result of sneezing, coughing, talking, and is composed of droplets of different sizes, which consist of saliva, mucus and salt. At the highest concentrations of the virus is in large drops that are less stable in aerosols and quickly settle. A longer time in the air are small drops of viral aerosol. Drying aerosol droplets accompanied by inactivation of viruses. Infection with respiratory viruses almost always at the expense of phase aerosol droplet indoors. First of all infected people with weakened immune systems that are too close to the sick person. Less dangerous to inhale dried drops of which have inactivated viral particles. The concentration of viral particles in the aerosol cloud is reduced by dilution large volume of air and settling large aerosol droplets. However, the presence of small aerosol droplets enables the virus to penetrate into the lower

respiratory tract. Infectious agent can be transported air flows over long distances - dysyatky kilometers from the center of infection. Spread of the virus depends on the wind speed, on the other hand rainy weather reduces the spread of viruses.
Resistant viruses in the environment, especially adenoviruses can pylevoyu phase of an aerosol into the air flow repeatedly and for a long time to circulate in this room. According resistant viruses in aerosols and the surface, they can be divided into three groups: low stability viruses, such as paramyxovirus (parainfluenza virus, especially respiratory syncytial virus), more resistant viruses hryppu transmitted from sick people healthy only in the form of aerosol droplet phase and resistant viruses such as adenoviruses and ECHO viruses that enter the body not only in the form of droplet phase, but pylevoyi aerosol phase.

To study the microbiota air, such as bacteria and molds are various methods and established a number of instruments for the concentration of microorganisms from the air. Some devices used with appropriate modifications and concentration of viruses from the air. Since viruses are usually found in indoor upovitri low concentration which does not allow them to allocate necessary preliminary concentration of viruses from the air. The most favorable conditions for catching viral aerosol preserving infectious virus activity is created by concentrating them in a liquid medium. Trapping liquid used as material for virus isolation or conduct further concentration of viruses, adding to tubes with liquid catching 30% solution of polyethylene glycol with a molecular weight of 4000 or 6000.

After centrifugation of the suspension removed the top layer of matter and analyze virusvmisnyy bottom layer. In addition to capture fluids for concentration of viruses from the air can be used membrane filters. With surface filters viruses wash liquid medium with antibiotics. Determining the length of conservation activity in infectious air of different respiratory viruses is a key issue in connection with the airborne spread of respiratory infections. In experimental studies determined that the duration of the infectious activity of the virus in aerosol state depends on factors such as temperature and humidity, sunlight, humidifying liquid composition, etc. Indoors major factor that affects the rate of inactivation of

viruses in aerosols, is humidity. The viruses are resistant to varying degrees to that of relative humidity. Thus, influenza viruses, parainfluenza and respiratory syncytial virus inactivated faster at high relative humidity and to a lesser extent - at a low. Polio virus, viruses and adenoviruses ECHO more resistant in the air at high relative humidity, but rather are inactivated at low relative humidity. Vesicular stomatitis viruses and bark stable both at low and at high relative humidity, but inactivated at average relative humidity.

Sanitary Virology household items

Houseware be intermediaries in carrying viral agents from an infected to a healthy person. Especially great role of consumer goods in children's institutions due to close contacts of children. Viruses can be isolated from swabs of various household items in children's institutions and hospitals, toys, utensils, kitchen tools, textiles, glass, wood, hands of staff.

Adenoviruses type 5 and 7 ECHO viruses remain infectious activity on some household items more than 7 days, and parainfluenza viruses and respiratory syncytial virus - for several minutes or hours. Adenoviruses and enteroviruses can with everyday objects come second in the air and spread in aerosol form pylevoyi phase. Research washings of consumer goods for viruses carried by epidemiological indicators in kindergartens, nurseries, hospitals and other institutions. Are washed away from the surface of objects with a sterile swab is placed in a test tube with liquid (solution Hanks, lactalbumin hydrolyzate). Tampon squeeze out the liquid and the virus was concentrated by filtration or sedimentation using aluminum sulphate.

Hygiene and food virology

On the spread of viruses in food is much less known than the bacteria and fungi for several reasons.

First, being obligate parasites, viruses do not grow on nutrient media. Usually their growing use tissue cultures and chicken embryos.

Secondly, viruses do not multiply in food, their concentration is lower compared with bacteria and concentration techniques required for their discharge. Despite a number of studies that focus on this issue, it is extremely difficult to identify more than 50% of virus particles from products such as minced meat.

Third, work with viruses is not practiced in many microbiological laboratories food industry. However, the use of polymerase chain reaction (PCR) using reverse transcriptase (RT-PCR) to detect possible number of viruses in food, especially in the tissues of oysters and clams. PCR laboratory diagnostics raised food to a new level - the level of direct detection of extremely small concentrations.

A number of viruses that are found in food, are able over time to preserve their infectious activity. In particular, enteroviruses retain their infectivity in mincemeat for 8 days at 23 - 24 ° C, which is independent of the deterioration of the product. The use of foods containing neinaktyvovani viruses are the cause of certain diseases. In particular outbreak of hepatitis have a close connection with the consumption of certain food products. Because hepatitis A virus is transmitted by fecal-oral route, the shellfish use of infected reservoirs leads to disease. There is evidence on the relationship of hepatitis from eating salads and meat sandwiches in the hotel and restaurant establishments. Approximately 8% of patients with hepatitis B infection is the reason people water and food that contained a virus. Noroviruses (genus Norovirus, family Caliciviridae) cause intestinal infections in mammals, particularly gastroenteritis. Research carried out by food epidemiological indicators. Viruses that are in liquid dairy products, concentrated using polyethylene glycol with a molecular weight of 4000 or 6000. Processing semisolid foods (cheese, cheese products, meat and fish prepared food, bread) and solid (cereals, cheeses, meats and al.) is the extraction of viral particles in the liquid phase, and from the virus extract precipitated using polyethylene glycol. Data on pathogenicity viruses to humans are presented in Table 7.

Table 7

Classes (Group) pathogenicity viruses

№	Species of microorganism	Disease
I група		
1.	Filoviridae: viruses Marburg and Ebola	Hemorrhagic fever
2.	Arenaviridae: viruses Lassa	Hemorrhagic fever
3.	Poxviridae: virus smallpox	Smallpox human
II група		
1.	Togaviridae horse encephalomyelitis viruses	Encephalitis, encephalomyelitis, fever

2.	Flaviviridae: Tick-borne encephalitis virus complex: Omsk hemorrhagic fever, Japanese encephalitis, West Nile. Yellow fever virus. HCV .	Encephalitis, entsefalomiyelyty. Hemorrhagic fever Parenteral hepatitis, hepatocellular carcinoma liver
3.	Bunyaviridae, *Gen. Bunyavirus* : Complex California encephalitis *Gen. Nairovirus:* Crimean hemorrhagic fever virus.	Encephalitis, encephalomyelitis, meningoencephalitis, fever. Fever, myositis, arthritis Fever with meningeal syndrome, encephalitis
4.	Rhabdoviridae, *gen. Lyssavirus* : rabies virus.	Rabies
5.	Hepadnaviridae: hepatitis B and D virus	Parenteral hepatitis
6.	Retroviridae: Human immunodeficiency virus (HIV-1 HIV 2) virus T cell leukemia human (HTLV)	AIDS, T - cell leukemia human
7.	Unconventional agents: Pathogens slow neuroinfections (prions)	Kreytsfeld-Jakob disease, Kuru, scrapie.

III група		
1.	Orthomyxoviridae **:** influenza viruses A, B and C	Influenza
2.	Picornaviridae: *gen. Enterovirus* : wild polio virus strains hepatitis A and E	Poliomyelitis, enteral hepatitis
3.	Herpesviridae: herpes simplex virus types I and II, zoster-herpesvirus herpes virus type 6 (HBLV-HHV6) virus cytomegalovirus Epstein-Barr virus	Herpes simple Chickenpox, shingles. cytomegalovirus, infectious mononucleosis, Berkita lymphoma, nasopharyngeal carcinoma.
IV-група		
1.	Adenoviridae: all types of adenoviruses	Acute respiratory viral infections, conjunctivitis.
2.	Reoviridae, *gen. Reovirus* : human retroviruses *Gen. Rotavirus* : human rotavirus.	Rhinitis, gastroenteritis. Gastroenteritis, enteritis.
3.	Picomaviridae, *gen. Enterovirus* : Coxsackie virus group A and B ECHO viruses enteroviruses types 68-71	Acute respiratory viral infections, polyneuritis. Serous meningitis, diarrhea, polyneuritis, uveitis

	gen. Rinovirus : 120 types of human rinoviruses	Serous meningitis, conjunctivitis.
4.	Coronaviridae Coronaviruses human	Acute respiratory viral infections, enteritis
5.	Paramyxoviridae: Human parainfluenza virus type 1-4 respiratory syncytial virus (PC-virus) paroatyta virus epidemic, measles virus	Pneumonia Pneumonia, bronchitis, bronchiolitis, parotitis measles conjunctivitis
6.	Togaviridae *gen. Rubivirua:* rubella virus	Rubella
7.	Rabdoviridae, *gen.*: vesicular stomatitis virus	Vesicular stomatitis

Contamination viruses vegetables possible using infected sewage irrigation on the fields, orchards and gardens. For desorption of viral particles from the surface of vegetables pour phosphate buffer (pH 8.2), vzbovtuyut, illuminate the liquid by centrifugation and the virus was concentrated from the supernatant as described above.

Study of the nature of viruses to date suggest that viruses are not organisms, even small, as any, even the smallest organisms such mycoplasma, rickettsia and chlamydia have their own protein synthesizing system. Viruses - independent genetic structures that can function only in cells that have varying degrees

depending on the cellular synthesis of nucleic acids and are totally dependent on protein synthesis and cell energy systems and are able to evolve.

Thus, viruses are a diverse and large group of many non-cellular forms of life that are not microorganisms and merged into the realm of Vira. Viruses studied within virology, which is a separate discipline, which has its object and methods. Considering the relationship between viruses organisms must be borne in mind that they are special symbionts that parasitize the genetic and biochemical levels, but despite this, the viruses have their own history, independent of the evolution of organisms in which they reprodukuyutsya. As pro- and eukaryotes, viruses inherent genetic continuity, the ability to play and variability caused by mutations and recombination.

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