Ministry of Public Health of Ukraine

ZAPOROZHYE STATE MEDICAL UNIVERSITY

DEPARTMENT OF GENERAL HYGIENE AND ECOLOGY

**Independent work of students**

Methodical manual

for independent work of students for the 6th course

discipline "Hygiene and Ecology"

specialty 7.12010001 «Curative medicine»

direction of prepare 1201 «Medicine»

ZAPOROZHYE

2017

УДК 613(075.8)

M 61

*Approved at a meeting of the Central Methodical Commission of Zaporozhye State Medical University*

*(protocol №­­­­­­5, 25.05.2017)*

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M 61 Independent work of students. Methodical manual for independent work of students for the 6th course : methodical manual for independent work of students for the 6th course discipline "Hygiene and Ecology" specialty 7.12010001 «Curative medicine», direction of prepare 1201 «Medicine» / E. V. Kirsanova, I. Ye. Sukhomlinova. – Zaporozhye : ZSMU, 2017. – 288 p.

Methodical manual compiled by the department of general hygiene and ecology of Zaporozhye State Medical University in accordance with the curriculum for students on 6 course of medical faculty.

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Methodical manual approved at a meeting of the CMC ZSMU 20.04.2017, protocol №6.

**Topic 1. Scientific basis of medical bìorithmology and chronohygiene.**

**1. Purpose:** To consolidate theoretical knowledge of biological rhythms, their significance for chronohygiene.

**2.1. Know:**

2.1.1. Background and principles of medical science as bìorithmology and chronohygieneand its value.

2.1.2. Key characteristics and classification of the most common biological rhythms.

**2.2. To be able to:**

2.2.1. The determination of different types of curves daily biological rhythms, such as daytime performance and computation of biological rhythms.

2.2.2. Use in the course of educational and employment process and in his spare time biorytmolohichni principles of rational organization of everyday human activities.

**3. Question to self:**

3.1. Biological rhythms and human health. The concept of biological rhythms. Background and causes of medical bìorithmology as a science.

3.2. Key characteristics of biological rhythms (level or mezor, period, amplitude, akrofaza, the form of full-time curves, etc.).

3.3. Classification of the most common biological rhythms.

3.4. Methods of determination of different types of full-time curves of biological rhythms.

3.5. Methods of determining the type of full-time disability rights.

3.6. Methods for determining the estimated human biological rhythms.

3.7. The concept of the DS as the main type chronohygiene and as medical and hygienic category. Types of DS.

3.8. Bìorithmology, principles of rational organization of everyday human activities. Chronohygiene as primary prevention DS.

**4. The structure and content of classes:**

In independent work of students have 1 hours. Assessment of learning on the subject submitted to the final module control.

**5. Literature:**

5.1.1. Hygiene and Ecology: Textbook / Ed. V.G. Bardova. - Vinnitsa: New Book, 2006. - P. 569 - 583.

The main purpose of washing hands is to cleanse the hands of [pathogens](file:///G:\wiki\Pathogen) (including [bacteria](file:///G:\wiki\Bacterium) or [viruses](file:///G:\wiki\Virus)) and chemicals which can cause personal harm or disease. This is especially important for people who handle food or work in the medical field. While hot water may more effectively clean your hands, this is primarily due to its increased capability as a solvent, and not due to hot water actually killing germs. Hot water is more effective at removing dirt, oils and/or chemicals, but contrary to popular belief, it does not kill micro organisms. A temperature that is comfortable for hand washing (about 45 °C) is not nearly hot enough to kill any micro organism. It would take more than double that temperature to effectively kill germs (100 °C, which is boiling).

Personal hand washing

To maintain good [hygiene](file:///G:\wiki\Hygiene), hands should always be washed after using the toilet, changing a diaper or tending to someone who is sick; before eating; before handling or cooking food and after handling raw meat, fish or poultry. Conventionally, the use of soap and warm running water and the washing of all surfaces thoroughly, including under fingernails is seen as necessary. One should rub wet, soapy hands together outside the stream of running water for at least 20 seconds, before rinsing thoroughly and then drying with a clean or disposable towel. After drying a dry paper towel should be used to turn off water and open exit door. Moisturizing [lotion](file:///G:\wiki\Lotion) is often recommended to keep the hands from drying out, should one's hands require washing more than a few times per day.



Antibacterial soaps have been heavily promoted to a health-conscious public. To date, there is no evidence that using recommended antiseptics or disinfectants selects for antibiotic-resistant organisms in nature. However, antibacterial soaps contain common antibiotics such as Triclosan, which has an extensive list of resistant strains of organisms. So, even if antibacterial soaps do not select for antibiotic resistant strains, they might not be as effective as they are marketed to be. These soaps are quite different from the non-water-based hand hygiene agents referred to below, which also do not promote [antibiotic resistance](file:///G:\wiki\Antibiotic_resistance).

Medical hand washing

The purpose of hand washing in the health care setting is to remove or destroy (disinfect) [pathogenic microorganisms](file:///G:\wiki\Pathogens) ("germs" in common parlance) to avoid transmitting them to a patient. The application of water alone is ineffective for cleaning skin because water is unable to remove fats, oils, and proteins, which are components of organic soil. Therefore, removal of microorganisms from skin requires the addition of soaps or detergents to water. Plain soap does not kill [pathogens](file:///G:\wiki\Pathogen). However, the addition of antiseptic chemicals to soap ("medicated" or "antimicrobial" soaps) does confer killing action to a hand washing agent.Such killing action may be desired prior to performing surgery or in settings in which antibiotic-resistant organisms are highly prevalent.

The proper washing of hands in a [medical](file:///G:\wiki\Medicine) setting generally consists of the use of generous amounts of soap and water to lather and rub each part of ones hands systematically for 15 to 20 seconds. Hands should be rubbed together with digits interlocking. If there is debris under fingernails, a bristle brush is often used to remove it. Finally, it is necessary to rinse well and wipe dry with a paper towel. After drying, a dry paper towel should be used to turn off water and open exit door.

To 'scrub' one's hands for a [surgical operation](file:///G:\wiki\Surgery), one requires a tap that can be turned on and off without touching with the hands, some [chlorhexidine](file:///G:\wiki\Chlorhexidine) or [iodine](file:///G:\wiki\Iodine) wash, sterile towels for drying the hands after washing, a sterile brush for scrubbing and another sterile instrument for cleaning under the fingernails. All jewellery should be removed. This procedure requires washing the hands and forearms up to the elbows, and one must in this situation ensure that all parts of the hands and forearms are well scrubbed several times. When rinsing, it is ensured at all times that one does not allow water to drip back from the elbow to your hands. When done hands are dried with the sterile cloth and the surgical gown is donned.

In the late 1990s and early part of the 21st century, non-water-based hand hygiene agents (also known as alcohol-based hand rubs, antiseptic hand rubs, or hand sanitizers) began to gain popularity. Most are based on [isopropyl alcohol](file:///G:\wiki\Isopropyl_alcohol) or [ethanol](file:///G:\wiki\Ethanol) formulated together with a humectant such as glycerin into a gel, liquid, or foam for ease of use and to decrease the drying effect of the alcohol. The increasing use of these agents is based on their ease of use, rapid killing activity against microorganisms, and lower tendency to induce irritant contact dermatitis as compared to soap and water hand washing. Despite their effectiveness, the non-water agents do not clean hands of organic material, they simply disinfect them. However, disinfection does prevent transmission of infectious microorganisms.

Visible soiling of any sort on the hands must be washed with soap and water because alcohol-based hand rubs are ineffective in the presence of organic material. In addition, alcohols are ineffective against non-lipid-enveloped viruses (e.g., Noroviruses) and the spores of bacteria (e.g., Clostridium difficile) and protozoa (e.g., Giardia lamblia). When such microorganisms are likely to be encountered, soap and water hand washing is preferable.

The [New England Journal of Medicine](file:///G:\wiki\New_England_Journal_of_Medicine) reports that hand washing remains at unacceptable levels in most medical environments, with large numbers of doctors and nurses routinely forgetting to wash their hands before touching patients. One study has shown that proper hand washing and other simple procedures can decrease the rate of catheter-related bloodstream infections by 66 percent.

1.     [Hand washing](http://www.mayoclinic.com/health/hand-washing/HQ00407) from [Mayo Clinic](file:///G:\wiki\Mayo_Clinic)

2.      [Hand washing](http://www.tufts.edu/med/apua/Patients/handwashing.html) from [Tufts University](file:///G:\wiki\Tufts_University)

3.      Infection control and hospital epidemiology : the official journal of the Society of Hospital Epidemiologists of America. (Infect Control Hosp Epidemiol) 2006 Oct; 27(10): 1107-19

4.      [Clean hands](http://www.cdc.gov/cleanhands/) from the [CDC](file:///G:\wiki\Centers_for_Disease_Control_and_Prevention)

5.      [WHO Guidelines on Hand Hygiene in Health Care](http://www.who.int/patientsafety/events/05/HH_en.pdf)

Bathing

Bathing is the immersion of the body in [fluid](file:///G:\wiki\Fluid), usually [water](file:///G:\wiki\Water), or an aqueous solution. It is generally practiced as part of regular [hygiene](file:///G:\wiki\Hygiene).



Some [spa](file:///G:\wiki\Destination_spa) facilities provide bathing in various other liquids such as [chocolate](file:///G:\wiki\Chocolate) or [mud](file:///G:\wiki\Mud), and there have been examples of bathing in [champagne](file:///G:\wiki\Champagne_(beverage)). Additionally, exposing the body to open air is sometimes considered bathing, for example, in [sunbathing](file:///G:\wiki\Sunbathing).

Bathing serves several purposes:

[Hygiene](file:///G:\wiki\Hygiene), and the physical appearance of cleanliness

[Decontamination](file:///G:\wiki\Decontamination) from [chemical](file:///G:\wiki\Chemical_hazard), [biological](file:///G:\wiki\Biological_hazard), [nuclear](file:///G:\wiki\Nuclear_hazard) or other exposure-type hazards.

[Recreation](file:///G:\wiki\Recreation)

Therapy (e.g. [hydrotherapy](file:///G:\wiki\Hydrotherapy)), healing, rehabilitation from injury or addiction, relaxation (e.g. [Blessed Rainy Day](file:///G:\wiki\Blessed_Rainy_Day))

[Religious](file:///G:\wiki\Religion), or, less frequently, other ceremonial [rites](file:///G:\wiki\Rite) (e.g. [Baptism](file:///G:\wiki\Baptism), [Mikvah](file:///G:\wiki\Mikvah))

Celebration and socialization, e.g. running through fountains after winning the [World Series](file:///G:\wiki\World_Series), or jumping through a hole cut in the ice over a lake on [New Year's Eve](file:///G:\wiki\New_Year's_Eve).

Ensuring people are free of certain items such as weapons or other [contraband](file:///G:\wiki\Contraband): In Chicago, Russian baths were a safe meeting place for rival gang leaders. Weapons are difficult to conceal on a nearly naked body. If the meeting resulted in reconciliation, the gangs would meet upstairs for [bagels](file:///G:\wiki\Bagel), [cream cheese](file:///G:\wiki\Cream_cheese) and [borscht](file:///G:\wiki\Borscht). [[1]](http://www.cyberbohemia.com/Pages/russianbaniaspreading.htm) Many homeless shelters, and almost all prisons have an [intake facility](file:///G:\w\index.php) or intake process that includes a supervised [shower](file:///G:\wiki\Shower) with change of clothes to ensure that no contraband or contamination enters the facility.

Bathing is usually done in a bath (i.e. a place designed for bathing), but may also be done in places not specifically intended for bathing, such as [rooftops](file:///G:\wiki\Roof) ([sunbathing](file:///G:\wiki\Sunbathing) and[windbathing](file:///G:\w\index.php)), a [lake](file:///G:\wiki\Lake), [river](file:///G:\wiki\River), or [sprinkler](file:///G:\wiki\Sprinkler) connected to a garden hose.

One town known for its baths is [Bath](file:///G:\wiki\Bath,_Somerset) (known during [ancient Roman](file:///G:\wiki\Ancient_Roman) times as [Aquae Sulis](file:///G:\wiki\Aquae_Sulis)), a Roman city in [England](file:///G:\wiki\England) famous for healing [hydrothermal springs](file:///G:\wiki\Hydrothermal_springs), and most recently for the [Bath Spa Project](file:///G:\wiki\Bath_Spa_Project) consisting of a rooftop pool overlooking the city of Bath, as well as four circular clear glass steam baths. The word bath is believed to be derived from the name of the

Healthy life-style and personal hygiene

According to the official definition of the WHO (Statute, 1946) “Health is a state of complete physical, mental and social welfare, not only absence of diseases or physical handicaps”.

From hygienic point of view “Health is the state of total biological, physical, psycho-physiological, social welfare when functions of all organs and systems of the human organism are balanced with environment, any diseases, pathological states and physical handicaps are absent”. It is a state of the organism when it realizes fully its biological and social functions – domestic, labour, social (interaction with other people and whole society).

According to the definition of specialists in other medical sciences “Health is the interval, within quantitative fluctuations of which, psychological and physiological processes are able to maintain the living system at the level of functional optimum, with self-regulation mechanisms functioning without physiological stress and failure”.

From the point of view of new subject, studied at school nowadays, “Health is the process (methods and means) of preservation, development of biological, physiological functions, optimal working capacity and social activity of the person if this person’s life is maximally active”.

Healthy lifestyle and usage of methods and means of personal hygiene are the basis to maintain and strengthen the health of individual and population in the whole.

Healthy lifestyle of the person is a big complex of methods and means of life, biologically and socially directed and expedient, which correspond to the human requirements and abilities. The person has to follow them to provide formation, preservation and strengthening of the health, reproductive ability and active longevity.

Healthy life-style of the population is a lifestyle, which provides integration of complete biological and social adaptation of each individual with maximum possible self-expression of people, nation, class, social group in specific conditions of life, and causes and provides further social development.

Methods and means of healthy lifestyle maintenance include subjective and objective conditions and factors, which depend on health of individual and society as a whole.

Subjective methods and means include:

o       adherence to personal hygiene rules – correct conditions of labour and rest, sleep and activity, eating patterns;

o       regular maintenance of clean body;

o       regular physical training, usage of methods and means for the organism tempering;

o       absence of harmful habits – drugs, toxical substances, alcohol, smoke abuse;

o       standard of personal culture.

Objective methods and means include:

o       endowment of a person resulted from level of education, profession, presence and type of work, level of salary; presence of family and number of family members, living conditions;

o       cold and hot water-supply in the residential premises; for some professions – in industry, public eating establishments – bath-houses, saunas, pools;

o       psychological and hygienic microclimate during interaction with society, work collective, family etc.;

o       full-value, sufficient, balanced, varied nutrition;

o       correspondence to hygienic requirements of domestic and occupational clothes, footwear, personal protective equipment in industry;

o       correspondence to hygienic standards of work hardness, intensity, complexity, factors of occupational environment.

Physical training is of great importance for preserving and strengthening health of each person and for hypokynesia prevention. Physical training influences cortex of brain and subcortical centers, forms balanced nervous and psychological state, stimulates development of the organism muscles, cardio-vascular system.

Physical training includes the following:

-               morning exercises for restoration of physical activity and working capacity after sleep;

-               physical pauses during workday for increasing the working capacity;

-               physical training in person’s free time.

Tempering means increasing of the organism resistance to influence of fluctuations of water and air temperature, air humidity, atmospheric pressure, solar radiation and other physical factors of environment.

Main principles of tempering:

-         course – gradual increasing of intensity and duration of influence of tempering factor;

-         systematic character – procedures have to be done regularly according to the present scheme;

-         complex character – purposeful connection of all organs and systems of the organism and influence of some environment factors during tempering;

-         individual regime and its correspondence to biological rhythmus of the organism.

Significance of tempering is in the following:

-         increases adaptation abilities of the organism to the unfavourable factors’ influence;

-         decreases sensitivity to respiratory and other infectious diseases;

-         increases working capacity;

-         forms positive physiological reactions.

Main tempering factors are not only air, water, solar radiation and corresponding capabilities of the organism, but also gradual increase of physical loading and autogenic training of psychological and physiological state.

Water as a tempering factor

Water procedures result in construction and dilatation of blood vessels that increase the organism resistance to fluctuations of environment temperature and lead to reflex influence on activity of organism organs and systems. Bathing, shower, dousing with water, rub-down, bathes for lower extremities and other water procedures are used for this purpose. There are such types of bathes according to the temperature as:

-         cold – les than 200C;

-         fresh – 20-330C;

-         indifferent – 34-360C;

-         warm – 36-390C;

-         hot – more than 400C.

If water is used for tempering, it is better to start with rub-down and only after 2-3 weeks begin dousing with water.

Hygienic requirements to equipment and mode of action of solaria and photaria

Solaria are specially equipped grounds/lawns outdoors for taking sun and air bathes.

Solaria are equipped at the flat place protected from wind with green plantation or shields, near the water reservoir, in the park or forest. The following parameters are used for equipment of this ground: sand, grass or wood covering, orientation on South, South-East, sufficient distance form sources of the air pollution and noise. There are trestle-beds of 40-60 cm height on the ground; shading area, meteorological post, broadcasting center to talk about doses of sun and air bathes, shower, medical post, check-rooms, post for issue of linen and beach equipment – near this ground.

Radiation has to be even, taking into account individual sensitivity of the skin.

UV radiation from artificial sources is carried out in photaria. People are irradiated with UV rays during certain period of time, in minutes. Photaria can be equipped differently. There are cabin, connecting or labyrinth types of photaria and photaria of beacon type. As sources of UV radiation erythemal (LE-30) or direct mercury-quartz (DMQ) lamps may be used.

Harmful habits

Drug abuse (or narcomania, from Greek narka – stupor, numbness; mania – madness) is persistent and morbid propensity of the person to drugs (opium, morphine, cocaine etc.) usage of them to feel excited, intoxication, which lead to disorders of mentality, deep personality changes and functions of internals. Drugs may cause pleasant psychological state even after single use, and psychological and physical dependence after multiple use.

Toxicomania (from Greek toxicon – poison, mania – madness) is a disease resulted from abuse of any substance which causes short-time subjective attractive psychological state. Essence of toxicomania is a poisoning and need for further poisoning. Substances with different chemical structure and pharmacological activity are used create general psychological and physical effect – euphoria, personality changes, behavioral disorders and social degradation. This term encloses all forms of pharmaceutical and non-pharmaceutical substances abuse.

Alcohol abuse (Alcoholism) is a disease connected with systematic abuse of alcohol drinks which lead to psychological or physical disorders. As a result of alcohol abuse the alcohol intoxication is developed which is accompanied with emotional, motor, speech excitement, disappearance of self-control and critical assessment of situation. Frequent, excess alcohol abuse to receive euphoria effect may result in pathological passion accompanied by psychological and neurological disorders.

Tobacco abuse (Smoking) is a inhalation of substances with fume which causes both pleasant psychological state and the organism intoxication. Dry tobacco distillation takes place during smoking and some new substances are formed. Tobacco smoke consists of nearly 1 200 different substances, half of them have poison effect. There are such substances as nicotine and its derivatives, ammonia, carbon monoxide, prussic, acetic and formic acids, phenols, formaldehydes, hydrogen sulfide, carcinogenic matters, soot. The most poisoning substance of tobacco smoke is nicotine, its content depends on type and dryness of the tobacco. One drop of nicotine kills the dog, the leech, which has sucked the blood of inveterate smoker, dies. The lethal dose of nicotine for person who has never smoked before is 60-100 mg.

Program of healthy lifestyle consists of:

-         taking into account and usage of individual biorhythmus;

-         increasing psychological and emotional resistance (ability to to keep himself in check);

-         optimal motor activity for the organism;

-         rational food quality and eating patterns;

-         complex regular tempering;

-         hygienic behavior at home, during work;

-         regular physiological functions;

-         prevention, giving up harmful habits (drugs, alcohol and smoke abuse);

-         usage of biologically active substances and geroprotectors;

-         medical correction of different diseases (especially chronic diseases).

The physiological skin functions

The protective skin function from mechanical factors’ action and injuries is substantiated by its high elasticity, epidermal stretching and subcutaneous fat resiliency. Skin also protects the body from the physical factors’ influence: because of low heat conduction – from the heating action of some heat radiation levels to the cooling at some low temperature levels. Owing to melanin skin protects the body from the harmful action of ultraviolet and visible part of solar radiation. Owing to the keratoid layer skin is protected from drying and electric current within the limits of 1MOm.

Normal keratoid skin layer is rather resistant to the harmful chemical substances effect, except the liposoluble compounds and strong acids. Especially great importance is attributed to the barrier skin function in relation to microorganisms – bacteria, viruses, fungi. This function is substantiated by the mechanical barrier of keratoid epidermis, acid medium (pH = 5-6), sebum, sweat and proper skin hygiene.

The heat regulatory skin function: 82% of total heat irradiation occurs through skin – heat radiation, heat conduction, moisture evaporation (sweat) from the skin surface: in case of hot microclimate the skin vessels widen, the sweat is evaporated (the heat is selected for the hidden heat vaporization), while cool – the vessels narrow, the sweat is not evaporated, as a result – the skin temperature falls and heat loss is saved by radiation and evaporation.

The secretory skin function is fulfilled by its sebaceous and sweat glands; thanks to them water-fat emulsion which increases the protective skin functions is formed. Sebaceous glands also fulfill the excretory function: many toxic substances, lipids transformation products, drugs etc. are excreted with sebum.

Many waste products – NaCl, KCl, sulfates, phosphates, urea, uric acid, ammonium, amino acids, creatine and others are excreted with sweat. Apocrine inguinal and foot sweat glands excrete stinking substances of unpleasant smell, connected with the endocrinal sex glands.

The receptor skin function is fulfilled by means of thick neuroreceptors net. Skin fulfills the tactile function (sensation of touching and pressure), the temperature function (sensation of heat and cold) and pain sensitivity one.

D-vitamin forming skin function is substantiated by the fact that on the skin surface resulting from the solar and artificial UV radiation effect vitamin D3 is synthesized from 7-dehydrocholesterol, which constitutes the sebum. This vitamin is absorbed into blood, carried throughout the body; it fulfills the important function in metabolism, firstly in phosphorus-calcium metabolism.

Methods and means of skin cleanliness maintaining

Skin dirtying results from the accumulation of metabolic products, which are excreted with sebum, sweat and peeling of necrotized epidermis, from the deposition of clothes fibers, dust, microorganisms spreading and from the pollutants of everyday and occupational medium, where the person lives or works.

It’s necessary to wash off the dirt periodically for the normal skin functioning. According to human experience the normal skin functioning is possible in case of its washing weekly. In case of work with intensive external dirtying it’s necessary to wash skin daily. The main means for washing the skin is water. But because of sebum, everyday and technical oils insolubility in the water, skin cleansing can be effective only by means of soap and other washing means – washing agents use.

Hard soaps – are sodium salts of higher fatty acids triglycerides, liquid soaps – are potassium salts of higher fatty acids triglycerides.

To manufacture the synthetic washing agents (SWA) there are more than 100 formulae. The synthetic washing agents contain:

-                surface activity substances (SAS): alkylsulfates, alkylsulfonates, alkylarylsulfonates and others;

-                additions which contribute to the foaming (alkylolamide), to the fabrics softening and to the static electric charges taking away, to the prevention of the removed dirt deposition on the fabrics (carboxymethylcellulose - CMC), to the washing power of SAS (sodium tripolyphosphate and other phosphates), to the water softening (soda ash, tripolyphosphate, sodium bicarbonate and others), to supplying the washing solution with a pleasant smell, different bleachers (sodium perborate or optical bleaching agents). Some SWA contain disinfectants.

The main constituent for the SWA manufacturing is SAS, obtained from oil processing products.

SAS – are polar compounds which consist of hydrophobic (contributing to the division of molecules in oils) and hydrophilic (contributing to the division of molecules in water) molecules groups. The hydrophilic group includes: carbonyl (COO-), sulfate (-OSO3-), sulfonate (SO3-) groups, also the hydrophilic residues (CH2)4-O, and with the nitrogen content.

The hydrophobic group contains mainly paraffin chain (10-8 carbon atoms – aliphatic radicals) of benzene or naphthalene ring with alkyl radicals.

The synthetic SAS are divided into:

-                anionic (forming negative anions in water);

-                cationic (forming positive cations);

-                ampholytic (positive or negative depending on water pH);

-                nonionic (not forming ions but having strong bonds with water).

The anionic SAS – are the salts of sulfuric ethers (primary, secondary), alkylsulfates, fatty acids sulfates, alkyl benzene sulfonates, alkyl naphthalene sulfonates and others which have high foaming property, are less than cationic toxic property, are poorly absorbed by the skin and mucosa, are highly soluble on the sewerage system biological cleaning plant. But in the concentrated solutions (10-20%) the anionic SAS can result in skin irritation and allergic reactions (sulfonol НП-1, synthanol ДС-10, alkamon ОС-2), because of their permeability through the karotid epidermis.

The nonionic SAS (polyethylene glycol esters of fatty acids, fatty spirits, fatty amines, mercaptans, polypropylene glycols, alkylphenols) have higher washing power than anionic SAS. They can kill even tuberculosis mycobacterium. The sensitizing properties in high concentrations (10-20%) are typical for nonionic preparation OП-7. In the concentration to 1% these properties are not manifested.

The nonionic SAS can be co-carcinogenic and allergenic; they can increase skin permeability for different substances. For example, the mean for sanitary engineering cleaning “Cillit Magic” contains up to 5% of nonionic solvents, dyes and aromatizers, therefore it’s rather aggressive and requires one to use rubber gloves and to avoid contact with skin.

Alkylolamides in the concentration over 5% can cause irritating and allergenic effect.

Amphoteric compounds have no irritating and allergenic effect, but cause an unpleasant smell of SD which they belong to.

Hygienic requirements to the SD:

The degree of biological microorganism decomposition of ponds, where the sewage falls into, should reach 80%. So, the quickest and the most complete decomposition in water is typical for alkyksulfates and ether sulfates; sulphonol НП and sulphonol НП-3 are splitted slower (38% and 76%, respectively). Phosphates are better decomposited by microorganisms, but they contribute to the algae growth. Therefore, maximum allowable concentration (MAC) of SAS in ponds water shouldn’t exceed 0,5% mg/l for anionic and – 0,05-0,1% mg/l for nonionic ones.

SWA shouldn’t cause dermal-irritating reaction, toxic and allergenic effect on the body; they shouldn’t have any mutagenic, teratogenic, embryotoxic and carcinogenic properties; they shouldn’t have neither material nor functional accumulation in the body, should be easily washable off the human dermal surface, clothes, shoes, dishes and domestic objects; they should have high washing power and water solubility, without any unpleasant smell. Besides that, SD shouldn’t cause intensive skin degreasing, active reaction of their solution can’t exceed pH = 9.

Some SWA have definite requirements in terms of their bactericidal and disinfecting properties. Some other contain enzymes of proteolytic, amylolyticor or other activity, which provides more effective removal of protein, lipid or carbohydrate dirt.

SWA shouldn’t decrease the physical and chemical properties of the clothes and shoes material (air permeability, humidity ratio, vapour permeability, vaporability); they shouldn’t absorb in the tissues.

SWA for the washing up and washing of special equipment at catering enterprises, food, milk enterprises, meat and milk farming, meat-packing plants shouldn’t cause any steel constructions corrosion, and vice versa, should be easily washed off without any rubbing (only with water). These SWA include polyethylene glycol ethers, polypropylene glycols and disinfecting SWA (salts of quaternary ammonium compound chloramines B).

According to their physical structure SWA are manufactured in the form of powders, liquids, pastes and granules.

There are many synthetic washing powders of both domestic and foreign manufacturing. Among them the most widespread are:

-                “Lotos” («Лотос»), administered for the washing of cotton fabric. It is composed of: sulfonol, alkylsuphates, alkylsulfonates – 20-22%, sodium polyphosphate – 25%, sodium sulphate – 10%, sodium silicate – 10-13%, alkylolamides – 2%, optical breaching agent – 0,1-1,15%.

-                “Donbas” («Донбас»), which except the compounds that compose “Lotos”, includes soda ash – 10-20%.

-                “Era” («Ера»), which also includes sodium perborate – 8% and others.

Water hardness isn’t important for SWA: they don’t combine into insoluble compounds with calcium and magnesium salts; therefore they don’t loose their washing power even in cold water. At the same time the soaps in hard water combine into the compounds which impregnate clothes and linen fabric, decrease their ventilating capacity and other physical and chemical properties, and dye the linen into yellowish colour with an unpleasant smell.

Chemical means of skin protection

Protective ointments and pastes from harmful effect of chemical substances at the industry are also divided into hydrophobic and hydrophilic. The hydrophilic ointments and pastes are applied to protect the hands skin from oils, greases, oil products, solvents, varnishes, tars, glues and other organic compounds. They include: “Hiot” («Хіот») paste, “Zorya” («Зоря»), “Yalot” («Ялот») and others. Soap, starch, casein, beeswax, glycerin and others provide them with film-making properties (“biological gloves”). The hydrophilic ointments are easily washed off with water.

The hydrophobic protective ointments and pastes are applied to protect the hands skin from water solutions of aggressive and irritating substances. The pastes and ointments contain water-repellent compounds, insoluble in water (greases, nondrying oils, insoluble soaps). Silicone cream protects from solutions of acids, alkali, aggressive salts. Zinc stearate pastes protect from burns, artificial UV and intensive solar radiation. They include starch, glycerin, gelatin, porcelain clay, zinc oxide, graphite, talc, alum, tannin, colophony and others.

To wash dirty hands covered by paints, tars, bitumens and other organic compounds at painting, insulating and so on works, one should use washing pastes and ointments including abrasives (kaolin), porcelain clay, sand, soda ash, glycerin, vaseline, kerosene etc.

Bearing in mind the hygienic requirements, these means should correspond to the abovementioned conditions for SWA, first of all they shouldn’t cause any irritating or allergenic effect.

Hygienic characteristics of the body washing means

Bash-houses, saunas with their hot water and high temperature of saturated water steam contribute to the widening of sebaceous and sweat ducts, purification of skin and excretion of metabolic wastes from the body through the skin. Bash-houses were widespread in Ancient Rome time. According to their purpose the bath-houses are divided into toiletry, admission and mixed types. The most widespread are toiletry bath-houses (shower rooms or mixed ones). Besides, according to the mechanism of heat production they differentiate between steam bath-houses (Russian ones) and dry heat (Finnish) ones. In dry heat bath-houses (saunas) the microclimate is characterized by the combination of hot temperature (up to 100°C) with low relative humidity (15-20%). In the steam bath-houses the air temperature reaches 65-70%°C at the relative humidity over 75-80%. The contrast hydrothermal procedures have positive effect on the body and contribute to the normal physiological skin functions restoration.

Domestic means of the body washing such as showers, bathes are used by population more frequently despite of bath-houses and saunas, especially in rural, urban settlements, private houses (cottages). These means of the body washing are widespread especially if hot water-supply or means to receive hot water on point are present. From hygienic point of view they do not have any objections even have advantages if it is necessary of their immediate availability. But individual bathes have to be washed properly after each usage, public ones – obligatory disinfected also.

Bathwear / nakedness

Bathing usually involves the removal of at least some clothing; in private baths all clothing is removed. The amount of clothing removed depends on circumstance, custom, and willingness of bathers to reveal themselves. A [swimsuit](file:///G:\wiki\Swimsuit), swimming costume, or bathing suit is a garment designed for swimming or bathing. Typically a men's suit consists of shorts or briefs. A women's suit often consists of two pieces that cover the [breasts](file:///G:\wiki\Breast) and [pubic region](file:///G:\wiki\Intimate_part), or of one piece that resembles the combination of briefs and a tank top joined together.

Some European waterparks require bathers to be completely [naked](file:///G:\wiki\Nudity) and baths are sometimes not separated by gender. Prior to the [Meiji Restoration](file:///G:\wiki\Meiji_Restoration), bathing in Japan was mixed gender. Today, most [Japanese](file:///G:\wiki\Japan) baths are gender-segregated, while some rural Japanese baths are mixed gender. In both cases (mixed or segregated) public bathing in Japanis typically nude, with bathers carrying a small washtowel, although there are some mixed gender facilities where bathers wear [swimsuits](file:///G:\wiki\Swimsuit).

Frequency and time of the day

While it is customary for most people to bathe daily, personal hygiene habits vary, with some people bathing more than once a day and others every few days.

In Western culture, it is typical for people to bathe in the morning before starting the activities of the day or meeting with others outside the home. Arriving at work without having showered may be seen as a sign of unprofessionalism or slovenliness. In contrast, people in East Asia customarily bathe twice a day especially during the evening or the night, the rationale being that after a day's work one should remove sweat and dirt, in order to be comfortable and clean, thus keeping the bed clean.

Hazards of bathing

[http://intranet.tdmu.edu.ua/data/kafedra/internal/hihiena/classes_stud/en/med/lik/ptn/hygiene%20and%20ecology/3/11.%20Personal%20hygiene,%20healthy%20way%20of%20life.files/image005.gif](file:///G:\wiki\Image:Vintage_photo_nude_woman_1.jpg)[Drowning](file:///G:\wiki\Drowning) is one possible danger of bathing. In a shower bath drowning has been known to occur, even though the risks are less than in an immersion bath. Baths that have standing water involve a higher risk of drowning.

[Heatstroke](file:///G:\wiki\Hyperthermia) can also result from the use of sauna baths or other hot baths.

[Hypothermia](file:///G:\wiki\Hypothermia) from using cool baths and not being sensitive to the cold or because of falling asleep, etcetera.

[Ear infections](file:///G:\wiki\Otitis_media), also known as [swimmer's ear](file:///G:\wiki\Swimmer's_ear) can result from water building up and the resulting increase in bacteria.

[Impact injuries](file:///G:\wiki\Injury) are also possible from landing inappropriately in a bath, from an elevation, or from collision with other bathers, or with the sides of the bath.

[Irritation](file:///G:\wiki\Irritation) caused by bathing solutions or other cosmetic products.

[Infection](file:///G:\wiki\Infection) caused by sharing dirty bathwater or bathing with others.

[Collapsing](file:///G:\wiki\Fainting) when getting out of the bath because of the sudden change in blood pressure can occur, particularly when the bath is hot. Fainting can lead to accidents (including drowning if one falls back into the bath).

With advanced [age](file:///G:\wiki\Ageing), some people experience a diminished ability to [sense](file:///G:\wiki\Sense) [temperature](file:///G:\wiki\Temperature), and must use extra care to avoid accidentally [scalding](file:///G:\wiki\Burn_(injury)) themselves while bathing. This is also true of individuals of any age with [sensory nerve](file:///G:\wiki\Sensory_nerve) damage. Caution is needed with [children](file:///G:\wiki\Children) as well, as their body is much more sensitive to temperature and pain and they are more vulnerable to changes in temperature; this is particularly the case with infants.

Bathing [infants](file:///G:\wiki\Infant) too often has been linked to the development of [asthma](file:///G:\wiki\Asthma) or severe [eczema](file:///G:\wiki\Eczema) according to some researchers, including Michael Welch, chair of the [American Academy of Pediatrics](file:///G:\wiki\American_Academy_of_Pediatrics)' section on allergy and immunology .

Soap

Soap is a [surfactant](file:///G:\wiki\Surfactant) used in conjunction with [water](file:///G:\wiki\Water) for washing and [cleaning](file:///G:\wiki\Cleaning). It usually comes in a solid [molded](file:///G:\wiki\Molding_(process)) form, termed bars due to its historic and most typical shape. The use of thick [liquid](file:///G:\wiki\Liquid) soap has also become widespread, especially from [soap dispensers](file:///G:\wiki\Soap_dispenser) in public [washrooms](file:///G:\wiki\Washroom). Applied to a soiled surface, soapy water effectively holds particles in suspension so the whole of it can be rinsed off with clean water. In the developed world, synthetic [detergents](file:///G:\wiki\Detergent) have superseded soap as a [laundry](file:///G:\wiki\Laundry) aid.



Many soaps are mixtures of [sodium](file:///G:\wiki\Sodium) ([soda ash](file:///G:\wiki\Sodium_carbonate)) or [potassium](file:///G:\wiki\Potassium) ([potash](file:///G:\wiki\Potash)) [salts](file:///G:\wiki\Salt) of [fatty acids](file:///G:\wiki\Fatty_acid) which can be derived from oils or fats by reacting them with an [alkali](file:///G:\wiki\Alkali) (such as[sodium hydroxide/caustic soda/lye](file:///G:\wiki\Sodium_hydroxide) or [potassium hydroxide](file:///G:\wiki\Potassium_hydroxide)) at 80 – 100 °C in a process known as [saponification](file:///G:\wiki\Saponification). The fats are [hydrolyzed](file:///G:\wiki\Hydrolysis) by the base, yielding [glycerol](file:///G:\wiki\Glycerol) and crude soap. Historically, the alkali used was [potassium hydroxide](file:///G:\wiki\Potassium_hydroxide) made from the deliberate burning of vegetation such as [bracken](file:///G:\wiki\Bracken), or from wood ashes.

Soap is derived from either oils or fats. [Sodium tallowate](file:///G:\wiki\Sodium_tallowate), a common ingredient in many soaps, is in fact derived from [rendered](file:///G:\wiki\Kitchen_rendering) beef fat. Soap can also be made of vegetable oils, such as [palm oil](file:///G:\wiki\Palm_oil), and the product is typically softer. If soap is made from pure [olive oil](file:///G:\wiki\Olive_oil) it may be called [Castile soap](file:///G:\wiki\Castile_soap) or [Marseille soap](file:///G:\wiki\Marseille_soap). Castile is also sometimes applied to soaps with a mix of oils, but a high percentage of olive oil. The word "soap" is used colloquially to refer to a variety of cleaning solutions, including many that do not list soap as an ingredient but are instead detergents.

Although the word 'soap' continues to be used informally in everyday speech and product labels, in practice nearly all kinds of "soap" in use today are actually synthetic[detergents](file:///G:\wiki\Detergent), which are less expensive and easier to manufacture. While effort has been made to reduce their negative effect upon the environment, the results have been mixed.

Soaps are useful for cleaning because soap [molecules](file:///G:\wiki\Molecule) attach readily to both [nonpolar](file:///G:\wiki\Nonpolar) [molecules](file:///G:\wiki\Molecule) (such as [grease](file:///G:\wiki\Fat) or [oil](file:///G:\wiki\Oil)) and [polar](file:///G:\wiki\Chemical_polarity#Polar_molecules) molecules (such as [water](file:///G:\wiki\Water)). Although grease will normally adhere to skin or clothing, the soap molecules can attach to it as a "handle" and make it easier to rinse away. Allowing soap to sit on any surface (skin, clothes etc) over time can imbalance the moisture content on it and result in the dissolving of fabrics and dryness of skin.

(fatty end)  :CH3-(CH2)n - COONa: (water soluble end)

The hydrocarbon ("fatty") portion dissolves dirt and oils, while the ionic end makes it soluble in water. Therefore, it allows water to remove normally-insoluble matter by[emulsification](file:///G:\wiki\Emulsification).

The history and process of soap making

Early History

The earliest known evidence of soap use are [Babylonian](file:///G:\wiki\Babylonia) clay cylinders dating from 2800 BC containing a soap-like substance. A formula for soap consisting of water, [alkali](file:///G:\wiki\Alkali) and[cassia](file:///G:\wiki\Cassia) oil was written on a Babylonian clay tablet around 2200 BC.

The [Ebers papyrus](file:///G:\wiki\Ebers_papyrus) (Egypt, 1550 BC) indicates that [ancient Egyptians](file:///G:\wiki\Ancient_Egypt) bathed regularly and combined animal and vegetable oils with alkaline salts to create a soap-like substance. Egyptian documents mention that a soap-like substance was used in the preparation of [wool](file:///G:\wiki\Wool) for weaving.

Roman History

It is commonly reported that a soap factory with bars of scented soap was found in the ruins of [Pompeii](file:///G:\wiki\Pompeii) (79 AD). However, this has proved to be a misinterpretation of the survival of some soapy mineral substance, probably soapstone at the [Fullonica](file:///G:\w\index.php) where it was used for dressing recently cleansed textiles. Unfortunately this error has been repeated widely and can be found in otherwise reputable texts on soap history. The ancient Romans were generally ignorant of soap's detergent properties, and made use of the[strigil](file:///G:\wiki\Strigil) to scrape dirt and sweat from the body. The word "soap" appears first in a European language in [Pliny the Elder](file:///G:\wiki\Pliny_the_Elder)'s [Historia Naturalis](file:///G:\wiki\Natural_History_(Pliny)), which discusses the manufacture of soap from [tallow](file:///G:\wiki\Tallow) and ashes, but the only use he mentions for it is as a [pomade](file:///G:\wiki\Pomade) for hair; he mentions rather disapprovingly that among the [Gauls](file:///G:\wiki\Gaul) and [Germans](file:///G:\wiki\Teuton) men are likelier to use it than women.

A story encountered in some places claims that soap takes its name from a supposed "[Mount Sapo](file:///G:\wiki\Mount_Sapo)" where [ancient Romans](file:///G:\wiki\Ancient_Rome) [sacrificed](file:///G:\wiki\Sacrifice) animals. Rain would send a mix of animal tallow and wood ash down the mountain and into the clay soil on the banks of the [Tiber](file:///G:\wiki\Tiber). Eventually, women noticed that it was easier to clean clothes with this "soap". The location of Mount Sapo is unknown, as is the source of the "ancient Roman legend" to which this tale is typically credited.[[2]](http://www.algebralab.org/passage/passage.aspx?file=Chemistry_Soaps.xml) In fact, the [Latin](file:///G:\wiki\Latin) word sapo simply means "soap"; it was borrowed from a Celtic or Germanic language, and is [cognate](file:///G:\wiki\Cognate) with Latin sebum, "tallow", which appears in Pliny the Elder's account. Roman animal [sacrifices](file:///G:\wiki\Sacrifice)usually burned only the bones and inedible entrails of the sacrificed animals; edible meat and fat from the sacrifices were taken by the humans rather than the gods. Animal sacrifices in the ancient world would not have included enough fat to make much soap. The legend about Mount Sapo is probably [apocryphal](file:///G:\wiki\Apocryphal).

Arab History

The Arabs made soap from vegetable oil such as [olive oil](file:///G:\wiki\Olive_oil) and some aromatic oils such as [thyme](file:///G:\wiki\Thyme) oil. [Lye](file:///G:\wiki\Sodium_hydroxide) (Al-Soda Al-Kawia) was used for the first time, and the formula hasn't changed from the current soap sold in the market. From the beginning of the 7th century, soap was produced in Nablus (Palestine), Kufa (Iraq) and Basra (Iraq). Soaps, as we know them today, are descendants of historical Arabian Soaps. Arabian Soap was perfumed and colored, some of the soaps were liquid and others were hard. They also had special soap for shaving. It was commercially sold for 3 Dirhams (0.3 [Dinars](file:///G:\wiki\Dinars)) a piece in 981 AD. Al-Razi’s manuscript contains recipes for soap. A recently discovered manuscript from the 13th century details more recipes for soap making; e.g. take some sesame oil, a sprinkle of potash, alkali and some lime, mix them all together and boil. When cooked, they are poured into molds and left to set, leaving hard soap.

Historically, soap was made by mixing [animal fats](file:///G:\wiki\Animal_fat) with lye. Because of the caustic lye, this was a dangerous procedure (perhaps more dangerous than any present-day home activities) which could result in serious [chemical burns](file:///G:\wiki\Chemical_burn) or even [blindness](file:///G:\wiki\Blindness). Before commercially-produced lye []sodium hydroxide] was commonplace, potash [potassium hydroxide](file:///G:\wiki\Potassium_hydroxide) was produced at home for soap making from the ashes of a hardwood fire.

[Castile soap](file:///G:\wiki\Castile_soap) was produced in Europe as early as the [16th century](file:///G:\wiki\16th_century).

Modern History

In modern times, the use of soap has become universal in industrialized nations due to a better understanding of the role of [hygiene](file:///G:\wiki\Hygiene) in reducing the population size of[pathogenic](file:///G:\wiki\Pathogenic) [microorganisms](file:///G:\wiki\Microorganisms). Manufactured bar soaps first became available in the late nineteenth century, and [advertising](file:///G:\wiki\Advertising) campaigns in Europe and the United States helped to increase popular awareness of the relationship between cleanliness and health. By the 1950s, soap had gained public acceptance as an instrument of [personal hygiene](file:///G:\wiki\Hygiene).

Rarely, conditions allow for corpses to naturally turn in to a soap-like substance, such as the Soap Lady on exhibit in the [Mutter Museum](file:///G:\wiki\Mutter_Museum).

Purification and finishing

The common process of purifying soap involves removal of [sodium chloride](file:///G:\wiki\Sodium_chloride), [sodium hydroxide](file:///G:\wiki\Sodium_hydroxide), and [glycerol](file:///G:\wiki\Glycerol). These components are removed by [boiling](file:///G:\wiki\Boiling) the crude soap[curds](file:///G:\wiki\Curd) in water and re-precipitating the soap with salt.

Most of the water is then removed from the soap. This was traditionally done on a chill roll which produced the soap flakes commonly used in the 1940s and 1950s. This process was superseded by spray dryers and then by vacuum dryers.

The dry soap (approximately 6-12% moisture) is then compacted into small pellets. These pellets are now ready for soap finishing, the process of converting raw soap pellets into a salable product, usually bars.

Soap pellets are combined with fragrances and other materials and blended to homogeneity in an amalgamator (mixer). The mass is then discharged from the mixer into a refiner which, by means of an [auger](file:///G:\wiki\Auger), forces the soap through a fine wire screen. From the refiner the soap passes over a roller mill (French milling or hard milling) in a manner similar to [calendering](file:///G:\wiki\Calendering) paper or plastic or to making [chocolate liquor](file:///G:\wiki\Chocolate_liquor). The soap is then passed through one or more additional refiners to further plasticize the soap mass. Immediately before extrusion it passes through a vacuum chamber to remove any entrapped air. It is then extruded into a long log or blank, cut to convenient lengths, passed through a metal detector and then stamped into shape in refrigerated tools. The pressed bars are packaged in many ways.

[Sand](file:///G:\wiki\Sand) or [pumice](file:///G:\wiki\Pumice) may be added to produce a [scouring](http://en.wiktionary.org/wiki/scouring) soap. This process is most common in creating soaps used for human hygiene. The scouring agents serve to remove dead skin cells from the surface being cleaned. This process is called [exfoliation](file:///G:\wiki\Exfoliation_(cosmetology)). Many newer materials are used for exfoliating soaps which are effective but do not have the sharp edges and poor size distribution of pumice.

Handmade soap

Handmade soaps sold at a shop in [Hyères](file:///G:\wiki\Hy%D0%93%D0%81res), [France](file:///G:\wiki\France)

Some individuals continue to make soap in the home. The traditional name "[soaper](file:///G:\wiki\Soaper)", for a soapmaker, is still used by those who make soap as a [hobby](file:///G:\wiki\Hobby) or as an occupation. The most popular soapmaking processes today is the [cold process](file:///G:\wiki\Cold_process) method, where fats such as [olive oil](file:///G:\wiki\Olive_oil) react with [lye](file:///G:\wiki\Sodium_Hydroxide). Soapmakers sometimes use the [melt and pour](file:///G:\wiki\Melt_and_pour) process, where a premade soap base is melted and poured in individual molds, but this is not really to be considered soap-making. Some [soapers](file:///G:\wiki\Soaper) also practice other processes, such as the historical[hot process](file:///G:\wiki\Hot_process), and make special soaps such as clear soap (aka [glycerin soap](file:///G:\wiki\Glycerin_soap)).

Handmade soap differs from industrial soap in that, usually, an excess of fat is used to consume the alkali (superfatting), and in that the [glycerin](file:///G:\wiki\Glycerin) is not removed. Superfatted soap, soap which contains excess fat, is more skin-friendly than industrial soap; though, if not properly formulated, it can leave users with a "greasy" feel to their skin. Often, [emollients](file:///G:\wiki\Emollient) such as [jojoba](file:///G:\wiki\Jojoba) oil or [shea butter](file:///G:\wiki\Shea_butter) are added 'at trace' (the point at which the [saponification](file:///G:\wiki\Saponification) process is sufficiently advanced that the soap has begun to thicken), after most of the oils have saponified, so that they remain unreacted in the finished soap.

Disadvantages

Today, fat-based soaps have mostly been superseded by modern [detergents](file:///G:\wiki\Detergent). Washing agents do not contain soap for cleaning fabric, but for reducing foam.

The disadvantages of commercial soaps are:

Most commercial soaps have had their glycerine removed for use in other industries, which deprives the [skin](file:///G:\wiki\Skin) of the natural, moisturizing glycerine and generally leaves the skin feeling dry.

Some antibacterial soaps have antiseptic chemicals that can kill "healthy" bacteria that live symbiotically on the skin's surface and contribute to skin health. There is a theoretical risk of antibacterial additives, such as [Triclosan](file:///G:\wiki\Triclosan), in soaps contributing to [antibiotic resistant](file:///G:\wiki\Antibiotic_resistant) bacteria, however, controlled studies have not borne out that conclusion.[[2]](file:///G:\personal%20hyg%20internet\Soap.htm#_note-CDC_EID_1#_note-CDC_EID_1) When [Triclosan](file:///G:\wiki\Triclosan) is discharged into the environment and exposed to sunlight, it breaks down to yield [dioxins](file:///G:\wiki\Dioxins).[[3]](file:///G:\personal%20hyg%20internet\Soap.htm#_note-ES.26T_1#_note-ES.26T_1)

Soap-based products often contain the additive detergent [sodium laureth sulfate](file:///G:\wiki\Sodium_laureth_sulfate), which research has found to be harsh on skin. This product is also present in many non-soap cleaners for personal hygiene (shampoos, bathfoams, toothpaste, etc.).

Soap can have a mild [base](file:///G:\wiki\Base_(chemistry)) reaction with fabrics, resulting in damage over the long term. This could be due to excess [sodium](file:///G:\wiki\Sodium) [hydroxide](file:///G:\wiki\Hydroxide) ([NaOH](file:///G:\wiki\Sodium_hydroxide), an [alkali](file:///G:\wiki\Alkali)/[base](file:///G:\wiki\Base_(chemistry))) left from manufacture. This, however, is highly unlikely since most soap manufacturers don't formulate their soaps to have excess lye but rather excess oil or fat. It could also be caused by the very slight presence of NaOH from the [equilibrium reaction](file:///G:\wiki\Equilibrium_reaction):

R-COO-Na + H2O ↔ R-COO- + Na+ + H2O ↔ R-COOH + NaOH

However, this [equilibrium](file:///G:\wiki\Equilibrium_reaction) strongly favors the left-hand side so the fraction of NaOH formed is minuscule. It could simply be that soap itself is more alkaline in general and that this, in and of itself, is the cause for the damage.

Soap reacts with [lime](file:///G:\wiki\Lime_(mineral)) to form an insoluble deposit (soap scum) in "[hard water](file:///G:\wiki\Water_Hardness)":2Na+(R-COO)- (aq) + Ca2+(HCO3-)2(aq) → 2Na+(HCO3)-(aq) + Ca(R-COO)2(s) - where R stands for an [alkyl](file:///G:\wiki\Alkyl) group ([ppt](file:///G:\wiki\Precipitate))

Poorly finished soaps may contain excess [alkali](file:///G:\wiki\Alkali) ([NaOH](file:///G:\wiki\Sodium_hydroxide)) and react mildly [basically](file:///G:\wiki\Base_(chemistry)) with skin and fabric; Most handmade and commercial products are finished to neutrality or to a weak [acid](file:///G:\wiki\Acid) content to prevent this and be more compatible with the [skin's](file:///G:\wiki\Skin) slightly [acidic](file:///G:\wiki\Acidic) [pH](file:///G:\wiki\PH).

Commercial products use [chelating](file:///G:\wiki\Chelation) molecules ([sequestrants](file:///G:\wiki\Sequestrant)), often [EDTA](file:///G:\wiki\EDTA) derivatives to bind with any free [Ca](file:///G:\wiki\Calcium) or [Mg](file:///G:\wiki\Magnesium) ions and prevent [soap scum](file:///G:\w\index.php). These also help reduce fragrance loss, discoloration and [rancidity](file:///G:\wiki\Rancidification).

Castile soap has a very high alkalinity level, measured at about 9. pH of skin and hair has a slightly acidic pH level known to be about 5 to 6. Due to the high pH level, soapmakers who market liquid castile soap do not usually recommend it for washing hair, because it may cause hair to become dry. Those that do often recommend an acidic final rinse, such as with diluted vinegar, to restore the pH and remove any soap scum resulting from rinsing with hard water.

See also

[http://www.hygiene-educ.com/en/learn/personal/sci\_data/situation.htm#](http://www.hygiene-educ.com/en/learn/personal/sci_data/situation.htm)

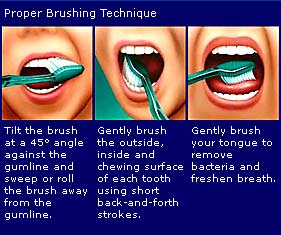
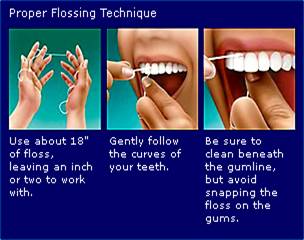
[Soap history by The Soap and Detergent Association](http://www.sdahq.org/cleaning/history/)

[History of soap by the Pharmaceutical Journal](http://www.pharmj.com/Editorial/19991218/articles/soap.html)

[Colonial Soap Making. Its History and Techniques. (The Soap Factory)](http://www.alcasoft.com/soapfact/historycontent.html)

Oral hygiene

Oral hygiene is the practice of keeping the [mouth](file:///G:\wiki\Mouth) clean. Oral hygiene is a [health](file:///G:\wiki\Health) program to prevent [cavities](file:///G:\wiki\Dental_caries) (dental caries), [gingivitis](file:///G:\wiki\Gingivitis), [periodontitis](file:///G:\wiki\Periodontal_disease), [bad breath](file:///G:\wiki\Halitosis) (halitosis), and other dental disorders.Oral hygiene consists of both personal and professional care. Dental [X-rays](file:///G:\wiki\X-ray) (radiographs) may be performed as part of routine professional examinations

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Personal care

Brushing and flossing

Careful and frequent brushing with a [toothbrush](file:///G:\wiki\Toothbrush) and [flossing](file:///G:\wiki\Dental_floss) help to prevent build-up of [plaque](file:///G:\wiki\Plaque) bacteria that change carbohydrate in our meals or snacks to acid which demineralises tooth eventually leading to tooth decay and toothache if acid episodes are frequent or are not prevented. Calculus (dental) or tartar buildup on teeth usually opposite salivary ducts is due to calcium deposits in resident plaque. Frequent brushing and swishing saliva around helps prevent these deposits. Cavities can be costly, in terms of the monetary cost to drill out the cavities and insert [dental fillings](file:///G:\wiki\Dental_fillings), and in terms of the tissue already damaged.

Almost all [cavities](file:///G:\wiki\Cavities) occur where food is trapped between teeth and inside deep pits and fissures in grooves on chewing surfaces where the brush, toothpaste, mouthwash, saliva and chewing gum, cannot reach.

Removing food from between teeth is easy before brushing to help saliva and fluoride access to neutralise acid and repair demineralised tooth, but chewing fibre like celery string is necessary to force saliva inside deep grooves after eating.

Special appliances or tools may be recommended to supplement (but not to replace) toothbrushing and flossing. These include special [toothpicks](file:///G:\wiki\Toothpick), water irrigation, or other devices. Initially [electric toothbrushes](file:///G:\wiki\Electric_toothbrush) were only recommended for persons who have problems with strength or dexterity of their hands, but many dentists are now recommending them to many other patients in order to improve their home dental care. In many parts of the world natural toothbrushes are used. In the Muslim world the [miswak](file:///G:\wiki\Miswak)or siwak is made from twigs or roots that are alleged to have an [antiseptic](file:///G:\wiki\Antiseptic) effect when applied as a toothbrush.

HYGIENIC INDICES

1-st group of Hygienic indices are used to estimate S of tooth crown that is covered by plaque. ( Fedorov – Volodkina index, Green-Vermillion index, Ramfiord index, Navy-Quigley-Hein index, Turecky index)

Fedorov – Volodkina index (oral hygiene index (OHI))

For  this index solution of Shiller-Pisarev (with iodine) is applied to 6 frontal mandible teeth   http://intranet.tdmu.edu.ua/data/kafedra/internal/stomat_ter/classes_stud/en/stomat/ptn/Therapeutic%20Dentistry/3%20year/V/03.%20Dental%20plaque%20and%20deposits.files/image026.gif for few minutes.

Scores:

1 – surface is not colored

2 – ¼ of tooth surface is colored

3 – ½ of tooth surface is colored

4 – ¾ of tooth surface is colored

5 – all tooth surface is colored

Total results we will get with the formula:

HI = http://intranet.tdmu.edu.ua/data/kafedra/internal/stomat_ter/classes_stud/en/stomat/ptn/Therapeutic%20Dentistry/3%20year/V/03.%20Dental%20plaque%20and%20deposits.files/image028.gif

∑ – sum of scores of every tooth

Results

1,1 – 1,5 points – oral hygiene index is good

1,6 – 2,0 points – satisfactory

2,1 – 2,5 points– poor

2,6 – 3,4 points– bad

3,5 -5,0 points – very bad






Food and drink in relation to oral hygiene

Foods that help your muscles and bones also help teeth and gums. Dairy contributes vitamin D, strengthening teeth. Breads and cereals are rich in vitamin B while fruits and vegetables contain vitamin C, both of which contribute to healthy gum tissue. Lean meat, fish, and poultry provide magnesium and zinc for teeth. Some people recommend that teeth be brushed after every meal and at bedtime, and flossed at least once per day, preferably at night before sleep. For some people, flossing might be recommended after every meal.

[Dentists](file:///G:\wiki\Dentist) and [dental hygienists](file:///G:\wiki\Dental_hygienist) can instruct and demonstrate brushing and flossing techniques.

 Better: Some foods may protect against cavities. [Milk](file:///G:\wiki\Milk) and [cheese](file:///G:\wiki\Cheese) appear to be able to raise [pH](file:///G:\wiki\PH) values in the mouth, and so reduce tooth exposure to [acid](file:///G:\wiki\Acid). They are also rich in[calcium](file:///G:\wiki\Calcium) and [phosphate](file:///G:\wiki\Phosphate), and may also encourage [remineralisation](file:///G:\wiki\Remineralisation). All foods increase saliva production, and since saliva contains buffer chemicals this helps to stabilise the pH at just above 7 in the mouth. Foods high in [fiber](file:///G:\wiki\Fiber) may also help to increase the flow of saliva. Unsweetened (basically sugar free) [chewing gum](file:///G:\wiki\Chewing_gum) stimulates saliva production, and helps to clean the surface of the tooth.

 Worse: Sugars are commonly associated with dental cavities. Other carbohydrates, especially cooked starches, e.g. [crisps/potato chips](file:///G:\wiki\Potato_chip), may also damage teeth, although to a much lesser degree. This is because starch is not an ideal food for the bacteria. It has to be converted by enzymes in [saliva](file:///G:\wiki\Saliva) first.

[Sucrose](file:///G:\wiki\Sucrose) (table sugar) is most commonly associated with cavities, although [glucose](file:///G:\wiki\Glucose) and [maltose](file:///G:\wiki\Maltose) seem equally gervic (likely to cause cavities). The amount of sugar consumed at any one time is less important than how often food and drinks that contain sugar are consumed. The more frequently sugars are consumed, the greater the time during which the tooth is exposed to low pH levels, at which point demineralisation occurs. It is important therefore to try to encourage infrequent consumption of food and drinks containing sugar so that teeth have a chance to repair themselves. Obviously, limiting sugar-containing foods and drinks to meal times is one way to reduce the incidence of cavities.

Artificially refined sugar is not the only type that can promote dental cavities. There are also sugars found in fresh [fruit](file:///G:\wiki\Fruit) and fruit juices. These foods (oranges, lemons, limes, apples, etc.) also contain acids which lower the pH level. On the other hand, [carbonic acid](file:///G:\wiki\Carbonic_acid) found in soda water is very weakly acidic (pH 6.1), and not associated with dental cavities(provided the soft drink is sugar free, of course). That said, soft drinks are not as healthy for the teeth as milk, due to their lower pH and lack of calcium. Drinking sugared soft drinks throughout the day raises the risk of dental cavities tremendously.

Another factor which affects the risk of developing cavities is the stickiness of foods. Some foods or sweets may stick to the teeth and so reduce the pH in the mouth for an extended time, particularly if they are sugary. It is important that teeth be cleaned at least twice a day, preferably with a [toothbrush](file:///G:\wiki\Toothbrush) and fluoride toothpaste, to remove any food sticking to the teeth. Regular brushing and the use of dental floss also removes the dental plaque coating the tooth surface.

[Chewing gum](file:///G:\wiki\Chewing_gum) assists oral irrigation between and around the teeth, cleaning and removing particles, but for teeth in poor condition it may damage or remove loose fillings as well.

[Smoking](file:///G:\wiki\Tobacco_smoking) and chewing tobacco are both linked with multiple dental hazards. Regular vomiting, as seen in victims of [bulimia](file:///G:\wiki\Bulimia), also causes significant damage.

Other

[Retainers](file:///G:\wiki\Retainers)- can be cleaned in mouthwash or denture cleaning fluid. [Fluoride](file:///G:\wiki\Fluoride)-containing, or anti-plaque (tartar control) [toothpastes](file:///G:\wiki\Toothpaste) or [mouthwashes](file:///G:\wiki\Mouthwash) may be recommended by the dentist or dental hygienist. [Dental braces](file:///G:\wiki\Dental_braces) may be recommended by a dentist for best oral hygiene and health. [Dentures](file:///G:\wiki\Dentures), [retainers](file:///G:\wiki\Retainer_(orthodontic_device)), and other appliances must be kept extremely clean. This includes regular brushing and may include soaking them in a cleansing solution.

Regular tooth cleaning by the dental hygienist is recommended to remove tartar (mineralized plaque) that may develop even with careful brushing and flossing, especially in areas that are difficult for a patient to reach on his own at home. Professional cleaning includes [tooth scaling](file:///G:\wiki\Tooth_scaling) and [tooth polishing](file:///G:\w\index.php) and [debridement](file:///G:\wiki\Debridement) if too much [tartar](file:///G:\wiki\Calculus_(dental)) has accumulated. This involves the use of various instruments or devices to loosen and remove deposits from the teeth.

Most dental hygienists recommend having the teeth professionally cleaned at least every six month.

More frequent cleaning and examination may be necessary during the treatment of many of the dental/oral disorders. Routine examination of the teeth is recommended at least every year. This may include yearly, select [dental X-rays](file:///G:\wiki\Dental_X-rays).

However, in between cleanings by a dental hygienist, everyone must have good oral hygiene to support the professional care.

Complications

Usually there are no complications to the upkeep of oral hygiene; however, overly vigorous or incorrectly performed brushing or flossing may result in injury to the [gingiva](file:///G:\wiki\Gingiva)(gums). Some results of improper or over vigorous brushing may include: worn-out bristles, unusually sore gums, damage to enamel of teeth, [gingivitis](file:///G:\wiki\Gingivitis) and bleeding gums.

One should always call the dentist or dental hygienist if instructions or demonstration of proper brushing or flossing techniques is needed, or to schedule routine dental cleaning and examination.

The toothbrush

The toothbrush     is an instrument used to clean [teeth](file:///G:\wiki\Teeth), consisting of a small [brush](file:///G:\wiki\Brush) on a handle. [Toothpaste](file:///G:\wiki\Toothpaste), often containing [fluoride](file:///G:\wiki\Fluoride), is commonly added to a toothbrush to aid in cleaning. Toothbrushes are offered with varying textures of bristles, and come in many different sizes and forms. Most [dentists](file:///G:\wiki\Dentist) recommend using a toothbrush labelled "Soft", since firmer bristled toothbrushes can really damage [tooth enamel](file:///G:\wiki\Tooth_enamel) and irritate [gums](file:///G:\wiki\Gingiva) as indicated by the [American Dental Association](file:///G:\wiki\American_Dental_Association). Toothbrushes are often made from [synthetic fibers](file:///G:\wiki\Synthetic_fiber), although natural toothbrushes are also known in many parts of the world.

History

A variety of [oral hygiene](file:///G:\wiki\Oral_hygiene) measures have been used since before recorded history. This has been verified by various excavations done all over the world, in which[toothpicks](file:///G:\wiki\Toothpick), [chewsticks](file:///G:\wiki\Chewstick), tree [twigs](file:///G:\wiki\Twig), strips of [linen](file:///G:\wiki\Linen), bird [feathers](file:///G:\wiki\Feather), animal [bones](file:///G:\wiki\Bone) and [porcupine](file:///G:\wiki\Porcupine) quills were recovered. The first modern idea of a toothbrush is believed to have been invented in [China](file:///G:\wiki\China) around 1600. However, many other peoples used different forms of toothbrushes. [Ancient Indian](file:///G:\wiki\Ancient_India) medicine has used the [neem tree](file:///G:\wiki\Neem) and its products to create toothbrushes and similar products for millenia. In the [Muslim](file:///G:\wiki\Muslim) world, the [miswak](file:///G:\wiki\Miswak), or siwak, made from a twig or root with [antiseptic](file:///G:\wiki\Antiseptic) properties is widely used. Rubbing [baking soda](file:///G:\wiki\Sodium_bicarbonate) or [chalk](file:///G:\wiki\Chalk) against the teeth was also common.

William Addis of [England](file:///G:\wiki\England) is credited with creating the first mass-produced toothbrush in [1780](file:///G:\wiki\1780). In 1770 he had been placed in jail for causing a riot. While in prison, he decided that the method for teeth brushing of the time – rubbing a [rag](file:///G:\wiki\Rag) on one's teeth with [soot](file:///G:\wiki\Soot) and [salt](file:///G:\wiki\Salt) – could be improved. So he took a small animal [bone](file:///G:\wiki\Bone), drilled small holes in it, obtained some bristles from a guard, tied them in tufts, then passed the bristles through the holes on the bone and glued them.

The first [patent](file:///G:\wiki\Patent) for a toothbrush was by H. N. Wadsworth in [1850](file:///G:\wiki\1850) in the [United States](file:///G:\wiki\United_States), but mass production of the product in America only started in [1885](file:///G:\wiki\1885). The rather advanced design had a bone handle with holes bored into it for the Siberian Boar hair bristles. [Boar](file:///G:\wiki\Boar) wasn't an ideal material; it retained [bacteria](file:///G:\wiki\Bacteria), it didn't dry well, and the bristles would often fall out of the brush. It wasn't until [World War II](file:///G:\wiki\World_War_II), however, that the concept of brushing teeth really caught on in the U.S., in part due to the fact that it was part of American soldiers' regular daily duty to clean their teeth. It was a practice that they brought back to their home life after the conclusion of the war

Natural bristles (from animal [hair](file:///G:\wiki\Hair)) were replaced by [synthetic fibers](file:///G:\wiki\Synthetic_fiber), usually [nylon](file:///G:\wiki\Nylon), by [DuPont](file:///G:\wiki\DuPont) in [1938](file:///G:\wiki\1938). The first nylon bristle toothbrush, made with nylon yarn, went on sale on[February 24](file:///G:\wiki\February_24), [1938](file:///G:\wiki\1938). The first [electric toothbrush](file:///G:\wiki\Electric_toothbrush), the Broxodent, was introduced by the Bristol-Myers Company (now [Bristol-Myers Squibb](file:///G:\wiki\Bristol-Myers_Squibb)) at the centennial of the American Dental Association in [1959](file:///G:\wiki\1959).

In January [2003](file:///G:\wiki\2003), the toothbrush was selected as the number one invention [Americans](file:///G:\wiki\United_States) could not live without, beating out the [automobile](file:///G:\wiki\Automobile), [computer](file:///G:\wiki\Personal_computer), [cell phone](file:///G:\wiki\Mobile_phone), and [microwave oven](file:///G:\wiki\Microwave_oven), according to the [Lemelson](file:///G:\wiki\Jerome_H._Lemelson)-[MIT](file:///G:\wiki\Massachusetts_Institute_of_Technology) Invention Index

Electric toothbrushes

The first electric toothbrush was developed in [1939](file:///G:\wiki\1939) in [Scotland](file:///G:\wiki\Scotland), but did not appear on the open market until the [1960s](file:///G:\wiki\1960s), when it was marketed as the [Broxodent](http://broxodent.com/) in the[United States](file:///G:\wiki\United_States) by [Squibb](file:///G:\wiki\Bristol-Myers_Squibb). In [1961](file:///G:\wiki\1961), [General Electric](file:///G:\wiki\General_Electric) introduced a rechargeable cordless toothbrush that moved up and down when activated.  

In [1987](file:///G:\wiki\1987), the first rotary action toothbrush for home use, the Interplak, appeared in shops for the general public. There are currently many different varieties of model that use this mechanism. Research shows that they tend to be somewhat (but not extremely) more effective at removing [plaque](file:///G:\wiki\Dental_plaque) and preventing [gingival](file:///G:\wiki\Gingival) bleeding than manual toothbrushes and vibrating toothbrushes. Evolution of the modern toothbrush

Different kind of brushes

The Cochrane study separated the electrical toothbrush designs into:

side-to-side

circular ultra-sonic vibration, like the [Sonicare](file:///G:\wiki\Sonicare) manufactured by [Philips](file:///G:\wiki\Philips) - which claims to have a secondary cleaning action caused by vibrating saliva rotation-oscillation in which a circular head spins back and forth in quick bursts - like many of Braun's Oral B-brushes.

counter oscillation, in which tufts of bristles rotate in different directions simultaneously

See also

1.      [American Artifacts](http://www.americanartifacts.com/smma/scott/scott.htm) - Dr. Scott's Quack Electric Devices

2.     [Academy of General Dentistry](http://www.agd.org/consumer/topics/advances/main.asp) - Dental advances

3.      [ToothbrushExpress.com](http://www.toothbrushexpress.com/html/toothbrush_history.html) - Toothbrush History

4.      [Thumbs down for electric toothbrush](http://news.bbc.co.uk/1/hi/health/2679175.stm) - BBC News

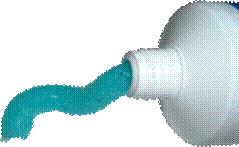
5.      [[1]](http://www.blackwell-synergy.com/doi/abs/10.1111/j.1601-5037.2004.00048.x?cookieSet=1&journalCode=idh) Penick, Catherine (2004) Power toothbrushes: a critical review - International Journal of Dental Hygiene 2 (1), 40-44. doi: 10.1111/j.1601-5037.2004.00048.x

6.      [Manual versus powered tooth brushing for oral health. Commentary](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=15846633&dopt=Abstract)

7.      [Sonicare ® toothbrushes](http://www.animated-teeth.com/electric_toothbrushes/t3_sonic_toothbrushes.htm) : How do sonic toothbrushes work?

Toothpaste

Toothpaste is a [paste](file:///G:\wiki\Paste) or [gel](file:///G:\wiki\Gel) [dentifrice](file:///G:\wiki\Dentifrice) used to clean and improve the aesthetic appearance and health of [teeth](file:///G:\wiki\Teeth). It is almost always used in conjunction with a [toothbrush](file:///G:\wiki\Toothbrush). Toothpaste use can promote good [oral hygiene](file:///G:\wiki\Oral_hygiene): it can aid in the removal of [dental plaque](file:///G:\wiki\Dental_plaque) and [food](file:///G:\wiki\Food) from the teeth, it can aid in the elimination and/or masking of [halitosis](file:///G:\wiki\Halitosis), and it can deliver active ingredients such as [fluoride](file:///G:\wiki\Fluoride) to prevent tooth and gums ([Gingiva](file:///G:\wiki\Gingiva)) disease. Most people in [developed countries](file:///G:\wiki\Developed_countries) consider toothpaste a necessity and use it at least once a day.



History

The earliest known reference to a toothpaste is in a manuscript from [Egypt](file:///G:\wiki\Egypt) in the [4th century](file:///G:\wiki\4th_century) A.D., which prescribes a mixture of powdered [salt](file:///G:\wiki\Salt), [pepper](file:///G:\wiki\Black_pepper), [mint](file:///G:\wiki\Mint) leaves, and[iris](file:///G:\wiki\Iris_(plant)) flowers. The Romans used toothpaste formulations based on human [urine](file:///G:\wiki\Urine). An 18th century American toothpaste recipe containing burnt bread has been found. Another formula around this time called for [dragon's blood](file:///G:\wiki\Dragon's_blood) (a resin), [cinnamon](file:///G:\wiki\Cinnamon), and burnt [alum](file:///G:\wiki\Alum).

However, toothpastes or powders did not come into general use until the [19th century](file:///G:\wiki\19th_century) in Britain. In the early [1800s](file:///G:\wiki\1800s), the toothbrush was usually used only with water, but tooth powders soon gained popularity. Most were home made, with [chalk](file:///G:\wiki\Chalk), pulverized [brick](file:///G:\wiki\Brick), and [salt](file:///G:\wiki\Salt) being common ingredients. An 1866 Home Encyclopedia recommended pulverized [charcoal](file:///G:\wiki\Charcoal), and cautioned that many patented tooth powders then commercially marketed did more harm than good.

By [1900](file:///G:\wiki\1900), a paste made of [hydrogen peroxide](file:///G:\wiki\Hydrogen_peroxide) and [baking soda](file:///G:\wiki\Baking_soda) was recommended. Pre-mixed toothpastes were first marketed in the 19th century, but did not surpass the popularity of tooth-powder until [World War I](file:///G:\wiki\World_War_I). In [New York City](file:///G:\wiki\New_York_City) in [1896](file:///G:\wiki\1896), [Colgate & Company](file:///G:\wiki\Colgate-Palmolive) manufactured toothpaste in the first collapsible tube, similar to that recently introduced for artists' paints.

[Fluoride](file:///G:\wiki\Fluoride) was first added to toothpastes in 1914, and was criticized by the American Dental Association (ADA) in 1937. Fluoride toothpastes developed in the [1950s](file:///G:\wiki\1950s)received the ADA's approval. Countries limit and suggest different amounts acceptable for health. Much of [Africa](file:///G:\wiki\Africa) has a slightly higher percent than the [U.S.](file:///G:\wiki\United_States)

In [June](file:///G:\wiki\June), [2007](file:///G:\wiki\2007), the US [Food and Drug Administration](file:///G:\wiki\Food_and_Drug_Administration) and similar agencies in [Panama](file:///G:\wiki\Panama), [Puerto Rico](file:///G:\wiki\Puerto_Rico) and [Australia](file:///G:\wiki\Australia) advised consumers to avoid, return, or discard certain brands of toothpaste manufactured in [China](file:///G:\wiki\Peoples_Republic_of_China), after batches of Chinese made toothpaste were found to be contaminated with the poisonous chemical [Diethylene glycol](file:///G:\wiki\Diethylene_glycol), also called[Diglycol](file:///G:\wiki\Diglycol) or [Diglycol stearate](file:///G:\w\index.php), (or labelled as "DEG" on the tube). The chemical is used in [antifreeze](file:///G:\wiki\Antifreeze) as a solvent and is potentially fatal.

Toothpaste is most commonly sold in flexible [tubes](file:///G:\wiki\Tube), though harder containers are available. The hard containers stand straight up, availing more of the toothpaste and saving shelf space.

Ingredients and flavors

[Sodium fluoride](file:///G:\wiki\Sodium_fluoride) (NaF) is the most popular active ingredient in toothpaste to prevent cavities; some brands use [sodium monofluorophosphate](file:///G:\wiki\Sodium_monofluorophosphate) (Na2PO3F). Nearly all toothpaste sold in the United States has 1000 to 1100 parts per million fluoride ion from one of these active ingredients, in the UK the fluoride content is often higher, a NaF of 0.32% w/w (1450ppm fluoride) is not uncommon. This consistency leads some to conclude that cheap toothpaste is just as good as expensive toothpaste. When the magazine[Consumer Reports](file:///G:\wiki\Consumer_Reports) rated toothpastes in 1998, 30 of the 38 were judged excellent.

Many, though not all, toothpastes contain [sodium lauryl sulfate (SLS)](file:///G:\wiki\Sodium_dodecyl_sulfate) or another of the sulfate family. SLS is found in other personal care products as well, such as shampoo, and is largely a foaming agent. SLS may cause a greater frequency of [mouth ulcers](file:///G:\wiki\Mouth_ulcer) in some people as it can dry out the protective layer of oral tissues causing the underlying tissues to become damaged. Some brands include powdered white [mica](file:///G:\wiki\Mica). This acts as a mild abrasive to aid polishing of the tooth surface, and also adds a cosmetically-pleasing glittery shimmer to the paste. Many may include frustules of dead [diatoms](file:///G:\wiki\Diatoms), as a mild abrasive.

Ingredients such as [baking soda](file:///G:\wiki\Baking_soda), [enzymes](file:///G:\wiki\Enzymes), [vitamins](file:///G:\wiki\Vitamins), [herbs](file:///G:\wiki\Herbs), [calcium](file:///G:\wiki\Calcium), [calcium sodium phosphosilicate](file:///G:\w\index.php), [mouthwash](file:///G:\wiki\Mouthwash), and/or [hydrogen peroxide](file:///G:\wiki\Hydrogen_peroxide) are often combined into base mixes and marketed as being beneficial. Some manufacturers add antibacterial agents, for example [triclosan](file:///G:\wiki\Triclosan) or [zinc chloride](file:///G:\wiki\Zinc_chloride). Triclosan is a very common ingredient in the UK.

Toothpaste comes in a variety of [flavors](file:///G:\wiki\Flavor), most often being some variation on [mint](file:///G:\wiki\Mint) ([spearmint](file:///G:\wiki\Spearmint), [peppermint](file:///G:\wiki\Peppermint), regular mint, etc). Other more exotic flavors include: [anise](file:///G:\wiki\Anise),[apricot](file:///G:\wiki\Apricot), [bubblegum](file:///G:\wiki\Bubblegum) (marketed mostly to children), [cinnamon](file:///G:\wiki\Cinnamon), [fennel](file:///G:\wiki\Fennel), [neem](file:///G:\wiki\Neem), [ginger](file:///G:\wiki\Ginger), [vanilla](file:///G:\wiki\Vanilla), [lemon](file:///G:\wiki\Lemon), [orange](file:///G:\wiki\Orange_(fruit)), [pine](file:///G:\wiki\Pine). Flavors which have been introduced but discontinued due to poor reception include [peanut butter](file:///G:\wiki\Peanut_butter), [iced tea](file:///G:\wiki\Iced_tea), and even [whisky](file:///G:\wiki\Whisky). Some brands of toothpaste are unflavored,  but many are both flavored and sweetened. Because [sugar](file:///G:\wiki\Sugar) can cause tooth decay, artificial sweeteners are generally employed for this purpose. The inclusion of sweet-tasting but highly toxic [diethylene glycol](file:///G:\wiki\Diethylene_glycol) in Chinese-made toothpaste led to a multi-nation and multi-brand toothpaste recall in 2007.

Many toothpastes contain [colorings](file:///G:\wiki\Food_coloring) for better visual acceptance.

Toothpaste is not intended to be swallowed. Some types of toothpaste may cause [nausea](file:///G:\wiki\Nausea) or [diarrhea](file:///G:\wiki\Diarrhea) if swallowed in excess quantity. Extended consumption while the teeth are forming can result in [fluorosis](file:///G:\wiki\Dental_fluorosis). This is why young children should not use toothpaste except under close supervision. There are several non-fluoride toothpaste options available in the market for those with no tolerance to fluoride.

Striped toothpaste

Striping of toothpaste is solely for the purpose of providing an alternative appearance; it provides no functional benefit to the consumer.

Striped toothpaste can be produced by including two different colored toothpastes in an unusual type of packaging. The collapsible tube has two tanks, one filled with each color paste (see figure). Squeezing the tube pushes the two pastes out the opening. The tube nozzle layers the pastes to produce a striped pattern.

To keep the cost of packaging to a minimum, it is now common for tubes to be filled with striped paste (e.g. Aquafresh). As the tube is squeezed, the stripes flow parallel to each other and do not mix. The patterned paste that gets dipensed is simply a narrower version of what is in the tube. Filling is done using a multi-nozzle filling head that dispenses a different colored stripe in each direction. To keep the stripes parallel to the axis of the tube, the head starts at the bottom and retracts as it fills, staying just above the level of the paste. Tubes with two compartments are generally reserved for toothpastes containing two formulas intended to react together and therefore kept isolated until dispensed.

Characteristics of the organism biological rhythmus and their classification

Good health state and high level of work capacity of the human depend on synchronization of the organism vital activity, i.e. the central nervous system ability to provide interaction of different periodic functions of the organism and coincidence of both the organism and environment rhythmics.

It was established, that heart rate and respiratory rate of healthy person have the 4/1 relation. Any changes of this relation are the evidence of the certain connection disturbance in the organism and allow to draw a conclusion that some organism functions are out of order, and certain unfavourable changes in the health state are taking place.

Biorhythms are defined as periodic changes of the physiological and psychological processes intensity during time period. Biorhythms are typical for all living organisms on the Earth and are precondition to provide the normal vital activity of them according to the main nature rhythms, resulted from Earth revolution around the sun and stars and leading to change of seasons, day and night, influence of Moon phases, high and low tide etc.

Disorders and changes of biological rhythms significantly influence psychological and physiological functions, psychological and emotional state of the human and are the result of social conditions of life and urbanization factors (work on different shifts in industry, long-distance travel and flights etc.). These disorders may be the cause of significant psychological and emotional loading, neurosis and even marked disturbances of criteria indices of the mental health.

There are different classifications of biological rhythms. They are based on the frequency characteristics, organization level of biological systems and peculiarities of interaction between the organism and environment.

Periodic processes are observed at the different organization level of living systems and cover the highest frequency band. The most complete classification of biological rhythms by their frequency characteristics was proposed by N.I. Moiseeva and V.M. Sysuev (1981). Five main classes of biological rhythms may be defined according to this classification:

Class 1 –high frequency rhythms (period from milliseconds to 30 minutes; oscillation on molecular level, heart and respiratory rate, intestinal peristalsis etc.);

Class 2 –middle frequency rhythms (from 30 minutes to 28 hours), including

ultradian (to 20 hours) and circadian (from 20 to 28 hours) rhythms;

Class 3 – mesorhythms (from 28 hours to 20 days), including infradian (from 28 hours to 6ays) and circaceptidal (near days);

Class 4 – macrorhytms (from 20 days to 1year);

Class 5 – megarhythms (from 1 year to decades).

Another very important criterion of biorhytms classification is by organization level of biosystems. According to this criterion, such biorhythms as cellular, organ, organism and population are defined.

By peculiarities of interaction between the organism and environment one defines adaptive biological rhythms, i.e. oscillation with periods similar to main geophysical cycles, they are synchronizers of external and internal rhythms and physiological ones, which reflect the state of the organism physiological systems.

Desynchronosis and methods of their prevention. Chronohygiene

Based on scientific research, it was established, that a lot of pathological states are resulted from the biological rhythms disturbance. Such states are named desynchronosis. They may appear during studying, training, other types of human activity, including development of different diseases.

An example of the desynchronosis is arrhythmic pulse among people suffering from cardio-vascular diseases, changes of respiratory rate among people suffering from pneumonia, bronchial asthma, changes of intestinal peristalsis among people suffering from gastro-intestinal diseases etc.

Vascular resistance during essential hypertension is higher at nighttime, than at daytime. Intracellular enzyme activity of patient suffering from angina pectoris is lower at nighttime than at daytime. Patients suffering from myocardial infarction have disturbances of the electrolytic metabolism daily rhythms: increased sodium and decreased potassium concentration in red blood cells at nighttime; lipid exchange rhythm is also disordered; the contractile myocardial function is depressed especially in the evening.

Patients with hepatocirrhosis have the following desynchronosis: essentially depressed amplitude of the daily rhythm of the steroid hormones excretion comparing to healthy one, significant disturbances of the bioenergetic process rhythms are also registered etc.

Marked desynchronosis are registered among patients suffering from endocrine diseases: daily changes of glucose concentration in blood (diabetes mellitus), 17-oxycorticosteroids, catecholamines and electrolytes excretion (pancreatitis), other significant disorders of metabolism rhythm (diseases of hypothalamohypophysial and diencephalic systems).

Patients suffering from manic-depressive psychosis have the acute attack of manic phase as desynchronosis of the “calm-activity” biorhythm cycle. Rhythms disorders of hypothalamo-pituitary-adrenal axis are registered during stress situations resulted from influence of extremal environment factors.

Branch of medical science chronomedicine (and corresponding branches – chronotherapy, chronopharmacology, chronohygiene) was formed based on the research of desynchronosis and causes of their appearance. At the heart of this discipline is elaboration of optimal timing schemes of therapeutic, pharmacodynamic and preventive means and methods. The most effective regime of occupational activity, time and optimal duration of rest, sleep periods and time for eating were worked out for people working in different shifts. Also the rest duration and regime after flight were elaborated for pilots who cross several time zones. Special programs were worked out for occupational selection of people, the most capable for flight on different shifts and leaving out people unable for such type of work, taking into account their biorhythmic peculiarities.

It has been underlined that all people have different daily regimes of work capacity. Some of them - so called “larks”, work with high energy before noon; some - so called “owls” – after noon. L. Tolstoy, A. Chekhov, E. Hemingway preferred to work early in the morning. “Owls” went to bed late, woke up in the morning with some difficulties, had the highest work capacity in the evening or even at night. H. de Balsac and D. Mendeleev preferred to work at night.

Each human should know his personal rhythm of work capacity. If you determine your period of the highest work capacity, you may use this time for the most complicated and important tasks, while periods of the work capacity decreasing may be used for less important work.

Individual peculiarities of each person’s biorhythms have to be taken into account during organization of occupational activity and rest. The organization of the labour regime on second and third shifts in industry has to be coordinated with the individual biorhythm peculiarities in such way, that intensive load takes place during natural periods of increased work capacity. Special attention has to be given to professions, which are characterized with high responsibility or high monotony.

It is important for each person to develop individual rhythm of activity during a shift, increasing pace of work during periods of the high work capacity and taking short rest if fatigue appears.

Day sleep has been organized for the desynchronosis prevention and the work capacity increasing. It is recommended to organize the day rest in such way, that this rest corresponds to night sleep by its conditions. Silence, absence of external irritants, darkening etc. allow person to recuperate quicker and adapt to temporary changes of vital rhythm. Day sleep in conditions, which imitate the night, helps the organism to adapt quickly to unusual regimes. Another condition, which provides high work capacity during night time, is organization of obligatory hot nutrition. This type of nutrition compensates energy expenditure of the organism, and also is an effective timer. Longer working at night shift is better for the organism. Shorter night work periods are not very good due to the fact that the organism has not enough time for the work and rest changes adaptation.

Desynchronosis are observed among astronauts during their stay on the near-earth orbit. Unusual labour conditions in Space require maximum energy, attention and force in any time. It is very difficult, taking into account the fact, that astronauts meet the sunrise in Space up to 20 times per 24 hours. System of measures is directed to keep usual “earth” 24-hour rhythms for the desynchronosis prevention. Special films, radio- and TV-programs of connection with the Earth and other measures are used. These measures allow the astronauts to keep high work capacity during the flight.

Significant reorganization of biorhythms is necessary during flights across 4-5 time zones. According to the data of French researchers, 78% of the air personnel people flying on long distances have the desynchronosis disturbances. The company “British Airways” worked out the standard for its pilots: the pilot can cross not more than 40 time zones in any direction during 28 days.

There are some rules, which ease the human adaptation to the time zone changes. If the time zone change is for limited period of time, it is advisable to keep the work and rest regime similar to usual. If work at new place needs maximum load, it is necessary to change the work and rest regime gradually and in advance, adapting to new time zone.

Having some knowledge on biological rhythms, doctor and patient, taking into account the physician’s recommendations, may plan treatment and preventive measures which prevent the desynchronosis development.

The biological rhythms consist in the self-maintaining independent processes of the organism states periodical shifts and the vibration of the individual’s physiological reactions intensity.

A man has a complex hierarchy and strict time order in the establishment of his personal biorhythmic structure resulting from the internal and external synchronizers action. Moreover, the entire organism can exist only under proper phase interrelations of different fluctuation processes in cells, tissues, organs and functional systems on one hand; on the other hand – their absolute synchronization with the environment. So, health status is a status of the optimal harmony between time structure of the internal organism medium and the influence of the environmental factors; the biological rhythms display the shifts of various indices of physiological processes of wave-shaped form.

Various rhythmical vibrations of definite states of the living systems are registered with a frequency from once per millisecond to once per several years. The most significant for a human are ultradian (the period length is 0.5-20 hours), circadian (20-28 hours), infradian (28-60 hours) and circaceptidal (60-148 hours) biological rhythms.

|  |
| --- |
|  |
|  | http://intranet.tdmu.edu.ua/data/kafedra/internal/hihiena/classes_stud/en/med/lik/ptn/hygiene%20and%20ecology/3/11.%20Personal%20hygiene,%20healthy%20way%20of%20life.files/image016.gif |

The main characteristics of the biological rhythms are: level, period, amplitude, acrophase and a form of rhythm day curve (fig. 1).

Fig. 1 Graphic image of a typical biological rhythm and its main characteristics

(Amp – rhythm amplitude, Acr – rhythm acrophase, T – rhythm time)

Determination of the human calculation biological rhythms

The father of idea concerning the necessity of consideration and determination of the calculation biological rhythms was Swiss businessman G. Thommen. He was the person to set up a “critical” day of a person, which repeated with certain periodicity.

The hypothesis, that starting with the birth, the human body experiences, regardless one from another, three different by their contents cycles of functional body state shifts:the physical cycle lasting 23 days, the emotional cycle lasting 28 days and the intellectual one – 33 days.

They say, that the first period of all three cycles is more beneficial and the second one is less. For instance, a person during the physical phase first period is more likely to be engaged in physical training and sports or any other activity demanding intensive physical efforts; the emotional cycle first period is characterized by the exultant mood and optimism, the first period of the intellectual phase – by the excellent background for the mental activity. Instead, the second period is characterized by the phenomena of opposite character and contents.

But the most unfavourable, even “critical”, are the days, when the curves of each cycle, which present also sinusoids, cross the ground elevation; this happens on 11.5, 14 and 16.5 days. The most critical are so-called double or threefold critical days, when the ground elevation is at the same time crossed by two or thee sinusoids. By the way, these days have been named as “black holes”. So, having information about so-called calculation biorhythms, according to supporters of this theory, we can rather accurately and exactly forecast the most unfavourable moments for future in every person’s life. To be honest, there is still no comprehensive scientific basis to this theory, but according to some observations, the frequency of various accidents and emergency situations is the most significant exactly on the days called “black holes”.

To assess the calculation biological rhythm, first we should calculate the amount of the spent days, naturally taking into account the duration of both ordinary and leap-years. Then we divide the obtained number of days in the period quantity of each calculation rhythm. The whole number obtained as a result of division characterizes the amount of total cycles by the definite calculation rhythm which have been already spent; the remainder allows determining the exact day of each of the rhythms. Marking it on the proper curve-sinusoid we can obtain the profound information concerning the main characteristics of the calculation biological rhythms.

Determine your own calculation biological (physical, emotional, intellectual) rhythms. Based on the received results draw sinusoids of these rhythms and determine their critical days and so called double and threefold critical days or “black holes”.

Method of calculation

For example, the person was born 24 of January 1983. Her age in days on 24.01.2004 is:

I.                   Calculation of spent days:

16 ordinary years × 365 days = 5 840 days

5 leap years × 365 days = 1 830 days

+ days of current January = 24 days

                                      Total = 7 694

II.                Calculation of spent cycles:

Number of physical cycles: 7 694 : 23 = 334.52 cycles

Number of emotional cycles: 7 694 : 28 = 274.78 cycles

Number of intellectual cycles: 7 694 : 33 = 233.15 cycles

III.             Calculation of days of current cycles:

Physical cycle:

|  |  |
| --- | --- |
| 1 cycle – 23 days | x = http://intranet.tdmu.edu.ua/data/kafedra/internal/hihiena/classes_stud/en/med/lik/ptn/hygiene%20and%20ecology/3/11.%20Personal%20hygiene,%20healthy%20way%20of%20life.files/image018.gif = 11.96 days |
| 0.52 cycle – x days |

Emotional cycle:

|  |  |
| --- | --- |
| 1 cycle – 28 days | y = http://intranet.tdmu.edu.ua/data/kafedra/internal/hihiena/classes_stud/en/med/lik/ptn/hygiene%20and%20ecology/3/11.%20Personal%20hygiene,%20healthy%20way%20of%20life.files/image020.gif = 21.28 days |
| 0.76 cycle – y days |

Intellectual cycle:

|  |  |
| --- | --- |
| 1 cycle – 33 days | z = http://intranet.tdmu.edu.ua/data/kafedra/internal/hihiena/classes_stud/en/med/lik/ptn/hygiene%20and%20ecology/3/11.%20Personal%20hygiene,%20healthy%20way%20of%20life.files/image022.gif = 4.95 days |
| 0.15 cycle – z days |

IV.            Mark the days of current cycles on graph of calculation biorhythms.

V.               Conclusion:

Unfavourable days for:

-          emotional cycle: 5.01, 17.01, 30.01;

-          physical cycle: 12.01, 23.01;

-          intellectual cycle: 20.01.

Nowadays, besides mathematical methods of the biological rhythms calculation there is special software, which allows to calculate quickly and to represent information in graphical image. Using these programs you may calculate biorhythms either for you, or for your relatives, colleagues etc.

TEMPERAMENT

In psychology, temperament is the innate aspect of an individual's personality, such as [introversion](http://en.wikipedia.org/wiki/Introversion) or [extroversion](http://en.wikipedia.org/wiki/Extroversion).

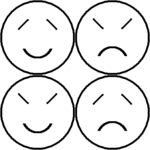
Temperament is defined as that part of the personality which is genetically based. Along with character, and those aspects acquired through learning, the two together are said to constitute personality.

Historically the concept was part of the theory of the [humours](http://en.wikipedia.org/wiki/The_four_humours), which had corresponding [temperaments](http://en.wikipedia.org/wiki/The_four_temperaments). It played an important part in premodern psychology, and was important to philosophers like [Immanuel Kant](http://en.wikipedia.org/wiki/Immanuel_Kant) and [Hermann Lotze](http://en.wikipedia.org/wiki/Hermann_Lotze).

More recently, with the emphasis on the biological basis of personality, the relationship between temperament and character has been examined with renewed interest

It has also inspired artists like Carl Nielsen, and Hindemith, whose music is featured in George Balanchine's ballet "The Four Temperaments."

History and development



Temperament theory has its roots in the ancient [four humors](http://en.wikipedia.org/wiki/Humorism) theory of the Greek doctor [Hippocrates](http://en.wikipedia.org/wiki/Hippocrates) (460-370 BC), who believed certain human behaviors were caused by body fluids (called "humors"): [blood](http://en.wikipedia.org/wiki/Blood), yellow [bile](http://en.wikipedia.org/wiki/Bile), black bile, and [phlegm](http://en.wikipedia.org/wiki/Phlegm). Next, [Galen](http://en.wikipedia.org/wiki/Galen) (131-200) developed the first [typology](http://en.wikipedia.org/wiki/Typology) of temperament in his dissertation De temperamentis, and searched for [physiological](http://en.wikipedia.org/wiki/Physiological) reasons for different behaviors in humans. [Nicholas Culpeper](http://en.wikipedia.org/wiki/Nicholas_Culpeper) (1616-1654) was the first to disregard the idea of fluids as defining human behavior, and [Immanuel Kant](http://en.wikipedia.org/wiki/Immanuel_Kant) (1724-1804), [Rudolf Steiner](http://en.wikipedia.org/wiki/Rudolf_Steiner) (1861-1925), [Alfred Adler](http://en.wikipedia.org/wiki/Alfred_Adler) (1879-1937), [Erich Adickes](http://en.wikipedia.org/wiki/Erich_Adickes) (1866-1925), [Eduard Spränger](http://en.wikipedia.org/wiki/Eduard_Spranger) (1914), [Ernst Kretschmer](http://en.wikipedia.org/wiki/Ernst_Kretschmer) (1920), and[Erich Fromm](http://en.wikipedia.org/wiki/Erich_Fromm) (1947) all theorized on the four temperaments (with different names) and greatly shaped our modern theories of temperament. [Hans Eysenck](http://en.wikipedia.org/wiki/Hans_Eysenck) (1916-1997) was one of the first psychologists to analyze personality differences using a psycho-[statistical](http://en.wikipedia.org/wiki/Statistical) method ([factor analysis](http://en.wikipedia.org/wiki/Factor_analysis)), and his research led him to believe that temperament is [biologically](http://en.wikipedia.org/wiki/Biological)based. The factors he proposed in his book Dimensions of Personality were [Neuroticism](http://en.wikipedia.org/wiki/Neuroticism) (N) which was the tendency to experience negative emotions, and the second was[Extraversion](http://en.wikipedia.org/wiki/Extraversion) (E) which was the tendency to enjoy positive events, especially social ones. By pairing the two [dimensions](http://en.wikipedia.org/wiki/Dimension), Eysenck noted how the results were similar to the four ancient temperaments.

Eysenck's temperaments demonstrating the two axes and sub-temperaments between the four main temperaments.

High N, High E = Choleric

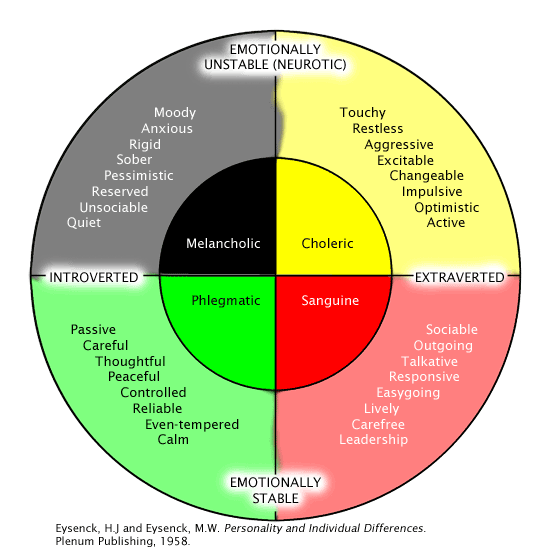
High N, Low E = Melancholic (also called "Melancholy"/pl. "-ies")

Low N, High E = Sanguine

Low N, Low E = Phlegmatic

Other researchers developed similar systems, many of which did not use the ancient temperament names, and several paired extroversion with a different factor, which would determine [relationship](http://en.wikipedia.org/wiki/Interpersonal_relationship)/[task](http://en.wikipedia.org/wiki/Task)-[orientation](http://en.wikipedia.org/wiki/Orientation). Examples are [DiSC assessment](http://en.wikipedia.org/wiki/DiSC_assessment), [Social Styles](http://en.wikipedia.org/wiki/Social_style), and a theory that adds a [fifth temperament](http://en.wikipedia.org/wiki/Five_Temperaments). One of the most popular today is the [Keirsey Temperament Sorter](http://en.wikipedia.org/wiki/Keirsey_Temperament_Sorter), whose four temperaments were based largely on the Greek gods [Apollo](http://en.wikipedia.org/wiki/Apollo), [Dionysus](http://en.wikipedia.org/wiki/Dionysus), [Epimetheus](http://en.wikipedia.org/wiki/Epimetheus) and [Prometheus](http://en.wikipedia.org/wiki/Prometheus), and were mapped to the 16 types of the Myers-Briggs Type Indicator ([MBTI](http://en.wikipedia.org/wiki/MBTI)). They were renamed (SP=[Artisan](http://en.wikipedia.org/wiki/Artisan), SJ=Guardian, NF=[Idealist](http://en.wikipedia.org/wiki/Idealist), NT=Rational). Rather than using extroversion and introversion (E/I) and task/people focus, like other theories, KTS mapped the temperaments to "Sensing" and "Intuition" (S/N, renamed "concrete" and "abstract") paired with a new category, "Cooperative" and "pragmatic" (loosely based on Judging and Perception, or J/P). When "Role-Informative" and "Role-Directive" (loosely connected with Thinking/Feeling or T/F, and corresponding to people/task-orientation), and finally E/I are factored in, you attain the 16 types. Finally, the [Interaction Styles](http://en.wikipedia.org/wiki/Interaction_Styles) of Linda V. Berens combines Directing and Informing with E/I to form another group of "styles" which greatly resemble the ancient temperaments, and these are mapped together with the Keirsey Temperaments onto the 16 types.

The four personality types



Each of the four types of humours corresponded to a different personality type.

Sanguine

Sanguine indicates the personality of an individual with the temperament of [blood](http://en.wikipedia.org/wiki/Blood), the season of spring (wet and hot), and the element of air. A person who is sanguine is generally optimistic, cheerful, confident, popular, and fun-loving. He or she can be daydreamy to the point of not accomplishing anything and can be impulsive, possibly acting on whims in an unpredictable fashion. Sanguines usually have a lot of energy, but have a problem finding a way to direct the energy. This also describes the [manic](http://en.wikipedia.org/wiki/Mania) phase of a[bipolar disorder](http://en.wikipedia.org/wiki/Bipolar_disorder).

Choleric

Choleric corresponds to the fluid of yellow [bile](http://en.wikipedia.org/wiki/Bile), the season of summer (dry and hot), and the element of [fire](http://en.wikipedia.org/wiki/Fire_(classical_element)). A person who is choleric is a doer and a leader. They have a lot of ambition, energy and drive, and try to instill it in others, and can dominate people of other temperaments, especially phlegmatic types. Many great charismatic, military and political figures were cholerics. On the negative side, they are easily angered or bad tempered.

In folk medicine, a baby referred to as "colic" is one who cries frequently and seems to be constantly angry. This is an adaptation of "choleric," although no one now would attribute the condition to bile. Similarly, a person described as "bilious" is mean-spirited, suspicious, and angry. This, again, is an adaptation of the old [humour theory](http://en.wikipedia.org/wiki/Humour_theory) "choleric." The disease [Cholera](http://en.wikipedia.org/wiki/Cholera) gained its name from choler (bile).

Melancholic

Melancholic is the personality of an individual characterized by [black bile](http://en.wikipedia.org/wiki/Melancholia); hence ([Greek](http://en.wikipedia.org/wiki/Greek_language) μελας, melas, "black", + χολη, kholé, "bile"); a person who was a thoughtful ponderer had a melancholic disposition. Often very kind and considerate, melancholics can be highly creative - as in poets and artists - but also can become overly obsessed on the tragedy and cruelty in the world, thus becoming depressed. It also indicates the season of autumn (dry and cold) and the element of earth. A melancholy is also often a perfectionist, being very particular about what they want and how they want it in some cases. This often results in being unsatisfied with one's own artistic or creative works, always pointing out to themselves what could and should be improved.

This temperament describes the [depressed](http://en.wikipedia.org/wiki/Depression_(mood)) phase of a [bipolar disorder](http://en.wikipedia.org/wiki/Bipolar_disorder).

There is no bodily fluid corresponding to black bile. However, the medulla of the [adrenal glands](http://en.wikipedia.org/wiki/Adrenal_glands) decomposes very rapidly after death, and it is possible that this product is the mythical "black bile".

Phlegmatic

A phlegmatic person is calm and unemotional. Phlegmatic means pertaining to [phlegm](http://en.wikipedia.org/wiki/Phlegm), corresponds to the season of winter (wet and cold), and connotes the element of water.

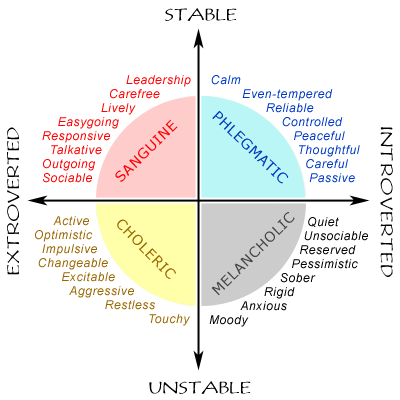
While phlegmatics are generally self-content and kind, their shy personality can often inhibit enthusiasm in others and make themselves lazy and resistant to change. They are very consistent, relaxed, rational, curious, and observant, making them good administrators and diplomats. Like the [sanguine](http://en.wikipedia.org/wiki/Sanguine) personality, the phlegmatic has many friends. But the phlegmatic is more reliable and compassionate; these characteristics typically make the phlegmatic a more dependable friend.

Why study temperament?

 nderstanding temperament - your own and others - makes you much better equipped to handle interpersonal relationships successfully.  Studying your own temperament helps you understand your strengths and weaknesses and why you do some of the things you do.  Understanding another's temperament can help you adapt your communication to theirs or, at the least, understand why you have problems with them.

         The four "types"

 Why four?  Why not forty?  There are more than four kinds of people, aren't there?  Of course, but everyone from the ancients to modern psychologists find that people can be grouped into four basic types of personality.  These are:



Sanguine

                   1.      Influencing of others, SP - Artisan - The Sanguine is receptive by nature and outgoing.  He is usually called a 'super-extrovert'. This temperament is usually thought of as a "natural salesman", but they also tend to enter professions that are outgoing, such as acting.

         He "leads into a room with his mouth" and is never at a loss for words.  His outgoing nature makes him the envy of more timid temperament types.  He is most comfortable around people and does not like being alone.  He is often known as a "toucher"; reaching out and touching the arm or shoulder of the person he is talking with.  This can make more introverted temperaments nervous and uncomfortable.

His energy can make him seem more confident than he actually is and his cheery disposition often causes others to excuse his weaknesses by saying, "That's just how he is".  The sanguine is mostly a happy person whom others are glad to have around.

         The weakness of the sanguine includes a lack of discipline which can be expressed in many ways - including a generally "messy" lifestyle or overeating.  The sanguine is the most emotional of the temperaments and can burst into tears or a rage without warning.  These "bursts" are usually over as fast as they occur, but this lack of emotional consistency can affect other areas of his life.  He may be "morally flexible" and may take advantage of others via his good nature.

 A sanguine's tremendous personal talents can be made or broken by his lack of self-discipline.

         Choleric

         1.      Decisive, NT - Rational - The choleric is the most forceful and active of the four types.  He is strong-willed and independent and opinionated.  The choleric thrives on activity.  He is the most practical and makes sound, quick decisions.  He is not afraid of obstacles and tends to drive right through or over problems.  He is probably the strongest natural leader of the four types.  He has the most problem with anger and does not display compassion easily.  He is quick to recognize opportunities and quick to capitalize on them - though details irritate him and, unless he learns to delegate, he will often gloss over details.  His strong will and determination may drive him to succeed where more gifted people give up.

         The choleric is a developer and may be seen in construction supervision or coaching or law enforcement.  Most entrepreneurs are choleric.  Because of their impatience they often end up doing everything themselves.  A choleric is extremely goal/task oriented in leading others.  His biggest weakness as a leader is a tendency to run right over people if he feels they are in his way.  He assumes that approval and encouragement will lead others to slack off and he probably finds criticism and faultfinding more useful for his purposes.  Through his natural determination he may succeed where others may give up.

 A choleric's weaknesses include anger and hostility.  A choleric is the most likely to have an active temper; he is a door slammer and horn blower and he can carry a grudge for a long time.  This includes a cutting and sarcastic tongue and the choleric will rarely hesitate to tell someone off.  The choleric is the least likely to show affection or any public show of emotion.  His emotions are the least developed of all the temperaments.  Additionally, a choleric can be inconsiderate, opinionated and crafty in getting his own way.

 Melancholy

         1.      Conscientious, SJ - Guardian - The melancholy is an introverted temperament type.  His natural style is analytical and perfectionist.  He is the most moody of types ranging from highly "up" to gloomy and depressed.  During his low periods he can be very antagonistic and does not make friends easily.  He is the most dependable of the temperaments due to his perfectionistic tendencies.  His analytical ability allows him to accurately diagnose obstacles and problems which often keep him from making changes - he prefers the status quo and may seem overly pessimistic.

         He may choose a difficult life vocation involving personal sacrifice.  Many melancholies become doctors or scientists or artists.  Their interpersonal style can be critical and negative.  He tends to be more indecisive than other types.  They have difficulty giving praise and approval because they cannot bring themselves to say something that is not 100% true.  They also are usually dissatisfied with themselves, being highly self-critical.

         Other weaknesses include being "thin skinned" or touchy and easily offended.  He often feels persecuted and may seek revenge for real or imagined insults.  He tends to be "all or nothing" in his evaluation of things; everything must be black or white and no shades of gray.  He is least likely to consider mitigating circumstances when evaluating a person or situation.  No temperament is more likely to be legalistic and rigid.  He can be intolerant and impatient with those who do not see things his way.

Phlegmatic

 1.     Steady, NF - Idealist - the phlegmatic is best characterized by the words "easy going".  He is the calm and steady person who is not easily disturbed.  He is the easiest temperament type to get along with.  Life for him is happy, unexcited and calm.  Underneath the calm exterior, the phlegmatic is the most timid temperament type.  He often uses humor to make his points.  The phlegmatic is more an observer and does not involve himself in the activities of others.

         Phlegmatics make excellent teachers, counselors and administrators.  They are very dependable and organized and, while they never volunteer, they make good group leaders.

         The weakness of a phlegmatic includes lack of motivation or even laziness; they appear to lack drive and ambition.  A phlegmatic needs to realize that he is not internally motivated and should take up activities that force him into action.  The phlegmatic is self-protective and may be selfish.  He is often very stubborn, though it is hidden beneath his mild-mannered style.  He is also the most fearful of temperaments.

         After defining each temperament in "black and white" we must realize that no one is completely one temperament type.  Each of us is a blend of usually two and occasionally 3 types.  One temperament type is dominate and one is secondary.  And don't forget that training, lifestyle, upbringing and other circumstances may have forced an individual to function "off style".  The saddest people I have seen are those who have "put on" a style that is not theirs naturally for so long that it has become a habitual way of life

<http://www.peterursbender.com/quiz/quiz.html>

HYGIENIC ESTIMATION OF CLOTHING

Clothing protects the vulnerable [nude](http://en.wikipedia.org/wiki/Nude) [human body](http://en.wikipedia.org/wiki/Human_body) from the extremes of [weather](http://en.wikipedia.org/wiki/Weather), other features of our environment, and for safety reasons. Every article of clothing also carries a[cultural](http://en.wikipedia.org/wiki/Culture) and social meaning. Human beings are the only mammals known to wear clothing, with the exception of pets clothed by their owners.

People also decorate their bodies with [makeup](http://en.wikipedia.org/wiki/Makeup) or [cosmetics](http://en.wikipedia.org/wiki/Cosmetics), [perfume](http://en.wikipedia.org/wiki/Perfume), and other [ornamentation](http://en.wikipedia.org/wiki/Human_physical_appearance#Clothing_and_personal_effects); they also cut, dye, and arrange the hair of their heads, [faces](http://en.wikipedia.org/wiki/Facial_hair), and bodies (see[hairstyle](http://en.wikipedia.org/wiki/Hairstyle)), and sometimes also mark their skin (by [tattoos](http://en.wikipedia.org/wiki/Tattoo), [scarifications](http://en.wikipedia.org/wiki/Scarification), and [piercings](http://en.wikipedia.org/wiki/Piercing)). All these decorations contribute to the overall effect and message of clothing, but do not constitute clothing per se.

Articles carried rather than worn (such as [purses](http://en.wikipedia.org/wiki/Purse), [canes](http://en.wikipedia.org/wiki/Cane), and [umbrellas](http://en.wikipedia.org/wiki/Umbrella)) are normally counted as [fashion accessories](http://en.wikipedia.org/wiki/Fashion_accessory) rather than as clothing. [Jewelry](http://en.wikipedia.org/wiki/Jewelry) and [eyeglasses](http://en.wikipedia.org/wiki/Eyeglasses) are usually counted as accessories as well, even though in common speech these items are described as being worn rather than carried.

The practical function of clothing is to protect the human body from dangers in the environment: weather (strong sunlight, extreme heat or cold, and precipitation, for example), [insects](http://en.wikipedia.org/wiki/Insect), noxious chemicals, [weapons](http://en.wikipedia.org/wiki/Weapon), and contact with abrasive substances, and other hazards. Clothing can protect against many things that might injure the naked human body. In some cases clothing protects the environment from the clothing wearer as well (example: [medical scrubs](http://en.wikipedia.org/wiki/Scrubs_%28clothing%29)).

Humans have shown extreme inventiveness in devising clothing solutions to practical problems and the distinction between clothing and other protective equipment is not always clear-cut. See, among others: [air conditioned clothing](http://en.wikipedia.org/wiki/Air_conditioned_clothing), [armor](http://en.wikipedia.org/wiki/Armor), [diving suit](http://en.wikipedia.org/wiki/Diving_suit), [swimsuit](http://en.wikipedia.org/wiki/Swimsuit), [bee-keeper's costume](http://en.wikipedia.org/wiki/Beekeeping#Protective_clothing), [motorcycle leathers](http://en.wikipedia.org/wiki/Motorcycle_leathers), [high-visibility clothing](http://en.wikipedia.org/wiki/High-visibility_clothing), and [protective clothing](http://en.wikipedia.org/wiki/Protective_clothing).

Clothing as social reason

Social messages sent by clothing, accessories, and decorations can involve social status, occupation, ethnic and religious affiliation, marital status and sexual availability, etc. Humans must know the code in order to recognize the message transmitted. If different groups read the same item of clothing or decoration with different meanings, the wearer may provoke unanticipated responses.

Social status

In many societies, people of high rank reserve special items of clothing or decoration for themselves as symbols of their [social status](http://en.wikipedia.org/wiki/Social_status). In ancient times, only [Roman](http://en.wikipedia.org/wiki/Ancient_Rome)senators could wear garments dyed with [Tyrian purple](http://en.wikipedia.org/wiki/Tyrian_purple); only high-ranking Hawaiian chiefs could wear [feather cloaks](http://en.wikipedia.org/wiki/Feather_cloak) and [palaoa](http://en.wikipedia.org/w/index.php?title=Palaoa&action=edit) or carved whale teeth. Under the Travancorekingdom of Kerala (India), lower caste women caste had to pay a tax for the right to cover their upper body. In [China](http://en.wikipedia.org/wiki/China) before the establishment of the [republic](http://en.wikipedia.org/wiki/Republic_of_China), only the emperor could wear yellow. In many cases throughout history, there have been elaborate systems of [sumptuary laws](http://en.wikipedia.org/wiki/Sumptuary_law) regulating who could wear what. In other societies (including most modern societies), no laws prohibit lower-status people wearing high status garments, but the high cost of status garments effectively limits purchase and display. In current Western society, only the rich can afford [haute couture](http://en.wikipedia.org/wiki/Haute_couture). The threat of social ostracism may also limit garment choice.

Occupation

Military, police, and firefighters usually wear [uniforms](http://en.wikipedia.org/wiki/Uniform), as do workers in many industries. School-children often wear [school uniforms](http://en.wikipedia.org/wiki/School_uniform), while college and university students sometimes wear academic dress. Members of religious groups may wear uniforms known as [habits](http://en.wikipedia.org/wiki/Religious_habit). Sometimes a single item of clothing or a single accessory can declare one's occupation or rank within a profession — for example, the high [toque](http://en.wikipedia.org/wiki/Toque) or [chef's hat](http://en.wikipedia.org/wiki/Chef%27s_hat) worn by a chief cook.

Ethnic, political, and religious affiliation

In many regions of the world, [national costumes](http://en.wikipedia.org/wiki/National_costume) and styles in clothing and ornament declare membership in a certain village, caste, religion, etc. A Scotsman declares his clan with his [tartan](http://en.wikipedia.org/wiki/Tartan). A [Muslim](http://en.wikipedia.org/wiki/Muslim) woman might wear a [hijab](http://en.wikipedia.org/wiki/Hijab) to express her religion. A male [Sikh](http://en.wikipedia.org/wiki/Sikh) may display his religious affiliation by wearing a [turban](http://en.wikipedia.org/wiki/Turban) and other traditional clothing. A French peasant woman may identify her village with her cap or [coif](http://en.wikipedia.org/wiki/Coif).

Clothes can also proclaim dissent from cultural norms and mainstream beliefs, as well as personal independence. In [19th-century](http://en.wikipedia.org/wiki/19th_century) Europe, artists and writers lived [la vie de Bohème](http://en.wikipedia.org/wiki/Bohemianism) and dressed to shock: [George Sand](http://en.wikipedia.org/wiki/George_Sand) in men's clothing, female emancipationists in [bloomers](http://en.wikipedia.org/wiki/Bloomers), male artists in velvet waistcoats and gaudy neckcloths. [Bohemians](http://en.wikipedia.org/wiki/Bohemianism), [beatniks](http://en.wikipedia.org/wiki/Beatnik),[hippies](http://en.wikipedia.org/wiki/Hippie), [goths](http://en.wikipedia.org/wiki/Gothic_fashion), [punks](http://en.wikipedia.org/wiki/Punk_fashion) and [skinheads](http://en.wikipedia.org/wiki/Skinhead) have continued the ([counter-cultural](http://en.wikipedia.org/wiki/Counter-culture)) tradition in the [20th-century](http://en.wikipedia.org/wiki/20th_century) [West](http://en.wikipedia.org/wiki/Western_Culture). Now that [haute couture](http://en.wikipedia.org/wiki/Haute_couture) plagiarises [street fashion](http://en.wikipedia.org/wiki/Street_fashion) within a year or so, street fashion may have lost some of its power to shock, but it still motivates millions trying to look [hip](http://en.wikipedia.org/wiki/Hip) and [cool](http://en.wikipedia.org/wiki/Cool).

Marital status

Hindu women, once [married](http://en.wikipedia.org/wiki/Marriage), wear [sindoor](http://en.wikipedia.org/wiki/Sindoor), a red powder, in the parting of their hair; if widowed, they abandon sindoor and jewelry and wear simple white clothing. Men and women of the Western world may wear [wedding rings](http://en.wikipedia.org/wiki/Wedding_ring) to indicate their marital status.

Sexual availability

Clothing may signal an individual's receptiveness to sexual advances. Some garments signal lack of interest in advances; some garments and accessories indicate openness to flirtation. What constitutes modesty and allurement varies radically from culture to culture, within different contexts in the same culture, and over time as different [fashions](http://en.wikipedia.org/wiki/Fashion) rise and fall. Often, exposure of skin and hair is an availability signal; covering skin and hair signals unavailability. However, minute adjustments of "modesty" signals can subvert the surface meaning and convey a mixed message ("I'm nice but I like to flirt too").

The vocabulary of women's clothing is usually more developed than the vocabulary of men's clothing in this regard.

Examples of sexual signaling:

In [Amish](http://en.wikipedia.org/wiki/Amish) communities, both men and women dress in plain garments that cover the body, without intricate details or patterns. Women also wear a prayer veil. Unmarried women wear black veils, married women wear white ones.

Many [Muslim](http://en.wikipedia.org/wiki/Muslim) women wear a head or body covering (see [hijab](http://en.wikipedia.org/wiki/Hijab), [burqa](http://en.wikipedia.org/wiki/Burqa) or bourqa, [chador](http://en.wikipedia.org/wiki/Chador) and [abaya](http://en.wikipedia.org/wiki/Abaya)) that proclaims their status as respectable and modest women.

Streetwalking [prostitutes](http://en.wikipedia.org/wiki/Prostitutes) in countries such as the United States where prostitution is illegal dress to advertise their status to potential customers, while avoiding anything that might constitute an unambiguous offer of sex for sale (which would increase their chances of being caught and convicted). They tend to wear current fashions in exaggerated form, bare a great deal of skin, and wear heavy makeup.

An American or European woman who wants to signal availability must sport some culturally accepted signals of flirtatious intent, but without the exaggeration that might lead others to say that she is dressing like a prostitute. In the last few decades, there has been a consistent trend towards the mainstreaming of formerly extreme fashion, in which "over-the-top" becomes ordinary and loses any shock value it might once have had.

Clothing fetishes

Because clothing and adornment have such frequent links with sexual display, humans may develop clothing [fetishes](http://en.wikipedia.org/wiki/Fetishism). They may strongly prefer to have sexual relations with other humans wearing clothing and accessories they consider arousing or sexy. In Western cultures, such fetishes may include extremely high heels, lace, leather, or military clothing. Other cultures have different fetishes. The men of [Heian](http://en.wikipedia.org/wiki/Heian_Period) [Japan](http://en.wikipedia.org/wiki/Japan) lusted after women with floor-sweeping hair and layers of silk robes. Fetishes vary as much as [fashion](http://en.wikipedia.org/wiki/Fashion). Sometimes the clothing itself becomes the object of fetish, such as the case with [used girl panties](http://en.wikipedia.org/wiki/Burusera) in [Japan](http://en.wikipedia.org/wiki/Japan).

Religious habits and special religious clothing

Religious clothing might be considered a special case of occupational clothing. Sometimes it is worn only during the performance of religious ceremonies. However, it may also be worn everyday as a marker for special religious status.

For example, [Jains](http://en.wikipedia.org/wiki/Jain) wear unstitched cloth pieces when performing religious ceremonies. The unstitched cloth signifies unified and complete devotion to the task at hand, with no digression.

The cleanliness of religious dresses in Eastern Religions like [Hinduism](http://en.wikipedia.org/wiki/Hinduism), [Buddhism](http://en.wikipedia.org/wiki/Buddhism) and [Jainism](http://en.wikipedia.org/wiki/Jainism) is of paramount importance, which indicates purity.

Sport and activity

Most sports and physical activities are practised wearing special clothing, for practical, comfort or safety reasons. Common [sportswear](http://en.wikipedia.org/wiki/Sportswear) garments include [shorts](http://en.wikipedia.org/wiki/Shorts), [T-shirts](http://en.wikipedia.org/wiki/T-shirt),[polo shirts](http://en.wikipedia.org/wiki/Polo_shirt), [tracksuits](http://en.wikipedia.org/wiki/Tracksuit), and [trainers](http://en.wikipedia.org/wiki/Sneaker). Specialised garments include [wet suits](http://en.wikipedia.org/wiki/Wet_suit) (for [swimming](http://en.wikipedia.org/wiki/Swimming), [diving](http://en.wikipedia.org/wiki/Diving) or [surfing](http://en.wikipedia.org/wiki/Surfing)) and [salopettes](http://en.wikipedia.org/wiki/Salopettes) (for [skiing](http://en.wikipedia.org/wiki/Skiing)).

Clothing materials

Common clothing materials include:

[Cloth](http://en.wikipedia.org/wiki/Cloth), typically made of viscose [cotton](http://en.wikipedia.org/wiki/Cotton), [flax](http://en.wikipedia.org/wiki/Flax), [wool](http://en.wikipedia.org/wiki/Wool), [hemp](http://en.wikipedia.org/wiki/Hemp), [ramie](http://en.wikipedia.org/wiki/Ramie), [silk](http://en.wikipedia.org/wiki/Silk), [lyocell](http://en.wikipedia.org/wiki/Lyocell), or [synthetic fibers](http://en.wikipedia.org/wiki/Synthetic_fiber) such as [Polyester](http://en.wikipedia.org/wiki/Polyester) and [Nylon](http://en.wikipedia.org/wiki/Nylon) among many others.

[Down](http://en.wikipedia.org/wiki/Down_feathers) for down-filled [parkas](http://en.wikipedia.org/wiki/Parka)

[Fur](http://en.wikipedia.org/wiki/Fur_clothing)

[Leather](http://en.wikipedia.org/wiki/Leather)

[Denim](http://en.wikipedia.org/wiki/Denim)

Less-common clothing materials include:

[Paper](http://en.wikipedia.org/wiki/Paper)

[Jute](http://en.wikipedia.org/wiki/Jute)

[Rubber](http://en.wikipedia.org/wiki/Rubber)

[PVC](http://en.wikipedia.org/wiki/Polyvinyl_chloride)

Recycled [PET](http://en.wikipedia.org/wiki/Polyethylene_terephthalate)

[Tyvek](http://en.wikipedia.org/wiki/Tyvek)

[Rayon](http://en.wikipedia.org/wiki/Rayon)

[Hemp](http://en.wikipedia.org/wiki/Hemp)

[Bamboo](http://en.wikipedia.org/wiki/Bamboo)

Recycled or Recovered [Cotton](http://en.wikipedia.org/wiki/Cotton)

[Soy](http://en.wikipedia.org/wiki/Soy)

Other [Natural Fibers](http://en.wikipedia.org/wiki/Natural_Fiber)

Reinforcing materials such as [wood](http://en.wikipedia.org/wiki/Wood), [bone](http://en.wikipedia.org/wiki/Bone), [plastic](http://en.wikipedia.org/wiki/Plastic) and [metal](http://en.wikipedia.org/wiki/Metal) may be used in [fasteners](http://en.wikipedia.org/wiki/Fastener) or to stiffen garments.

Clothing maintenance

Clothing, once manufactured, suffers assault both from within and from without. The human body inside sheds skin cells and body oils, and exudes sweat, urine, and feces. From the outside, sun damage, damp, abrasion, dirt, and other indignities afflict the garment. Fleas and lice take up residence in clothing seams. Well-worn clothing, if not cleaned and refurbished, will smell, itch, look scruffy, and lose functionality (as when [buttons](http://en.wikipedia.org/wiki/Button) fall off and [zippers](http://en.wikipedia.org/wiki/Zipper) fail).

In some cases, people simply wear an item of clothing until it falls apart. Cleaning leather presents difficulties; one cannot wash bark cloth (tapa) without dissolving it. Owners may patch tears and rips, and brush off surface dirt, but old leather and bark clothing will always look old.

But most clothing consists of cloth, and most cloth can be [laundered](http://en.wikipedia.org/wiki/Laundry) and mended (patching, [darning](http://en.wikipedia.org/wiki/Darning), but compare [felt](http://en.wikipedia.org/wiki/Felt)).

Laundry, ironing, storage

Humans have developed many specialized methods for laundering, ranging from the earliest "pound clothes against rocks in running stream" to the latest in electronic [washing machines](http://en.wikipedia.org/wiki/Washing_machine) and [dry cleaning](http://en.wikipedia.org/wiki/Dry_cleaning) (dissolving dirt in [solvents](http://en.wikipedia.org/wiki/Solvents) other than water).

Many kinds of clothing are designed to be [ironed](http://en.wikipedia.org/wiki/Ironing) before they are worn to remove wrinkles. Most modern formal and semi-formal clothing is in this category (for example, [dress shirts](http://en.wikipedia.org/wiki/Dress_shirt) and [suits](http://en.wikipedia.org/wiki/Suit_%28clothing%29)). Ironed clothes are believed to look clean, fresh, and neat. However, much contemporary casual clothing is made of knit materials that do not readily wrinkle and so do not have to be ironed. Some clothing is [permanent press](http://en.wikipedia.org/wiki/Permanent_press), meaning that it has been treated with a synthetic coating (such as [polytetrafluoroethylene](http://en.wikipedia.org/wiki/Polytetrafluoroethylene)) that suppresses wrinkles and creates a smooth appearance without ironing.

Once clothes have been laundered and possibly ironed, they are usually hung up on [clothes hangers](http://en.wikipedia.org/wiki/Clothes_hanger) or folded, to keep them fresh until they are worn. Clothes are [folded](http://en.wikipedia.org/wiki/Folding) to allow them to be stored compactly, to prevent [creasing](http://en.wikipedia.org/wiki/Crease), to preserve creases or to present them in a more pleasing manner, for instance when they are put on sale in stores.

Many kinds of clothes are folded before they are put in [suitcases](http://en.wikipedia.org/wiki/Suitcase) as preparation for travel. Other clothes, such as [suits](http://en.wikipedia.org/wiki/Suit_%28clothing%29), may be hung up in special garment bags, or rolled rather than folded. Many people use their clothing as packing material around fragile items that might otherwise break in transit.

[](http://en.wikipedia.org/wiki/Image:Neandertal.jpg)

A [Neanderthal](http://en.wikipedia.org/wiki/Neanderthal) clothed in [fur](http://en.wikipedia.org/wiki/Fur)

Clothing historians trace the development of dress by studying various sources, including magazines and catalogs, paintings and photographs, and hats, shoes, and other surviving items. Reliable evidence about everyday clothing from the past can be hard to obtain because most publications and images concern the fashions of the wealthy. Furthermore, clothing that has survived from the past tends not to be typical of what was worn in daily life. Museum collections are full of fashionable ball gowns, for example, but have very few everyday dresses worn by ordinary working-class women. Even fewer examples of ordinary men's clothing have been saved. Images, such as paintings, prints, and photographs, do provide considerable evidence of the history of everyday clothing. These sources indicate that although everyday clothing does not usually change as rapidly as fashionable dress, it does change constantly.

THE FUNCTIONS OF CLOTHING

The most obvious function of clothing is to improve the comfort of the wearer, by protecting the wearer from the elements. In hot climates, clothing provides protection from [sunburn](http://en.wikipedia.org/wiki/Sunburn) or [wind](http://en.wikipedia.org/wiki/Wind) damage, while in cold climates its thermal insulation properties are generally more important. Shelter usually reduces the functional need for clothing. For example,[coats](http://en.wikipedia.org/wiki/Coat_(clothing)), [hats](http://en.wikipedia.org/wiki/Hat), [gloves](http://en.wikipedia.org/wiki/Glove), and other superficial layers are normally removed when entering a warm home, particularly if one is residing or sleeping there. Similarly, clothing has seasonal and regional aspects, so that thinner materials and fewer layers of clothing are generally worn in warmer seasons and regions than in colder ones.

Clothing performs a range of social and [cultural](http://en.wikipedia.org/wiki/Culture) functions, such as individual, occupational and sexual differentiation, and social status.[[6]](http://en.wikipedia.org/wiki/Clothing#cite_note-Flugel1930-6) In many societies, norms about clothing reflect standards of [modesty](http://en.wikipedia.org/wiki/Modesty), [religion](http://en.wikipedia.org/wiki/Religion), [gender](http://en.wikipedia.org/wiki/Gender), and [social status](http://en.wikipedia.org/wiki/Social_status). Clothing may also function as a form of adornment and an expression of personal taste or style.

Clothing can and has in history been made from a very wide variety of materials. [Materials](http://en.wikipedia.org/wiki/Clothing_material) have ranged from leather and furs, to woven materials, to elaborate and exotic natural and synthetic fabrics. Not all body coverings are regarded as clothing. Articles carried rather than worn (such as [purses](http://en.wikipedia.org/wiki/Handbag)), worn on a single part of the body and easily removed ([scarves](http://en.wikipedia.org/wiki/Scarves)), worn purely for adornment ([jewelry](http://en.wikipedia.org/wiki/Jewelry)), or those that serve a function other than protection ([eyeglasses](http://en.wikipedia.org/wiki/Eyeglasses)), are normally considered [accessories](http://en.wikipedia.org/wiki/Fashion_accessory) rather than clothing, as are [footwear](http://en.wikipedia.org/wiki/Footwear) and [hats](http://en.wikipedia.org/wiki/Hat).

Clothing protects against many things that might injure the uncovered human body. Clothes protect people from the elements, including rain, snow, wind, and other weather, as well as from the sun. However, clothing that is too sheer, thin, small, tight, etc., offers less protection. Clothes also reduce risk during activities such as work or sport. Some clothing protects from specific [environmental](http://en.wikipedia.org/wiki/Environment_(biophysical)) hazards, such as [insects](http://en.wikipedia.org/wiki/Insect), noxious chemicals, weather, [weapons](http://en.wikipedia.org/wiki/Weapons), and contact with abrasive substances. Conversely, clothing may protect the environment from the clothing wearer, as with doctors wearing [medical scrubs](http://en.wikipedia.org/wiki/Scrubs_(clothing)).

Humans have shown extreme inventiveness in devising clothing solutions to environmental hazards. Examples include: [space suits](http://en.wikipedia.org/wiki/Space_suits), [air conditioned clothing](http://en.wikipedia.org/wiki/Air_conditioned_clothing),[armor](http://en.wikipedia.org/wiki/Armor), [diving suits](http://en.wikipedia.org/wiki/Diving_suits), [swimsuits](http://en.wikipedia.org/wiki/Swimsuits), [bee-keeper gear](http://en.wikipedia.org/wiki/Beekeeping#Protective_clothing), [motorcycle leathers](http://en.wikipedia.org/wiki/Motorcycle_leathers), [high-visibility clothing](http://en.wikipedia.org/wiki/High-visibility_clothing), and other pieces of [protective clothing](http://en.wikipedia.org/wiki/Protective_clothing). Meanwhile, the distinction between clothing and protective equipment is not always clear-cut—since clothes designed to be fashionable often have protective value and clothes designed for function often consider fashion in their design. Wearing clothes also has social implications. They cover parts of the body that social norms require to be covered, act as a form of adornment, and serve other social purposes.

Clothing Choices Many factors influence the clothing that people wear, including climate, available materials, culture, religion, gender, and lifestyle. In this illustration, the man on the left is a hunter living in a hot climate. The loincloth that he wears is practical for his needs. The burnoose (a loose, hooded robe) worn by the man in the second drawing is practical for the climate of the Middle East. Loose-fitting and white, it helps the wearer stay cool and protects the body against sun, wind, and sand. The woman in the red outfit lives in a cold, northern country, where multiple layers provide the best protection against the elements. The man on the right wears a standard Western business suit, a garment that works well in a variety of climates and is generally worn by urban office workers.

         Since prehistoric times, people in almost all societies have worn some kind of clothing. Many theories have been advanced as to why humans began to wear clothing. One of the earliest hypotheses is the so-called modesty/shame theory, also known as the fig leaf theory. This theory is based on the biblical story of creation. In the book of Genesis, Adam and Eve, the first human beings, realize they are naked after they eat an apple from the tree of knowledge. Ashamed of their nakedness, they make clothing for themselves out of fig leaves. As late as the 19th century, most Europeans and Americans believed that people wore clothing primarily for reasons of modesty. With the rise of a nonreligious worldview, however, people began to offer other theories. Some argued that the origin of clothing was functional—to protect the body from the environment. Others argued that some clothing was designed for sexual attraction—to display the body's beauty.

Evidence that early clothing was indeed functional came from a 1991 discovery of a 5,000-year-old male body, frozen on top of a glacier near the Austrian-Italian border. It was clothed in a fur cap, a crudely tanned leather cape, a loincloth (strip of cloth wrapped around the waist and between the legs), leggings, and leather shoes. A grass cloak covered the fur and leather clothing. These clothes would have provided protection against the cold and rain. The Iceman, as he is called, also had tattoos, which may have been marks of decoration or tribal identity, or were perhaps intended to provide magical protection.

Decoration seems to satisfy a fundamental human need. Other animals groom themselves, but only human beings have ornamented themselves. Although in some societies people have worn little or no clothing, so far as we know, people have decorated their bodies in some way in all societies throughout history. Archaeological and anthropological evidence suggest that early people may have decorated their bodies with paint, tattoos, and other types of ornamentation even before they began wearing clothing made of fur or fabric. Body decoration, like clothing, has served a variety of social and symbolic purposes.

Woman in U.S. Army Uniform Clothing can be an indicator of a person’s role or position in society. Uniforms, such as the army fatigues worn by the woman in this photograph, frequently indicate a person’s profession. Professional uniforms also include those worn by nurses and doctors, by members of religious orders, and by police officers and firefighters.

Modern scholars believe that clothing provides a mark of identity and a means of nonverbal communication. In traditional societies, clothing functions almost as a language that can indicate a person's age, gender, marital status, place of origin, religion, social status, or occupation. In modern industrialized societies, clothing is not so rigidly regulated and people have more freedom to choose which messages they wish to convey. Nevertheless, clothing can still provide considerable information about the wearer, including individual personality, economic standing, even the nature of events attended by the wearer. When a woman who usually wears blue jeans puts on a frilly, flowered dress, she may be stating that she wants to look more traditionally feminine. A person wearing a T-shirt emblazoned with the name of a rock band is probably a fan of that music group and may have attended one of the group’s concerts.

A society’s economic structure and its culture, or traditions and way of life, also influence the clothing that its people wear. In many societies, religious laws regulated personal behavior and permitted only members of an elite class to wear certain prestigious items of clothing. Even in modern democracies, clothing may represent social standing. Clothing with a designer label tends to be relatively expensive, so it may function as an outward sign of a person's economic standing. Clothing most obviously defines a social role in the case of uniforms, such as those worn by police officers and nurses, and garments worn by clergy or members of religious orders. Clothing metaphors—blue-collar and white-collar workers, for example—are used to distinguish between types of work (factory or office, in this example).

Clothing also derives meaning from the environment in which it is worn. In most cultures brides and grooms as well as wedding guests wear special clothes to celebrate the occasion of a marriage. The clothing worn for rituals such as weddings, graduations, and funerals tends to be formal and governed by unwritten rules that members of the society agree upon. Clothing may also signal participation in leisure activities. Certain types of recreation, especially active sports, may require specialized clothing. For example, football, soccer, and hockey players wear matching jerseys and pants designed to accommodate such accessories as protective pads.

Most modern societies comprise different social groups, and each group has its own beliefs and behaviors. As a result, different clothing subcultures exist. Within a single high school, for example, teenagers known as jocks are likely to wear different styles of clothing than teens called nerds. This difference can indicate to which group a teen belongs.

MATERIALS USED FOR CLOTHING

Fur Clothing The earliest clothing was made from animal skins and fur, as far back as 30,000 years ago. While fur and leather are still used to make some things, most articles of clothing are now made out of other fabrics.

The development of new materials for use as covering or ornament has played a major role in the history of clothing. In early prehistoric times, the range of materials for clothing was small. Until about 10,000 years ago, people used animal skins for clothing. Single skins were worn as capes thrown around the shoulders; two skins fastened together at the shoulder made a simple garment. Fitted clothes, such as trousers or a parka (an outer garment with a hood), were also made from animal skins. Simple needles made out of animal bone, found in many sites in Europe and Asia, provide evidence of sewn leather and fur garments from at least 30,000 years ago. However, only with the development of textile technology did greater variety become possible.

FIBER

Fiber, fine hairlike structure, of animal, vegetable, mineral, or synthetic origin. Commercially available fibers have diameters ranging from less than 0.004 mm (0.00015 in) to 0.2 mm (0.008 in) and they come in several different forms: short fibers (known as staple, or chopped), continuous single fibers (monofilament), untwisted bundles of continuous filaments (tow), and twisted bundles of continuous filaments (yarn). Fibers are classified according to their origin, chemical structure, or both. They can be braided into ropes and cordage, made into felts (also called nonwovens), woven or knitted into textile fabrics, or, in the case of high-strength fibers, used as reinforcements in composites—that is, products made of two or more different materials .

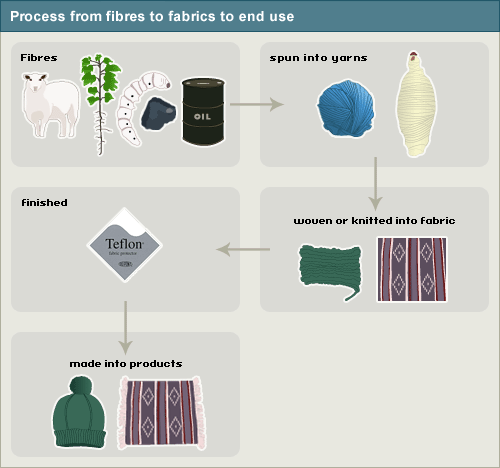
Types of fibre

Textile materials are made in three stages:

1.     [Spinning](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev2.shtml#spinning) fibres into yarns

2.     [Weaving](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev2.shtml#weaving) or [knitting](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev2.shtml#knitting) yarns to make fabrics

3.     [Finishing](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev2.shtml#finishing) fabrics to make them more useful



Where fibres come from  
Natural fibres come from plants and animals: cotton from the cotton plant, linen from the flax plant, wool from sheep, silk from silkworms.  
Synthetic fibres are manufactured using plant materials and minerals: viscose comes from pine trees or petrochemicals, while acrylic, nylon and polyester come from oil and coal.There are two types of textile fibres: [natural](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev2.shtml#natural) fibres and [synthetic](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev2.shtml#synthetic) or man-made fibres.

Synthetic fibres are [continuous filament](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev2.shtml#continuous_filament) fibres, while natural fibres are usually short [staple fibres](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev2.shtml#staple_fibres). The exception to this rule is silk - a natural fibre whose continuous filaments are up to one kilometre in length!

Natural fibres

1. Natural fibres from plants:

Cotton is used for making jeans, t-shirts and towels. It is cool to wear, has a soft [handle](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev3.shtml#handle), a good [drape](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev3.shtml#drape), and is [durable](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev3.shtml#durable). It can be washed and ironed, but it creases easily, is very [absorbent](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev3.shtml#absorbent) and dries slowly.

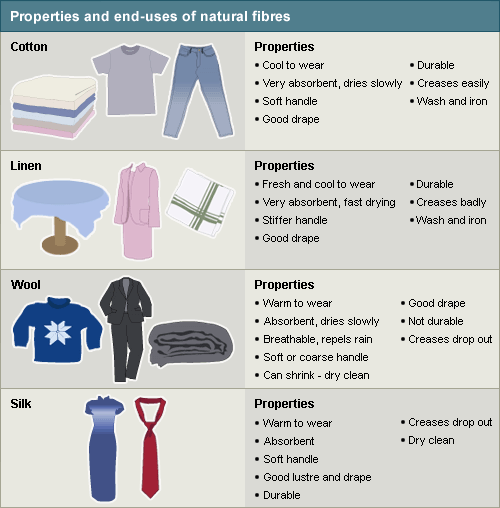
Linen is used for summer clothing, tea towels and tablecloths. It is fresh and cool to wear, has a stiffer handle, and a good drape. It is durable, but can be washed and ironed. It creases badly and is very absorbent, but is also fast drying.

2. Natural fibres from animals:

Wool is used for jumpers, suits and blankets. It is warm to wear, absorbent, dries slowly, is [breathable](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev3.shtml#breathable), repels rain and can be soft or coarse to handle. It does not have good drape, and is not durable; however, creases tend to drop out. If it is not dry-cleaned it may shrink.

Silk is used for evening wear and ties. It is warm to wear, absorbent, has a soft handle and a good [lustre](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev3.shtml#lustre) and drape. It is durable and creases drop out. It needs to be dry cleaned.

The graphic summarises the properties and [end-uses](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev3.shtml#end-uses) of natural fibres.



ANIMAL FIBERS

All animal fibers are complex proteins. They are resistant to most organic acids and to certain powerful mineral acids such as sulfuric acid (H2SO 4). However, protein fibers are damaged by mild alkalies (basic substances) and may be dissolved by strong alkalies such as sodium hydroxide (NaOH). They can also be damaged by chlorine-based bleaches, and undiluted liquid hypochloride bleach will dissolve wool or silk.

The principal component of silk is the protein fibroin. Silk is exuded in continuous filaments from the abdomens of various insects and spiders. It is the only natural filament that commonly reaches a length of more than 1000 m (more than 3300 ft). The only silk used in commercial textiles is produced from the cocoons of the silkworm. Several silk filaments can be gathered to produce textile yarn. However, silk is often produced and used in staple form to manufacture spun yarns.

The principal component of hair, wool, and fur is the protein keratin. Individual hairs may be as long as 91 cm (36 in) but are usually no more than 41 cm (16 in). Thus, fibers of hair and wool are not continuous and must be spun into yarn if they are to be woven or knitted into textile fabrics, or they must be made into felt. Any hair fiber can legally be marketed as wool or bear the common English name of the animal from which it was gathered—for example, camel's hair.

The principal hair fiber used to produce textile fabrics is sheep's wool. In wild sheep, the wool is a short, soft underlayer protected by longer, coarser hair. In domesticated sheep bred for their fleece, the wool is much longer. Yarns made of wool are classified as either woolen or worsted. Wool fibers less than 5 cm (less than 2 in) in length are made into fuzzy, soft woolen yarns. Longer fibers are used for the smoother and firmer worsted yarns. Naturally crimped wool fibers produce air-trapping yarns that are used for insulating materials.

Other animals used as sources of hair fibers for textiles include camels, llamas, alpacas, guanacos, vicuñas, rabbits, reindeer, Angora goats, and Kashmīr (or cashmere) goats. Fur fibers from animals such as mink and beavers are sometimes blended with other hairs to spin luxury yarns but are most often found as fur pelts. Horsehair and cow's hair are used for felts and are sometimes spun as yarn, particularly for upholstery and other applications for which durability is important. Even human hair has been spun into yarn and used for textiles.

VEGETABLE FIBERS

Vegetable fibers are predominantly cellulose, which, unlike the protein of animal fibers, resists alkalies. Vegetable fibers resist most organic acids but are destroyed by strong mineral acids. Improper use of most bleaches can also weaken or destroy these fibers.

There are four major types of vegetable fibers: seed fibers, which are the soft hairs that surround the seeds of certain plants; bast fibers, the tough fibers that grow between the bark and stem of many dicotyledonous plants; vascular fibers, the tough fibers found in the leaves and stems of monocotyledons and grass-stem fibers. Other fiber types, of limited utility, include strips of leaf skins, such as raffia; the fiber of fruit cases, such as coir; and palm fibers.

Only two seed fibers, cotton and kapok, have commercial importance. Cotton fiber, which grows in the seed pod of cotton plants, is the only one that is useful for the manufacture of textiles. Different species of cotton plants produce fibers of different lengths. Long-staple fibers are spun into fine, strong yarns, which are then woven into better-quality fabrics. Short-staple fibers produce coarser yarns for durable fabrics. Cotton yarns can be dyed and printed easily, so that they are useful for producing woven fabrics with a multitude of colors and designs. Kapok cannot be spun but is used as upholstery stuffing. Because it is hollow, kapok is buoyant. It was once used in flotation devices such as life preservers, but it has largely been replaced by other materials.

A wide variety of bast fibers are used in applications ranging from fine woven textiles to cordage. Linen cloth is made from flax. Coarser clothes and rope are produced from hemp, jute, ramie, and sunn.

Vascular fibers are used almost exclusively for making cordage. They include agave (sisal), henequen, manila hemp, and yucca. The vascular fibers of pineapple have been used in the production of textiles. Entire stems of some grasses and straws, such as esparto, are woven as fibers for hats and matting.

The papermaking industry also uses vegetable fibers extensively. Cotton and flax form the basis for fine rag papers. Grasses, hemp, jute, and manila are often used in wrapping papers and other coarse papers. Newsprint and kraft papers are produced from wood fiber after appropriate chemical treatment. Wood fiber and bagasse (the fiber of sugarcane) are made into building board by a process analogous to papermaking.

MINERAL FIBERS

Glass, which is made from silica sand, is the only inorganic (mineral) fiber widely used in commercial applications. There are two main forms of glass fibers: continuous and staple. Continuous glass fiber, which is made by drawing molten glass into threads, is used in textile materials. The use of air, steam, or gas to disrupt the flow of the molten glass stream produces staple fibers. These fibers can be fabricated into mats or into bulk-molding and sheet-molding compounds with the use of resins, or organic binders. Quartz mineral is high-silica, high-purity glass that is good for long-term use at temperatures as high as 1400° C (2552° F).

Since the early 1960s, ceramic fibers such as aluminum oxide, (also called alumina [Al203]), silicon carbide (SiC), and boron carbide (B 4C) have been developed mainly for use in heat-resistant composite materials. Many components of helicopters, military aircraft, civil aircraft, missiles, and spacecraft, including satellites and space shuttles, are made from these high-strength, lightweight composites.

Fibers of asbestos, formerly used for insulation and fireproofing, were found to be carcinogenic and are no longer used. Thin metal wires are used for the production of gauze. Aluminum fibers coated with plastics possess a bright glitter and are used in decorative yarns.

SYNTHETIC FIBERS

Synthetic fibers derived from natural cellulose were first developed at the end of the 19th century and became known as rayons. In a typical rayon-making process, natural cellulose made from wood pulp is treated with chemicals to form a thick liquid. This liquid is then extruded as filaments into a weak acid bath that converts the filaments back into pure cellulose. Rayons are not, therefore, completely synthetic but are actually regenerated fibers. Acetates and triacetates, which are true synthetic fibers, were developed shortly after rayon. They are derived from cellulose acetate in a process similar to that used for making rayon.

Most synthetic fibers are now derived from organic polymers, materials consisting of large organic molecules. Most of them are thermoplastic—that is, they are softened by heat. The first commercially successful organic synthetic fiber, nylon (polyamide), dates from 1938. Since then many other fibers, including acrylic (polyacrylonitrile), aramid (aromatic polyamide), olefins (polyethylene and polypropylene), polyester, and spandex (polyurethane), have been developed. In a typical fiber-spinning process, a molten polymer or polymer solution is extruded through tiny holes in a spinneret into an environment that causes the filaments to solidify. The fiber's properties depend on the base polymer, the spinning process, and the post-spinning treatment of the fiber, which can include drawing, annealing, applying a finish, and coating. Fiber properties such as weight, abrasion resistance, heat resistance, chemical resistance, moisture resistance, strength, stiffness, elasticity, and ease of dyeing and coloring can be optimized by such treatments.

Carbon and graphite  fibers are high-strength materials that are used as reinforcing agents in composites. Carbon fibers are produced by using heat to chemically change rayon or acrylic fibers. Carbonization occurs at temperatures of 1000° C to 2500° C (1832° to 4532° F) in an inert atmosphere. Carbon fibers are converted to graphite at temperatures above 2500° C. Carbon and graphite fibers can also be made from pitch, a residual petroleum product. Products that use carbon fibers include heat-shielding materials, aircraft fuselages and wings, spacecraft structures, and sports equipment. High-strength fibers such as aramid and polyethylene are also used in armor applications such as bullet-resistant garments, car doors, and crew seats for military helicopters and aircraft.

Synthetic fibres

The main synthetic fibres are:

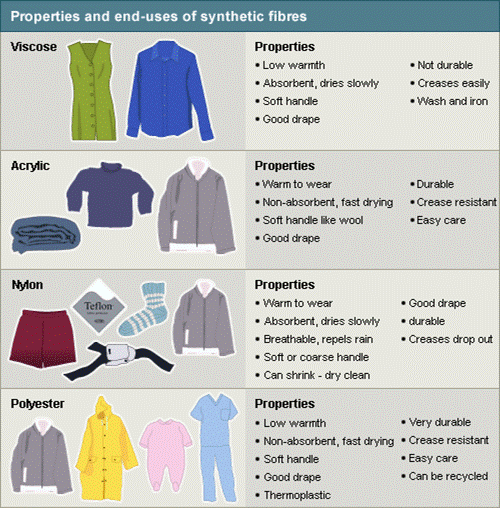
Viscose is used for shirts, dresses and linings. It has a soft [handle](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev4.shtml#handle), a good [drape](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev4.shtml#drape) and can be washed and ironed. However it has low warmth, and is [absorbent](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev4.shtml#absorbent) and slow-drying. Viscose is not [durable](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev4.shtml#durable) and creases easily.

Acrylic is used for jumpers, [fleece](http://www.bbc.co.uk/schools/gcsebitesize/design/textiles/fibresrev4.shtml#fleece) jackets and blankets. It is warm to wear, non-absorbent, and fast-drying, with a soft handle like wool, and a good drape. It is easy to care for, durable and crease-resistant.

Polyester is used for raincoats, fleece jackets, children's nightwear, medical textiles and working clothes. It has a soft handle, a good drape, is very durable, crease-resistant, easy-care, non-absorbent, and fast drying. It can be recycled, but has low warmth.

Nylon (Tactel) is used for active sportswear, fleece jackets, socks and seat belts. It has a soft handle, a good drape, is non-absorbent, fast drying, very durable, crease-resistant and easy-care. However it has low warmth.

The graphic summarises the properties and end-uses of synthetic fibres.



Nylon

Nylon, term applied to a synthetic resin widely used for textile fibers, characterized by great strength, toughness, and elasticity, and processed also in the form of bristles and molded articles. Nylon was developed in the 1930s by scientists of Eleuthère Irénée du Pont de Nemours, headed by the American chemist Wallace Hume Carothers. It is usually made by polymerizing adipic acid and hexamethylenediamine, an amine derivative. Adipic acid is derived from phenol; hexamethylenediamine is made by treating adipic acid catalytically with ammonia and hydrogenating the product Hydrogenation. Nylon is insoluble in water and in ordinary organic solvents; it dissolves in phenol, cresol, and formic acid, and melts at 263° C (505° F).

In making textile fibers, small chips of the nylon polymer, which is obtained as a tough, ivorylike material, are melted and forced through holes in a metal disk called a spinneret. The filaments are congealed by a blast of air and are then drawn to about four times their original lengths. The diameter of the filaments is controlled by changing the rate at which the molten nylon is pumped into the spinneret and the rate at which the filaments are drawn away. Filaments much finer than those of ordinary textile fibers can be made from nylon. Nylon fibers can have the appearance and luster of silk or can be made to resemble natural fibers such as cotton; their tensile strength is higher than that of wool, silk, rayon, or cotton. Dyes are applied either to the molten mass of nylon or to the yarn or finished fabric. Acetate rayon dyes are usually used for nylon.

Nylons made from other acids and amines resemble, in general, the nylon described above.

Nylon is used in the manufacture of fabrics for such articles as hosiery, night garments, underwear, blouses, shirts, and raincoats. Nylon fabrics are water-resistant; they dry quickly when laundered and usually require little to no ironing. Nylon fibers are also used for parachutes, insect screening, medical sutures, strings for tennis rackets, brush bristles, rope, and fishing nets and line. Molded nylon is used for insulating material, combs, dishware, and machinery parts.

Clothing, coverings and garments intended to be worn on the human body. The words cloth and clothing are related, the first meaning fabric or textile, and the second meaning fabrics used to cover the body. The earliest garments were made of leather and other nonfabrics, rather than of cloth, but these nonfabric garments are included in the category of clothing.

Hygienic demands for fabrics and clothing

The main clothing purpose is esthetics and protection from cold: wind, rain, heat, mechanical injuries, different irradiations, chemical factors etc. The main clothing function is to maintain the microclimate under the clothing in optimal for body heat balance parameters.

Therefore, the fabrics should have the following basic hygienic qualities: low (for winter clothing) and high (for summer clothing) heat conductivity, porosity, lightness, low hygroscopic property, water-retaining property, water permeability, high steam conductivity and evaporability, and also durability, wearability, low absorbing properties in relation to the chemical compounds, anti-electrostatic properties etc.

These qualities depend on the fiber origin (cotton, flax, hemp, wool, silk, synthetic fabrics), the fabrics’ thickness, their shrinkage and compression while soaking, washing, on the impregnation while wearing by dust, sebum, technical oils, calcium and magnesium salts while washing with a soap in hard water etc.

The fabrics quality also depends on their chemical origin and solubility of dyes used for coloration (with arsenic, stibium, lead, aniline, picric acid, ursol and coralin content) in water and fats (sebum).

Bacteria, fungi, parasites and their eggs (pathogens of tuberculosis, diphtheria, anthrax, streptococci, pneumococci, peritoneo-typhus and lice nits) can be accumulated and keep their virulence in clothing fabrics during its wearing.

Hygienic demands for shoes

Shoes have to protect feet from unfavourable environmental conditions: cold, mechanical injuries, dirt; by design they should correspond to all physiological and anatomical foot’s structure peculiarities and size, support the amortization, spring foot functions; they should be convenient, lightweight, of good air and vapour permeability, water-resistant; they should correspond to labour conditions, way of life, climate, year season. Shoes should be durable, hard-wearing, and resistant to deformations contributing to plateaupodia development.

Neglecting these demands can lead to the blood and lymph circulation, and musculoskeletal system functioning disorders, also to corns and rub sores. Low air and vapour permeability of the shoes material contributes to the feet sweat and inflammatory processes development.

To manufacture the shoes first of all leather should be used, which owing to its pores provides necessary ventilation, sweat evaporation and owing to its fatness it is water resistant, soft, and elastic. Also, fur, wool fabrics for winter and for summer season – cotton and silk ones may be used. To manufacture the sole now more often porous or dense rubber, polyurethane are implemented. Rubber or other water resistant material (kersey, artificial leather) is used for the outer covering of the working shoes which are for the works on the exposed soil (at the agriculture, building etc.).

Wearing shoes with synthetic polymer materials which are widely used today, can lead to the increased feet hyperhidrosis and fungal lesions development (epidermophytosis), to the accumulation of the static electricity significant levels (up to 500 – 2000 V/cm), to the chemical substances educed from the polymer materials effect on skin: there can be dermatitises, allergies. Thus, the insufficiency and relative expensiveness of leather, the esthetic look and relative cheapness of polymer materials contribute to their widespread usage at the shoes’ industry.

Methods of examination of the clothing’s fabrics hygienic indices

I. The fabric physical properties examination

1.1.         The fabric thickness determination

The fabric thickness determination is carried out by means of micrometer. They take two cardboard disks of 3 cm in diameter, determine their thickness by putting them in between two pressure bars of micrometer, then using only “cracker” press the disks till the first “cracker” clicking (not to allow the excess pressure) and read the registration from the micrometer scale. The micrometer scale consists of two parts: the internal at the device base (from 0 to 25 mm) consisting also of two parts: the lower – 1 mm, the upper – 0.5 mm and the external – on the micrometer barrel, where the reading from the tenth and hundredth fractions of millimeter takes place (from 0 to 50). The device reading is carried out by the next algorithm: on the internal scale they read the amount of millimeters from the lower scale and if near the barrel edge there is a line of the upper scale, they add 0.5 mm, then add tenth and hundredth fractions of millimeters from the scale on the barrel. For example, the lower part of the scale demonstrates 8 mm and a line of the upper scale, the barrel – 35, so the result will be: 8 + 0.5 + 0.35 = 8.85 mm.

As soon as the disks thickness has been measured, the fabric sample is put in between them; the fabric sample thickness is measured together with disks in the same way. To determine the fabric thickness it is necessary to subtract the disks thickness from the disks with fabric thickness.

1.2.         The fabric specific weight (density) determination

Density is a fabric mass of 1 cm2 (grams). They cut a piece of fabric 1×1 cm on natural thickness. Then taking the mass of the fabric 1 cm2 they calculate its mass on the sample thickness of 1 cm.

The calculation is carried out by the next formula (1):

http://intranet.tdmu.edu.ua/data/kafedra/internal/hihiena/classes_stud/en/med/lik/ptn/hygiene%20and%20ecology/3/11.%20Personal%20hygiene,%20healthy%20way%20of%20life.files/image033.gif        (1)

where: D – the fabric specific weight (density);

  Po – the mass of the weighed sample 1 cm2, g;

            S – the area of the weighed sample, cm2;

            m – the fabric thickness, mm.

1.3.         The fabric porosity determination

         It is calculated by the next formula (2):

http://intranet.tdmu.edu.ua/data/kafedra/internal/hihiena/classes_stud/en/med/lik/ptn/hygiene%20and%20ecology/3/11.%20Personal%20hygiene,%20healthy%20way%20of%20life.files/image035.gif        (2)

where: P – the fabric porosity, %;

           D – the fabric specific weight (density);

           d – the density of the fabric fibre (conditionally is taken as 1.3 regardless of fibre origin).

1.4.         The fabric capillarity determination

The cut fabric piece of 25 cm in length and 2.5 cm in width is attached by one end to the support paw, the second end is placed into a cup with eosion solution (1:1000). The capillarity degree is determined by the eosion solution increase height from the initial liquid position in cm per 30 min.

1.5.          The dry and wet fabric relative heat conductivity determination

First, in the laboratory by means of catathermometer they determine the air cooling ability. The device is warmed in a glass of water (temperature is 80°C) up to the filling of the device upper reservoir by one third. Then the catathermometer is wiped dry and the time in seconds of the device cooling from 38°C to 35°C is noted. The air cooling capacity quantity is calculated by the next formula (3):

http://intranet.tdmu.edu.ua/data/kafedra/internal/hihiena/classes_stud/en/med/lik/ptn/hygiene%20and%20ecology/3/11.%20Personal%20hygiene,%20healthy%20way%20of%20life.files/image037.gif        (3)

|  |  |
| --- | --- |
| where: | Ho – is a an unknown quantity of air cooling ability in cal/cm2 ∙sec; |
|  | F – the device factor (constant quantity indicated on the device); |
|  | T – the time of catathermometer cooling from 38°C to 35°C, in sec. |

While the fabric heat conductivity examination they determine:

T1 – the time of catathermometer cooling from 38°C to 35°C of a dry study fabric;

T2 – the time of catathermometer cooling from 38°C to 35°C of a wet study fabric.

The device is warmed once more, wiped dry and the study fabric cover is put on the catathermometer reservoir; then the cooling quantity (H1) is measured again using the same formula. The difference in quantity of air cooling capacity (Ho) and cooling capacity in the study fabric cover (H1) is found out. Then the cooling quantity of wet fabric is found out and it is compared to the dry one (%).

II. The fabric origin examination

2.1. Boiling with alkali

While boiling with alkali (NaOH or KOH 10 % solution) the fabric fibers of animal origin (silk, wool) are dissolved, of vegetable origin (cotton, flax) – only expand. The reaction is carried out in the test-tube, into which 2-3 ml of NaOH or KOH solution is pored, then the study fabric sample is placed there. It is boiled on the spirit brazing during 1-2 min.

2.2. The xanthoproteic reaction

Nitric acid (HNO3) of 1.2-1.3 specific mass dyes the fabrics of animal origin (wool, natural silk) into yellow or light-brown colour; it doesn’t change the colour of vegetable origin fabric. To carry out the xanthoproteic reaction it’s necessary to drop 1-2 drops of HNO3 onto the study fabric and wait for the result during 5-10 min.

2.3. The treatment by acetone

The acetone dissolves the synthetic silk and doesn’t influence the natural fibres. Some acetone drops are dropped onto the fabric sample placed in the Petri dish; then the place is several times wiped by a cotton wool.

Hygienic demands concerning different types of fabrics

|  |  |  |  |
| --- | --- | --- | --- |
| Indices | Fabrics types | | |
| Cotton | Wool | Synthetic fabric |
| Hygroscopic property | 7 % | 12-13% | 5.8% |
| Capillary raise | 110 mm/hour | 100 mm/hour | 95 mm/hour |
| Heat conductivity coefficient | 0.035 kcal/m2∙degree | 0.033 kcal/m2∙degree | 0.035 kcal/m2∙degree |
| Moisture absorption | 150-300 g/m2 | 330-770 g/m2 | 100-110 g/m2 |
| Fibers specific weight | 1.52 g/cm2 | 1.32 g/cm2 | 1.58 g/cm2 |

Hygienic demands concerning different types of clothing

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indices | Linen | | Dresses, shirts, blouses | | Suits | | | Coats | |
| winter clothing | summer  clothing | winter clothing | summer  clothing | winter clothing | summer  clothing | lining  fabrics | winter clothing | summer  clothing |
| Thickness, mm | 1.3-1.5 | 0.1-0.3 | --- | 0.2-0.3 | ≥ 100 | ≤ 1.5 | --- | is calculated | |
| Air permeability, dm3/m2, sec | 51-100 | ≥ 100 | ≥100 | ≥ 330 -370 | ≥ 100 | ≥150 | ≥ 100 | depends on the wind | |
| Humidity permeability, g/m2 | 52-56 | ≥ 56 | --- | --- | ≥ 40 | ≥ 40 | ≥ 50 | ≥ 40 | ≥ 50 |
| Hygroscopic property at relative humidity of 65 %,  % | ≥ 7 | ≥ 7 | 7 | 7 | 7-13 | ≥ 7 | | ≤ 13 | 7 and above |

**Topic 2. Hygienic evaluation of conditions of stay of patients in medical-prophylactic institutions.**

**1. Purpose:** To learn basic hygienic and anti-epidemic measures in the system of prevention of nosocomial infections (storey) in a modern health care settings and to assess treatment-guarding routine of patients in health care facilities.

**2.1.** **Know:**

2.1.1. Definition and classification storey, basic ways to implement specific epidemiological storey, health and safety measures of prevention.

2.1.2. Architectural planning, engineering and organizational measures to ensure the health of guarding routine of patients in health care facilities.

**2.2.** **To be able to:**

2.2.1. Draw up an action plan to prevent and eliminate foci storey in hospitals, maternity hospitals and other medical hospitals.

2.2.2. Giving hygienic assessment of conditions of stay of patients in inpatient hospital units for data situational problem.

**3.** **Question to self:**

3.1. Definition and classification storey.

3.2. Causes and characteristics rush infection in hospitals.

3.3. Sources, routes of transmission and the most common pathogens storey in contemporary hospitals.

3.4. The system of sanitation measures to prevent storey:

- Architectural and planning decisions hospitals;

- Interior decoration and sanitary equipment of hospitals;

- Ventilation and heating hospitals;

3.5. Organization of sanitary regime hospital cleaning.

3.6. Personal hygiene of patients and staff as a means of preventing storey.

3.7. Anti-epidemic measures in the organization of food and visiting patients.

**4.** **The structure and content of classes:**

After the baseline test control nobility (15 tests in 15 minutes) students under the guidance of the teacher stripped main question topics under item 3.1 - 3.7, introduced with the applicable regulations in the field of hygiene of health care settings. Thereafter, students receive individual tasks that contain information about the architectural and planning decisions and sanitary treatment hospital, also in conditions of stay of patients in palatnomu department. Based on data presented in the tasks, students are hygienic conclusion.

In the performance of students using existing regulations and design standard of hygiene findings *(Appendix 1).*

**5.** **Literature:**

5.1.1 Hygiene and Ecology / Ed. V.G. Bardova. - Vinnitsa, "New Book" - 2003. - P. 485-492.

5.2.1 Environmental sanitation / Ed. E.G. Goncharuk. - K., 2003. - P. 618-632, 651-657.

5.2.2. DBN "Health Institutions". - K., 2001.

Hygiene is a basic preventive science. It studies influence of the environmental factors on the human organism and social health; it has the goal to determine and substantiate theoretically hygienic norms, sanitary regulations and measures, realization of which provides optimum condition for life and activity of people, improving the health and preventing diseases.

This subject studies the factors which influence on the human body, create the threshold values and maximum admissible concentrations, levels and doses for these factors. There are psychogenic (information) and material (chemical, physical, biological) factors.

Afferent stimulation causes various emotions (grief, horror, joy etc), changes physical state of the organism. Positive emotions are realized in positive changes: better blood supply of the brain, heart, normalizing blood pressure. Distress, negative emotions can cause disease. They are risk factors for myocardium infarction, hypertension, ulcerous disease, diabetes etc. Great part of afferent loading has social nature. Chemical compounds are often necessary for vital activity and health, but they can be the cause of disease. For example: iodine deficit causes goiter and cretinism, chemical hazards (pollutants) can cause poisoning. Physical factors (microclimate, noise, ionizing radiation, vibration, air pressure) present various kinds of energies. They form an environment we live in but all these factors can be the hazards too. For example, high air temperature can cause overheating and heat stroke, intensive noise – cochlear neuritis and deafness, etc. Biological factors are microbes, viruses, fungi, and helminthes. They can cause diseases of the man and animals, spoil food products, damage sanitary-technical equipment. In real life human being is under the influence of not only one but also complex of environmental factors. They use the terminology: combined influence – influence of several factors of common origin (for example, several chemical compounds). “Common influence” means several factors of different origin are acting. Complex influence is characterized by the situation when only one factor is present but it has different routes of exposure.



The main aim of the subject is the prevention of diseases. Successful prevention depends upon knowledge of causation, dynamics of transmission, identification of risk factors and risk group, an organization for applying these measures to appropriate persons or group and continuous evaluation and development of procedures applied. Nowadays prevention is defined in terms of three levels:

       Primary prevention

       Secondary prevention

       Tertiary prevention.

Hygiene is dealing with the first level mainly. The aim of primary prevention is to maintain health by removing the precipitating causes and determinants of departures from good health.

Hygiene is a science of preserving and promoting the health of both the individual and the community. It has many aspects: personal hygiene (proper living habits, cleanliness of body and clothing, healthful diet, a balanced regimen of rest and exercise); domestic hygiene (sanitary preparation of food, cleanliness, and ventilation of the home); public hygiene (supervision of water and food supply, containment of communicable disease, disposal of garbage and sewage, control of air and water pollution); industrial hygiene (measures that minimize occupational disease and accident); mental hygiene (recognition of mental and emotional factors in healthful living) and so on. The World Health Organization promotes hygienic practices on an international level.

Methods of hygienic researches:

       -method of sanitary examination and describing

       -experimental methods:

       -experiment with simulation of natural conditions

       -laboratory experiment on animals

       -chambers experiment on people

       -“natural experiment”

       -sanitary statistic methods:

       -method of mathematical modeling

       -epidemiological method

Specific hygienic method is method of sanitary examination and describing which is used for studying the environment. Sanitary examination and describing is carried out according to special programs (schemes), which contain questions. Answers to these questions characterize the object, which is being examined hygienically. As a rule it is usually supplemented by laboratory analyses (chemical, physical, microbiological and other), which allows characterizing environment from the qualitative side.

Aim of hygiene is preserving and promoting the health. Its objectives are:

1.    Studying environmental factors

2.    Studying interaction between human organism and environment

3.    Environmental hygienic standards and guidelines developing

4.    Sanitary supervision substantiating

5.    Prospective analysis of environmental health

Hygiene has close links with social medicine and public health, clinical epidemiology, pediatrics, internal diseases, human ecology.

Hygienic standardization:

Environmental standards are definite ranges of environmental factors, which are optimal, or the least dangerous for human life and health. In Ukraine basic objects of hygienic standardization are:

       MAC – maximum admissible concentration (for chemical admixtures, dust and other hazards)

       MAL – maximum admissible level (for physical factors)

       LD – dose limit (for lionizing radiation)

                 Optimum and admissible parameters of microclimate, lighting, solar radiation, atmospheric pressure and other natural environmental factors.

                  Optimum and admissible daily requirements in food and water.

Important methodological problems of hygienic norms setting are:

1) Possibility of application of data got in the experiment on animals to people;

2) Conception about levels of harmful influence (MAC and MAL, must be below them).

Possibility of application of results got in the experiment on animals to people and studying of toxic influence of chemical substances (and some physical factors) is corroborated by hygienic and toxicological investigations. It was an idea to use the so-called reserve coefficients or 'coefficients of extrapolation’ to increase the safety of hygienic norms. It was made because of different sensitivity of animals and people. It was recommended to decrease experimental MAC by 2, 100 and more times in the dependence on the toxic abilities, cumulative action of substance and type of experiment on animals. It is possible to apply data of the sanitary-toxicological experiment on “average animal” to “average human being”. But it is more hard to apply these data to human population among which genetic and other differences are present (age, disease, pregnancy, etc.) which stipulate differentiated sensitivity to the agents. This problem is theoretically unsolved today. But in practice solution is found the in increase of types of experiment on animals of different age, on pregnant animals with modeling of disease and in increase of reserve coefficient and obligatory checking the hygienic norms reliability (MAC and MAL in natural conditions).

As it was said one of the main problems of hygienic norms setting is elaboration of correct conception about the level of harmful influence. Some investigators consider that it is necessary to distinguish the level of biological influence and the level of harmful influence. According to their conception all first stages of physiologic and biochemical reactions which occur as a result of influence of a factor are within limits of adaptation possibilities of the organism. Only when they "come out” of their limits reaction of the organism has a compensatory character. In this case their influence can be considered as harmful because physiologic and biochemical reactions get hygienic significance. But it is too hard to determine the distinction between adaptation and compensatory processes in the experiment. To solve this problem the following rules should be used - data got in the experiment can be considered hygienically valuable only if they are stable (for example, during one month), reliable in the comparison with control group and especially progressive in time. It is recommended to apply loading method, which allows comparing adaptation resources of animals being tested with the control group. Besides that, it is recommended to orient basically on integral parameters of organism condition (weight, temperature, functionality of CNS, concentration of sugar in the blood, etc.) or changes on the organism level, which show the upset of relative equilibrium between the organism and environment. Degree of different of different constants of the organism must be token into account. Changes of stable constants indicate the hygienic significance of changes. Thus, according to this conceptions threshold dosage of toxic substance is that minimum concentration of it in the object of environment influence of which brings about changes in the organism, which result from physiological adaptation reactions.

But some investigators consider that distinction between adaptation and compensatory processes is conditional. That's why threshold of action must be considered as any statistically reliable deflection of physiological and biochemical reactions (parameters) in tested animals from animals of the control group. In this case threshold of action and consequently MAC will be some lower. It is considered that such principle can be used while the setting of norms for factors, which influence on the whole population.

A group of scientists came to the conclusion that there are no any threshold dosages for mutagenous or cancerogenous substances because even the smallest concentration of them can cause mutation (or development of tumor) in the organism. It is known that degree of risk is in proportion to the dosage and quantity of people who were under influence of cancerogenous (mutagenous) substance. International Committee of Radiation Protection (ICRP) in relation to approves this conception mutagenous and cancerogenous influence of ionizing radiation. That's why MAL of ionizing radiation must not bring about more frequent development of tumors or mutations than spontaneous level of this pathology, which is typical for people living in normal not polluted conditions. Conception of ICRP about the non-threshold influence is cruel and, therefore, the best measure is to protect the health of the human being, from the influence of such dangerous factors.

But it was found out in experiments on animals with decreasing dosages of cancerogenous substances that there can be such concentration at which tumors occurs not more often than in the control group. Besides the following fact is against the conception about non-threshold action of cancerogenous (mutagenous) substances. It was found out that substances differ one from another by dosage, which brings to development of tumour (mutation). Supporters of non-threshold theory consider "thresholds imaginary because of small number of animals in the experiment. For example, cancerogenous substance inducts tumours - with the frequency 2,000 per 1,000,000 animals; it means that probability of tumour development is low – 0,2 per 100 animals. Supporters of non-threshold theory suggest to set MAC or MAL according the following way: to determine on animals the dependence of “dosage – effect” for 4-6 dosages of cancerogenous (mutagenous) substance, extrapolate the obtained data into small dosages and find the dosage which slightly increases the level of spontaneous pathology.

Let's study the methodical scheme of hygienic norms of substantiation using, the example of MAC for some toxic substance. The first stage is stud physical and chemical properties of the substance, elaboration of methods of quantitative determination of this substance in different subjects, determination of its regimen of action on the human (duration, interruption, changes of intensity), ways of getting into the organism, study migration in different elements of the surrounding, mathematical prediction of duration of existence in different surroundings.

The second stage is study direct influence on the organism. It is started from 'sharp' experiments the main goal of which is getting initial toxicometric data about the substance (determination of LD50, or LC50 threshold of strong action (LIMac) and other. With the knowledge of physical and chemical properties of t he substance, its initial toxicological characteristics and approximate level of MAC can be calculated.

The third stage - is conduction of 'subsharp' experiment during l-2 months for determination of cumulating coefficient and the most vulnerable physiologic systems and organs specification of mechanisms of action and metabolism.

The fourth (basic) stage is carrying out chronic experiment which lasts 4-6 months in the case of modelling of working conditions, 8-12 - communal conditions, 24-36 - in study processes of aging or induction of tumours.

During the experiment integral parameters are studied. They reflect condition of animals, degree of strain of regulative systems, functions and structure of organs, which take part in processes of metabolism (activity of enzymes), influence of functional loadings.

Numbers of MACs of toxic chemical substances in the Ukraine are various: for the air of working zone - more than 800, water- 700, atmosphere air- 200, foodstuffs - more than 200, soil - more than 30.

Basic objects, which are under the hygienic norms setting, can be divided into two groups.

The first group contains factors of anthropogenesis origin, which are unfavourable for human being, and are not necessary for the normal life activity (dust, noise, vibration, ionising radiation, etc.). MAC, MAL and LD are those parameters, which are set for this group of factors.

The second group contains factors of natural surrounding which are necessary (in certain amount) for normal life activity (food-stuffs, solar radiation, microclimatic factors and others). For this group the following parameters must be set: optimum, minimum and maximum admissible parameters.

In those cases when factors influence on the human not only directly (physiologically) but also indirectly (through the environment) all types of possible influence must be examined at hygienic norms setting. For example setting of hygienic norms for toxic substance in the water of natural reservoirs determination of maximum concentrations must be based on worsening of organoleptic properties of the water (organoleptic sign), toxic influence (sanitary - toxicological sign) and disturbance of processes of self-clearing of reservoirs (general sanitary sign). In this case MAC are set according that harmful parameter which is characterized by the lowest level of concentration. Such parameter is called limiting.

BASIC TASKS AND LAWS OF HYGIENE

The homeostasis of organism of practically healthy people can be also kept at changing (denaturation, pollution) of up to the certain meanings of parameters of the factors of natural environment. It is possible due to processes of adaptation (at the healthy man) and compensation (at the ill man), having also individual limits for every organism.

That is why, the basic and specific purpose of hygiene as science is the studying of the laws and regularities of the healthy man, healthy collectives, populations, population with the natural and changed environment and, on the basis of it, development of ways and means ensuring preservation and strengthening health of the man and whole society.

It is established, that if all etiological factors of not infectious nature, which can change a level of health of the population take as 100 %, the densities of each of them will be such as: the conducting meaning in formation of level of health of the population is a healthy or unhealthy way of life (49-53 %), the second place occupies the genetic factor (18-22 %), third one - factors of pollution of an environment (17-20 %) and only fourth (8-10 %) - medical etiological factors (out of time rendered medical aid, poor quality , inefficiency of preventive measures and etc). From these data follows, that for all responsible for health people services of the country, including sanitary - epidiological, it is necessary to make basic emphasis formation of healthy way of life, and then on struggle with pollution of environment by substances, which can be potential mutagens receipt in organism of the man or influence on it, can promote occurrence of genetic defects, which is shown in first and the subsequent generations.

The role of doctor - hygienist is development and introduction of medical measures promoting recovery of the patients, and also development of organizational measures on duly and effective rendering of medical aid is great. However paramount role in decrease of negative influence of etiological dangerous factors of environment on health of the people the doctors - hygienist should play.

Thus, all laws of hygiene are formulated preceding mainly that the doctors - hygienist in the greatest degree answer for level of health of the people, which depends from adverse and beneficial effect of the factors of environment on organism of man.

The basic law of hygiene is based on principles fixed in a basis of one of the conducting laws of the epidiology, which was formulated by the academician L.B. Gromashevski. According to this law the driving forces (conditions), that are determining epidemic process, are: a source of an infection – the ill or contagious man, mechanism of transfer and susceptible to the given infection organism. At deenergizing even by one of these driving forces the occurrence of infectious disease or epidemics (epidemic process) is impossible.

The first law of hygiene

The first law of hygiene (about three driving forces of adverse influence of factors of an environment on health of the population) can be formulated as follows: the infringement of level of health of the people (disease, decreasing of the resistance, immunological status, adaptation-compensatory opportunities of organism), caused by physical, chemical, biological and psychogenic etiological factors, can arise only at presence of three driving forces: a source of insalubrity (polluting substance) or the complex of the insalubrities, factor (mechanism) of influence or transfer of this polluting substance and susceptible (sensitive to influence of the insalubrity) organism. At the absence of one of these conditions, or the driving forces of process of changing of level of health under influence of the factors of environment for the given age-sexual or professional group of the people the disturbances of health will not take place.



From the first law of hygiene follows, that it is necessary the presence of all three driving forces for the decreasing of health of the population. The exception of uniform circuit of one of these driving forces eliminates probability of deterioration of health, and the reduction of size of one of driving forces of this circuit limits a degree of infringement of level of health of the people. Hence, basic task of hygiene as the science should be the scientific substantiation of a complex of preventive measures directed on elimination or even on reduction (at the beginning) of role of one, two or all three driving forces of deterioration of health of the population.

This law allows a hygienic science on the basis of the first driving force of level of health, i.e. a source of insalubrity (polluting substance) to create the systematized doctrine about various substances, that are polluting the environment, their qualitative and quantitative criteria’s, to classify them on a degree of danger for health of the people. For example, on a degree of danger distinguish four groups of chemical substances – pollutes:

 I - especially high toxic (middle death doze -DL5о - is lower than 50 mg/kg of weight of body);

 II - high toxic (DL5о = 50-200 mg/kg);

Ш - middle toxic (DL5о = 200-1000 mg/kg);

IV - low toxic (DL5о- more than 1000 mg/kg)

A variety of physical, chemical, biological and other substances polluting environment, allows to create the doctrine about constant, faltering, isolated, complex, combined receipt in organism, and also about antagonistic, summarized, potentional influence of pollution.

The concept about the second driving force of level of health is a concept about role of the factors of transfer mechanisms of the report of polluting substances up to susceptible organism, about densities of each factor, if them works simultaneously, that allows to study ways of migration of polluting substances of a source of pollution to the man. Thus the polluting substance can enough long be in objects of an environment (atmospheric air, water of reservoirs, ground), but can’t be dangerous for the man. Only then it can render harmful influence, when it gets in the organism of the man with inhaled air, water, food in quantities exceeding hygienic norm.

Thus, the polluting substance can render damaging action on organism, if mechanism of transfer it in organism of man enclose or work by one of the ecological chains, for example for polluting chemical substances: polluting substance - air-man; polluting substance - water - man; polluting substance - soil - plant - animal - man. If from ecological circuit to withdraw this or that factor (link) of transfer (polluted air, water, foodstuff), the mechanism of transfer will not work.

At last, the conception about the third driving force of the first law - about susceptible to the given polluting substance or complex of substances of organism, allowing to systematize our knowledge and to prove scientifically the preventive measures, directed on amplification of the imunological reactivity of organism, on disclosing and using of laws, determining ways and meanings of increasing of stability of organism to influence of the adverse factors of environment, amplification of mechanisms  of self regulating, adaptation and compensation.

The knowledge and using of the laws of hygiene allows practical medicine and its sanitary - preventive branch successfully to develop and to introduce measures, directed on all driving forces of level of health of the population. The knowledge of the first law of hygiene - law on dependence of level of health on three driving forces - requires of the doctor of the creative approach to the decision of question, on which one or what of these driving forces in concrete conditions first of all to direct the preventive measures.

The second law of hygiene

The second law of hygiene is law of inevitable negative influence on environment of activity of the people.  Irrespective of the will and consciousness, in connection with physiological, household and industrial activity, the people negatively influence on the environment, that the more dangerously, than below scientific and technical level of production, culture of the population and social conditions of life.

During the process of live the man allocates in environment excrement (faces, urine), which are very dangerous in the epidemic and sanitary attitude. This danger grows if not to undertake of measures of immediate removal of excrements from the inhabited localities through the water drain with the further neutralization on clearing sewer structures.



The negative influence of the people on environment is shown more strongly owing to household and especially unreasonable irresponsible industrial activity. The inevitability of amplification of negative influence is caused by further extending use of natural resources for satisfaction of growing material and spiritual needs of society, scientific and technical progress which is not taking into account this influence. This historically natural process inevitably conducts to dangerous to health of the man interrelations with environment, brings in essential and at times unforeseen changes to elements of biosphere, which, being polluted, negatively influence health of the man. So, is authentically proved, that caused by scientific and technical progress of industrial activity of the man, integration of cities and industrial centers, if they occur without the account of the hygienic requirements, result in progressing pollution of environment by the chemical, physical, biological polluting factors in quantities dangerous to biosphere in whole and to the man in particular.

The technological measures assume the organization, adjustment of production processes so that any harm of physical, chemical, biological origin (initial raw material, basic or collateral products of manufacture, it wastes) has not got in environment in quantities, exceeding it of an opportunity to self cleaning and dangerous for health of the man both in immediate and mediate influence. Among such measures effective are waste less technology, turnaround water supply, hermetic sealing of technological systems etc. For protection of atmospheric air against the pollution by exhaust gases of transit measures it is developed the system end burning of exhaust gases, replacement of carburetor engines, that are working on petrol, diesel, gas, electricity.

In basis of scientific - hygienic measures lays the hygienic norm. So, the decreasing in atmospheric emissions of concentration of harmful chemical substances is reached by the appropriate accounts of extreme allowable emissions by the enterprise, group of the enterprises.

To ensure decreasing of concentration of harmful substances in emissions, wastewater, it is using the various designs of sanitary - technical clearing structures, for example dust-, aurum-, gas-catchers, sedimentation, filters.



However listed above protective measures and means are not always effective. In these cases the doctor -prevents should apply the natural factors, planes measures. At the using the last one it is taking into account the winds, prevailing in the given district (rose of winds), which defines the accommodation of the industrial enterprise, height of pipes (for the greater dispersion of emissions in an atmosphere height of pipes is increased) etc. Besides it is allocated the sanitary - protective zones between the enterprises the inhabited zone, applied the shielding gardening of these zones etc. The sizes of sanitary - protective zones depend on character and degree of the harm of technological emissions of the enterprises. For example, the size of sanitary - protective zone for confectionery factories, bred factors, and other manufactures on processing foodstuff of the fifth class, according to sanitary classification of the enterprises, is determined within the limits of 50 m. For the chemical enterprises and other manufactures of the first class A this size makes 3000 м, B- 1000 m. For large heat and power plants size of sanitary - protective zone is accounting to dispersion of technological emissions in an atmosphere and can reach three and more kilometers from borders of the inhabited territory. The sanitary - protective zones is defined also for high-voltage transmission lines, radio transmitting and television stations creating fields of high and super high frequencies of electromagnetic radiation.



Completely to exclude the hitting of polluting substance, especially dangerous, with wastewater in a reservoir, and then with water in organism of the man, the doctor - prophylactic should demand on a substantiation of zones of sanitary protection, introduction of turnaround systems of water supply of the industrial enterprises in development of measures. Thus the wastewater is cleared on factory clearing structures and again goes in a production cycle.

The third law of hygiene

The third law of hygiene –is the law of inevitable negative influence on an environment and health of the people of natural ecological accidents (flood, earthquake etc), natural both toxic biochemist provinces and toxic failures (on AES, enterprises, transport). The natural environment becomes soiled not only under influence of physiological, household and industrial activity of the people, but also at the extreme natural phenomena, cataclysms, such as flares on the Sun, volcanic activity, earthquake, active cyclonic and anticyclones activity etc.



So, during geological formation of the terrestrial cortex the geochemical anomalies with the increased or reduced contents of active microelements, such as F, Mo, others and I were formed under influence of extreme conditions. Such anomalies have resulted in occurrence of biogeochemical provinces, in which the diseases of the natural- pesthole   character, which has received the name endemic, are observed by A.P. Vinogradoff (1938). The most well known among them are goiter, endemic fluorose, caries, endemic molybdenose etc.

The fourth law of hygiene

The fourth law of hygiene – is the law of positive influence of human society on environmental . During creation of favorable conditions of residing and labor activity the human society, that is depending on social level of development, culture, achievement of scientific and technical progress, economic opportunities, purposefully renders positive influence on an environment, the sanitary processes of it, warning pollution and by that. Thanks to this the level of health of the population is raising.

The man, due to the labor activity during all historical development creates and constantly increases conditions, which improve its existence with the help of using of the resources and gifts of a nature. Now technical progress creates completely new ways of moving material and power resources in biosphere, which is directed on improvement of conditions of life.



However we must not think, that the environment is absolutely defenseless in front of the activity of the man. The nature has huge resources of self-preservation, self-updating, self-regulation, maintenance of ecological balance, self-cleaning, but these reserves are not boundless. So, due to solar radiation, temperature processes, occurring in an atmosphere, there are winds, that are promoting the moving and dispersion of smokes and gases, which are thrown out by an industry and vehicle. A ultra-violet part of a solar spectrum, dispersion, concretion, neutralization promotes decomposition of many chemical components of emissions, clearing of air of biological impurity.

The fifth law of hygiene

The fifth law of hygiene is the law of inevitable negative influence of the muddy environment on health of the population. At contact of the man with an environment, that is polluted by physiological extraction, household or technogenic pollution in quantities, that are exceeding the hygienic specifications, it comes inevitably change of a level of health in the part of its deterioration.

The numerous hygienic researches it was established communication between concentration of harmful emissions in an atmosphere of cities and morbidity of the population by illnesses of respiratory system and the cardiovascular systems. Such impurity of atmospheric air of cities, as oxides of sulfur, nitrogen, the various organic substances, irritate mucous environments, are the reason of occurrence of a plenty inflammation of diseases of an eye, respiratory system. The cases of bronchial asthma have become frequent. With pollution of water by heavy metals, in particular by connections cadmium, mercury, connected development heavy intoxications among the population. So, in 1956 it is described endemic named of the disease of Mina Mata. This disease was by a consequence of the using by the population of coast of a gulf Mina Mata (Japan) of a fish (basic products of a feed of the local population), polluted   by the metylmercury, which was dumped in great quantities in the sea by a chemical factory. Among the inhabitants of coast of the river Initsu   in Japan the mass poisoning cadmium is registered, that was named the disease Itai-itai (disease of bones). 200 men were ill, and there were fatal outcome in half of cases. As well as in the previous examples, the poisoning of the local population is connected to consumption a fish, containing much cadmium owing to pollution one of gulfs on the Japanese islands by waste water of the industrial enterprises with high concentration cadmium. Among the population, living in some regions of USA, Australia, Germany, the cases of a poisoning by selenium are registered. The disease is shown as infringement of function of the digestive channel, development of the yellow coloring of a skin, defeat of teeth.

The sixth law of hygiene

The sixth law of hygiene is the law of positive influence of the factors of a natural environment on health of the population. The natural factors of an environmental, pure air, pure water, good-quality, high-grade food positively influence on health of the people, promoting its preservation and strengthening at reasonable using.

All organic life of the Earth is obliged by the existence to solar radiation. The influence of solar radiation on organism and health is defined by his spectral structure: the seen radiation provides function of the visual analyzer, infra-red has thermal, ultra-violet - stimulating, biological, bacteriostatic action.

Rational using of solar radiation, sufficient insolation of dwellings and other premises promotes strengthening of health of the man, increasing of it reactivity and the stability to the adverse factors of environment. The man feels the thermal comfort, if the temperature of air under clothes is in limits 32-34оС, humidity of air - within the limits of 40-60 %, speed of movement of air - 0,2-0,5 m/s, and radiating temperature on 1-2оС is lower than temperature of air. The fluctuation of parameters of a microclimate in limits of the adaptation opportunities of organism promotes increasing of stability of it, strengthening of health of the man, his hardening. The natural fluctuations of atmospheric pressure also positively influence on the health of the healthy man, rendering stimulating action on vascular system. The positive influence on health of the man renders pure air containing about 21 % of oxygen, no more than 0,03 % of carbonic gas, and also sufficiently ionized (containing easy negative ions). At pollution of air the contents of carbonic gas is increased, the concentration of negative ions is reduced, on change with which there come heavy positive ions adversely influencing on organism.



The strongest positive action on a level of health of the people renders a balanced diet. The balanced diet is the balanced feed ensuring normal growth and development of organism, his high serviceability and stability to the adverse factors of an environment. Conditions of a balanced diet are: quantitative sufficiency of food (accordingly to the power inputs of the organism); qualitative full value, that is the presence in a diet of all necessary food substances (fibers, fats, carbohydrates, vitamins, mineral salts and microelements, flavoring substances, water) in optimum quantities and parity; a rational mode of a feed (accordingly to quantity and time of reception of food with biological rhythms of organism); high assimilated food (accordingly to the quality of food  opportunities of digestive system); epidemic safety (absence in food of activators of diseases) and toxic harmlessness of food (absence of poisonous substances in toxic concentration).



It is necessary to note, that the positive action of the factors of an environment on organism and health can be effective only at their complex influence. Using of a complex of the improving factors (sun, air, water, physical activity, high-grade feed) is a necessary condition of preservation and strengthening of health both individual and public.

HOSPITAL HYGIENE.

THE HYGIENICAL ESTIMATION OF PLACING AND PLANNING OF SEPARATE STRUCTURAL SUBDIVISIONS OF HOSPITAL ON MATERIALS OF PROJECT.

Functioning of medical-preventive institutions represents a complex of technological, scientific - practical, economic and social - psychological problems, which decision impossible without the hygienic requirements and recommendations.

Tasks of hospital hygiene:

Ø     Preference to acceleration of recovery the patient, achievement of indemnification of functions, medical and psychological rehabilitation.

Ø     Achievement for psychological and somatic comfort for the patients during stay in hospital institutions.

Ø     Prevention of nosocomial infection

Ø     Maintenance of epidemic and radiologic safety.

Ø     Maintenance of healthy occupational environment for the medical personnel.

Ø     A regulation of use of new disinfectants, detergents, polymeric materials, newest equipment and technologies in medical institutions.

Ø     Formation of bases of a healthy life style at the personnel and patients MPI.

Ø     Minimization of influence on an environment for construction and operation of medical institutions.

         The main characteristic of all medical-preventive institutions is presence so called "hospital environment ". Hospital environment is a set of all factors of physical, chemical, biological and information nature, which carries out influence on an organism of the patient during treatment. There are microclimate of hospital premises, various radiation end wave influences, medicines, antiseptics and polymer material, special hospital strains of bacteria. These factors define dynamics of medical rehabilitation and health of patient and staff.

Before to buid any health facilities it’s recommended to arrange their planning with the authorized general plans and projects on the basis of the circuits of area development.



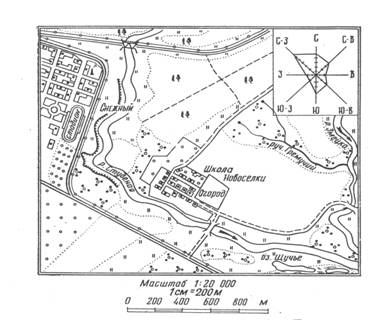


Fig. Situation plan of hospital

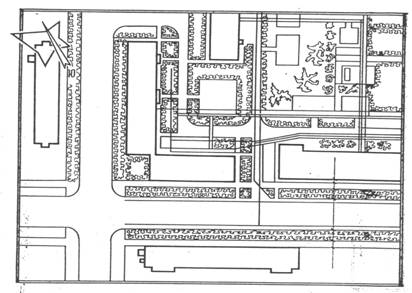


Fig. General plan of hospital

 When they develop the general plans of medical-preventive institutions it is necessary to take into account local climatic conditions and to provide measures on protection of building and nearby area from the adverse external factors. A choice of the ground area for an arrangement of houses of hospitals, maternity houses and others in-patient institutions should be agreed with local authorities and institutions of environmental health service. The medical institutions have to settle down in residential or suburb zones in conformity with the authorized plan and projects of detailed planning of the residential area in view of its functional application. General hospitals and maternity houses should be placed outside of the centre of cities and settlements, the hospitals of emergency care have to be under construction in view of the maximal approximation to groups of the population, which they are served. The specialized hospitals or complexes with capacity for over than on 1000 beds for  the patient stay during long time, and also special hospitals (psychiatric, tuberculosis and other) is necessary to place in a suburb zone, with 1000 m sanitary space from residential territories. In a choice of a site for health facility it is necessary to remember an environmental sanitary situation and prevailing direction of winds ("wind rose").

Table 7.1 Standards for area of health facility in Ukraine

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Health Facilities | Units of operational structure | | Land area  m2 per unit | |
|  |  |  | Children | Adults |
| Hospitals | beds | 35  50  150  300  400  500  600  800  1000 | —  —  250  125  125  135  135  —  — | 350  300  150  200  200  100  100  80  80 |
| Sanitariums | 1 place | Up to 500  Up to 1000  More than 1000 | 150.  125  120. | |
| Out-patient istitutions | Daily visits per 1000 persons | | 0,5 ha per one object | |
| dispensaries | Daily visits per 1000 persons | | 0,4 ha per one object | |
| Ambulance stations | 1 ambulance van per 1000 persons | | 0,07 ha per 1 van | |

The ground in hospital area must be clean, dry, without sharp differences a relief. The hospital area should be placed in aerodynamic shadow, so that the velocity of air movement did not exceed 5 m/s. They electrify the area, supply it with waterpipes and water drain, border on perimeter and protect by a strip of green plantings with width not less than 15 meters (2-3 lines of trees with low schtamb and rich crone). . It is forbidden to construct hospital institutions in places which were earlier used  for landfills, field of assenization (irrigation, filtration), cemetery, etc., and also that have polluted soil.



         Hospitals and maternity houses should be remoted from the railways, airports, high-speed highways and other powerful sources of pollution.

          At an arrangement medical and maternity institutions in residential zone it is necessary to place them not closer than 30 m from a red line of building and 30-50 m from apartment houses, depending on the number of floors in houses of medical-preventive institutions.

          The hospital area should be gardened and comfortable. The area of green plantings and lawns has to make not less than 60 % of the general area and area of garden zone - 25 sq. m. on a bed.

Bush it is necessary to place not closer than 5 m from a hospital house, trees - not closer than 10 m. Trees and the bushes with poisonous fruits, sharp hooks, allergic-dangerous (give a lot of pollen) plants are not used for gardening.

Hygienic meaning of vegetations:

Positive:

ϖ    Protection against wind, dust and noise

ϖ    Optimization of microclimatic conditions: they give a shadow, normalize a humidity of air and make an aerodynamic shadow

ϖ    Bactericide influence of phytoncides on bacterial pollution of air

ϖ    Oxygenation of air

ϖ    Fixing of dust by a grassy lawn

ϖ    Architectural-planning meaning

ϖ    Aesthetic and psychohygienic meaning

Negative:

ϖ    They can be a potential source of allergens

ϖ    Some plants are poisonous

ϖ    Danger of traumatisation with sharp and rigid stalks of plants, with heavy fruits etc

ϖ    Adsorption of dust particles by plants surface

Hospital area located in territory of settlements should have a strip of green plantings with width not less than 15 m with two-line planting of high-schtamb trees and  a line of bushes. Behind perimeter of a site of polyclinics, woman wealness centers and dispensary without IPD, and also ambulance stations they use a strip of green plantings.

          The bushes should be in width not less than 5 m around of radiologic and infectious departments, and also along the X-ray studies if they are on the ground floor.

Now they use 3 basic systems of building of medical institutions. They are distinguished by a various degree of centralization and isolation of functional departments.

The centralized system of building of hospitals is characterized by the maximal concentration of medical service. Usually the hospital house represents a multi-storeyed structure the separate departmentes and services situated at various levels in general architectural space. In Ukraine the hospital could not have more than 9 floors.

The basic advantages of the centralized system is:

Ø     Economy. At the expense of the small area and absence of duplication of the basic building volumes, functional departments, and engineering networks, the charges on construction and technical equipment of hospital decrease.

Ø     The reduction of the vertical and horizontal ways of movement of the personnel and patients allows to raise efficiency of medical process.

Ø     The large concentration of scientific and technical resources allows to develop departrments on the basis of this centralized type hospitals, which give the qualified and specialized medical care.

In the same time for this system has some drawback:

Ø     The raised risk of nosocomial infections. Difficulty of isolation of departments with a various structure, presence of ascending flows of bacterial aerosols, intensification of loading on hospital environment lead to increased risk of disease.

Ø     Deterioration of conditions of hospital environment. High concentration of technical equipment makes excessing of noise level. The microclimate of the top floors could be overcooling because of power wind drafts.

Ø     The architectural flexibility of the centralized system is low usually.

The decentrilized system is characterized by organization of various functional departments in separate houses.

The essence of pavilion system is the arrangement of separate functional departments in 2-3 floor-houses. The basic advantage of this system is:

•        Good isolation of various departments, that allows to prevent occurrence of nosocomial infections,

•        Good conditions for observance medical care regimen

         However, nowadays they were compelled to refuse decentralized  system. It is connected with:

•        The large expenses on building works and technical equipment

•        Reduction of garden zone

•        Increase of the length of movement for the personnel and patients. There are some technical decisions for reduction of the routes of the personnel, in particular underground type of communication, but it does not solve a problem

          Presently most perspective is the mixed system of construction. It unites features of centralized and decentralized system. It has the most flexible architectural planning.

         The territory of hospitals, maternity houses and other in-patent institutions should have convenient access roads with a firm covering. Internal roads and foot paths should be covered by the concret or asphalt.

The optimum capacity of multiprofile hospitals is accepted in 600-800 beds (allowable - 1000 beds).

Table 7.2 Zones of sanitary space between hospital objects

|  |  |  |
| --- | --- | --- |
| Departments | | Size |
| Radiological department | Other departments | More than 25 m |
| Vivarium | Hospital departments  Residential Houses | More than 100 m                      50 m |
| Furnace for waste incineration (<100 kg)  ♦    In economic yard  ♦    Separate building (> 100 kg) | Hospital departments  Residential Houses | More than 30 м                    100 м |
| Central medical gases station  (more than 10 tanks, volume is not less than 50 l) | Hospital departments  Residential Houses | 25 m |
| Warehouse for X-ray films (< 1000 kg) | Other | > 20 m |
| Hospitals and maternity houses | Residential buildings | > 30 m |
| OPD and WWC | Residential buildings | > 15 m |

         In the territory of hospitals there should be the following zones:

1.              Zone of medical departments:  for the infectious patient, medical departments for noninfectious  patient, for pediatric departments, for patrimonial houses and maternity departments, psychosomatic departments, dermato-veneralogical departments, radiologic departments

2.              OPD and administrative zone

3.              Garden zone

4.              Zone of court yard

Separate entrances to the various hospital zones should be provided. For emergencies they provide “Ambulance Road” – the entrance and exit for ambulance should create one-flow driving in and out of the hospital department area.

          The patologo-anatomic departments with a funeral zone should be isolated from ward departments and they should not be looked through windows of the departments, from the hospital garden, and also through windows of inhabited and public houses.

          Distance between houses with windows of chambers has to make 2,5 heights of opposite house, but not less than 24.

          Infectious, maternity, psychosomatic, dermatovenerologic and the children's departments of hospitals should be placed in the separate houses. If hospital has the out-patient department, the last should situate close to periphery of a site.

          Before front entrances to the hospitals, polyclinics, SES, dispensaries and the maternity houses they are provided grounds for the visitors by the account 0,2 m2 per one bed or per one visit on duty, but not less than 50 m2. Parking area for a vehicle of institutions, employees and visitors should be placed not closer than 100 from ward departments. The temporary parking of a vehicle of individual usage should be placed on distance not closer than 40 m from the entrance to the hospital.

          In territory of infectious hospital (department) should be allocated a "clean" and "dirty" zone isolated by one from one strip of green plantings. On departure from a "dirty" zone there should be stipulated platforms for desinfection of transport.

         Buildings of out-patient  institution as rule do not have more than 5 floors.

         The departments of children's hospitals for children till 3 years with the mothers should be placed not above than fifth floor, the chambers for infants and children's psychiatric departmentes - are not higher than the second floor.

         Cleaning of territory has to be carried out daily. For collecting of wastes and household dust they establish containers with covers. These containers should be disinfected and washed properly. Distance between a ground for dust container and ward and medical-diagnostic departments should be not less than 25 m. They should dispose waste from containers every day. Specific (postoperation, patologo-anatomic and other) medical waste should be incinerated in special furnaces.

         Planning of medical and maternity hospitals have to provide optimum sanitary - hygienic and antiepidemic modes and conditions of  patient stay, work and rest of the personnel.

          Structure of institutions and planning of its premises have to exclude an opportunity of crossing or another contact of "clean" and "dirty" flows.

Maternity houses - specialized stationary institutions, which provide health care for pregnant women in childbirth, recently delivered women, newborns, to the gynecologic patients (at presence  of gynecological department).

         They offer to place in basement of medical-diagnostic departments warehouses, sanitary - household premises for the personnel (wardrobes, shower-room), sanitary care unit, buffets and restaurants for the personnel, central laundry, premises for collecting and sorting of a dirty linen, premises for desinfecting of bad pans, oil-clothes and beds, premises of preservation, regeneration and heating of a medical muds; storehouse of radioactive dross and linen polluted with radioactive substances.

         It’s forbidden to place medical-diagnostic departments, workshops using hazardous materials and reception wards in basement of hospital.

         X-ray rooms and laboratories of radiodiagnostic should not be adjacent on a horizontal or vertical with chambers for the pregnant woman and children. It is forbidden to place x-ray studies under premises of shower, lavatories and other possible sources of water.

         Premises of hospitals, maternity houses and others should be illuminated by day light. The illumination by the second light or only artificial illumination is used in premises of barns, toilets, bathrooms, enema room, rooms of personal hygiene, shower and wardrobe rooms for the personnel, thermostate, microbiological banks, preparation and operational, apparatus, narcosis, photolaboratories and some other premises which do not require natural illumination. Operation room projected with natural illumination, it is necessary to focus on the north.

         The corridors of ward sections (departments) should have natural illumination. Distance between light pockets should not exceed 24 m, and between the first light pocket and window in the dead end of the corridor – 30 m.

          For protection from blinding actions and overheating in summer time from direct solar rays in medical stationary located in 3 and 4 climatic areas aperture wrapped up on sector of horizon 70-240º of northern latitude they have to use solar protection equipment.

Table 7.3 Window orienting in the hospitals

|  |  |  |  |
| --- | --- | --- | --- |
| Premises | Geographic latitudes | | |
| <  45° N | 45 - 55° N | > 55° N |
| Operation, IT wards, delivery room | N, NE, NW | N, NE, NW | N, NE, NW, E |
| Laboratories | N, NE, NW, SE, E | N, NE, NW, SE, E | N, NE, NW, S, SE, E |
| TB and Infection wards | S, SE, E, NE\*, NW\* | S, SE, E, NE\*, NW\* | S, SE, SW, NE\*, NW\* |
| Children departments | NO: W | | |

\* — not more than 10% of all beds

          The artificial illumination should answer assignment of a premise,  be sufficient, regulated and safe, to prevent the dazzling and other adverse influence on the human organism and internal hospital environment.

          The general artificial illumination is necessary stipulated in everything, without exclusions, premises. For illumination of separate functional zones and workplaces, they use local illumination.

          The artificial illumination of hospital premises is provided with luminescent and bulb lamps.

We use combined lighting (general and local illumination) in the hospital wards. In one-bed chambers the general illumination is provided. In chambers of children's and psychiatric departments, intensive therapy, the reanimation, in postoperation chambers they provide only ceiling fixtures of general illumination. For night shifts they use lamps in niches near doors

          The emergency illumination is provided at dressing, manipulation, procedural, ATS, assistant, drugstores, reception wards, laboratories of the urgent analysis, X-ray-operation room, and on the nurse stations.

Table 7.4 Artificial lighting of hospitals

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Premises | Е[lx] | max. coef. cf pulsation  % | Max. admissible discomfort index | Environment |
| Operation room | 400 | 10 | 25 |  |
| Delivery room, IT wards | 500 | 10 | 25 |  |
| Pre-operation room | 300 | 10 | 25 |  |
| Examination rooms (SURG, OB/GYN, PED, INF, DERM/VEN, dentists) | 500 | 10 | 25 |  |
| Other examination rooms | 300 | 10 | 25 |  |
| Offices | 300 | 10 | 40 |  |
| Telemetry, endoscopy, physiotherapy departments | 150 | 10 | 40 |  |
| Spa therapy | 150 | 20 | 60 | humid |
| HBO ward | 150 | 20 | 60 | Fire-dangerous |
| X-ray room | 50 | - | 40 |  |
| Children departments | 150 | 10 | 25 |  |
| Mental hospitals | 100 | 10 | 25 |  |
| Other wards | 100 | 10 | 25 |  |
| Laboratory | 300 | 10 | 40 |  |

         All hospitals should be equipped by centralized water supply, ssewege system, ventilation (if it’s necessary  - by systems of air conditioning), rubbish-collector with rubbish chamber, elevators as needed, electrical and telephone networks. If necessary they use centralized vacuum rubbish collectors and other equipment.

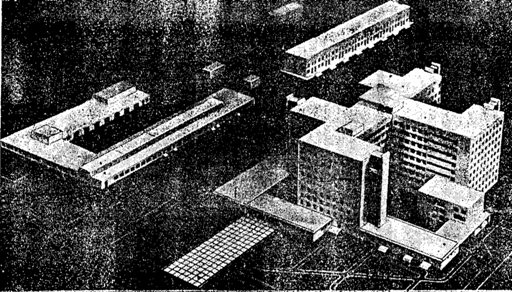


Fig. Hospital

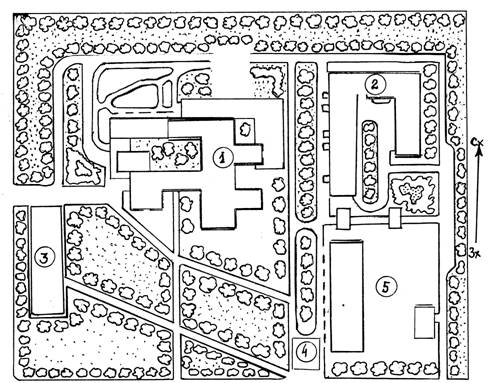


Fig. General plan of hospital

The site land project of the patient care institution includes the following zones:

-         a zone of the patient care buildings for non-infectious patients;

-         a zone of the patient care building with infectious diseases;

-         a polyclinic zone;

-         a zone of morbid anatomical department;

-         a household zone;

-         a landscape zone.

The infectious, obstetric, children’s, tuberculosis and psychiatric departments should have separate landscape zone of their own.

The hospital site housing density depending on the amount of beds should not exceed 10 – 15 %. Up to 60 – 65 % of the area should be occupied by all kinds of green area; 20 – 25 % - a household zone, passages and passageways. The size of the landscape zone should be not less than 25 m2 per one bed.

The distances between the hospital buildings should be the following:

-         between the walls with wards and doctors’ rooms windows – 2.5 of the opposite building height but not less than 25 m;

-         between the radiological building and other ones – 25 m;

-         the morbid anatomical building and a household one – at the distance of 30 m from other buildings, residential including;

-         between the buildings’ flanks – not less than 30 m, from the polyclinic, women’s consulting center and health centre – not less than 15 m.

The admission department for somatic patients (in the central building) and the rooms for the patients’ discharge should be joined together and should include: the examination room, sanitary inspection room, the wards for temporary admitted patients’ stay, the resuscitation and intensive care room, sometimes – the X-ray room.

There should be separate admission and discharge departments for the children’s, obstetric, infectious, dermatovenerologic, tuberculosis and psychiatric departments.

The admission departments areas depend on the amount of patients supposed to be admitted during 24 hours.

The sanitary inspection room is planned according to the current principle and consists of: the examination room, cloakroom, bath-and-shower room, dressing room.

In the infectious, dermato-venerologic and tuberculosis departments the admitted patient’s clothing is referred to the disinfecting department which is situated in the separate building within the household zone.

The laundry, central nutrition unit, boiler-room, garages and other hospital premises are also situated within the household zone.

HYGIENIC REQUIREMENTS CONCERNING HOSPITAL DEPARTMENTS

Each hospital department is intended for patients with similar diseases. It should include: ward sections for 25–30 beds, with 6–8 wards for 2–4 beds with the area of 7 m2 per bed, not less than 2 wards for 1 bed with the area of 9-12 m2 for severe somatic and infectious patients, with the cubic capacity of 20-25 m3 for each patient and the ventilation volume – 40-45 m3/hour. Except the wards in the ward, sector there should be a room for patients’ day-time stay (area of 25 m2), glazed verandah (30 m2), and medical accessory premises: the doctor’s room (8-9 m2), the procedure and manipulation room (12-15 m2), the medical nurse’s station (4 m2), and in the surgical departments sections – dressing rooms (pure and purulent). Besides, there should be a bar with a canteen (for two ward sections with the area of 18 m2), a room for clean and dirty linen (each of 4 m2), a lavatory with a bathroom (10 m2), a lavatory for patients and for personnel, a sanitary room (6-8 m2), and a corridor. There can be two types of the corridor: a side one with windows facing towards the Northern points, or a central – with light gaps (halls).

The optimal ward windows orientation in the Northern hemisphere is the South-East or South. But there should be 1-2 wards with the orientation towards the Northern points for severely ill patients or patients with fever. Beds should be located parallelly to the light conductive wall for a patient to be able to turn back from the dazzling effect of the direct solar radiation. The natural lighting indices (near the internal wall) should be the following: the daylight factor – 1,3-1,5 %, the lighting coefficient – 1:4-1:6, the angle of incidence – not less than 27°, the angle of aperture – not less than 5°, the coefficient of depth of premises – not more than 2. The artificial lighting should be general, 30-60 lux, and the night light – 10-15 lux with lamps in the lower part of the walls.

The wards ventilation should be achieved by means of exhaust ventilation ducts, presence of window leaves and windows which can be opened; the modern hospitals should be equipped with air-conditioners.

In the infectious diseases units the following rooms should be equipped: box wards (with every bed isolation), semi-boxes (the isolated wards with common lavatory and bathroom), and absolute boxes (the isolated wards with lavatory and bathroom).

The operating block of a surgical department should be situated in the blind-ended projection or in the separate outhouse of the hospital. In the operating block there should be following rooms: the operating room – 30 m2 (on the basis of 30-50 surgical beds in the department; for the complex operations – 40-45 m2), the pre-operating room – 10-12 m2, the sterilizing room (one for two operating ones), the anesthetic room – 15 m2, the instrumental room, the surgeon’s room (for protocols), the laboratory of the express tests, the plaster dressing room, the room of the mobile diagnostic, resuscitative apparatuses and the anesthetic equipment, the premises for the sterile and used operating linen, the washing and shower room for the operating brigade, the postoperative resuscitative wards, the lavatories for personnel, the operating nurse’s room and others depending on the surgical department type.

In the surgical departments there should be pure and purulent dressing rooms.

There are some peculiarities of the children’s departments and hospitals, tuberculosis, psychiatric and other specialized patient care institutions’ planning; they are explained in the normative documents and can be learned if it’s necessary.

A regional hospital for 510 beds with a polyclinic for 1 000 visitors per shift\*

(the project is worked out by the chair)

An explanatory note

A regional hospital group of buildings for 510 beds with a polyclinic for 1 000 visitors per shift is a center of providing population with a high qualified medical assistance; it is obliged to serve the district town and the district itself with a population of up to 100 thousand people taking into account other existing district hospitals.

The group of buildings consists of central building for 450 beds (9-storey one), the infectious one for 60 beds, the polyclinic or out-patient building (2-storey one) and accessory premises (1-storey building).

The polyclinic for 1 000 visitors per shift should provide the medical assistance to the population of up to 40 thousand and to provide them with the medial consultations.

The hospital is an organization, methodical and consulting centre for the patient care institutions of the entire district.

The hospital comprises 10 departments which are listed below.

The treatment and accessory premises of the hospital comprise the central building, the intensive care unit, the rehabilitation, X-ray, admission and administrative departments; there are the operating block and the clinical diagnostic laboratory. This project can be used within the I-B, II and III climatic zones.

To build the hospital group of buildings, a site with area of 7.3 hectares is required.

The hospital territory is divided into the following zones: the in-patient, the out-patient buildings (polyclinic), the infectious diseases unit, the household and accessory premises and landscape area (see fig. 44.1).

The central building departments should occupy the next floors:

1st floor – the obstetric department, the children’s department for 30 beds for the children till 1 year old, the admission department and the central hospital entrance;

2nd floor – the rehabilitation, obstetric and children’s (for 30 beds for children till the age of 6) departments ;

3rd floor – the rehabilitation, intensive care and children’s (for 30 beds for children after the age of 6) departments;

4th floor – the therapeutic department consisting of 2 sections for 30 beds and rehabilitation (5th floor – the neurological department for 30 beds, the therapeutic section for 30 beds and the X-ray department;

6th floor – the functional diagnostics department, the gynecological department consisting of 2 ward sections for 30 beds;

7th floor – the chemist’s shop, the otolaryngological department for 30 beds and the ophthalmologic one for 30 beds as well;

8th floor – the surgical department consisting of 2 ward sections for 30 beds and the clinical diagnostic laboratory;

9th floor – the trauma unit for 30 beds and the operating block

\*The chair can prepare another variant of the study (or real) project of the hospital institution.

The treatment and diagnostic departments are situated on each floor near the in-patient departments and are interconnected with them.

The ward sections have a short main corridor, lighted on each side. At the place where the corridors are crossed there should be projected halls of the day-time stay and the nurses on duty stations .

The infectious diseases unit for 60 beds is projected in the U-shaped 1-storey building, where the boxes’ section for 30 beds (one flank) and the semi-boxes’ section for 30 beds (another flank) are situated.

The morbid anatomical department is projected in the separate isolated building.

The household block is projected as an isolated building and household yard where central heat post, boiler house, garage, workshop, laundry and nutrition unit are located.

The hospital is projected in the skeleton bearing-wall constructions of II-04 series.

The hospital buildings are provided with the central water heating system, the tidal-exhaust mechanical ventilation, hot water supply from the boiler room, the electricity supply from the transformer substation and low current from the district telephone station and internal ATS.

 The quality of water has to allow State Standard "Drink water". The system of hot water supply is projected with circulation.

         Table 7.5 Hygienic requirements for water supply (daily needs)

|  |  |  |
| --- | --- | --- |
| Health facility | Cold water | Hot water |
| OPD | 15 l per1 visit |  |
| Hospitals:  - rural  - town | 150 l per bed  250 l per bed | 150 l per bed |
| Infection & TB hospitals | 250 l per bed | 250 l per bed |
| Spa therapy  - bath  - subaquatic bath  - shower  - hydropathy unit  - hydro massage  - vertical extansion bath | 500 l per bed OR  900 l per hour  700 per hour  200 per hour  3000 per hour  500 per hour  800 per hour |  |

For waste treatment from hospital catering service in hospitals they establish fat-catching device. The treatment of waste from hospitals including infectious is carried out by municipal sewer system. At absence of municipal sewege systemthey use system of local waste treatment.

          For all health facilities should be provided reserve (emergency) hot water supply. They could use electrical boilers or second input of hot water supply. For heating it’s used water heating system with maximal water temperature in heating devices 85oC (Using water steam heating in the hospitals is prohibited).

         The heating radiating concrete panels can be used in following premises: operation, preoperation, resuscitation wards, narcosis, delivery, premises of electrolight treatment, psychiatric departments of hospitals, therapy rooms, rooms for premature babies, injured children, little children and newborns infection wards, combustiological wards, complete and incomplete boxes, premises of blood bank, storerooms for sterile materials and medications, x-ray rooms, laboratories and experimental - biological clinics (vivaria).

          The toilets for the patient should be equipped with cabins, hangers, drying devices for hands, mirrors. In lavatories of female ward sections there should be equipped cabins of women hygiene with ascending shower (bidet).

          The quantity of sanitary devices (toilet pans) for the patient in ward departments of hospitals should be accepted at the rate of  1 device per 15 men and per 10 women, but not less than 1 device. The quantity of pissuare in male lavatories has to equate to quantity of another sanitary devises. The sizes of lavatory cabins for the patient should be not less than 1,5 (1,1) m with obligate opening of doors outside. In sanitary - household premises for the attendants it is necessary to accept:

1.     Quantity of sanitary devices for the medical staff - not less than 2 devices for the women and 1 device for the men; but not less than 1 sanitary unit on each department

2.     Quantity of shower cabins -  1 shower cabin per 10 employees in infectious and phthysiatric departments, in other departments - 1 shower cabin on 15 employees in the largest shift. If less number of the personnel it is necessary to provide 1 shower cabin on department.

         Lavatory for the patient in ward departments for hundicapped patients should have special equipment (racks, folding ), that the seriously ill patient can use of sanitary devices.

          The houses of medical and patrimonial houses should be equipped with systems of balanced ventilation, except for infectious departments. In the last should be established the exhausting ventilation. The exhausting ventilation from chambers has to be carried out through individual channels, which prevents of air movement by the vertical.

         They use exhausted from operational, narcosis, resuscitation, patrimonial and X-ray rooms, as a rule, from two zones: 40 %- from upper zone (10 cm. from a ceiling), 60 %- from the bottom zone (on 60 cm from a floor) in view of allocation in these premises of gases and steams, which can form explosive mixes, or difficult positively charged ions.

Ventilation systems in operation, narcosis, resuscitation, maternity and other wards with severe sanitary should be equipped with  bacterial filters.

Table 7.6 Hygienic demands to hospital environmnet

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Premise | Air t° | AEH | | | AEH for natural air exchange | Germ pollution | | | | | | | | |  |
| GMN | | | | | Str. | | | | Categoria of pureness |
| inlet | exhaustion | | Before  work | | |  | | Before  work | |  | |
| 1 | 2 | 3 | 4 | | 5 | 6 | | | 7 | | 8 | | 9 | | 10 |
| Adult and children wards | 20°С | 80 m3/h per one bed  100% | | | 2 |  | | | 3500\*5000 | |  | | to 16\*  to 36 | | P |
|  |  | |  |  | | |  | |  | |  | |  |
| TB wards | 20°С | 80 m3/h per 1 bed | | | 2 |  | | | —»— | |  | | —»— | | D |
|  | 80% | 100% | |  |  | | |  | |  | |  | |  |
| Wards for hypothyreotic patients | 24°С | 80 m3/h per 1 bed  100% | | | 2 |  | | | —»— | |  | | —»— | | P |
| Wards for hyperthyreotic patients | 15°С | —— » —— | | | 2 |  | | | —»— | |  | | —»— | | P |
| 1-2 beds room, IT rooms, cobustiological rooms | 22°С | > 10 eph | | | - |  | | | —»— | |  | | —»— | | VP |
|  | 100% | 80% - aseptic | |  | | |  | |  | |  | |  |
|  | 80% | 100% - septic | |  | | |  | |  | |  | |  |
| Operation room | 22°С | —— » —— | | | —»— | 500 | | | 1000 | |  | | < 4 | | VP |
|  |  | \*1)  \*2) | |  |  | | |  | |  | |  | |  |
| Delivery room | 22°С | —— » —— | | | —»— | 750 | | | 2000 | |  | | < 24 | | VP |
|  |  |  |  | |  | (in delivery -1000) | | | | |  | |  | |  |
| Premature children wards | 25°С | : | | | —»— | 500 | | 1000 | | |  | | < 4 | | VP |
|  | 100% | 80% - aseptic | |  |  | | | | |  | |  | |  |
|  | 100% | 100% - septic | |  |  | |  | | |  | |  | |  |
| Newborn wards | 25°С | —— » —— | | —»— | |  | 3000 | | |  | | 44 | |  | |
| Boxes | 22°С | 2,5 (from corridore) 100% | 2,5 | 2,5 | |  | 3500  7000 | | |  | | 16  36 | | Б | |
| Infection wards | 20°С | 80 m3/h | 80 m3/h | —— | |  | 3500  7000 | | |  | | 16  36 | | Б | |
| Wards for patients with scarlet fever | 20°С | —— » —— | | —— | |  | 3500 | | |  | | 75-100 | | Б | |
| Sterilization rooms | 18°С | —    3 | 3 - septic  — -aseptic | 2    2 | |  |  | | |  | |  | | Б    4 | |
| Dressing rooms | 22°С | 2 | 2 | 2 | | 750 | 1500 | | |  | | більше 4 (до 16) | | 4 | |
| Therapy room | 22°С | 2 | 2 | 2 | |  | 2500 | | |  | | 32 | | 4 | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Notes:                   \*   — summer / winter

                            \*1) — 20% through neighbor premises

                            \*2) — inlet with sterile air

Reception ward of hospital has following functional tasks:

•        Reception, registration and distribution of patients

•        Previous diagnostics

•        The decision of a question about necessity of in-patient or out-patient treatment

•        Sanitary treatment of patients

•        Prevention of communicable diseases

•        Shifting needed patients to other health facilities

•        Discharging the patient and distribution of an information.

The number of patients are receipted by the reception ward depend on the number of beds in the hospital and its specialization::

•        2 %  of beds number - in TB, mental and rehab hospitals

•        15 %- in emergency hospitals and maternity houses

•        10 %- in other hospitals.

The number of the patient flows should be accepted from the ratio:

•        1 flow per 800 beds- TB and rehab hospitals

•        1 flow on 600 beds- in mental hospitals

•        1 flow on 150 beds- in emergency care facilities

•        1 flow on 200 beds- others hospitals.

         For each flow in hospitals (excepting infectious, children and obstetric hospitals) they provide one examination room/box and one sanitary treatment unit. In infectious hospitals and infectious departments of general hospitals they provide reception wards with examination boxes, their quantity depends on quantity of beds in department:

•        up to 60 beds - 2 boxes.

•        100 -3 boxes

•        more then 100 beds-by the formula X=3\*x, where x - 1 additional box for every 50 beds of department.

The similar boxes are organized in children hospitals.

          In obstetric departments the reception premises (examination room, sanitary treatment unit) should be provided as combined for physiological department and department of a pathology of pregnancy and separately for observation and gynecologic departments. The movements the patient of all departments, including stairs and elevators, should be isolated one from one.

         If it’s necessary they organize traumatological shifts, their offices should be placed on the ground floors of houses.

          For reception of the infectious patient they provide isolator room which connected to examination room of the ward.

         Ward department is the basic functional structural element of in-patient medical institutions. The basic types of ward departments is: noninfectious department (for adult and children) and infectious departments, maternity department

          If children departments has 60 or more beds they should be placed in separate buildings. Infectious and TB departments are placed only in separate buildings.

          Ward department consists of ward sections and general premises located between the sections. The general premises include the medical and diagnostic offices, catering service premises etc.

          The ward section represents the isolated complex of rooms and medical-auxiliary premises providing care for patients with homogeneous diseases. The quantity of beds in ward section, as a rule, is not less 20 and no more than 30 (except for psychiatric).

          The quantity of 1 bed rooms in observation obstetric department, department of a pregnancy pathology and also in hematological, neurosurgical and urologic departments for adult persons and children should be not less than 15 %, and in others departments - not less than 7 % of quantity of beds in department.

          The quantity of 2 beds rooms  in the specified departments has to make not less than 15 %. In all other departments project not less than two 3 bed rooms in each section.

The  best ratio is 20%of one-bed, 20% for two-bed and 80% for three and four-bedrooms.

In infectious stationary basic structural unit of ward department could be not  a ward, but complete or uncompleted box or boxed room. Boxes provide a complete isolation of the patient. There are 1-2 bed boxes using in Ukraine.

Isolator has two exits: to the department and to outdoor environment. The patient never leave  Isolator through the department door, they pass only through external exit with tambour. The access of the medical personnel to Isolator is provided from a "conditionally clean" corridor through sluices, where medical staff should change their gowns, wash and disinfect hands. The doors in the sluices should be placed on the slanting line. Isolator department have the largest maneuverability and carrying ability, it is important for small departments.

Incomplete Isolatores distinguish from boxes  because they have no an external exit. They also are provided on 1 and 2 beds. The mode  of non- Isolator department differs from boxed one by that the patients are brought in incomplete isolatores through a general corridor department. In isolator departments it is recommended to use 25 % of all beds in isolatores per 1 bed, other - in 2 bedsisolators. In everyone ward section should be provided two incomplete boxes on 1-2 beds.

In noninfectious departments for children  older one year and for adults they use rooms having not more than 4 beds. Capacity of rooms for infants, and also for newborns in observation obsteric department should be not more than on 2 beds each.

Recommended percent of boxes in section for children younger 3 years is 100 %.

          At presence of the gynecological departments in structure of health institution it should be isolated from obstetrics and other “clean” departments. Women in the childbirth and pregnant women are divided into 2 flows in the filter of reception department . One  flow is made  by women in childbirth and pregnant women, which are directed at department of a pathology of pregnancy and physiological department, other - in observation department.

The reception in observation department of the maternity house is for the pregnant women and women in the childbirth who have:

•        a fever (temperature of a body 37,6 oC  and more without other expressed symptoms)

•        long waterless interval (waters break in 12 and more  hours before the reception in hospital)

•        trombophlebitis of any localization (acute or chronic form in a stage of an exacerbation)

•        inflammatory diseases of kidneys and urine tracts (acute stage, an exacerbation of chronic process during pregnancy, symptomless bacteriuria- 100000 CCU/ml and more)

•        signs of any urogenital infection  (colpitis, cervicitis,  choriamnionitis etc)

•        clinical or laboratoric data about TORCH infection (TORCH - toxoplasmosis, rubeola, cytomegalovirus, herpes, listeriosis, veneral diseases (STD))

•        intrauterinal death of fetus

•        acute respiratory disease (influenza, tonsillitis), signs of inflammatory diseases (pneumonia, otitis)

•        skin diseases of infectious ethyology

•        Tuberculosis (closed forms of any localization at absence of specialized hospital). (Pregnant women and women in the childbirth with the open form of a tuberculosis are should be hospitalized in the specialized maternity houses (department); if there are not presented  - in boxes or isolators of observation department with the following transferring in tuberculosis dispensary)

And also:

•        skin diseases (noninfectious)

•        at absence of the medical documentation

•        for an abortion on medical and social indication in ІІ the period of pregnancy

•        malignant tumors

•        women have the anomalies of development of a fetus, which revealed during pregnancy (at absence of specialized hospitals)

•        women in the childbirth (in terms 24 hours after deliveries in case of childbirth outside of medical institution)

They transfer the pregnant women, women in the childbirth and women recently delivered if these women have:

•        increase of temperature of a body 38oС and higher (at three times measuring)

•        fever with not clear genesis (temperature of a body up to 37,5oС), that lasts more than 1 day

•        postpartum inflammatory disease (endometritis, mastitis, wound infection т. і.)

•        extragenital infectious diseases which do not require transferring in specialized in-patient department (ARVI, herpes etc.)

          The pregnant women, women in the childbirth  and women recently delivered, which suffer on infectious diseases, are subject to hospitalization and transferring in the appropriate infectious hospitals. The observation department should be placed or in the separate house, be isolated, above it there should not be an obstetric department.

          At presence of gynecological department to it the separate reception is provided. Gynecologic department is necessary completely isolated from obstetric departments.

The operational block

          The operational block is structural unit of hospital using for surgical operations.

          The operational blocks are divided into general and specialized (traumatologic, cardiologic, neurosurgical). By an attribute of presence one department (aseptic) or two (aseptic and septic) operation room are divided on aseptic and combined.

          The operational block has such functional zones:

 І. The sterile zone: an operational room

ІІ. A zone of restrictions

•        group of premises for preparation to operation: preoperation, wardrobe for overalls, narcosis room,

•        group of premises for the equipment: apparatus room (AABC, hypotemia)

•        group of premises of postoperation wards

•        group of auxiliary premises, which contain also sluice at an entrance to operational room

ІІІ. A zone of the limited access:

•        group of premises for diagnostic researches

•        group of premises for preparation tools and equipment for operation: sterilization, instrumental-material (instrumental-financially)

•        group of premises of the personnel: offices of the surgeons, office of the doctor - anaesthesiologist, room of the nurses-anaesthesiologists, room of attendants

•        auxiliary premises: sluices at an entrance in septic and aseptic of department, room to the central board, plasters і and that similar

•        warehouse premises:  blood bank etc

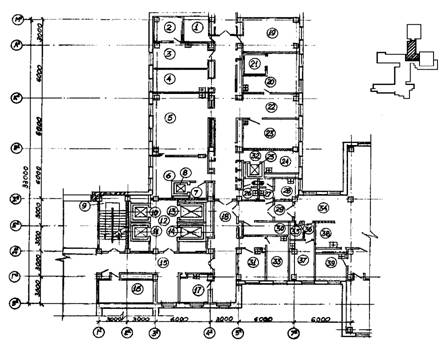


Fig. The operational block

          It is necessary to accept quantity operational in CR, interregional and urban regional hospitals: 1 on everyone 30 beds to a surgical structure and 1 on 25 beds in hospitals of emergency care. The ratio of septic and aseptic operational in operational blocks of general hospitals is necessary 1:3, but it is not less than one septic operational room per block.

          The quantity of beds in post-operation ward is accepted as 2 bed per operation room. At presence of departments of anaestasiology and reanimation or the reanimations and ІТ department, postoperation wards are not provided, and their quantity is taken into account of beds of department of anaestesiology and reanimation.

         Postoperation room are being placed in separate isolated section at the operational block, or in structure of branch anaestasiology and reanimation or the reanimations and ІТ department or it's isolated in structure of surgical department.

          For maintenance of free transportation the patient width of door apertures is necessary to be not less than 1,1 m. A floor in operation room should have antistatic covering. The ventilation in operation and dressing room provides conditioning of air. Than inflows of air from system of conditioning - in the top zone of a premise (is not lower 2,5 from a floor), exhaustion - from two zones: top and bottom (0,4 from a floor). Air, which is showed in operational has to be cleaned with  the bilaterial circuit (rough and thin clearing).

For control on the hospital environment they use following indicator of air pureness:

•        Oxygen: 20-21 %. Very stable size, does not decrease even at intensive consumption (restoration for the infiltration).

•        Carbonic gas:

•        · very clean air < 0,05%

•        · rather clean air < 0,07%

•        · satisfactorily clean air < 0.1%

•        Dust pollution:

•        It is no more than 500 particles in 1 cm3

•        ·clean air < 0,1 мг/м3

•        dirty air > 0,15 мг/м3

•        Oxydation of air:

•        clean air - up to 6 mg О2/м3

•        · is moderate - polluted - up to 10 мг О2/м3

•        · dirty - up to 12 мг О2/м3

Hospitals produce about 230 kg of sold wastes per bed annually (0,63 g/day). Nowadays they use for waste treatment in the hospitals some modern schemes:

In canalized dwelling place there are:

1.     complex of local treatment units with thermal decontamination in liquid and solid phase of waste. It has high effectiveness of decontamination. Power is about 100 m3/day

2.     complex of local treatment units with septic-dehelminthizator. (25 m3/day)

3.     complex of local treatment units with a septic (25 m3/day)

4.     complex of local treatment units with the contact defenders (10-15 m3/day)

5.     complex of local treatment units with a 2-level septic (100-150 m3/day). It's used in Odessa infectious hospital, for example.

6.     complex of local waste buildings with a aerotank of continued aeration and mechanic aerator (400 (!) m3/day)

7.     complex "Rapid Lock" (to 840 (!) m3/day)

8.     complex of local treatment units with circular oxygenation channel (COC). It's used for waste treatment of tuberculosis hospitals if volume of waste is up to 700 m3/day

9.     complex of local treatment units with emsher and biofilter. They use it for waste treatment of tuberculosis hospitals if volume of waste is up to 500 m3/day

10. complex of local treatment units with septic and biofilter ( for small tuberculosis hospitals, waste to  50 m3/day)

For canalized areas they use:

11. complex of local treatment units with ground fields of filtration (irrigation). The scheme are being used if volume of wastes is 50-100 m3/day and there is sandy soil.

12. complex of local treatment units with underground fields of filtration. Waste pipes (drenas) is placed on the depth 3 m, loading is about 15-20 l/day The scheme are being used if volume of wastes is 50-100 m3/day

13. complex of local treatment units with sand-gravel filters

14. complex of local treatment units with filtering trench

For waste treatment in tuberculosis hospitals they use two-stages of biologic purification.

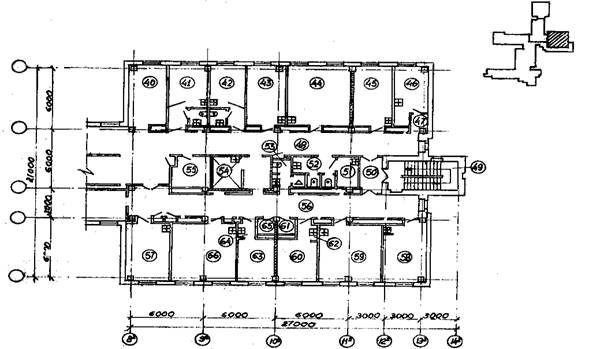


Fig. Ward section of teraputic department

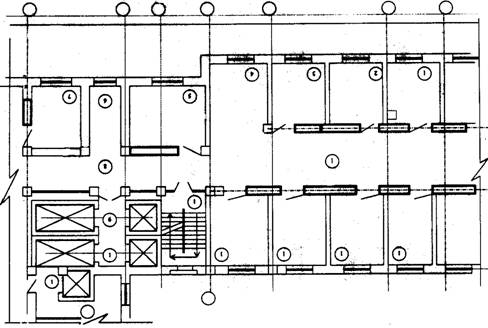


Fig. Ward section of children department



Fig. Ward section of infection department

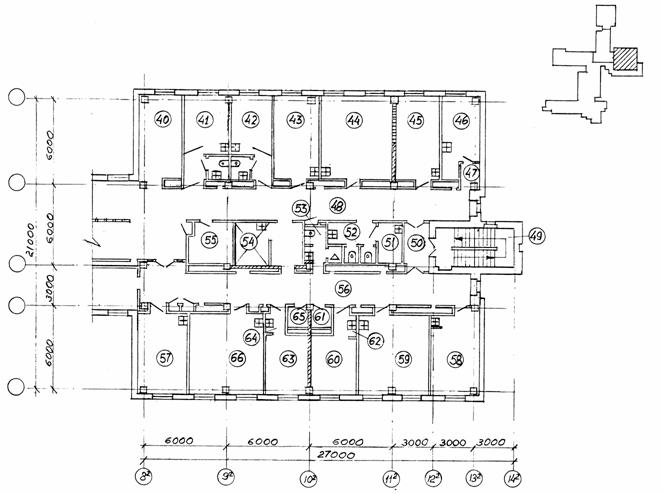


Fig. Typical ward section

You know that on the hospital area they provide some functional zones. The infectious departments should be isolated from non-infectious. The currents of movement for "pure" and "dirty" (suspicious for communicable diseases) patient should be also isolated from each other according to a principle of one-way flow. It’ very important how departments are distributed by the floors. Departments requiring aseptic conditions (surgical, maternity, neonatological) should be placed on the first floors of a hospital building. At the arrangement of operation - reanimation complex septic operations have to be placed above aseptic. In infectious cases of departments intended for hospitalization of the homogeneous patients they place them by the floors, thus the most contagious patients (with aerial infections) are placed in the top floors.

            Sanitary - antiepidemic measures provide health promotion activity among the patients and personnel, monitoring of an epidemic situation, including revealing vira- and bacteria carriers. With this purpose the system of the previous and periodic (current) medical surveys is introduced. So, pupils of medical schools, the students of medical high schools during  practice should pass obligatory physical examination with participation of physician, dermatovenerologist, they have to make fluorography (if this research was not taken during the previous 6 months), analysis feces on carriage of intestinal infections and helmints eggs, and the persons are more senior than 18 years - on HIV, RW and urethral (for women also vestibular and vaginal) smear on Neisseria gonorrhoeae.

          Before practice in maternity houses, newborn wards, children's hospitals (departments), surgical departments etc. it is necessary to pass inspection of stomatologist, otholaringologist with an obligatory capture smears on staphylococci tests (from a nose and fauces)

          Prior to the beginning work in maternity houses, children's hospitals and other MPI medical workers should to pass inspection including fluorography (6 months), RV and tests on gonorrhea, analysis on HIV they repeat every year, carriage of pathogenic staphylococcus and RW -too, tests on gonorrhea and analysis on HIV - 1 time per 6 months, on carriage - 1 time per 6 months will be carried out.

All hospitals should be supplied with a linen - accordingly of sheet of equipment at enough. Change of a linen by the patient should be carried out in process of its pollution, regularly, but not less once for one week. Polluted linen should be changed immediately. The change of bed-clothes for delivered women should be carried out 1 time per 3-4 days, body linen and towels - daily, under napkins - by the necessity. Change of a linen by the patient after operation should be carried out regularly to the discontinuance of exudation from wounds.

In maternity hospitals (patrimonial blocks and other premises with aseptic mode for newborn) should be used a sterile linen.

          The temporary (not more than 12 hours) preservation of dirty linen in departments could be provided in the shut container (metal, plastic boxes, dense boxes, and other capacities, which are subject of disinfecting). For work with a dirty linen the personnel should be supplied sanitary clothes (dressing gown, cap, mask, glove).

The clean linen should be stored in the special premises, deduced for it. In departments they should have a daily stock of a linen. Linen and container should be marked.

The washing of a hospital linen should be carried out by centralized way in special laundries at the hospitals. The washing of a linen in medical institutions is carried out in conformity with the instruction on technology of processing of a linen of medical establishments at factories – laundries.

The washing of hospital linen in urban municipal laundries on a condition of allocation on them of special technological lines is supposed which exclude an opportunity of contact of hospital linen with not hospital. The linen in infectious, observation and purulent - surgical departments before washing should give in disinfecting in special premises by processing of disinfecting solution in washing machines.

After recovery of the patient, his death, and also for the prevention of pollution a mattress, pillow, the blankets should be changed and a disinfected.

At the reception ward all in-patients will pass special sanitary processing in acceptance branch (acceptance soul or baths, the cutting of nails and other procedures) by the necessity. It depends on results of the examination.  They give to each patient soap and wiping  bast for personal use. After sanitary care the complete set clean body linen, pajamas, shoes (slippers) is given out to the patient. They keep the personal clothes and the footwear for safety in special container with hangers (polyethylenic bags, covers with a dense fabric etc.) or it is transferred to preservation to its relatives or familiars.

Washing of the patient is carried out not less than 1 time per week with marking in the case history. Hygiene of the seriously ill patients (washing, wiping of a skin of the person, parts of a body, rinsing oral cavity etc.) will carry out constantly after the meal and at pollution of a body. It should be organized a hair dressing and shaving for the patient. Each patient should be supplied with a personal towel and soap.

The serving medical personnel of hospital, patrimonial houses and other medical institutions should be supplied complete sets of the replaceable worker (sanitary) clothes: dressing gowns, caps, replaceable shoes (slippers) in quantities, that provides daily change sanitary clothes. All medical personnel of medical or patrimonial institutions have to be faultlessly tidy and accurate, edge of the worker (sanitary) clothes should completely close personal (home) clothes. The hair should completely be covered with caps. Change of footwear of the personnel of operational, patrimonial blocks, resuscitation, dressing rooms and newborn departments should be with non-fabric material, suitable for desinfecting.

The doctors, nurses should wash hands before the examination of each patient or performance of procedures, and also after "dirty procedures " (cleaning of premises, change of the patient linen, visiting of a lavatory etc).

HOSPITAL SYSTEMS

The development of the internal market and creation of trusts has produced incentives for hospitals to plan on the basis of maximising the role and status of the individual trust. We have, however, observed over the past two years an increasing trend for groups of hospitals to work more collaboratively, and a softening, or even abandonment, of the competitive ethos, in line with the government's white paper The New NHS.[6](http://www.bmj.com/cgi/content/full/319/7221/1361#B6#B6)

The result of this is that the type and range of options that are considered to be available change when the objective is how to plan for an area where a number of hospitals form a potential network of complementary provision, rather than how to compete. Joint plans are increasingly likely to be followed by mergers, the ultimate surrender of individual aspirations to the collective will. The recent acute strategy for Scotland is an early example of what seems to be a growing trend towards planning on a system-wide basis.

This development reflects the view that some services must be organised on a scale larger than any one hospital, for some services for populations as large as one million. However, as the Calman Hine report recognised for cancer care, the amount of evidence bearing on such large scale issues is limited.[7](http://www.bmj.com/cgi/content/full/319/7221/1361#B7#B7) Furthermore, neither the Calman Hine report nor the Scottish strategy report[8](http://www.bmj.com/cgi/content/full/319/7221/1361#B8#B8) adequately deals with the relation between services organised in this way, as they do not allow for the impact of their proposals on the way other services are provided---even though the same staff and facilities may beinvolved.   
The wider system

Both the demands placed on hospitals and their efficiency as providers depend on the nature and effectiveness of community based services such as rehabilitation facilities and out of hours cooperatives formed by general practitioners. They also depend on the way in which potential users, particularly of emergency services, decide whether and how to access care. Although the phrase "whole systems approach" has now found its way into official documents, virtually no research has been commissioned at the "whole system" level.   
Staffing and medical specialisation

One of the most powerful factors making for change in hospitals has been increasing medical specialisation. As the recent review by the York Centre for Reviews and Dissemination[9](http://www.bmj.com/cgi/content/full/319/7221/1361#B9#B9) and Posnett's article in this series[10](http://www.bmj.com/cgi/content/full/319/7221/1361#B10#B10) have shown, high quality evidence on the benefits of this process of centralisation and specialisation is limited. Nevertheless, the recent recommendations for hospitals by the BMA and the Royal Colleges of Physicians and Surgeons envisage a continuation of this process.[11](http://www.bmj.com/cgi/content/full/319/7221/1361#B11#B11) Furthermore, the colleges are issuing guidance that will put managers in a position in which they will have to close or reduce the role of some hospitals.

This is in direct opposition to the high value placed on access by the public, and unless models can be developed to overcome this it is possible that the accountability of the colleges will be questioned, and they may come into direct conflict with politicians. The problem is particularly acute in more rural areas, where even the revised minimum populations suggested in the most recent document by the BMA and the royal colleges may be hard to achieve. A compromise will need to be developed between the requirements of education and training and the development of local services, and some hospitals may not be able to continue to function as educational establishments responsible for training junior doctors.

Changes in the way that hospitals provide care have implications for clinical training and the working environment of clinical staff as well as for future staffing requirements, and vice versa. Because responsibility for these different areas is divided among the professions, training organisations, the Department of Health, and the NHS Executive, the links between them have been persistently neglected.

The results of this are apparent in the current crisis in the recruitment of nursing staff. Although many other factors play a part, one element is the lack of research on the number and type of nurses that hospitals require and the contribution of nursing to patient outcomes.   
The research agenda

The previous sections have focused on the areas where we believe that more research is required. Two general points need to be made.

Firstly, research relevant to hospitals has tended to concentrate on single interventions and less frequently on some models of service delivery such as hospital at home. It tends not to address issues about the planning of whole systems, and it is rare for the results of hospital reconfiguration to be evaluated. Although there is a requirement for large capital schemes to be evaluated after completion, this does not seem to happen routinely, and where such evaluations are carried out the results are often not in the public domain. Politicians and policymakers may find the critical evaluation of previous decisions uncomfortable, but unless it is carried out mistakes will be repeated and there will be no collective learning within the NHS about how to plan such schemes.

In the past, funding to support this type of research has been limited. The new research into service delivery and organisation to be commissioned by the NHS Executive offers the potential for many of these areas to be investigated.

Even though this initiative is welcome, it will not be enough. An additional problem is that the time lag in implementation means that evaluation may become history rather than research and, given the pace of change, the past may not be a reliable guide to the future. No substantial sources of funding have been available to support this type of research. Moreover, many of the questions for which planners, managers, and policymakers need answers are not easily answered with traditional methods of research into the health service.

Secondly, new research techniques are required to support planning for the hospitals of the future, including the development of scenario planning and modelling, and simulation techniques to identify uncertainties and the sensitivity of plans to forecasting errors. There should be more evaluation of completed plans and much better systems to exchange knowledge about innovations. Some nationally led experiments are also needed---in the development of service models---for example, for rural areas where the trends referred to above are undermining existing patterns of provision.

Little research has been done that highlights the central issues of hospital planning: how many hospitals we need, what services each should offer, how they should relate to each other, and how, once these issues are resolved, they should be organised, staffed, and managed. http://www.bmj.com/cgi/content/full/319/7221/1361

Plans for the future of hospitals need to recognise our lack of knowledge, and, if there is to be central guidance, this should be that whatever is planned should be robust in as many possible futures as are conceivable. Research should be directed at understanding how flexibility can be incorporated into hospital design at low cost. In this respect there is perhaps some reason to be concerned about the impact of the private finance initiative. These schemes will have fewer beds but may not incorporate design ideas that allow flexibility since, in many cases, the costs associated with the planning will fall on the NHS.

This failure of research reflects a larger failure to take the planning of hospitals seriously, which has been particularly marked since regional health authorities were abolished. Although geographical variations rule out a "one size fits all" approach, we have identified a range of issues that require a central response. The professions have begun with the publication of a consultation document on acute hospital services to respond to this challenge.[12](http://www.bmj.com/cgi/content/full/319/7221/1361#B12#B12) We can only hope that the Department of Health will do so too

HOSPITAL AND HOSPITALISM

The medicine is one of the most abundant spheres of labor activity of society. It calculates more than 170 medical specialties. In the system of public health services of Ukraine more than 200 thousand doctors are employed, including dentists, over 500 thousand of nurses.

DUTIES AND RESPONSIBILITIES OF EACH SERVICES

FUNCTIONS OF THE HOSPITAL

Hospital administration functions can be classified into three broad categories:

1. Medical - which involves the treatment and management of patients through the staff of physicians.

2. Patient Support - which relates directly to patient care and includes nursing, dietary diagnostic, therapy, pharmacy and laboratory services.

3. Administrative - which concerns the execution of policies and directions of the

hospital governing discharge of support services in the area of finance, personnel, materials and property, housekeeping, laundry, security, transport, engineering and board and the maintenance.

MAJOR FUNCTIONS OF THE ADMINISTRATIVE SERVICE

1. Provide service related to accounting, billing, budget, cashiering, housekeeping, laundry, personnel, property and supply, security, transport, engineering, and maintenance; and

2. Render support services to hospital care providers, clients, other government, and private agencies, and professional groups.

RESPONSIBILITIES

1. To plan, direct and coordinate financial operations of the hospital;

2. To prepare work and financial plan and provide fund estimates for programs and projects;

3. To manage the receipt and disbursement of cash/ collections;

4. To administer personnel development programs, policies and standards;

5. To give advice on matters affecting policies, enforcement and administration of laws, rules and regulations;

6. To procure, store, manage and issue the inventory and disposal of unserviceable hospital equipment and materials; and

7. To provide general services such as repairs and maintenance, housekeeping, laundry, transport and security.

NOSOCOMIAL INFECTION

An infection that can be acquired in a hospital. ABPA is a nosocomial infection.

Risk factors for nosocomial infection

        Duration of hospital stay

        Indwelling catheters

        Mechanical ventilation

        Use of total parenteral nutrition

        Antibiotic usage

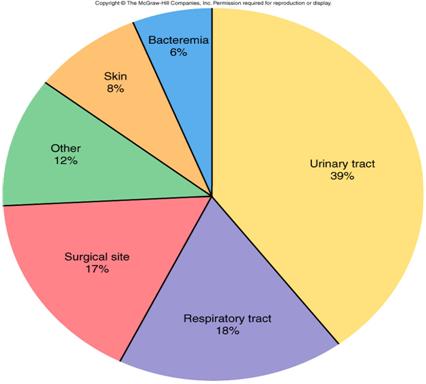
        Use of histamine (H2) receptor blockers (owing to relative bacterial overgrowth)

        Age—more common in neonates, infants, and the elderly

        Immune deficiency



Invasion and multiplication of microorganisms in body tissues, as in an infectious disease. The infectious process is similar to a circular chain with each link representing one of the factors involved in the process. An infectious disease occurs only if each link is present and in proper sequence. These links are (1) the causative agent, which must be of sufficient number and virulence to destroy normal tissue; (2) reservoirs in which the organism can thrive and reproduce; for example, body tissues and the wastes of humans, animals, and insects, and contaminated food and water; (3) a portal through which the pathogen can leave the host, such as the respiratory tract or intestinal tract; (4) a mode of transfer, such as the hands, air currents, vectors, fomites, or other means by which the pathogens can be moved from one place or person to another; and (5) a portal of entry through which the pathogens can enter the body of (6) a susceptible host. Open wounds and the respiratory, intestinal, and reproductive tracts are examples of portals of entry. The host must be susceptible to the disease, not having any immunity to it, or lacking adequate resistance to overcome the invasion by the pathogens. The body responds to the invasion of causative organisms by the formation of [ANTIBODIES](http://medical-dictionary.thefreedictionary.com/antibody) and by a series of physiologic changes known as [INFLAMMATION](http://medical-dictionary.thefreedictionary.com/inflammation).



The spectrum of infectious agents changes with the passage of time and the introduction of drugs and chemicals designed to destroy them. The advent of antibiotics and the resultant development of resistant strains of bacteria have introduced new types of pathogens little known or not previously thought to be significantly dangerous to man. A few decades ago, gram-positive organisms were the most common infectious agents. Today the gram-negative microorganisms, and [Proteus](http://medical-dictionary.thefreedictionary.com/Proteus), [Pseudomonas](http://medical-dictionary.thefreedictionary.com/Pseudomonas), and [Serratia](http://medical-dictionary.thefreedictionary.com/Serratia) are particularly troublesome, especially in the development of hospital-acquired infections. It is predicted that in future decades other lesser known pathogens and new strains of bacteria and viruses will emerge as common causes of infections.

The development of resistant strains of pathogens can be limited by the judicious use of [ANTIBIOTICS](http://medical-dictionary.thefreedictionary.com/antibiotic). This requires culturing and sensitivity testing for a specific antibiotic to which the identified causative organism has been found to be sensitive. If the patient has been receiving a broad-spectrum antibiotic prior to culture and sensitivity testing, this should be discontinued as soon as the specific antibiotic for the organism has been found. It would be helpful, too, if the general public understood that antibiotics are not cure-alls and that there is danger in using them indiscriminately. In some instances an antibiotic can upset the normal flora of the body, thus compromising the body's natural resistance and making it more susceptible to a second infection ([SUPERINFECTION](http://medical-dictionary.thefreedictionary.com/superinfection)) by a microorganism resistant to the antibiotic.

Although antibacterials have greatly reduced mortality and morbidity rates for many infectious diseases, the ultimate outcome of an infectious process depends on the effectiveness of the host's [IMMUNE RESPONSES](http://medical-dictionary.thefreedictionary.com/immune+response). The antibacterial drugs provide a holding action, keeping the growth and reproduction of the infectious agent in check until the interaction between the organism and the immune bodies of the host can subdue the invaders.

Intracellular infectious agents include viruses, mycobacteria, [Brucella](http://medical-dictionary.thefreedictionary.com/Brucella), [Salmonella](http://medical-dictionary.thefreedictionary.com/Salmonella), and many others. Infections of this type are overcome primarily by [T LYMPHOCYTES](http://medical-dictionary.thefreedictionary.com/T+l's) and their products, which are the components of cell-mediated [IMMUNITY](http://medical-dictionary.thefreedictionary.com/immunity). Extracellular infectious agents live outside the cell; these include species of [Streptococcus](http://medical-dictionary.thefreedictionary.com/Streptococcus) and [Haemophilus](http://medical-dictionary.thefreedictionary.com/Haemophilus). These microorganisms have a carbohydrate capsule that acts as an antigen to stimulate the production of antibody, an essential component of humoral [IMMUNITY](http://medical-dictionary.thefreedictionary.com/immunity).

Infection may be transmitted by direct contact, indirect contact, or vectors. Direct contact may be with body excreta such as urine, feces, or mucus, or with drainage from an open sore, ulcer, or wound. Indirect contact refers to transmission via inanimate objects such as bed linens, bedpans, drinking glasses, or eating utensils. Vectors are flies, mosquitoes, or other insects capable of harboring and spreading the infectious agent.

PATIENT CARE. Major goals in the care of patients with threatening, suspected, or diagnosed infectious disease include the following: (1) prevent the spread of infection, (2) provide physiologic support to enhance the patient's natural curative powers and resources for warding off or recovering from an infection, (3) provide psychologic support, and (4) prepare the patient for self-care if this is feasible.

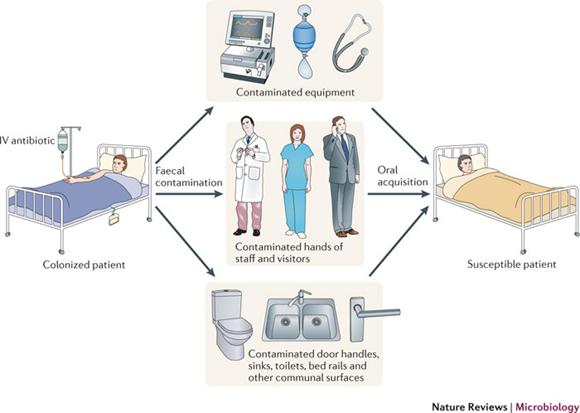
Special precautions for prevention of the spread of infection can vary from strict [ISOLATION](http://medical-dictionary.thefreedictionary.com/isolation) of the patient and such measures as wearing gloves, mask, or gown to simply using care when handling infective material. No matter what the diagnosis or status of the patient, handwashing before and after each contact is imperative.

Unrecognized or subclinical infections pose a threat because many infectious agents can be transmitted when symptoms are either mild or totally absent.

In the care of patients for whom special precautions have not been assigned, gloves are indicated whenever there is direct contact with blood, wound or lesion drainage, urine, stool, or oral secretions. Gowns are worn over the clothing whenever there is copious drainage and the possibility that one's clothes could become soiled with infective material.

When a definitive diagnosis of an infectious disease has been made and special precautions are ordered, it is imperative that everyone having contact with the patient adhere to the rules. Family members and visitors will need instruction in the proper techniques and the reason they are necessary.

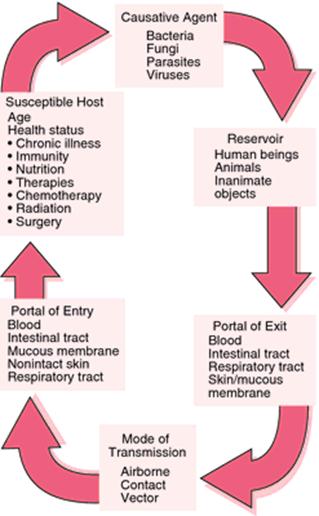
Physiologic support entails bolstering the patient's external and internal defense mechanisms. Integrity of the skin is preserved. Daily bathing is avoided if it dries the skin and predisposes it to irritation and cracking. Gentle washing and thorough drying are necessary in areas where two skin surfaces touch, for example, in the groin and genital area, under heavy breasts, and in the axillae. Lotions and emollients are used not only to keep the skin soft but also to stimulate circulation. Measures are taken to prevent pressure ulcers from prolonged pressure and ischemia. Mouth care is given on a systematic basis to assure a healthy oral mucosa.

  
  
The total fluid intake should not be less than 2000 ml every 24 hours. Cellular dehydration can work against adequate transport of nutrients and elimination of wastes. Maintenance of an acid urine is important when urinary tract infections are likely as when the patient is immobilized or has an indwelling urinary catheter. This can be accomplished by administering vitamin C daily. Nutritional needs are met by whatever means necessary, and may require supplemental oral feedings or total [PARENTERAL NUTRITION](http://medical-dictionary.thefreedictionary.com/parenteral+nutrition). The patient will also need adequate rest and freedom from discomfort. This may necessitate teaching her or him relaxation techniques, planning for periods of uninterrupted rest, and proper use of noninvasive comfort measures, as well as judicious use of analgesic drugs.

Having an infectious disease can alter patients' self-image, making them feel self-conscious about the stigma of being infectious or “dirty,” or making them feel guilty about the danger they could pose to others. Social isolation and loneliness are also potential problems for the patient with an infectious disease.

Patients also can become discouraged because some infections tend to recur or to involve other parts of the body if they are not effectively eradicated. It is important that they know about the nature of their illness, the purposes and results of diagnostic tests, and the expected effect of medications and treatments.

Patient education should also include information about the ways in which a particular infection can be transmitted, proper handwashing techniques, approved disinfectants to use at home, methods for handling and disposing of contaminated articles, and any other special precautions that are indicated. If patients are to continue taking antibacterials at home, they are cautioned not to stop taking any prescribed medication even if symptoms abate and they feel better.



Practical methods for preventing nosocomial infection

What's in

        Hand washing:

o        as often as possible

o        use of alcoholic hand spray

o        removing jewellery before washing

        Stethoscope: cleaning with an alcohol swab at least daily

        Gloves: supplement rather than replace hand washing

        Intravenous catheter:

o        thorough disinfection of skin before insertion

o        changing administration sets every 72 hours

What's out

        Hand washing: using a brush

        Mask:

o        routine use in theatre

o        during wound dressing

        Gowning: routine use in neonatal units

        White coats: enforced use in clinical units

        Intravenous catheter:

o        routine removal of peripheral catheters after 72 hours

o        use of impermeable, transparent dressings

o        in-line bacterial filters



**The reference problem "Modern Problems storey and measures of prevention"**

In the current sanitary survey of architectural and planning solutions and engineering accomplishment of Cardiology (Internal Medicine) Department N-American hospital doctor SES of environmental hygiene were set as follows: Hospital built in 1996 for a typical project. Therapeutic department is located in a two-story medical building on the second floor and consists of two sections room of thirty beds each. Log in sections directly from marching through the single door area. The internal planning department bellhop with two sided orientation of windows in houses east and west. Western orientation have 6 houses (4 beds) - three in each section. At the time of examination in the department were in hospital 72 patients. The walls in the corridors palatnyh sections painted with oil paint yellow to a height of 1.3 m and above - whitewashed with lime. Paula - wooden planks, painted with oil paint. The corridor has a hall light, windows facing south. The floor in the wards as wood, painted with oil paint. The walls are covered with water-paint yellow-green. Premises procedural and manipulative rooms have floor of unglazed ceramic tiles, the walls are covered with a layer of oil paint to a height of 1.2 m. The ceiling in all rooms with lime ornaments, white. Harvesters for staff and patients are common to two palatnyh sections and are made ​​of unglazed floor tiles, walls whitewashed with lime at full height. In the men's dressing room for patients, there are four toilets and two urinals in the women - three toilets. Chamber of patients have a rectangular shape, beds are located: in the triple chambers - 2 along the side walls and one - in a window with four chambers - railing to one another along the side walls of the passage in the center chamber. Each chamber is meant by a bedside table on each bed and 1 chair. At the time of check in double rooms of the palace was set on an extra bed. The area per bed in 3 and 4 bed wards is 4.7, 6.0 and 6.5 m 2, respectively.

Heating is a local medical building boiler room, as heaters made ​​of cast iron radiators are installed to separate premises room window sill sections. Coolant - superheated steam at a temperature of supply in the building - 90 O C. Ventilation chambers, facilities personnel and procedural - a natural by non-tightness in window fittings. Hot water supply - by local boiler. At the time of the survey on January 20 microclimate parameters defined in the two wards were: humidity - 60%, temperature - 27 C, air velocity - 0.01 m/s.Temperature surface of cast iron radiators in the House - 92 ° C. In all functional areas room sections applied lateral natural light and artificial general overhead light bulb with a solid spherical lenses.

***Etalon hygienic conclusion.***

Me, student of VI year 22 Group I of the Medical Faculty ZHMU Petrenko SM results of the sanitary survey of the Internal Medicine Department N-American Hospital on the basis of requirements SanPiN 5279-90. Established the following violations of sanitary requirements, which may lead to the spread of storey and a violation of medical guarding mode:

1. At the entrance to the office room sections missing platforms, which can lead to disruption of temperature branches in winter.
2. Room section - rated capacity of 60 beds actually accounts for 72 beds.
3. The walls in the corridors room sections (rooms with dry mode) to paint acrylic paint to the entire height. Tone colors should be warm but not bright. The same applies to the sick (panel green in chambers may have a negative psychological and emotional impact on patients).
4. Floor in the corridors and wards should be provided with strong solid material (linoleum) as counter from boards may have cracks, which makes their cleaning and reduces the effectiveness of disinfectants in wet cleaning.
5. Harvesters for patients should be provided for each section room. The walls in the dressing room, and procedural manipulation (the room with a wet regime) to paint waterproof paint, or covered with glazed tiles to full height.
6. Number of urinals men's dressing room must be by the number of toilets - that is four. Number of toilets in the ladies (2) Does not correspond to the number of patients - one toilet per 10 women.
7. Location of beds in wards for patients does not meet the hygienic requirements - bed should be installed parallel to the wall with windows.
8. Do not let's increase the number of beds in wards against the project. The area per bed in wards with extra beds installed does not meet hygienic standards (must be at least 7.0 m for therapy of patients).
9. Heater temperature is much higher than the limit (maximum - 85 ° C), which can lead to burns patients and worsen climate chambers. As the coolant should be considered not overheated steam, and water. The temperature in room is too high (optimal in the cold season - 22-25 °C), which creates discomfort heating microclimate.
10. Artificial lighting sick should include combined, that is next to the bed on the wall at 1.7 m from the floor to establish a local fixture, and in the House - the next light (near the front door at 0.3 m above the floor).

Date Signature Name

Appendix 1

**Patient questionnaire forms concerning the sanitary regime in the department and hospital**

1. Your name, family and patronymic name, age, sex.
2. Disease diagnoses. Have you been to the hospital before (once, twice, more), how long are you staying in the hospital?
3. How many beds are there in the ward, the ward area and orientation?
4. What kind of ward do you prefer: for one- two-, three- or more beds, why?
5. Do your ward neighbours bother you and how (noise, lighting, unpleasant smell etc.)?
6. Do the morning manipulations, temperature survey, cleaning disturb your rest and sleep?
7. What other factors connected with the day schedule and hospital regime bother you?
8. Are you satisfied with the microclimate in the ward (temperature, humidity, air movement) and the air quality (unpleasant smells and their spreading from your neighbours or other rooms of the department)?
9. Does the noise, its sources bother you (within the ward, from the corridor and other rooms, out of the building); at what day or night time is it the most intensive?
10. Are you satisfied with the ward planning, beds location, their quality, comfort, the quality of other furniture and equipment?
11. Do you feel any discomfort from the direct ward insolation? What window orientation would you prefer and why?
12. Your remarks and wishes about the ward natural and artificial lighting, wall colour, furniture, equipment, installation of radio, system of urgent personnel call.
13. Are you satisfied with the organization and regime of nutrition? Your wishes about its improvement.
14. Do you smoke during your stay in the hospital? Have you smoked before the admission?
15. Do you use the hospital garden, park and how often? If not, why.
16. Your other remarks and wishes.

**Topic 3. Food poisoning as a hygiene problem. The method investigation of cases of food poisoning.**

**1.** **Purpose:** To expand and consolidate theoretical knowledge of various nosological forms of food poisoning and methods of their investigation. Be able to interpret preventive action with food poisoning.

**2.1.** **Know:**

2.1.1. Classification of food poisoning.

2.1.2. Various nosological forms of food poisoning and its prevention.

2.1.3. Methods of investigating food poisoning.

**2.2.** **To be able to:**

2.2.1. Explain preventive action in infectious diseases of the alimentary factor in transmission.

**3.** **Question to self:**

3.1. Food poisoning, their definition and classification.

3.2. Food Toxoinfection: definition, diagnosis, clinical, prevention principles.

3.3. Microbial toxicosis: the concept, diagnosis, clinical, prevention.

3.4. Food poisoning of unknown etiology.

3.5. Methods of investigation of food poisoning. Documents issued during and upon completion of the investigation of food poisoning.

3.6. Legal and methodological documents used in the investigation of food poisoning and its prevention.

3.7. Preventive measures to eliminate and prevent food poisoning.

3.8. The role of aerogenic and purulent diseases, intestinal infections among hospital staff in case of food poisoning and microbial nature of infection.

**4.** **Literature:**

5.1.1. Hygiene and Environment. Handbook / Ed. V.G. Bardova-Vinnitsa. New book. 2006 - P. 327 - 328.

5.1.2. Food hygiene with basics / V.I. Tsypriyan et al. Teach. the user. - K.: Health, 1999. – P. 385-439.

5.2.1. Scientists at meals. Vol. 2. Security of power supply / Ed. V.D. Vanhanen. - Donetsk: Donetsk region, 2005 - 276 p.

Bacterial Food Poisoning

Al B. Wagner, Jr., Professor and Extension Food Technologist

Food borne illness is an ever-present threat that can be prevented with proper care and handling of food products. It is estimated that between 24 and 81 million cases of food borne diarrhea disease occur each year in the United States, costing between $5 billion and $17 billion in medical care and lost productivity.

Chemicals, heavy metals, parasites, fungi, viruses and bacteria can cause food borne illness. Bacteria related food poisoning is the most common, but fewer than 20 of the many thousands of different bacteria actually are the culprits. More than 90 percent of the cases of food poisoning each year are caused by Staphylococcus aureus, Salmonella, Clostridium perfringens, Campylobacter, Listeria monocytogenes, Vibrio parahaemolyticus, Bacillus cereus, and Entero-pathogenic Escherichia coli. These bacteria are commonly found on many raw foods. Normally a large number of food-poisoning bacteria must be present to cause illness. Therefore, illness can be prevented by (1) controlling the initial number of bacteria present, (2) preventing the small number from growing, (3) destroying the bacteria by proper cooking and (4) avoiding re-contamination.

Poor personal hygiene, improper cleaning of storage and preparation areas and unclean utensils cause contamination of raw and cooked foods. Mishandling of raw and cooked foods allows bacteria to grow. The temperature range in which most bacteria grow is between 40 degrees F (5 degrees C) and 140 degrees F (60 degrees C). Raw and cooked foods should not be kept in this danger zone any longer than absolutely necessary. Undercooking or improper processing of home-canned foods can cause very serious food poisoning.

Since food-poisoning bacteria are often present on many foods, knowing the characteristics of such bacteria is essential to an effective control program.

Staphylococcus aureus

Man’s respiratory passages, skin and superficial wounds are common sources of S. aureus. When S. aureus is allowed to grow in foods, it can produce a toxin that causes illness. Although cooking destroys the bacteria, the toxin produced is heat stable and may not be destroyed. Staphylococcal food poisoning occurs most often in foods that require hand preparation, such as potato salad, ham salad and sandwich spreads. Sometimes these types of foods are left at room temperature for long periods of time, allowing the bacteria to grow and produce toxin. Good personal hygiene while handling foods will help keep S. aureus out of foods, and refrigeration of raw and cooked foods will prevent the growth of these bacteria if any are present.

Salmonella

The gastrointestinal tracts of animals and man are common sources of Salmonella. High protein foods such as meat, poultry, fish and eggs are most commonly associated with Salmonella. However, any food that becomes contaminated and is then held at improper temperatures can cause salmonellosis. Salmonella are destroyed at cooking temperatures above 150 degrees F. The major causes of salmonellosis are contamination of cooked foods and insufficient cooking. Contamination of cooked foods occurs from contact with surfaces or utensils that were not properly washed after use with raw products. If Salmonella is present on raw or cooked foods, its growth can be controlled by refrigeration below 40 degrees F.

Clostridium perfringens

C. perfringens is found in soil, dust and the gastrointestinal tracts of animals and man. When food containing a large number of C. perfringens is consumed, the bacteria produce a toxin in the intestinal tract that causes illness. C. perfringens can exist as a heat-resistant spore, so it may survive cooking and grow to large numbers if the cooked food is held between 40 degrees F and 140 degrees F for an extensive time period. Meat and poultry dishes, sauces and gravies are the foods most frequently involved. Hot foods should be served immediately or held above 140 degrees F. When refrigerating large volumes of gravies, meat dishes, etc., divide them into small portions so they will cool rapidly. The food should be reheated to 165° F. prior to serving.

Clostridium botulinum

Botulism accounts for fewer than one of every 400 cases of food poisoning in the U.S., but two factors make it very important. First, it has caused death in approximately 30 percent of the cases; and secondly, it occurs mostly in home-canned foods. In 1975, for example, 18 or 19 confirmed cases of botulism were caused by home-processed foods, and the other was caused by a commercial product that was mishandled in the home. Cl. botulinum can exist as a heat-resistant spore, and can grow and produce a neurotoxin in under processed, home-canned foods. An affected food may show signs of spoilage such as a bulging can or an off-odor. This is not true in all cases, so canned foods should not be tasted before heating. The botulinum toxin is destroyed by boiling the food for 10 minutes.

Vibrio parahaemolyticus

V. parahaemolyticus is found on seafoods, and requires the salt environment of sea water for growth. V. parahaemolyticus is very sensitive to cold and heat. Proper storage of perishable seafoods below 40 degrees F, and subsequent cooking and holding above 140 degrees F, will destroy all the V. parahaemolyticus on seafoods. Food poisoning caused by this bacterium is a result of insufficient cooking and/or contamination of the cooked product by a raw product, followed by improper storage temperature. It is a major problem in Japan where many seafoods are consumed raw. Vibrio vulnificus is another member of the vibrio genus that is found in the marine environment. V. vulnificus is truly an emerging pathogen, but it can be controlled with proper cooking and refrigeration.

Bacillus cereus

B. cereus is found in dust, soil and spices. It can survive normal cooking as a heat-resistant spore, and then produce a large number of cells if the storage temperature is incorrect. Starchy foods such as rice, macaroni and potato dishes are most often involved. The spores may be present on raw foods, and their ability to survive high cooking temperatures requires that cooked foods be served hot or cooled rapidly to prevent the growth of this bacteria.

Listeria

Before the 1980’s most problems associated with disease caused by Listeria were related to cattle or sheep. This changed with food related outbreaks in Nova Scotia, Massachusetts, California and Texas. As a result of its widespread distribution in the environment, its ability to survive long periods of time under adverse conditions, and its ability to grow at refrigeration temperatures, Listeria is now recognized as an important food-borne pathogen.

Immunocompromised humans such as pregnant women or the elderly are highly susceptible to virulentListeria. Listeria monocytogenes is the most consistently pathogenic species causing listeriosis. In humans, ingestion of the bacteria may be marked by a flu-like illness or symptoms may be so mild that they go unnoticed. A carrier state can develop. Death is rare in healthy adults; however, the mortality rate may approximate 30 percent in the immunocompromised, new born or very young.

As mentioned earlier Listeria monocytogenes is a special problem since it can survive adverse conditions. It can grow in a pH range of 5.0-9.5 in good growth medium. The organism has survived the pH 5 environment of cottage cheese and ripening cheddar. It is salt tolerant surviving concentrations as high as 30.5 percent for 100 days at 39.2 degrees F, but only 5 days if held at 98.6 degrees F.

The key point is that refrigeration temperatures don not stop growth of Listeria. It is capable of doubling in numbers every 1.5 days at 39.5 degrees F. Since high heat, greater than 170 degrees F, will inactivate the Listeria organisms, post-process contamination from environmental sources then becomes a critical control point for many foods. Since Listeria will grow slowly at refrigeration temperatures, product rotation becomes even more important.

Yersinia enterocolitica

Even though Yersinia enterocolitica is not a frequent cause of human infection in the U.S., it is often involved in illness with very severe symptoms. Yersiniosis, infection caused by this microorganism, occurs most commonly in the form of gastroenteritis. Children are most severely affected. Symptoms of pseudoappendicitis has resulted in many unnecessary appendectomies. Death is rare and recovery is generally complete in 1-2 days. Arthritis has been identified as an infrequent but significant sequel of this infection.

Y. enterocolitica is commonly present in foods but with the exception of pork, most isolates do not cause disease. Like Listeria this organism is also one that can grow at refrigeration temperatures. It is sensitive to heat (5%) and acidity (pH 4.6), and will normally be inactivated by environmental conditions that will killSalmonellae.

Campylobacter jejuni

C. jejuni was first isolated from human diarrhea stools in 1971. Since then it has continually gained recognition as a disease causing organism in humans.

C. jejuni enteritis is primarily transferred from animal origin foods to humans in developed countries. However, fecal contamination of food and water and contact with sick people or animals, predominates in developing countries.

Although milk has been most frequently identified throughout the world to be a vehicle for Campylobacter, one anticipates that future investigations will identify poultry and its products and meats (beef, pork, and lamb) as major reservoirs and vehicles.

C. jejuni dies off rapidly at ambient temperature and atmosphere, and grows poorly in food.

The principles of animal science will play a significant role in the control of this ubiquitous organism. Hygienic slaughter and processing procedures will preclude cross-contamination while adequate cooling and aeration will cause a decrease in the microbial load. In addition, thorough cooking of meat and poultry products followed by proper storage should assist in maintaining food integrity and less contamination.

Enteropathogenic Escherichia coli

Enteropathoginec E. coli is a significant cause of diarrhea in developing countries and localities of poor sanitation. In the U.S. it has been associated with “travelers’ diarrhea.” However the latest outbreak in North America occurred in a nursing home in Ontario. This was a severe outbreak of E. coli0157:H7 associated hemorrhagic colitis.

There are at least four subgroups of enteropathogenic E. coli: enterotoxigenic, enterinvasive, hemorrhagic, and enteropathogenic. Each strain has different characteristics.

The major source of the bacteria in the environment is probably the feces of infected humans, but there may also be animal reservoirs. Feces and untreated water are the most likely sources for contamination of food.

Control of enteropathogenic E. coli and other food-borne pathogens such as Salmonella and Staphylococcus aureus can be achieved. Precautions should include adequate cooking and avoidance of recontamination of cooked meat by contaminated equipment, water or infected food handlers. Food service establishments should monitor adequacy of cooking, holding times, and temperatures as well as the personal hygiene of food handlers.

Prevention

The first step in preventing food poisoning is to assume that all foods may cause food-borne illness. Follow these steps to prevent food poisoning:

Wash hands, food preparation surfaces and utensils thoroughly before and after handling raw foods to prevent recontamination of cooked foods.

Keep refrigerated foods below 40 degrees F.

Serve hot foods immediately or keep them heated above 140 degrees F.

Divide large volumes of food into small portions for rapid cooling in the refrigerator. Hot, bulky foods in the refrigerator can raise the temperature of foods already cooled.

Remember the danger zone is between 40 degrees F and 140 degrees F.

Follow approved home-canning procedures. These can be obtained from the Extension Service or from USDA bulletins.

Heat canned foods thoroughly before tasting.

When in doubt, throw it out

Infants, older persons, women who are pregnant and anyone with a compromised immune system are especially susceptible to food-borne illness. These people should never consume raw fish, raw seafood, or raw meat type products.

You are the key to preventing food-borne illness. By observing the simple rules of good handling, food poisoning can be eliminated.

| Bacterial Reference Table | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| Bacteria Responsible | Description | Habitat | Types of Foods | Symptoms | Cause | Temperture Sensitivity |
| Staphylococcus aureus | Produces a heat-stable toxin | Nose and throat of 30 to 50 percent of healthy population; also skin and superficial wounds. | Meat and seafood salads, sandwich spreads and high salt foods. | Nausea, vomiting and diarrhea within 4 to 6 hours. No fever. | Poor personal hygiene and subsequent temperature abuse. | No growth below 40° F. Bacteria are destroyed by normal cooking but toxin is heat-stable. |
| Salmonella | Produces an intestinal infection | Intestinal tracts of animals and man | High protein foods – meat, poultry, fish and eggs. | Diarrhea nausea, chills, vomiting and fever within 12 to 24 hours. | Contamination of ready-to-eat foods, insufficient cooking and recontamination of cooked foods. | No growth below 40° F. Bacteria are destroyed by normal cooking. |
| Clostridium perfringens | Produces a spore and prefers low oxygen atmosphere. Live cells must be ingested. | Dust, soil and gastrointestinal tracts of animals and man. | Meat and poultry dishes, sauces and gravies. | Cramps and diarrhea within 12 to 24 hours. No vomiting or fever. | Improper temperature control of hot foods, and recontamination. | No growth below 40 degrees F. Bacteria are killed by normal cooking but a heat-stable spore can survive. |
| Clostridium botulinum | Produces a spore and requires a low oxygen atmosphere. Produces a heat-sensitive toxin. | Soils, plants, marine sediments and fish. | Home-canned foods. | Blurred vision, respiratory distress and possible DEATH. | Improper methods of home-processing foods. | Type E and Type B can grow at 38° F. Bacteria destroyed by cooking and the toxin is destroyed by boiling for 5 to 10 minutes. Heat-resistant spore can survive. |
| Vibrio parahaemolyticus | Requires salt for growth. | Fish and shellfish | Raw and cooked seafood. | Diarrhea, cramps, vomiting, headache and fever within 12 to 24 hours. | Recontamination of cooked foods or eating raw seafood. | No growth below 40° F. Bacteria killed by normal cooking. |
| Bacillus cereus | Produces a spore and grows in normal oxygen atmosphere. | Soil, dust and spices. | Starchy food. | Mild case of diarrhea and some nausea within 12 to 24 hours. | Improper holding and storage temperatures after cooking. | No growth below 40° F. Bacteria killed by normal cooking, but heat-resistant spore can survive. |
| Listeria monocytogenes | Survives adverse conditions for long time periods. | Soil, vegetation and water. Can survive for long periods in soil and plant materials. | Milk, soft cheeses, vegetables fertilized with manure. | Mimics meningitis. Immuno-compromised individuals most susceptible. | Contaminated raw products. | Grows at refrigeration (38-40° F) temperatures. May survive minimum pasturization tempertures (161° F for 15 seconds.) |
| Campylobacter jejuni | Oxygen sensitive, does not grow below 86° F. | Animal reservoirs and foods of animal origin. | Meat, poulty, milk, and mushrooms. | Diarrhea, abdomianl cramps and nausea. | Improper pasteuriztion or cooking. Cross-contamination. | Sensitive to drying or freezing. Survives in milk and water at 39° F for several weeks. |
| Versinia enterocolitica | Not frequent cause of human infection. | Poultry, beef, swine. Isolated only in human pathogen. | Milk, tofu, and pork. | Diarrhea, abdominal pain, vomiting. Mimics appendicitis. | Improper cooking. Cross-contamination. | Grows at refrigeration temperatures (35-40° F) Sensitive to heat (122° F) |
| Enteropathogenic E. coli | Can produce toxins that are heat stable and others that are heat-sensitive. | Feces of infected humans. | Meat and cheeses. | Diarrhea, abdominal cramps, no fever. | Inadequate cooking. Recontamination of cooked product. | Organisms can be controlled by heating. Can grow at refrigeration temperatures. |

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Publication Revised November 2008

Hygiene and Environmental Health Module: 9. Foodborne Diseases and the Investigation of Disease Outbreaks

Study Session 9  Foodborne Diseases and the Investigation of Disease Outbreaks

Introduction

Foodborne diseases are a major public health problem. They result from eating foods that contain substances which are either infectious or toxic in nature. In the previous session you have learned about microbial and chemical food contamination. In this session you will learn more about the foodborne diseases that are important for public health, their type and classification, their characteristics and their common symptoms. You will also learn how outbreaks of foodborne diseases should be investigated.

Learning Outcomes for Study Session 9

When you have studied this session, you should be able to:

9.1  Define and use correctly all of the key words printed in bold. (SAQ 9.1)

9.2   Describe the main types and classification of foodborne diseases. (SAQs 9.1 and 9.2)

9.3  Describe and give examples of the most common bacterial, viral and parasitic foodborne diseases. (SAQ 9.3)

9.4  Describe how you can conduct investigations of foodborne disease outbreaks. (SAQ 9.4)

9.1  Overview of foodborne diseases

Since as far back as the time when the documentation of human history began, consumption of contaminated food and foodborne diseases have been a major global health problem. Contamination can be with microorganisms, chemicals and physical objects in food (as you learned in Study Session 8), which can lead to a variety of foodborne diseases or ill effects such as poisoning.

Foodborne diseases are still a major public health concern all over the world today. They are responsible for many cases of adult illnesses and some deaths, but more importantly, contaminated food is a source of the acute diarrhoeal diseases that claim the lives of enormous numbers of children every day. Worldwide, about 2 million children under the age of five years die from diarrhoeal diseases every year.

In developing countries like Ethiopia, the problem reaches great proportions for many reasons. Most basic among these are poverty and a lack of public health awareness. The problem of foodborne disease is more serious among rural communities where there tends to be a lower level of awareness about the causes and prevention of foodborne infection.

Well-documented information is lacking regarding the extent of foodborne diseases in Ethiopia because many cases are not properly diagnosed or not reported, and many people who are sick with foodborne diseases do not visit health facilities. This makes it difficult to collect statistical data or even make an estimation of the level of the problem – except that it is certainly huge.

9.2  Transmission of foodborne diseases

In the two previous study sessions you have learned about microorganisms and food contamination. The single method of transmission of foodborne diseases to human beings is through ingestion (eating) of food in the following categories:

Raw or undercooked meat and meat products

raw milk (that is, milk that has not been pasteurised or sterilised)

food items contaminated with human faeces (directly or indirectly)

raw vegetables contaminated with soil

food contaminated by chemicals, e.g. pesticides such as malathion

food prepared using contaminated water, e.g. for washing vegetables

food kept in an unsuitable condition for a long time after preparation

poisonous plants.

Why is it unwise to eat food that has been kept for a long time after it was prepared?

It may have been kept in conditions that created a favourable environment for the growth and multiplication of microorganisms in the food, especially if it was exposed to flies, cockroaches, etc., or kept at a warm temperature.

9.3  Classification of foodborne diseases

Foodborne diseases are usually classified on the basis of whatever causes them. Accordingly they are divided into two broad categories: food poisoning and food infections. Each of these categories is further subdivided on the basis of different types of causative agent (see Figure 9.1). We will discuss each of them in turn.

[](http://www.open.edu/openlearnworks/mod/oucontent/view.php?id=195&amp;printable=1&extra=thumbnail_idp2808448)

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Figure 9.1  Classification of foodborne diseases.

9.3.1  Food poisoning

Food poisoning can be from chemical or biological sources. If we eat food that contains harmful chemicals, or biological toxins (poisons) from plants, animals or microorganisms, that food can make us sick. Some common sources of food poisoning are caused by contaminants already in the food when the raw materials are harvested, for example:

Bacterial toxins produced by bacteria such as Clostridium botulinum and Clostridium perfringens, which are commonly found in the natural environment, e.g. in soil.

Chemical toxins, e.g. insecticides sprayed onto growing crops.

Heavy metals, e.g. lead and mercury, particularly in fish caught near chemical processing facilities.

Certain toxic plant tissues, e.g. poisonous mushrooms.

Toxic animal tissues, e.g. the poison glands of certain fish, crabs, etc.

Chemical food poisoning can also occur if foodstuffs have been in contact with toxic chemicals during food production, processing, storage and handling.

The symptoms of food poisoning can range from mild headache to severe flu-like symptoms. The most common signs and symptoms are nausea, stomach cramps, diarrhoea, fever, chills and vomiting. A person with food poisoning may have any combination of these symptoms depending on the cause or the agent involved. The illness may begin from 1 to 72 hours after eating the food.

9.3.2  Food infection

The diagnosis, treatment and prevention of all these diseases are covered in more detail in the Module on Communicable Diseases.

Food infection occurs as a result of ingestion of pathogenic microorganisms with food. The ingested microorganisms multiply in the gut and can cause diseases like diarrhoea, typhoid fever and cholera; intestinal parasites can cause diseases such as amoebiasis and taeniasis (tapeworm disease); andzoonotic foodborne diseases (i.e. those that are transmitted to humans from other animals), e.g. anthrax and bovine tuberculosis.

There are many different kinds of foodborne diseases and they may require different treatments, depending on the symptoms they cause. Illnesses that cause acute watery diarrhoea or persistent vomiting lead to dehydration if the person loses more body fluids and salts (electrolytes) than they are able to replace. It is therefore important to rehydrate the person, ideally with oral rehydration salts (ORS), or if this is not available, a simple mixture of clean water with some sugar and salt is advised.

Electrolytes are salts in the body that conduct electricity; they are found in all cells, blood and other body fluids, and are essential for normal functioning.

9.3.3  A catalogue of foodborne diseases

Tables 9.1 and 9.2 in Appendix 9.1 (at the end of this study session) summarise the types of organism which cause food infections and food poisoning (respectively). The tables also show the types of food items that are the main risk factors for the associated foodborne diseases. You are not expected to memorise the details of these tables; use them as references that you can consult for information when you need it.

Look at Table 9.1. What do anthrax and tapeworm infection have in common?

Raw meat consumption from sick and dying animals (like ox, cow, sheep, goat, camel) is responsible for transmitting anthrax, and raw beef and pork are the source of tapeworm infection.

Which foodborne infections in Table 9.1 are commonly associated with consumption of contaminated milk and dairy products?

Brucellosis, typhoid fever, non-typhoid salmonellosis, bovine tuberculosis, E.coli infection and listeriosis.

9.4  Selected examples of common foodborne diseases in Ethiopia

In Tables 9.1 and 9.2 we summarised the most widespread foodborne diseases and the different causative agents and types of foods involved. Now you will learn about a few of the most common foodborne diseases in Ethiopia, together with some advice that you can use to inform people in your community on how to avoid these diseases.

9.4.1  Bacterial infections

Many common diarrhoeal diseases are caused by bacterial infections transmitted by ingestion of contaminated food and water. Prevention of these diseases should be focused on good personal hygiene by all food handlers, including the consumer of the food. Some bacterial diseases such as anthrax, bovine tuberculosis and brucellosis are particularly related to foods of animal origin; these are described in detail in Study Session 12.

9.4.2  Viral infections

Several different viruses may be transmitted by contaminated food via the faeco-oral route. Foodborne viral infections usually have an incubation period of between one and three days. They cause illnesses which are self-limited in people who are otherwise healthy (i.e. they recover naturally) but occasionally severe illness and even deaths may also occur.

In the group of viral infections causing viral gastroenteritis (VGE), rotavirus is a common cause of vomiting and watery diarrhoea. Dehydration is the likely consequence unless appropriate rehydration therapy is used. Caliciviruses such as norovirus (also known as Norwalk virus) also cause diarrhoea.

Viral hepatitis caused by Hepatitis A and E viruses is almost exclusively transmitted by the faeco-oral route. Hepatitis A is distinguished from other viral causes by its prolonged (two to six weeks) incubation period and its ability to spread beyond the stomach and intestines into the liver. It often induces jaundice, or yellowing of the skin, and can occasionally lead to chronic liver dysfunction.

9.4.3  Tapeworms

Tapeworms are one of the most common causes of foodborne parasitic diseases in Ethiopia.

Beef tapeworm

You will learn more about beef tapeworm in Study Session 12.

Taenia saginata (the beef tapeworm) is the most common cause of tapeworm disease in Ethiopia. Immature forms of the tapeworm develop in the muscles of animals that have eaten tapeworm eggs while grazing on infected grass. People are infected when they eat raw or undercooked beef (Figure 9.2). The adult tapeworms develop in the person’s small intestine and segments of the worms containing eggs are deposited in the environment when the person defecates. This is how the cycle is continued.



Figure 9.2  Eating raw beef can be dangerous because it might be infected with beef tapeworm. (Photo: Zegeye Hailemariam)

Dog tapeworm

Hydatid disease, caused by dog tapeworm, is transmitted when a person ingests the eggs of Echinococcus granulosus in food contaminated with dog faeces. This disease may cause symptoms in women that resemble ‘false pregnancy’, because its effect is to enlarge the liver and cause the abdomen to swell so the woman may appear to be pregnant. The infection may also lodge in the lung or the brain. The prevention of disease caused by dog tapeworm is through personal hygiene when handling food and thorough washing of raw foods, especially if they have come into contact with soil.

Fish tapeworm

Fish tapeworm (Diphyllobothrium latum) infects people through the consumption of raw fish and is more common in the lake areas of Ethiopia where the diet is highly dependent on fish. The symptoms of infection with the fish tapeworm are similar to those of other tapeworm infections, i.e. abdominal discomfort or pain, nausea, vomiting or diarrhoea, and loss of appetite and weight loss. People should be advised only to eat fish that has been properly cooked.

9.4.4  Bacterial food poisoning

In this section, we describe two of the most common sources of food poisoning in Ethiopia, and the advice you can give to people in your community on how to avoid being poisoned by these bacterial sources of contamination.

Staphylococcal food poisoning

Staphylococcal food poisoning is caused by one of the many species of staphylococcal bacteria and is the most common and major type of food poisoning you are likely to encounter. This type of food poisoning can result from the preparation of food more than half a day in advance of needs, storage at ambient temperature, inadequate cooling or inadequate reheating. It begins with symptoms such as nausea, vomiting, stomach cramping and diarrhoea. These can persist for days and lead to dehydration, loss of electrolytes and even death if not treated promptly. Control measures are promoting and monitoring the personal hygiene of food handlers, safe and hygienic conditions in food preparation areas, and keeping cooked or processed foods covered and in cool conditions until consumed.

Botulism

Foodborne botulism is a form of food poisoning caused by Clostridium botulinum. It occurs in poorly canned foods, including home-canned foods, and honey. It is advisable not to eat food from deformed or bulging cans and not to give honey to young children.

*Appendix 1*

**The reference problem "Food poisoning as a hygienic problem"**

**Task**

After the gala dinner in the cafeteria 30 people sick. Patients associated with the use of its state aspic and boiled meat made ​​from beef. The incubation period ranged from 4 to 6 hours. Acute onset, with sharp pains in the stomach and intestine. All the victims were recorded symptoms such as nausea, vomiting, repeated stool, general weakness. Critical states were not. All the victims recovered.

1. Select the previous diagnosed.
2. What materials should be sent for laboratory testing to establish the final diagnosis?

**Etalon conclusion.**

Previous diagnosis - food poisoning. Diagnosis is established on the basis of simultaneity, mass and a clear expression of early disease, its relationship with eating. Based on the duration of the incubation period of 4-6 hours, clinical presentation (acute onset, sharp pain in the stomach, vomiting) nature of the food (jelly, boiled meat) assumption that in this case we find food poisoning of microbial nature.

To confirm the diagnosis and determine the causative agent must conduct a study of blood and faeces of patients (for statement of serological tests), the remnants of food (jelly, boiled meat).

Date Signature Name

**Topic 4. Labor hygiene of medical workers in medical-prophylactic institutions.**

**1.** **Purpose:** Master the knowledge on the hygienic conditions and harmful factors influencing the efficacy of patients’ treatment and medical workers’ health.

Become familiar with the legislative and organizational measures of the provision of the optimal regime, hygienic conditions for patients of the in-patient departments and the medical workers’ labour protection.

Master the general scheme and methods of subjective (sanitary inspection) and objective sanitary control of the conditions of patients’ stay and the conditions of medical personnel labour at the hospital.

* + 1. **2.1.You should know:**
    2. 2.1.1. Basic hygienic requirements concerning the planning, equipment, regime, exploitation of the treatment, diagnostic, accessory and consumer subdivision of the in-patient departments.
    3. 2.1.2. Hygienic standards of microclimate, air, ventilation, natural and artificial lighting of different subdivisions of the medical institution, their importance in the patients’ treatment efficacy and the conditions of medical personnel labour.
    4. 2.1.3. Harmful and dangerous factors of different subdivisions of the medical institution (diagnostic, physiotherapeutic, balneal etc.), their influence on the patients’ and medical personnel health.

**2.2. You should have the following skills:**

* + 1. 2.2.1. To carry out the sanitary inspection and determine the objective figures of the hygienic condition of the medical institution different subdivisions.
    2. 2.2.2. To determine and assess harmful and dangerous factors of different subdivisions of the medical institution and their influence on the patients’ and medical personnel health.

1. **Self-training questions**
   1. Hygienic significance of the planning, equipment, optimal regime of exploitation of the patient care institutions as conditions for the increase of patients’ treatment efficacy, prophylaxis of nosocomial infections and creation of safe medical personnel labour conditions.

3.2. Hygienic requirements concerning the planning, sanitary appliance of the different type admission department and patients’ discharge.

3.3. Hygienic requirements concerning the planning, sanitary appliance, optimal regime of exploitation of the therapeutic, surgical departments, the operating block and the intensive care units.

3.4. Hygienic peculiarities of planning, sanitary appliance, optimal regime of exploitation of the infectious, children’s, phthisiatric and other specialized departments.

3.5. Hygienic requirements concerning the planning, sanitary appliance, optimal regime of exploitation of the ward sections and the wards of different departments of patient care institutions.

3.6. Hygienic requirements concerning the planning, sanitary facilities, optimal regime of exploitation of the X-ray, radiological, physiotherapeutic departments of the treatment institutions.

3.7. Patients’ nutrition organization at in-patient departments and the hygienic control of its full value and safety.

3.8. Sanitary and hygienic requirements concerning collection, removal and sterilization of solid, liquid and specific wastes.

3.9. Occupational hazards, hygiene and labour protection of different medical departments (surgical, therapeutic, infectious diseases, psychoneurological and others) medical personnel.

3.10. Occupational hazards, hygiene and labour protection of the medical personnel of diagnostic, physiotherapeutic, balneal and other specific departments, intensive care units and medical institution laboratories.

3.11. Legislative and organizational measures concerning the medical workers’ labour protection.

3.12. Personal patients’ and medical workers’ hygiene within the system of health and labour protection, prophylaxis of nosocomial infection and occupational diseases.

1. **Self-training assignments**
   1. State the hygienic value of the ward for 5 beds for patients with thyrotoxicosis; the area is 30 m2, the height – 3 m. The microclimate of the ward is characterized by the air temperature – 17°C, the radiation temperature of the walls – 15°C, the relative humidity is 70 %, the air movement speed is 0.1 m/c. The vertical variation of the temperature is ±20C, the horizontal variation of the air temperature – ±2.50C, the daily temperature variation – 5°C. The CO2 concentration in the ward during the inspection is 0.2 %.

Calculate the actual and required air volume and the ventilation rate. State the hygienic value of the ward sanitary regime and give recommendations concerning its improvement.

* 1. The operating room for two operating tables has the area of 30 m2,the height of 3 m, one window sized 2,5×2 m facing towards the north-east, the outlet and inlet ventilation with the ventilation rate in both directions 1.5 times per hour. State whether this operating room complies with the hygienic standards and the conditions of the operating team’s labour.
  2. State whether the X-ray room of a district hospital complies with the hygienic standards and the conditions of the medical personnel’ labour. The procedure room area is 30 m2, the panel room area is 4 m2, the photolaboratory – 4 m2, the doctor’s room – 6 m2, the reception – 10 m2. The procedure room is equipped with the natural outlet and inlet ventilation, having the ventilation ducts near the floor and near the ceiling (the height is 3 m).To protect the X-ray doctor they use lead-impregnated glass with a 10 mm thickness and a small lead-impregnated rubber of 0.4 mm thickness.

1. **Structure and content of the lesson**

This is a seminar lesson but the students have to carry out their independent tasks concerning the sanitary inspection of the hospital department during their off-hour training. At the beginning of the lesson students have their self-training exercises checked. Students’ questioning and teacher’s explanations prepare the students for the lesson. Then all the theoretical questions related to item 3 and recommended literature, the legal documents which regulate the planning, equipment, hospital or its separate departments exploitation regime – the building norms and rules (BNandR), sanitary norms and rules (SNandR), the legislation on the medical workers’ labour protection are thoroughly discussed.

After this the students independently study the basic legal documents or abstracts from them prepared by the chair, write the notes down in the protocol. At the end of the lesson the teacher gives the tasks for their self-training during their off-hour study. This task deals with the sanitary inspection of the conditions of the patients’ stay in the in-patient department, where the student must supervise one of patients (in one of the clinical departments), and the conditions of medical personnel labour.

The results of the inspection are filled in “Act of sanitary inspection” according to the questions list “Scheme of sanitary and hygienic inspection of hospital” (Appendix 3) and “Questionnaire of the patients and medical personnel on the sanitary regime and the conditions of labour in the hospital and in the inspected department”.

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Occupational health medical staff in health care facilities. Rational safety of medical staff

The concept of health worker includes managers and medical facilities, and nurses, and laboratory technicians, and support staff. This work requires mental and physical exertion in extreme conditions. Of great importance are the hygienic standards and work and rest. Among the hazards in health care workers is isolated: a combination of unfavorable microclimate conditions, the possibility of trauma due to equipment and transport, contact with pathogens during epidemics, the work in an uncomfortable position, the complexity of contact with sick, night duty, the polling operation, emergency operations, psycho-emotional overload.

Classification of factors: mechanical, physical, chemical, biological, psychogenic.

Mechanical: forced position of the body, organs voltage (surgeons, anesthetists, physiotherapists, masseurs). When prolonged standing during surgery there is muscle tension, stagnation of blood in the lower extremities, which contributes to the development of varicose veins, the violation of ventilation.

Chemicals: products of the chemical and pharmaceutical industry (drugs and disinfectants, medicines, solvents, acids and bases).

Biological: pathogenic microorganisms, viruses, antibiotics, vaccines, sera.

Physical: X-rays, ultrasound, UV light, ionizing radiation (neutrons and gamma-rays), laser radiation, currents and fields UHF, VHF, high blood pressure, aerosols (smoke, soot, liquids, sprays), noise and vibration devices, change microclimatic conditions (temperature, humidity, air velocity, the concentration of carbon dioxide). Physical factors are often found in combination with each other. Psychogenic factors: contact with sick nervous and mental diseases, psychogenic effects associated with poor treatment outcome. Control of workers' health - periodic inspections (cardiologists, internists, ophthalmologists). The main prevention areas: optimization of work and rest (especially the staff of health facilities of hospitals, surgical nurses), creating optimal microclimate conditions, prevention of air pollution, radiation safety. When the occupational disease risk in health worker should provide a degree shift. The incidence of health workers is the highest in comparison with the textile and garment industry, which is also dominated by women. Most of the diseases associated with gynecology, hypertension, diseases of the musculoskeletal system, pancreas, liver and gall bladder. In-patient health care workers work combined with walking on the site, which is especially dangerous during epidemics of influenza. Health workers are often busy counseling and educational and teaching activities, certain difficulties associated with the issuance of sick leave conflict patients and their relatives. When used in medicine the method of hyperbaric oxygenation (HBO) traced a combination of several hazards. This method is used in surgery for the treatment of patients with chronic hypoxia, gas gangrene, carbon monoxide poisoning when and cyanide. During the change of pressure from health workers observed dysbarism - appear ear and tooth pain and sinusitis. Women have dysmenorrhea, menorrhagia and algomenoreya (violent and bloody period).

Laser radiation is widely used in medicine. The laser - a quantum of electromagnetic generator of optical range. High directivity, small divergence, high power laser beam made it indispensable in many areas of medicine (neurosurgery, cardiac surgery, oncology, dentistry, dermatology, gynecology, ophthalmology, laser biostimulation of tissue processes). Use of laser in medicine due to harmful radiation affecting the cornea and the lens (keratitis and cataracts) for the vitreous body and the retina (scotoma), skin (burns, metabolic disorders of the skin, skin cancer, when it is UV-range) for internal organs under the influence of shock waves (there are changes in the brain stem structures, vegetative-vascular dysfunction, sweating, bradycardia and blood pressure instability, excitability of the central nervous system).

 Measures of protection from the laser beam: 1. Eye protection 2. Protection of skin and mucous membranes; 3. Pollution Prevention space product of interaction of laser beam with the tissue; 4. Warning of contact harmful impurities with the skin, mucous membranes, respiratory tract, gastrointestinal tract; 5. compliance with safety measures.

Collective protection: the right layout of the operating laser, the rational distribution of equipment, light-absorbing color of the walls, floor, ceiling, lack of shiny objects, shading windows, ventilation and removal of products of laser interaction with biological tissues, fencing systems and shields, lasers ground.

Individual protection: goggles, gown made of thick cotton cloth, light-absorbing material gloves, tight-fitting mask of 3-4 layers of cheesecloth.

Radiation safety of medical staff. In medicine it is widely used ionizing radiation and radioactive substances: 1. the purpose of diagnostics (X-ray, fluoroscopy, computed tomography), 2. for the purpose of treatment, 3. with research objectives.

Radiation safety of medical staff

Radioactivity - spontaneous transformation of the nuclei of one element into another, accompanied by the emission of ionizing radiation.

Ionizing radiation - any radiation except for visible and UV radiation. Ionizing radiation is divided into electromagnetic (wave: X-ray and gamma) and corpuscular (neutrons, protons, alpha and β). The threshold dose leads to a shift of integral indicators of the body (health, changes in morphological and functional constants - acute and chronic radiation sickness, radiation tissue damage, radiation cataract). No threshold effects are associated with mutations in the chromosomes (genetic disorders, leukemias and tumors teratogenic effects on the fetus). The most sensitive to ionizing radiation cells that rapidly multiply. Critical organs (receiving the most damage): Group 1 - gonads, red bone marrow and whole body, Group 2: all the internal organs, endocrine glands, nervous and muscular tissue, Group 3: skin, bone, forearm, ankle and foot. As the dose limits used effective dose for Group 1 authorities: 20 mSv / year (for the staff), 1 mSv / year (for the population). For 2 and 3 groups of bodies using equivalent dose 150 mSv and 500 mSv (for staff) and 15 mSv and 50 mSv (for the population). All sources of ionizing radiation can be in the open (vapors, gases, liquids containing radionuclides) and closed (in the package or in the aggregate state: radioactive beads for intra-abdominal radiotherapy, needle of cobalt machines for radiotherapy and diagnostic radiology) form. Objects OS shall be subjected to radiometric research and health assessment on the basis of admissible volumetric activity (DOA) or permissible specific activities (ROVs). For protection against radiation in the clear: the organizational and planning measures, sealing, use nonsorbent materials for finishing equipment, compliance with "radiation aseptic" (prohibition of storage in the office place of food, applying cosmetics, smoking ban, proper decontamination of the contaminated PPE.). When working with closed radiation protection used amount (reduction to the minimum allowable irradiation source activity), the time (manipulation bringing automatism), the distance (distance increase 2-fold decrease in dose 4 times, 3 times - 9) and screens. When working with γ radiation screens use of materials having a large atomic weight (Pb and U), with β-radiation - Al and plexiglas. When working with the neutron source using multi-screens (1 layer- hydrogen-containing material, 2- cadmium, boron, 3-lead).

Appendix 1

**Hygienic characteristics of occupational hazards for different medical personnel**

The occupational exercise load and hazards of the surgical specialties doctors include:

* the number of surgical interventions – up to 150 per year in general surgery, 170 – in otorhinolaryngology, 370 – in obstetrics and gynecology. The number and complexity of the operations increase with the raising the level of the surgeon’s skill;
* the forced body position with the trunk frontal bending and the prolonged static tension of muscles of the shoulder girdle, back and stretched forward arms;
* the hot microclimate of the operating room with high streams of the radioactive heat from the artificial lighting sources (shadowless lamp);
* the ionizing radiation during the X-ray examinations, especially in traumatology, vascular surgery, neurosurgery;
* the toxic effect of the narcosis agents (nitrous oxide, halothane, chloroform, diethyl ether) and anesthetics;
* high mental and nervous-emotional exertion, connected with the complexity and duration of the surgical intervention, possible post-operative complications and responsibility for patient’s life.

Among the diseases afflicting the surgical specialties doctors with temporary disability the most widespread are the diseases of nervous system, cardio-vascular system, digestive system and acute respiratory diseases.

Among chronic diseases of these specialists such diseases, as the diseases of cardio-vascular system, neurasthenias, connected with high psycho-emotional and physical load should be mentioned. They are: angina pectoris, hypertension, vegeto-vascular dystonia and neurasthenia.

There are frequent diseases due to the prolonged standing at the surgical table: radiculitis, osteochondrosis, dyskinesia, varix dilatation of the lower extremities.

Surgeons’ disabilty or necessity to change their occupation in 60 – 80 % cases can be explained by chronic intoxication with narcotic agents and anesthetics, in 11 – 20 % cases - by the infectious diseases, 9 – 10 % cases - by physical and nervous overexertion.

Hygienic peculiarities of labour conditions and health status of the therapeutic doctors depend on the patient service forms. In case of polyclinic, district service, the leading role belongs to the excess physical load, which depends on the year season (amount of calls), the size of the doctor’s district and the type of the buildings (detached houses or many-storeyed buildings, elevator’s presence or absence). These specialists may also suffer from psycho-emotional exertion and different physical factors’ unfavourable effect – X-ray, UHF, ultrasound, laser and other diagnostic and physiotherapeutic measures, chemical harmful substances – the pharmacological preparations, from which nurses suffer more frequently.

Occupational diseases of therapeutic doctors, first of all of the phthisiatricians, infectiologists, specialists in skin and venereal diseases, helminthologists, the laboratory assistants at the bacteriological, virological, helminthological laboratories include the corresponding infections; phthisiatricians, X-ray doctors, radiologists suffer from dermatitis, eczemas, toxicodermia, melanomas, leucosis, skin cancer, radiation sickness; psychiatrists – psychoneurosis and others.

One of the main occupational hazards for dental doctors is their forced standing with the bending and turning trunk position which leads to the prolonged static tension of the corresponding muscles groups; noise and vibration due to drilling machine, sight exertion, blinding effect of the photopolymer lamp, penetration of mercury fumes from the mercury amalgam into the respiratory organs, fumes of the polymer materials solvents, danger of infection from the patient with the upper respiratory tract diseases during the incubation or convalescence stage, while performing the manipulations connected with the patient’s mucosal membrane or blood contact.

Abovementioned hazards can result in bearing disorder (34 – 45%), varix dilatation of the lower extremities (19 – 49%), signs of the vibration diseases (paresthesia, loss of hands’ temperature sensibility and perceptibility, Dupuytren's contracture).

The visual analyzer exertion can lead to the accommodation spasm, so-called false myopia, and sore eye.

AIDS, prion disease, hepatitis B and C can be transmitted through saliva, gum tissue and open wound.

**Measures for improvement of the medical personnel labour conditions**

One of the main conditions of the medical personnel labour protection and successful patient treatment is planning of architectural solution of the medical institutions, the base of this solution are the building norms and rules (BN&R-II 69–78 “Patient care institutions”). These norms consist of the list of all necessary premises depending on the hospital specialization, departments, their interposition, the area measures, cubic capacity, and special requirements to the location, area, protective properties of walls and floor and ceiling in the X-ray, radiological, and physiotherapeutic departments’ walls and overlap. Special norms and requirements to the buildings of the infectious, tuberculosis etc. departments and hospitals exist.

Sanitary norms and rules (SN&R) and the State Standard № 12.1.005 – 76 “The air of working zone. General sanitary and hygienic requirements” imply the creation of the optimal microclimate conditions in separate functional premises of hospitals, natural and artificial lightning, sanitary appliance etc. The modern operation rooms also are assumed to have the local ventilation (aspirators) in the zone of the anesthesiologist’s working place, the systemic laboratory control of the anesthetics concentration in the air. The most effective prophylactic measure against the anesthetics’ toxic effect for the operating brigade members is the transition to the intravenous narcosis and spinal anesthesia.

Personal protective equipment of body, eyes and respiratory organs are widely used.

To be protected from the ionizing and non-ionizing electromagnetic radiation, methods based on physical laws of radiation decay, which are stated in the legislative and organization direction are used. They include the protection by means of the radiation sources capacity limitation, distance, time, and shielding.

Thus, the legislation implies limit doses of the ionizing radiation, maximum allowable concentrations of radionuclides in the air of working zone (Norms of radiation safety of Ukraine (NRSU)-97), their maximal allowable activities at the working place and other.

In order to keep health of medical personnel with harmful labour conditions, the legislation establishes the half day:

* 4-hour-day – for medical workers directly connected with the bare radionuclides;
* 5-hour-day – for personnel connected with sealed sources of the ionizing radiation (gamma-, X-ray), also for morbid anatomists, prosectors, forensic medical experts, anatomists;
* 5.5-hour-day – for doctors of the tuberculosis, psycho-neurological centers, physiotherapeutists, dentists;
* 6-hour-day – at the infectious, tuberculosis, psychiatric, narcological, balneal, radon, laboratory departments.

The leading position in the system of medical personnel health care is occupied by preventive and periodical medical examinations, regulated by the Order of the former USSR Ministry of Public Health (MPH) № 555 from 29.09.1989 and by the Order of Ministry of Public Health of Ukraine № 45 from 31.03.1994. According to these orders, such preventive and periodical medical check-ups are obligatory for the medical personnel with harmful labour conditions as well.

Issues of the medical personnel labour protection are also implied by the “Law on labour protection of Ukraine” (1992), the list of regulations and standards of the Labour Code (LC).

Appendix 2

**Scheme of sanitary and hygienic inspection of the hospital**

1. Name of the hospital, its address, the service district.
2. When was it built? What project was it built according to?
3. General number of beds in the hospital, hospital structure.
4. Location of the hospital in the settlement plan, the hygienic characteristics of the territory, the presence of the noise and air pollution sources. (Draw schematically the situation plan).
5. Hygienic assessment of the hospital site, type of the site development, the list of buildings. (Add the schematic general layout of the site).
6. Order of patient admission. The planning and work regime of the general purpose admission department. Peculiarities of the patient admission to the children’s, obstetric and infectious departments. Rules of the patient discharge.
7. Hygienic assessment of the therapeutic department ward section. Use the inspection and questioning method; carry out the objective studies: measure the wards temperature, air relative humidity, carbon dioxide concentration, lighting coefficient, daylight factor, noise level, actual and required air volume, and the ventilation rate (if the devices are available). If the devices are not available, determine only those indices which can be measured and calculated: lightning coefficient, angle of incidence, angle of aperture, artificial illumination by “Watt” method, area, cubic capacity of the wards and others. Add the schematic sketch drawing of the section and one or two wards plans.
8. Hygienic characteristics of the surgical department and the operating block, the intensive care unit, obstetric, infectious, children’s departments (they are distributed among the students by teacher; after that the students share the results of their inspection).
9. Hygienic assessment of the organization and quality of the patient nutrition.
10. Sanitary state and the regime of the wards and other hospital premises cleaning. Methods and measures of the nosocomial infection prevention.
11. Personal patient hygiene.
12. Sanitary state and the regime of the hospital territory cleaning. Removal and elimination of the garbage, the obstetric and surgical departments’ wastes.
13. Assessment of the in-patient department hygienic conditions by the patients themselves (see Appendix 2).
14. Sanitary facilities of the hospital:

* water supply (central, local, type of the source); the presence of the hot water supply;
* heating (type, the location of the heating devices, their sufficiency);
* ventilation: natural (exhaust ducts, window leaves, transoms), artificial (what prevails – inflow, exhaust chamber, their substantiation);
* sewerage system (central, local, the methods of moving away and destruction of the sewage).

1. Occupational hazards, hygiene and labour protection of medical personnel of different departments and specializations.
2. General conclusions concerning the positive and negative aspects of the sanitary and hygienic regime in the hospital, substantiated recommendations on their improvement.
3. Appendices: the graphic materials (situation, general layouts, plan of the ward section, wards), the patient questionnaire forms.

**Topic 5. Hygienic principles of rational organization of physical education and employment training for children and teenagers. Scientific basis of professional consultation.**

**1. Purpose**: Master theoretic knowledge on hygienic basics of rational organization of physical and labour training, occupational orientation of schoolchildren in modern conditions.

1.2. Become familiar with methods of hygienic assessment of organization of physical and labour training for children and adolescents.

1.3. Master methods of medical and occupational consultations, occupational selection and prognosis of the level of pupils’ occupational activity success.

**2.1. You should know:**

2.1.1. Hygienic basics of rational organization of physical and labour training of children and adolescents.

2.1.2. Hygienic requirements to organization of physical and labour training in modern general educational establishments.

2.1.3. Main stages and hygienic principles of occupational orientation, medical and occupational consultations and occupational selection of pupils.

**2.2. You should have the following skills:**

2.2.1. To carry out the hygienic assessment of organization of physical and labour training for children and adolescents.

2.2.2. To carry out the occupational selection and prognosis of pupils’ occupational activity success.

**3.** **Self-training question**

3.1. Hygienic principles of rational organization of physical training for children and adolescents. Types, means and forms of the physical training in modern educational establishments.

3.2. Definition of locomotor activity. Scientific backgrounds and methods of quantitative measurement and hygienic assessment of the locomotor activity. Hypokinesia prevention.

3.3. Physiological and hygienic backgrounds of assessment of the physical training lesson. Hygienic requirements to places for the physical training.

3.4. Medical control of organization of physical training lessons and hygienic aspects of medical provision of the physical training for children and adolescents.

3.5. Physiological and hygienic basics of tempering of the child and adolescent organism. Main types, principles and methods of organization of tempering.

3.6. Hygienic principles of the rational organization of the handcraft and polytechnical training of children and adolescents.

3.7. Physiological and hygienic basics of control on handcraft training of schoolchildren..

3.8. Hygienic requirements to content, regime, organization and conduct of the handcraft training in different types of modern educational establishments.

3.9. Occupational orientation as a hygienic problem. Psychological and physiological aspects of occupational self-determination. Professiongramm.

3.10. Modern system of occupational orientaton, its functions and leading components.

3.11. Scientific backgrounds of the medical and professional consultation carrying out. Definition of occupational selection. Methods of prediction of the professional success.

**4. Self-training assignments**

4.1. The physical training lesson includes 10 minutes of introductory part, 10 minutes of preparatory part, 15 minutes of main part and 10 minutes of final part. Total density of this lesson is 60%, locomotor density – 45%, level of such physical indices as heart and respiratory rate etc. increases by 15% comparing to initial level after the introductory part of the physical training lesson, by 40% after period of motion skills formation of the main part, by 60% after outdoor games, by 5% after the final part of the lesson. Give the hygienic assessment to this physical training lesson.

4.2. A 15 year old pupil has 167 cm body length and 59 kg body weight. His locomotor activity per day is 20 000 steps, daily energy consumption – 10 500 kJ, dynamic component of daily time is 120 minutes, heart rate in calm conditions – 72 beats per minute, after step-test (PWC170) – 90 beats per minute. Substantiate the hygienic conclusion on the locomotor activity and physical working capacity of this pupil.

4.3. Development of main occupationally important psychological and physiological functions of the 16 years old adolescent were examined. The following data were revealed: value of latent period of simple visual and motor reaction is 250 msec., number of disruptures of differentiated reaction during examination of the nervous processes mobility equals to 3, errors while studying the nervous processes steadiness based on assessment of reaction on mobile object – 15 msec., speed of the attention switching – 125 sec., errors during the kinesthesia research – 15 degrees, intergal index of the coordination of movements – 2.50 st. un.. Draw up the prediction concerning the occupational training success of this pupil if he has practical skills of the PC user and, if necessary, substantiate recommendations to correct the functional state of this schoolboy’s organism.

**5.Structure of the lesson**

This is 2 hours long lesson which is carried out in general schoolhouse or in laboratory of the department. Students get familiar with methods of hygienic assessment of organization of the children and adolescents physical training and handcraft, carry out of medical and professional consultations, occupational selection and prediction of the occupational training success of pupils.

Self-training work includes carrying out of hygieninc assessment of lessons of physical training and handcraft, locomotor activity and physical working capacity of schoolchildren. Exept mentioned above, the students get acquainted with methods of determination of the level of the occupational eligibility of pupils, determine the success level of their occupational training based on the data of the situational task.

Results of the work are written down into the protocol.

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# Actuality of theme

Hygiene is a science which studies of regularities of various environmental factors influence on population and individual health with the aim of substantiation of hygienic standarts, sanitary roles and preventive measures intended for assurance of optimal conditions of vital activity, health improved and prevention of diseases. A prophylactic work on a domestic, territorial or shopfloor area rank important place no less than medical and diagnostic work in activity of doctor of medical type. Prophylactic activity of doctor is based on methodological and methodical principles of hygienic diagnostics, which foresees the correct estimation of levels of environmental factors exposure on the individual or investigated population, diagnostics of the state of population health, in particular, health of supersensible sub-groups and individuals, establishing an objective cause-effect relations between the influence of environmental factors and possible changes of health. The various (demographic, statistical, epidemiological, clinical, experimental) methods are used for carrying out of hygienic diagnostics. The most modern method among above mentioned is risk assessment of unfavorable influence of environmental factors on health – identification of probability of undesirable effect development in certain levels and duration of harmful factor influence.

The wide use of chemical compounds in the vital functions of man causes intensive contamination of environment and origin of diseases of chemical etiology. Scientific ground and practical application of hygienical norms – maximum allowable concentrations (MAC) prevents the harmful action on the organism of chemical pollutants. The hygienical standardization of xenobiotic in the different objects of environment is characterized certain features which are conditioned a necessity to take into account all of possible negative consequences of its influence on an environment and human organism.

Learning aims

To know the methodological and methodical principles of hygiene, the role of environmental factors in etiology of different diseases, the theoretical bases and the general scheme of influence of complex of environmental factors on a population health, the main definitions and the content of stages of risk assessment methodology, methodical approaches to risk assessment of harmful influence of environmental factors on population health; basic principles and methods of scientific ground of hygienical norms of harmful chemical matters, basic parameters of toxicometry, chart of toxicological experiment, features of hygienical standardization of xenobiotic in the different objects of environment

Able to make the program of epidemiological research from an exposure and estimation of correlation between environmental factors and population health, to carrying out the integral estimation of the state of environment and health; to identify a risk factor, its harmful consequences for health, to calculate the relative and population risk for population; to estimate the basic parameters of toxicometry of chemical matters, to define critical indicator of harmfulness and to interpret the results of experimental researches, to ground of MAC of chemical matters in the different objects of environment, to estimate the type of the combined action of xenobiotics, to expect and estimate the actual intake and actual dose of toxic matters, in particular pesticides and nitrates.

Base knowledge, abilities and skills

Hygiene as a science, its purpose, tasks, object of study, connections with other sciences; sanitation, sanitary legislation of Ukraine; the classification of methods of hygienic research; the specific methods of hygiene [general hygiene]; the general philosophic laws and categories, their value for hygiene [philosophy, general hygiene]; the definition of “health”, “individual health”, “population health”, the basic criteria and statistical health indices, their dynamics and tendency in Ukraine and in the world, information sources about health; methods of reliable estimate of results of medical and statistical researches [social medicine]; an epidemiological method of research, its types [general hygiene, epidemiology]; methods of hygienic estimation of unfavorable effect of environmental factors on human health [general hygiene].

Basic principles of the hygienical standardization of xenobiotics, independent and complex standardization, stages of hygienical estimation of chemical matters, chart of toxicological experiment (acute, subacute and chronic experiments), basic parameters of toxicometry (accumulation, threshold doses and concentrations, remote effects), indexes of the functional state of organism and its separate systems at the action of xenobiotics, methods of their determination; classification of harmful matters on the degree of toxicness and accumulation; a concept about a hygienical norm, MAC; combined, complex, and joint action of environmental factors; a role of the hygienical standardization of xenobiotics in different environments [general hygiene].

Content of theme

Theoretical bases of hygiene, contribution of national scientists in their scientific substantiation. The general philosophic and subject methodology of hygiene. The significance of hygiene for forming of professional thought and practical activity of doctors of medical type.

Role of environmental factors as an etiologic (causal) factors and risk factors of development of different diseases. The determined and stochastic (possibilistic) effects in human organism under influence of environmental factors. Hygienic diagnostics. Ecological-dependent diseases, methods of their prognostication and prophylaxis. The methodology of high-quality (conceptual) and quantitative integral estimation of the state of environment and health. Population health as an integral criterion for environment estimation. Prognostication of changes of population health by means of the estimation of state contamination of atmospheric air, water, soil. The methods of establishment of correlations between the state of environment and health. General scheme of epidemiological research of identification and estimation of correlation between environmental factors and health.

Risk assessment methodology. Problem characteristics and main definitions. Main stages of risk assessment methodology: identification of harmful factors, exposure assessment, determine “dose-response” relationships for carcinogens and non-carcinogens, risk characterization, risk management. Direct and indirect methods of exposure assessment, biomarkers of exposure, effect and susceptibility. Problems of application of risk assessment methodology in Ukraine.

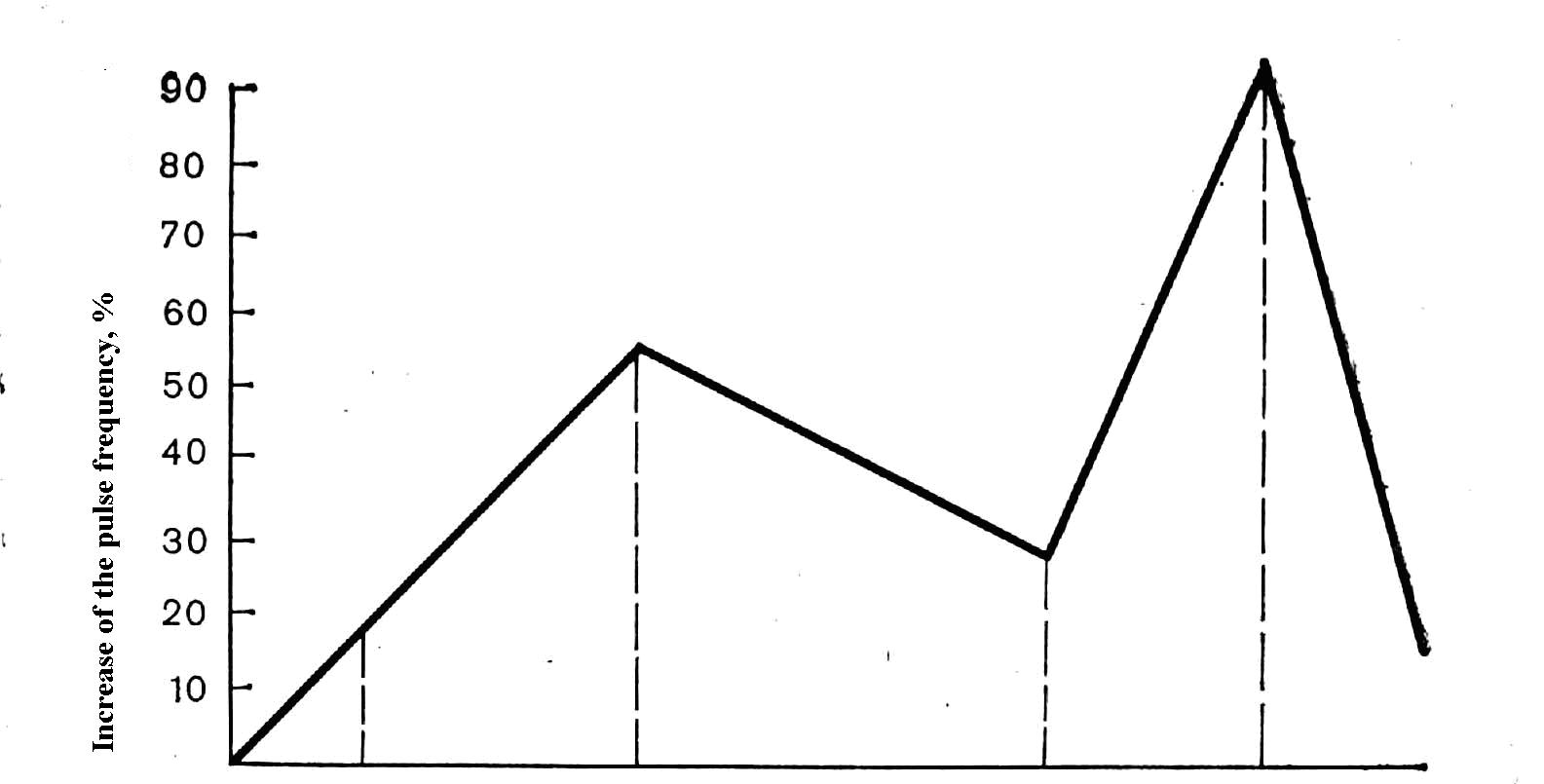
Object and tasks of prophylactic toxicology. Concept about toxicokinetics, toxicodynamics, toxicometry. Toxicness and accumulation of xenobiotics. Modern idea about accumulation, methods of its estimation. Classification of industrial pollutants and pesticides after the degree of toxicness and danger. A concept about the maximum allowable concentrations (MAC) of exogenous chemical matters, acceptable daily intake (ADI) and acceptable daily dose (ADD) in food rations, features of the independent hygienical standardization. Critical indicator of harmfulness of pollutants in different environments. Complex standardization of pesticides. Types of the combined action of matters. Legislatively normative documents in industry of the hygienical regulation.

**Hygienic assessment of the physical training and handcraft lessons**

*Hygienic assessment of the physical training lesson* includes carrying out of time-keeping observations (introductory, preparatory, main and final parts), examination of total and motor density of the lesson, external signs of fatigue development, drawing up of physiological curves of physical loading, usage of functional tests, research of the locomotor activity level and physical efficiency degree, control of the air and temperature environment inside schoolhouse and assessment of correct medical support of the lesson. During *time-keeping observations* the following parameters must be taken into account: introductory part (3–4 minutes) includes organization of the collective and pupils’ preparation to the lesson, preparatory part (12–15 minutes) serves for general physical training, main part (20–25 minutes), which is the topic of the lesson, consists of 2 periods: period of the motor skills formation and a sport game, final part (3–5 minutes) must help returning the organism to initial state.

*Total density of the physical training* is defined as correlation between effective time which includes time taken for doing different movements, demonstration and explanation of exercises by teacher, forming and reforming of ranks, tidying up of the sport equipment etc. and the duration of the lesson. According to the hygienic requirements this value must be not less than 80%. *Motor density of the physical training lesson* is defined as a correlation between time, taken for doing of different movements and the duration of the lesson. According to the hygienic requirements, this value must be not less than 60%.

*Physiological curve of physical load* is a graphic representation of reactions of main indices of the organism functional state (heart and respiratory rates, blood pressure etc.), resulted from the physical load (fig. 42.1). If the physical training lesson is organized correctly, this physiological curve must be bimodal and paraboloid. Level of physical indices should increase, as a rule, by 15-20% after introductory part of the lesson, by 50-60% – after the period of the motor skills formation of main part, by 70-90% – after a sport game, by 5-10% – after final part of the lesson. This indicates, that training is effective, and above indices must return to initial level in 2-3 minutes after the end of the lesson.



Structure of the lesson

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | 2 | 3 | | 4 |
| а | b |

Fig.1. Structure of the lesson and physiological curve of physical load during the physical training lesson

(1 – introductory part; 2 – preparatory part; 3 – main part; 4 –final part; а – period of the main motor skills formation; b – period of sport game)

Main *external indices of the fatigue development* include following: changing of complexion, especially intensive red colour of the face, disturbances of breathing characteristics, especially dyspnea appearance, worsening of the health state, decreasing of the coordination of attention, appearance of sweating and difficulties during coordinated movements etc..

The most widespread applied *functional tests* nowadays are the following: orthostatic test (conversion of the child from laying position to standing position with examination of reactions of cardiovascular and respiratory systems), Martine-Kushelevskiy test (doing 20 squats during 15 seconds), modified Letunov test (10 squeezes from the floor during 10 seconds), running on the spot at maximum pace during 10 seconds and running on the spot during 1minute (for girls) and 1.5 minutes (for boys) at 180 steps per minute, step-test (PWC170) etc..

Examination of *the physical readiness* includes assessment of speed (results of 30 (60, 100) meters running), muscle (data of squeezes from the floor, rising the body from laying position, tightenings on horizontal bar) and speed and muscle (results of broad jump from the spot) efficiency, and also level of the physical tolerance (data of 2000 (3000) meters running).

*Medical support of the physical training lesson* means than certain group of physical training is determined for each children based on the data of deep medical examination.

There are three groups of physical training of children and adolescents in school. *Main group of physical training* consists of children and adolescents without any deviations in the health state or have slight deviations, and sufficient physical condition. Among pupils of the main group the physical training is carried out in accordance to syllabuses on the subject completely, and control standards are checked with differentiated mark.

*Preparatory group of physical training* consists of children and adolescnts who have deviations on the health state and insufficient physical condition, and children-reconvalescents. The physical training among pupils of the preparatory group is carried out in accordance to syllabuses on the subject, obligatory following principles of sequence and succession.

Data concerning approximate terms of recovery for physical training after acute diseases are represented in table 1.

Table 1

**Terms of recovery for physical training after acute diseases**

|  |  |
| --- | --- |
| *Disease* | *Term of recovery for physical training after disease* |
| Acute respiratory and viral infections | 1 – 3 weeks |
| Sore throat | 2 – 4 weeks |
| Acute otitis | 2 – 4 weeks |
| Acute bronchitis | 1 – 3 weeks |
| Pneumonia | 1 – 2 weeks |
| Pleuritis | 1 – 2 weeks |
| Influenza | 2 – 4 weeks |
| Acute infectious diseases | 1 – 2 weeks |
| Acute nephritis | 2 weeks |
| Viral hepatitis | 8 – 12 weeks в |
| Appendicitis (after operation) | 1 – 2 weeks |
| Fractures of extremete bones | 1 – 3 weeks |
| Concussion of the brain | 3 – 12 months and more |

*Special group of physical training* includes children and adolescents with significant temporary or permanent deviations of the health state. The physical training with them is carried out according to the special differentiated syllabuses or programs of therapeutic physical training.

*Sanitary and hygienic assessment of the handcraft lesson* of pupils includes time-keeping observations, control of content (characteristics of main handcraft operations, peculiarities of the material choose and provision of profile polytechnical training, compliance to standards concerning duration and volume of handcraft, lifting and dislocation of loads), regime (place of the lesson in schedule and its structure, peculiarities of the study materials representation, usage of visual methods of training and form of active rest) and conditions of training (examination of sanitary and hygienic conditions of training and correspondence of workshop equipment to the pupils’ height, following safety instructions), revealing signs of the fatigue development among pupils during training and research of functional state of children and adolescents during handcraft activity.

**Complex hygienic assessment of locomotor activity of children and adolescents**

Criteria of complex hygienic *assessment of locomotor activity of children and adolescents* are the following: number of locomotions, value of energy expenditure and duration of dynamic component, both in daily cycle and during certain period of time, for example, during studying and off-hour periods.

*Number of locomotions* (in steps) is determined using pedometer PM-6 “Zoria” (ШМ–6 “Зоря”), Astra Zeneca or other construction which is fixed to clothes of the examined person in vertical position near the center of his body gravity.

*Value of energy expenditure* (in kJ or kcal) is calculated using time-keeping and table method, taking into account that energy expenditure of the organism consists of basal metabolic rate, energy expenditure for growth, development and deposition of tissue substances (15% from value of the basal metabolic rate), energy expenditure, caused by the thermal effect of food (10% from value of the basal metabolic rate), energy expenditure on certain activities and locomotor activity etc..

To determine energy expenditure on locomotor activity, it is necessary to multiply the time spent on certain types of activities by energy expenditure of this type of activities and body weight of the examined person. Value of total energy expenditure is calculated according to the following formula:

Е = ;

where: Е − value of total energy expenditure;

ЕLA − value of energy expenditure caused by locomotor activity.

*Duration of motor dynamic component* (in minutes or %) is determined based on the time-keeping data, questionnaire or interview of pupils.

Presence of paraboloid dependence of physiological reaction of the organism on values of daily locomotor activity and *standardized scales* (fig. 42.2) must be taken into account for individual assessment of motor activity in certain periods of time.

Standard values of locomotor activity, represented in tables 2 and 3 are used for assessment of locomotor activity of 15-17 years old adolescents.

Method of medical and occupational consultation and occupational selection

###### *Main stages of occupational consultation and occupational selection*

*Main stages of occupational consultation and occupational selection* are following:

* study of the health state and adaptive resources of the organism;
* determination of main psychological and physiological functions for examined profession based on the analysis of literature data, time-keeping during occupational training and working process;
* carrying out the expert assessment of occupational significance of psychological and physiological functions, physical qualities involving highly qualified specialists, physiologists, hygienists, masters of professional training in this process;
* selection of adequate, informative, reliable and simple methods of research of occupationally significant functions;
* taking into account the motivation direction, individual and typological, nervous and psychological peculiarities of the organism and initial level of main functions development;
* correspondence of received results to requirements of professiogram and psychophysiogram of examined specialty;
* scientifically substantiated prediction of the occupational training success and further occupational activity.

#### *Methods of prediction of success of occupational activity*

The most widespread *methods of occupational selection and prediction of the success of professional training and future occupational activity* are the following:

* method of delimitation of physiological fluctuations of criteria functions, which means studying types of reflex phenomena and their further assessment;
* vector analysis of occupational perspective;
* method of assessment of development of main occupationally significant functions (in points) and prediction of success of the occupational training;
* prediction of professional aptitude resulted from fundamental basis of fuzzy logic, neural networks.

*Delimitation of physiological fluctuations of criteria functions and determination of the type of reflex phenomena* of the organism allow to define people with high, average or low level of the development of main occupationally significant functions, identify both individual character of their formation and general mechanism of development of physiological reactions caused by the age and sex peculiarities.

*Vector analysis of occupational perspective* is the most demonstrative method of occupational selection of pupils, and it allows to define peculiarities of individual development of criteria functions with further graphic image of profile of psychological and physiological development of the schoolchild’s organism.

*Determination of success of professional training based on the point assessment of level of the development of occupationally significant functions* means the research of development peculiarities of criteria characteristics of the organism functional state, proper point assessment of the development of the main functions and general definition of prediction of the occupational training success and further occupational activity.

**Topic 6.** **Hygienic aspects of the population living in areas with elevated levels of radioactive contamination as a result of the Chernobyl disaster.**

**1.** **Purpose:** Learn to develop measures to minimize public exposure to ionizing radiation on the basis of quantitative evaluation of possible radiation exposure. Learn to develop antiradiation activities using sources of ionizing radiation in the workplace by examining the possible radiation effects on the staff. To familiarize with the main physical factors that affect the residents of modern human settlements (cities, towns) and their impact on human health and the main areas of prevention of harmful actions.

**2.1.** **Know:**

2.1.1. Physical characteristics and sources of ionizing radiation.

2.1.2. Biological effects of ionizing radiation and the conditions upon which it depends.

2.1.3. Meaning of "absorbed dose", "absorbed dose in air," "equivalent dose", "equivalent dose".

2.1.4. Peculiarities of formation and prevention of adverse effects of radiation exposure of the population during radiological procedures.

2.1.5. Methods of application of radionuclides and other sources of ionizing radiation in hospitals with diagnostic and therapeutic purposes.

2.1.6. The essence of the radiation hazard when working with radionuclides and other sources of ionizing radiation

**2.2.** **To be able to:**

2.2.1. Perform instrumental measurement of power absorbed in the air dose of gamma-radiation dosimeter using RKSB-104.

2.2.2. Conduct assessment of hygienic power absorbed dose, absorbed dose in air, equivalent dose according to situational problems.

2.2.3. Measure and evaluate the parameters that characterize the radiation environment in production and related facilities, and individual doses of staff working with radionuclides and other sources of ionizing radiation.

2.2.4 Carry out sanitary inspection of radiological and radiological departments of hospital facilities.

**3.** **Question to self:**

3.1. The concept of radioactivity. Hygienic characteristics of the sources of environmental pollution by radioactive substances.

3.2. Basic characteristics and measurements of ionizing radiation.

3.3. Types of exposure (external and internal exposure) on the body condition on which they depend.

3.4. Characterization of biological effects of ionizing radiation. Classification of the clinical effects of their harmful effects on the human body (deterministic, stochastic) and the conditions of their occurrence.

3.5. Methods and means of protection against external irradiation, based on physical laws of his weakening (defense number, time, distance, shielding)

3.6. Principles of hygienic norms of radiation safety regulations NRBU-97 and OSPU - 2005.

3.7. Instrumental methods for determining the equivalent dose rate in assessing the radiation characteristics of building materials, housing environment, food and drinking water.

3.8. Ionizing radiation as an industrial harm to staff hospitals.

3.9. Structure of the radiological department of the hospital. Features of radiation hazards and radiation protection in each division (open, closed source, distance therapy).

3.10. Characteristics of radiation hazards in X-ray diagnostic rooms and conditions on which it depends. Requirements for planning X-ray.

3.11. Ways to reduce radiation load of staff and patients of medical institutions. Sanitary equipment X-ray and radiology departments.

3.12. Methods of collecting and disposing of radioactive waste when working with open sources of ionizing radiation.

3.13. Methods and means of sanitary and radiation control when working with sources of ionizing radiation in medical facilities. Maintenance of records.

**4.** **The structure and content of classes:**

Check the source of knowledge (test control: 15 tests - 15 minutes). Consideration of theoretical issues. Practical work on measuring the equivalent dose of gamma radiation in the training room by dosimeter RKSB-104. Solving the problem of assessing the situational power of effective doses for different population groups by NRBU-97. Appearance and signing protocols.

**5.** **Literature:**

5.1. Hygiene and Environment. Handbook / Edited by VG Bardova. - Vinnitsa: New Book, 2006. - p.496-499, 499-507.

Effects of the Chernobyl disaster

The 1986 [Chernobyl disaster](https://en.wikipedia.org/wiki/Chernobyl_disaster) triggered the release of substantial amounts of [radioactivity](https://en.wikipedia.org/wiki/Radioactive_contamination) into the atmosphere in the form of both particulate and gaseous [radioisotopes](https://en.wikipedia.org/wiki/Radionuclide). It is one of the most significant unintentional releases of [radioactivity](https://en.wikipedia.org/wiki/Radioactivity) into the [environment](https://en.wikipedia.org/wiki/Natural_environment) to present.

The work of the [Scientific Committee on Problems of the Environment](https://en.wikipedia.org/wiki/Scientific_Committee_on_Problems_of_the_Environment) (SCOPE), suggests that the Chernobyl incident cannot be directly compared to atmospheric tests of nuclear weapons through a single number, with one being simply x times larger than the other. This is partly due to the fact that the isotopes released at Chernobyl tended to be longer-lived than those released by the detonation of atomic bombs, thus producing radioactivity curves that vary in shape as well as size

Radiation effects to humans

According to a 2009 [United Nations Scientific Committee on the Effects of Atomic Radiation](https://en.wikipedia.org/wiki/United_Nations_Scientific_Committee_on_the_Effects_of_Atomic_Radiation) (UNSCEAR), the Chernobyl accident had by 2005 caused 61,200 man-[Sv](https://en.wikipedia.org/wiki/Sievert) of radiation exposure to recovery workers and evacuees, 125,000 man-Sv to the populace of the [Ukraine](https://en.wikipedia.org/wiki/Ukraine), [Belarus](https://en.wikipedia.org/wiki/Belarus), and [Russia](https://en.wikipedia.org/wiki/Russia), and a dose to most of the more distant European countries amounting to 115,000 man-Sv. The same report estimated a further 25% more exposure would be received from residual radiosotopes after 2005.[[1]](https://en.wikipedia.org/wiki/Effects_of_the_Chernobyl_disaster#cite_note-UNSCEAR_2008_D-1) The total global [collective dose](https://en.wikipedia.org/wiki/Collective_dose) from Chernobyl was earlier estimated by UNSCEAR in 1988 to be "600,000 man Sv, equivalent on average to 21 additional days of world exposure to natural [background radiation](https://en.wikipedia.org/wiki/Background_radiation)."

Dose to the general public within 30 km of the plant

The inhalation dose (internal dose) for the public during the time between the accident and their evacuation from the area in what is now the 30 km evacuation zone around the plant has been estimated (based on ground deposition of [caesium-137](https://en.wikipedia.org/wiki/Caesium-137)) to be between 3 and 150 [mSv](https://en.wikipedia.org/wiki/Millisievert).

Thyroid doses for adults around the Chernobyl area were estimated to be between 20 and 1000 mSv, while for one-year-old infants, these estimates were higher, at 20 to 6000 mSv. For those who left at an early stage after the accident, the internal dose due to inhalation was 8 to 13 times higher than the external dose due to gamma /beta emitters. For those who remained until later (day 10 or later), the inhalation dose was 50 to 70% higher than the dose due to external exposure. The majority of the dose was due to iodine-131 (about 40%) and [tellurium](https://en.wikipedia.org/wiki/Tellurium) and [rubidium](https://en.wikipedia.org/wiki/Rubidium) isotopes (about 20 to 30% for Rb and Te).

The ingestion doses in this same group of people have also been estimated using the cesium activity per unit of area, isotope ratios, average day of evacuation, intake rate of milk and green vegetables, and what is known about the transfer of radioactivity via plants and animals to humans. For adults the dose has been estimated to be between 3 and 180 mSv, while for one-year-old infants, a dose of between 20 and 1300 mSv has been estimated. Again, the majority of the dose was thought to be mostly due to iodine-131, and the external dose was much smaller than the internal dose due to the radioactivity in the diet.

Short-term health effects and immediate results

The explosion at the power station and subsequent fires inside the remains of the reactor resulted in the development and dispersal of a radioactive cloud which drifted not only over [Russia](https://en.wikipedia.org/wiki/Russia), [Belarus](https://en.wikipedia.org/wiki/Belarus), and [Ukraine](https://en.wikipedia.org/wiki/Ukraine), but also over most of [Europe](https://en.wikipedia.org/wiki/Europe)[[5]](https://en.wikipedia.org/wiki/Effects_of_the_Chernobyl_disaster#cite_note-RFI_24-5) and as far as [Canada](https://en.wikipedia.org/wiki/Canada). In fact, the initial evidence in other countries that a major release of radioactive material had occurred came not from Soviet sources, but from Sweden, where on 28 April workers at the [Forsmark Nuclear Power Plant](https://en.wikipedia.org/wiki/Forsmark_Nuclear_Power_Plant) (approximately 1100 km from the Chernobyl site) were found to have radioactive particles on their clothing.

It was Sweden's search for the source of radioactivity (after they had determined there was no leak at the Swedish plant) that led to the first hint of a serious nuclear problem in the Western Soviet Union. In [France](https://en.wikipedia.org/wiki/France), the government then claimed that the radioactive cloud had stopped at the Italian border. Therefore, while some kinds of food ([mushrooms](https://en.wikipedia.org/wiki/Mushroom)in particular) were prohibited in Italy because of radioactivity, the French authorities took no such measures, in an attempt to appease the population's fears ([see below](https://en.wikipedia.org/wiki/Chernobyl_disaster_effects#Food_restrictions)).

Contamination from the Chernobyl disaster was not evenly spread across the surrounding countryside, but scattered irregularly depending on weather conditions. Reports from Soviet and Western scientists indicate that [Belarus](https://en.wikipedia.org/wiki/Belarus) received about 60% of the contamination that fell on the former [Soviet Union](https://en.wikipedia.org/wiki/Soviet_Union). A large area in Russia south of [Bryansk](https://en.wikipedia.org/wiki/Bryansk) was also contaminated, as were parts of northwestern [Ukraine](https://en.wikipedia.org/wiki/Ukraine).

203 people were hospitalized immediately, of whom 31 died (28 of them died from acute radiation exposure). Most of these were fire and rescue workers trying to bring the disaster under control, who were not fully aware of how dangerous the [radiation](https://en.wikipedia.org/wiki/Radiation) exposure (from the smoke) was (for a discussion of the more important isotopes in fallout see[fission products](https://en.wikipedia.org/wiki/Fission_products)). 135,000 people were evacuated from the area, including 50,000 from the nearby town of [Pripyat, Ukraine](https://en.wikipedia.org/wiki/Pripyat,_Ukraine). Health officials have predicted that over the next 70 years there will be a 2% increase in cancer rates in much of the population which was exposed to the 5–12 E[Bq](https://en.wikipedia.org/wiki/Becquerel) (depending on source) of [radioactive contamination](https://en.wikipedia.org/wiki/Radioactive_contamination) released from the reactor.

[Soviet](https://en.wikipedia.org/wiki/Soviet_Union) scientists reported that the Chernobyl Unit 4 reactor contained about 180–190 metric tons of [uranium dioxide](https://en.wikipedia.org/wiki/Uranium_dioxide) fuel and fission products. Estimates of the amount of this material that escaped range from 5 to 30%. Because of the intense heat of the fire, and with no [containment building](https://en.wikipedia.org/wiki/Containment_building) to stop it, part of the ejected fuel was vaporized or particulized and lofted high into the atmosphere, where it spread.

Workers and liquidators

[](https://en.wikipedia.org/wiki/File:ChernobylBadge.jpg)

Soviet medal awarded to 600,000+ liquidators.

The workers involved in the recovery and cleanup after the disaster, called "[liquidators](https://en.wikipedia.org/wiki/Liquidator_(Chernobyl))", received high doses of radiation. In most cases, these workers were not equipped with individual [dosimeters](https://en.wikipedia.org/wiki/Dosimeter) to measure the amount of radiation received, so experts could only estimate their doses. Even where dosimeters were used, dosimetric procedures varied - some workers are thought to have been given more accurate estimated doses than others.[[citation needed](https://en.wikipedia.org/wiki/Wikipedia:Citation_needed)] According to Soviet estimates, between 300,000 and 600,000 people were involved in the cleanup of the [30 km evacuation zone](https://en.wikipedia.org/wiki/Zone_of_alienation) around the reactor, but many of them entered the zone two years after the disaster.

Estimates of the number of "liquidators" vary; the [World Health Organization](https://en.wikipedia.org/wiki/World_Health_Organization), for example, puts the figure at about 600,000; Russia lists as liquidators some people who did not work in contaminated areas.[[citation needed](https://en.wikipedia.org/wiki/Wikipedia:Citation_needed)] In the first year after the disaster, the number of cleanup workers in the zone was estimated to be 211,000. These workers received an estimated average dose of 165 [millisieverts](https://en.wikipedia.org/wiki/Sievert)(16.5 [REM](https://en.wikipedia.org/wiki/Roentgen_equivalent_man)).

A sevenfold increase in DNA mutations has been identified in children of liquidators conceived after the accident, when compared to their siblings that were conceived before. However, this effect has diminished sharply over time.

Evacuation

[](https://en.wikipedia.org/wiki/File:Chernobyl_radiation_map_1996.svg)

Map showing caesium-137 contamination in the Chernobyl area in 1996

[Soviet](https://en.wikipedia.org/wiki/Soviet_Union) authorities started evacuating people from the area around Chernobyl only on the second day after the disaster (after about 36 hours). By May 1986, about a month later, all those living within a 30 km (19 mi) radius of the plant (about 116,000 people) had been relocated. This area is often referred to as the [zone of alienation](https://en.wikipedia.org/wiki/Zone_of_alienation). However, significant radiation affected the environment over a much wider scale than this 30 km radius encloses.

According to reports from Soviet scientists, 28,000 square kilometers (km 2, or 10,800 square miles, mi2) were contaminated by [caesium-137](https://en.wikipedia.org/wiki/Caesium-137) to levels greater than 185 kBq per square meter. Roughly 830,000 people lived in this area. About 10,500 km 2 (4,000 mi2) were contaminated by caesium-137 to levels greater than 555 kBq/m2. Of this total, roughly 7,000 km2 (2,700 mi2) lie in Belarus, 2,000 km2 (800 mi2) in the Russian Federation and 1,500 km2 (580 mi2) in Ukraine. About 250,000 people lived in this area. These reported data were corroborated by the International Chernobyl Project.

Civilians

Some children in the contaminated areas were exposed to high radiation doses of up to 50 [gray](https://en.wikipedia.org/wiki/Gray_(unit)) (Gy), mostly due to an intake of radioactive [iodine-131](https://en.wikipedia.org/wiki/Iodine-131) (a relatively short-lived [isotope](https://en.wikipedia.org/wiki/Isotope) with a [half-life](https://en.wikipedia.org/wiki/Half-life) of 8 days) from contaminated milk produced locally. Several studies have found that the incidence of [thyroid cancer](https://en.wikipedia.org/wiki/Thyroid_cancer) among children in [Belarus](https://en.wikipedia.org/wiki/Belarus), [Ukraine](https://en.wikipedia.org/wiki/Ukraine), and [Russia](https://en.wikipedia.org/wiki/Russia) has risen sharply since the Chernobyl disaster. The International Atomic Energy Agency ([IAEA](https://en.wikipedia.org/wiki/IAEA)) notes "1800 documented cases of thyroid cancer in children who were between 0 and 14 years of age when the disaster occurred, which is far higher than normal", although this source fails to note the expected rate. The childhood thyroid cancers that have appeared are of a large and aggressive type but, if detected early, can be treated. Treatment entails surgery followed by [iodine-131](https://en.wikipedia.org/wiki/Iodine-131)therapy for any [metastases](https://en.wikipedia.org/wiki/Metastases). To date, such treatment appears to have been successful in the vast majority of cases.

Late in 1995, the [World Health Organization](https://en.wikipedia.org/wiki/World_Health_Organization) (WHO) linked nearly 700 cases of [thyroid cancer](https://en.wikipedia.org/wiki/Thyroid_cancer) among children and adolescents to the [Chernobyl disaster](https://en.wikipedia.org/wiki/Chernobyl_disaster), and among these, some 10 deaths are attributed to [radiation](https://en.wikipedia.org/wiki/Radiation). However, the rapid increase in thyroid cancers detected suggests some of this increase may be an artifact of the screening process. Typical [latency time](https://en.wikipedia.org/wiki/Latency_time) of radiation-induced thyroid cancer is about 10 years, but the increase in childhood thyroid cancers in some regions was observed as early as 1987.

Plant and animal health

[](https://en.wikipedia.org/wiki/File:Kiev-UkrainianNationalChernobylMuseum_15.jpg)

An exhibit of a [piglet](https://en.wikipedia.org/wiki/Piglet_(animal)) with [dipygus](https://en.wikipedia.org/wiki/Dipygus) at the [Ukrainian National Chernobyl Museum](https://en.wikipedia.org/wiki/Ukrainian_National_Chernobyl_Museum). It is possible that birth defects are higher in this area.

A large swath of pine forest killed by acute radiation was named the [Red Forest](https://en.wikipedia.org/wiki/Red_Forest). The dead pines were bulldozed and buried. Livestock were removed during the human evacuations. Elsewhere in Europe, levels of radioactivity were examined in various natural foodstocks. In both Sweden and Finland, fish in deep freshwater lakes were banned for resale and landowners were advised not to consume certain types. Information regarding physical deformities in the plant and animal populations in the areas affected by radioactive fallout require sampling and capture, along with DNA testing, of individuals to determine if abnormalities are the result of natural mutation, radiation poisoning, or exposure to other contaminants in the environment (i.e. pesticides, industrial waste, or agricultural run-off).

Animals living in contaminated areas in and around Chernobyl have suffered from a variety of side effects caused by radiation. Oxidative stress and low levels of antioxidants have had severe consequences on the development of the nervous system, including reduced brain size and impaired cognitive abilities. It has been found that birds living in areas with high levels of radiation have statistically significantly smaller brains, which has shown to be a deficit to viability in the wild. Barn swallows (Hirundo rustica) that live in or around Chernobyl have displayed an increased rate of physical abnormalities compared to swallows from uncontaminated areas. Abnormalities included partially albinistic plumage, deformed toes, tumors, deformed tail feathers, deformed beaks, and deformed air sacks. Birds with these abnormalities have a reduced viability in the wild and a decrease in fitness. These effects are likely due to radiation exposure and elevated teratogenic effects of radioactive isotopes in the environment.

Invertebrate populations (including bumblebees, butterflies, grasshoppers, dragonflies, and spiders) has significantly decreased. Currently, most radioactivity around Chernobyl is located in the top layer of soil, where many invertebrates live or lay their eggs. The reduced abundance of invertebrates can have negative implications for the entire ecosystem surrounding Chernobyl.

Radionuclides migrate through either soil diffusion or transportation within the soil solution. The effects of ionizing radiation on plants and trees in particular depends on numerous factors, including climatic conditions, the mechanism of radiation deposition, and the soil type. In turn, radiated vegetation affects organisms further up the food chain. In general, the upper-level trophic organisms received less contamination, due to their ability to be more mobile and feed from multiple areas.

The amount of radioactive nuclides found to have been deposited into surrounding lakes has increased the normal baseline radioactive amounts by 100 percent. Most of the radionuclides in surrounding water areas were found in the sediments at the bottom of the lakes. There has been a high incidence of chromosomal changes in plant and animal aquatic organisms, and this generally has correlated with the contamination and resulting genetic instability. Most of the lakes and rivers surrounding the Chernobyl exclusion zone are still highly contaminated with radionuclides (and will be for many years to come) as the natural decontamination processes of nucleotides with longer half-lives can take many years.

One of the main mechanisms by which radionuclides were passed to humans was through the ingestion of milk from contaminated cows. Most of the rough grazing that the cows took part in contained plant species such as coarse grasses, sedges, rushes, and plants such as heather (also known as calluna vulgaris). These plant species grow in soils that are high in organic matter, low in pH, and are often very well hydrated, thus making the storage and intake of these radionuclides much more feasible and efficient.[[22]](https://en.wikipedia.org/wiki/Effects_of_the_Chernobyl_disaster#cite_note-Voors_125.E2.80.93140-22) In the early stages following the Chernobyl accident, high levels of radionuclides were found in the milk and were a direct result of contaminated feeding. Within two months of banning most of the milk that was being produced in the affected areas, officials had phased out the majority of the contaminated feed that was available to the cows and much of the contamination was isolated. In humans, ingestion of milk containing abnormally high levels of iodine radionuclides was the precursor for thyroid disease, especially in children and in the immunocompromised.

Some plants and animals have been able to adapt to the increased radiation levels present in and around Chernobyl. Arabidopsis, a plant native to Chernobyl, are able to resist high concentrations of ionizing radiation and resist forming mutations. This species of plant has been able to develop mechanisms to tolerate chronic radiation that would otherwise be harmful or lethal to other species. Recent studies suggest the 19-mile (30 km) "exclusion zone" surrounding the Chernobyl disaster has become a wildlife sanctuary. Animals have reclaimed the land including rare species such as lynx, Przewalski’s horses, wild boars and eagle owls whose populations are all thriving. When the disaster first occurred, many animals and plants died immediately; however, 25 years later, these animals and plants are reclaiming the abandoned cities to make it their habitat. Even the site of the explosion is flourishing with wildlife as birds nest in the wrecked nuclear plant, and plants and mushrooms live in and on the site.

Due to the [bioaccumulation](https://en.wikipedia.org/wiki/Bioaccumulation) of [caesium-137](https://en.wikipedia.org/wiki/Caesium-137), some mushrooms as well as wild animals which eat them, e.g. wild boars hunted in Germany and deer in Austria, may have levels which are not considered safe for human consumption. Mandatory radioactivity testing of sheep in parts of the UK that graze on lands with contaminated peat was lifted in 2012.

Suggested long-range effects

[Down syndrome](https://en.wikipedia.org/wiki/Down_syndrome) (trisomy 21). In [West Berlin](https://en.wikipedia.org/wiki/West_Berlin), [Germany](https://en.wikipedia.org/wiki/Germany), prevalence of Down syndrome (trisomy 21) peaked 9 months following the main fallout. Between 1980 and 1986, the birth prevalence of Down syndrome was quite stable (i.e., 1.35–1.59 per 1,000 live births ). In 1987, 46 cases were diagnosed (prevalence = 2.11 per 1,000 live births). Most of the excess resulted from a [cluster](https://en.wikipedia.org/wiki/Cluster_(epidemiology)) of 12 cases among children born in January 1987. The prevalence of Down syndrome in 1988 was 1.77, and in 1989, it reached pre-Chernobyl values. The authors noted that the isolated geographical position of West Berlin prior to reunification, the free [genetic counseling](https://en.wikipedia.org/wiki/Genetic_counseling), and complete coverage of the population through one central [cytogenetic](https://en.wikipedia.org/wiki/Cytogenetic) laboratory support completeness of case ascertainment; in addition, constant culture preparation and analysis protocols ensure a high quality of data.

Long-term health effects

Science and politics: the problem of epidemiological studies

[](https://en.wikipedia.org/wiki/File:Abandoned_village_near_Chernobyl.jpg)

An abandoned village near [Pripyat](https://en.wikipedia.org/wiki/Pripyat,_Ukraine), close to Chernobyl.

The issue of long-term effects of the Chernobyl disaster on civilians is very controversial. The number of people whose lives were affected by the disaster is enormous. Over 300,000 people were resettled because of the disaster; millions lived and continue to live in the contaminated area. On the other hand, most of those affected received relatively low doses of radiation; there is little evidence of increased mortality, cancers or birth defects among them; and when such evidence is present, existence of a causal link to radioactive contamination is uncertain.

An increased incidence of thyroid cancer among children in areas of Belarus, Ukraine and Russia affected by the Chernobyl disaster has been firmly established as a result of screening programs and, in the case of Belarus, an established [cancer registry](https://en.wikipedia.org/wiki/Cancer_Registry). The findings of most epidemiological studies must be considered interim, say experts, as analysis of the health effects of the disaster is an ongoing process.

Epidemiological studies have been hampered in the [Ukraine](https://en.wikipedia.org/wiki/Ukraine), [Russian Federation](https://en.wikipedia.org/wiki/Russian_Federation) and [Belarus](https://en.wikipedia.org/wiki/Belarus) by a lack of funds, an infrastructure with little or no experience in chronic disease [epidemiology](https://en.wikipedia.org/wiki/Epidemiology), poor communication facilities and an immediate public health problem with many dimensions. Emphasis has been placed on screening rather than on well-designed epidemiological studies. International efforts to organize epidemiological studies have been slowed by some of the same factors, especially the lack of a suitable scientific infrastructure.

Furthermore, the political nature of [nuclear energy](https://en.wikipedia.org/wiki/Nuclear_power) may have affected scientific studies. In Belarus, [Yury Bandazhevsky](https://en.wikipedia.org/wiki/Yury_Bandazhevsky), a scientist who questioned the official estimates of Chernobyl's consequences and the relevancy of the official maximum limit of 1,000 Bq/kg, was imprisoned from 2001 to 2005. Bandazhevsky and some human rights groups allege his imprisonment was a reprisal for his publication of reports critical of the official research being conducted into the Chernobyl incident.

The activities undertaken by Belarus and Ukraine in response to the disaster — remediation of the environment, evacuation and resettlement, development of uncontaminated food sources and food distribution channels, and public health measures — have overburdened the governments of those countries. International agencies and foreign governments have provided extensive logistic and humanitarian assistance. In addition, the work of the [European Commission](https://en.wikipedia.org/wiki/European_Commission) and World Health Organization in strengthening the epidemiological research infrastructure in Russia, Ukraine and Belarus is laying the basis for major advances in these countries' ability to carry out epidemiological studies of all kinds.

Caesium radioisotopes

Further information: [Fission products](https://en.wikipedia.org/wiki/Fission_products)

Immediately after the disaster, the main health concern involved radioactive iodine, with a [half-life](https://en.wikipedia.org/wiki/Half-life) of eight days. Today, there is concern about contamination of the soil with[strontium-90](https://en.wikipedia.org/wiki/Strontium-90) and [caesium-137](https://en.wikipedia.org/wiki/Caesium-137), which have half-lives of about 30 years. The highest levels of caesium-137 are found in the surface layers of the soil where they are absorbed by plants, insects and mushrooms, entering the local food supply. Some scientists fear that radioactivity will affect the local population for the next several generations. Note that caesium is not mobile in most soils because it binds to the clay minerals.

Tests (c. 1997) showed that caesium-137 levels in trees of the area were continuing to rise. It is unknown if this is still the case. There is some evidence that contamination is migrating into underground [aquifers](https://en.wikipedia.org/wiki/Aquifer) and closed bodies of water such as lakes and ponds (2001, Germenchuk). The main source of elimination is predicted to be natural decay of caesium-137 to stable [barium](https://en.wikipedia.org/wiki/Barium)-137, since runoff by rain and groundwater has been demonstrated to be negligible.

25 years after the incident

Twenty-five years after the incident, restriction orders had remained in place in the production, transportation and consumption of food contaminated by Chernobyl fallout. In the UK, only in 2012 the mandatory radioactivity testing of sheep in contaminated parts of the UK that graze on lands was lifted. They covered 369 farms on 750 km2 and 200,000 sheep. In parts of Sweden and Finland, restrictions are in place on stock animals, including reindeer, in natural and near-natural environments. "In certain regions of Germany, Austria, Italy, Sweden, Finland, Lithuania and Poland, wild game (including boar and deer), wild [mushrooms](https://en.wikipedia.org/wiki/Mushrooms), berries and carnivorous fish from lakes reach levels of several thousand Bq per kg of caesium-137", while "in Germany, caesium-137 levels in wild boar muscle reached 40,000 Bq/kg. The average level is 6,800 Bq/kg, more than ten times the EU limit of 600 Bq/kg", according to the TORCH 2006 report. The European Commission has stated that "The restrictions on certain foodstuffs from certain Member States must therefore continue to be maintained for many years to come".

As of 2009, sheep farmed in some areas of the UK are still subject to inspection which may lead to them being prohibited from entering the human [food chain](https://en.wikipedia.org/wiki/Food_chain) because of contamination arising from the accident:

Some of this radioactivity, predominantly [radiocaesium-137](https://en.wikipedia.org/wiki/Radiocaesium-137), was deposited on certain upland areas of the UK, where sheep-farming is the primary land-use. Due to the particular chemical and physical properties of the peaty soil types present in these upland areas, the radiocaesium is still able to pass easily from soil to grass and hence accumulate in sheep. A maximum limit of 1,000 [becquerels](https://en.wikipedia.org/wiki/Becquerel) per kilogramme (Bq/kg) of radiocaesium is applied to sheep meat affected by the accident to protect consumers. This limit was introduced in the UK in 1986, based on advice from the European Commission's Article 31 group of experts. Under power provided under the [Food and Environment Protection Act](https://en.wikipedia.org/w/index.php?title=Food_and_Environment_Protection_Act&action=edit&redlink=1) 1985 (FEPA), Emergency Orders have been used since 1986 to impose restrictions on the movement and sale of sheep exceeding the limit in certain parts of [Cumbria](https://en.wikipedia.org/wiki/Cumbria), [North Wales](https://en.wikipedia.org/wiki/North_Wales), Scotland and [Northern Ireland](https://en.wikipedia.org/wiki/Northern_Ireland)... When the Emergency Orders were introduced in 1986, the Restricted Areas were large, covering almost 9,000 farms, and over 4 million sheep. Since 1986, the areas covered by restrictions have dramatically decreased and now cover 369 farms, or part farms, and around 200,000 sheep. This represents a reduction of over 95% since 1986, with only limited areas of Cumbria, South Western Scotland and North Wales, covered by restrictions.

369 farms and 190,000 sheep are still affected, a reduction of 95% since 1986, when 9,700 farms and 4,225,000 sheep were under restriction across the United Kingdom. Restrictions were finally lifted in 2012.

In Norway, the [Sami people](https://en.wikipedia.org/wiki/Sami_people) were affected by contaminated food (the [reindeer](https://en.wikipedia.org/wiki/Reindeer) had been contaminated by eating [lichen](https://en.wikipedia.org/wiki/Lichen), which accumulates some types of radioactivity emitters).

Effect on the natural world

[](https://en.wikipedia.org/wiki/File:Chernobyl,_Ukraine.jpg)

[Earth Observing-1](https://en.wikipedia.org/wiki/Earth_Observing-1) image of the reactor and surrounding area in April 2009.

According to reports from Soviet scientists at the First International Conference on the Biological and Radiological Aspects of the Chernobyl Accident (September 1990), fallout levels in the 10 km zone around the plant were as high as 4.81 G[Bq](https://en.wikipedia.org/wiki/Becquerel)/m2. The so-called "[Red Forest](https://en.wikipedia.org/wiki/Red_Forest)" of pine trees, previously known as Worm Wood Forest and located immediately behind the reactor complex, lay within the 10 km zone and was killed off by heavy radioactive fallout. The forest is so named because in the days following the disaster the trees appeared to have a deep red hue as they died because of extremely heavy radioactive fallout. In the post-disaster cleanup operations, a majority of the 4 km2 forest was bulldozed and buried. The site of the Red Forest remains one of the most contaminated areas in the world.

In recent years there have been many reports suggesting the zone may be a fertile habitat for wildlife. For example, in the 1996 BBC [Horizon](https://en.wikipedia.org/wiki/Horizon_(BBC_TV_series)) documentary 'Inside Chernobyl's Sarcophagus', birds are seen flying in and out of large holes in the structure itself. Other casual observations suggest biodiversity around the massive radioactivity release has increased due to the removal of human influence (see the [first hand account of the wildlife preserve](http://web.archive.org/web/20031005140805/http:/www.nsrl.ttu.edu/chernobyl/wildlifepreserve.htm)). Storks, wolves, beavers, and eagles have been reported in the area.

[Barn swallows](https://en.wikipedia.org/wiki/Barn_swallow) sampled between 1991 and 2006 both in the Chernobyl exclusion zone had more physical abnormalities than control sparrows sampled elsewhere in Europe. Abnormal barn swallows mated with lower frequency, causing the percentage of abnormal swallows to decrease over time. This demonstrated the [selective pressure](https://en.wikipedia.org/wiki/Selective_pressure) against the abnormalities was faster than the effects of radiation that created the abnormalities. "This was a big surprise to us," Dr. Mousseau said. "We had no idea of the impact."

It is unknown whether fallout contamination will have any long-term adverse effect on the flora and fauna of the region, as plants and animals have significantly different and varying radiologic tolerance compared with humans. Some birds are reported with stunted tail feathers (which interferes with breeding). There are reports of mutations in plants in the area. The Chernobyl area has not received very much biological study, although studies that have been done suggest that apparently healthy populations may be [sink instead of source](https://en.wikipedia.org/wiki/Source-sink_dynamics) populations; in other words, that the apparently healthy populations are not contributing to the survival of species.

Using robots, researchers have retrieved samples of highly melanized black fungus from the walls of the reactor core itself. It has been shown that certain species of fungus, such as [Cryptococcus neoformans](https://en.wikipedia.org/wiki/Cryptococcus_neoformans) and [Cladosporium](https://en.wikipedia.org/wiki/Cladosporium), can actually thrive in a radioactive environment, growing better than non-melanized variants, implying that they use [melanin](https://en.wikipedia.org/wiki/Melanin) to harness the energy of ionizing radiation from the reactor.

**Topic 7. Hygiene in agricultural production.**

**1.** **Purpose:** Master the methods of assessment of food products quality and freshness according to their organoleptic criteria and laboratory analyses results.

**2.1. You should know:**

* + 1. Organoleptic criteria of food products quality and freshness.
    2. Principles of hygienic regulation of the food products quality and freshness.
    3. Full-value indices and deterioration indices of main food products.

2.2. You should have the following skills:

2.2.1. To sample the products and ready meals, send them to laboratory analyses, fill in the accompanying form.

2.2.2. To assess the organoleptic quality and deterioration indices of food products.

2.2.3. To use the State Standards and other normative documents during the assessment of the results of food products and ready meals laboratory analyses. To make the expert conclusion according to these results.

1. **Self-training questions**
   1. Food products and their classification, hygienic characteristic.
   2. State standards and hygienic regulations of food industry products, quality certificates of market products.
   3. Causes and criteria of food products deterioration.
   4. Storage conditions of food products, selling terms for unstable products and ready meals.
   5. Rules of food products culinary processing for saving their high quality, vitamins, gastrointestinal diseases prevention (gastritis, gastric ulcer of stomach and others).
   6. Quality and deterioration criteria of meat products (beef, pork, mutton, poultry etc.).
   7. Quality, deterioration and falsification criteria of milk and dairy products (sour cream, kefir, yoghurts, cheeses, butter and etc.).
   8. Quality and deterioration criteria of bread, bakeries, confectionery, biscuits.
   9. Quality and deterioration criteria of other grain products (flour, cereals, macaronis, vermicelli etc.).
   10. Quality and deterioration criteria of canned goods (meat, fish, vegetable and others).
   11. Quality and deterioration criteria of fresh and pickled vegetables.
   12. Food additives, their purpose, hygienic characteristics.
   13. Chemical weed-killers and artificial chemical fertilizers as food product pollutants.
   14. Regulations of sampling of the products for laboratory analyses, filling in the accompanying form, conservation and sealing up to laboratory for dispatching. Drawing up of the act of sample taking.
   15. Drawing the conclusion about food products quality based on the assessment of laboratory analyses results.
2. **Self-training assignments**

4.1. The patients of neurological and dermatological departments of regional hospital suffer from the insignificant gastrointestinal disorders. The meat used for preparing meals and suspected in causing these disorders was sampled at the nutrition unit for laboratory analyses.

The laboratory analyses results of meat sampling are the following:

- Organoleptic criteria: the meat surface is wet in some places, slightly sticky, darkened. The pit formed by pressure doesn’t smoothen well, the meat juice, produced during unfreezing is slightly blurred. The smell is sourish with slight stuffiness. The fat is grayish and sticks to the fingers. The articular surfaces of bones are covered with mucus a little, aren’t shiny.

- The broth is slightly blurred during boiling test, becomes turbid after adding the sulfuric acid copper solution and flakes appear. The intensive yellow color appears after adding the Nesler’s reagent to the broth filtrate.

Draw an expert conclusion about the meat quality and its possible connection with gastrointestinal disorders of the patients. What additional research must be done?

4.2. Draw an expert conclusion about a portion of the milk sampled at the market with following laboratory research results:

- organoleptic: color is white with cyanotic tint along edges; smell – insignificant, to 2 points; consistence (nail sample) – dense milk with small white grains; taste is a little bitterish (1 point); fat content according to Gerber – 2.2%; acidity – 180 of Terner; density according to the lactometer 1.035 g/cm3 (temperature 200С); solid residue calculated by Farington’s formula - 9%.

What additional research must be done to perform the complete assessment of this milk?

**5. Structure and content of the lesson**

This is a seminary lesson. At the beginning of the lesson students will have their knowledge of basics checked and self-training tasks examined. The questions stated in the paragraph 3 of this topic are studied by the students’ quiz and teacher’s explanations. The State standards, hygienic regulation on main food products, causes and dynamics of their deterioration, falsification signs are considered in details. The methods of food product preserving, storage rules and culinary processing are studied.

The students consider and assess the situational tasks worked out by the department at the second part of the lesson. The valid expert conclusions are drawn based on the results of organoleptic and laboratory analyses (of main systematically used food products).

The work has to be written down in the protocol.

**6. Literature**

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6.1.5. Lecture materials.

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Hygiene in Agriculture

Hygiene in Agriculture – WHY?

Agricultural hygiene helps protect livestock and crops from pests and disease, including insects, parasites, pathogens and weeds.

Optimising the health of animals and crops increases productivity, minimises animal suffering, and ultimately protects human health by ensuring that foodstuffs are safe for consumption. A healthy farm environment also protects the health of agricultural workers.

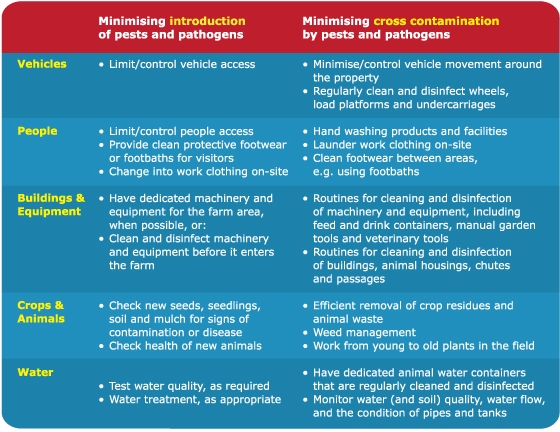
Pathogens are ubiquitous in farm environments. However, additional pathogens and pests can be introduced to farm environments mainly via movement of vehicles, people and stock onto the property, or via the farm’s water supply. Insects and other pests also "invade" without assistance.

Cross-contamination of pathogens and pests can also occur within the farm environment via movement of vehicles, people and stock around the property, or via contact with contaminated equipment, machinery and structures.

Therefore agricultural hygiene aims to minimise the introduction of additional pathogens and pests, as well as the spread of pathogens and pests in farm environments. This helps protect the safety of foodstuffs further down the supply chain.

Hygiene in Agriculture – HOW?

The key to agricultural hygiene is effective risk management and constant improvement of the hygiene standards at each level of the agricultural process and as agricultural products move further along into the human food chain. Effective cleaning, disinfecting and pest control regimes are integral, as summarised below.



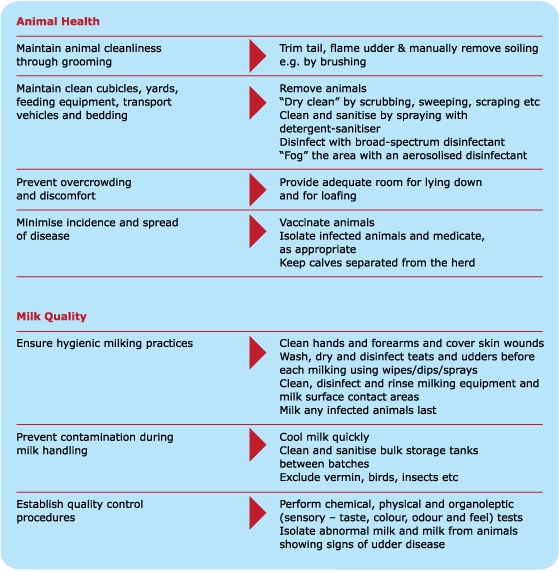
Cleaning and disinfection with good quality, effective products is integral to maintaining a healthy farm environment. Some of the specialised products for farm environments include powerful degreasers for cleaning organic material from equipment, vehicles, machinery, and buildings; descalers to remove inorganic build-up on machinery and equipment; wetting agents, minimising water use to dislodge dried matter such as manure; hand washes, with or without antimicrobial properties; heavy-duty laundry detergents; anddisinfectants, including water treatments.

Case study – The dairy industry

Hygiene in the dairy industry serves two purposes:

protecting the health of livestock – optimising herd productivity and minimising animal suffering

protecting the quality of the dairy product – protecting human health by eliminating all sources of faecal, bacterial, physical and chemical contamination.

  
(Sources 1 and 2)

Also essential to agricultural hygiene is effective pest control, which includes chemical, biological, and physical methods to protect animals, crops and pasture from different types of pests. Examples of chemical pesticides are those used to protect livestock from parasites, such as lice, ticks, mites and worms; as well as insecticides, fungicides, molluscicides, rodenticides and herbicides which protect crops and pasture from insects, fungus, snails, rats and mice, and weeds, respectively.

All veterinary and pesticide products in Australia are subject to a registration process overseen by the[Agricultural, Pesticide and Veterinary Medicines Authority (APVMA)](http://www.apvma.gov.au/). Products must meet criteria in the areas of public health, food safety, occupational health & safety and environment, as well as criteria ensuring products are fit for their intended purpose. The usage of these products is regulated by each of the states and territories. Click here for the [Australian Code of Good Manufacturing Practice for Veterinary Chemical Products](http://apvma.gov.au/node/72" \t "_blank).

Agricultural labor has a number of features. Many of his works are held in the open air. This is undoubtedly a positive impact on the health of workers. Along with this summer may be hyperthermia and heat stroke (with a bad head protection). During spring and autumn work possible hypothermia, which contributes to colds. Some operations (plowing, harrowing) are accompanied by considerable dust air.

Due to the extensive use of pesticides in agriculture can come into contact with chemicals.

Energy costs in agricultural workers, in spite of mechanization, is quite significant. In addition, work is often accompanied by irrational working posture. A significant part of the agricultural labor takes injuries, especially when working on sowing and harvesting machines.

The main harmfulness in the working conditions on livestock farms is a professional infection. Several livestock diseases, such as anthrax, brucellosis, glanders, etc., Can be transmitted to humans.

For some professions (milkers, calf) are also characterized by physical activity, often accompanied by forced body position. Work in barns, calf (high humidity, drafts) contributes to the development of colds, chronic catarrh of the upper respiratory tract. Milkmaids have observed sometimes specific occupational diseases arms (tendovaginitah, neuritis of the ulnar and median nerves, etc.) And a specific skin disease called "nodules doilschits". On livestock farms there is a risk of injury, especially by careless use of machinery for the preparation of animal feed.

Leading in agricultural production is a profession of the tractor. When working on the tractor, in addition to the above-mentioned negative aspects, marked forced position of the body, the ability to exhaust pollution cabin air, noise and vibration.

Work a trailer less complicated, but it is associated with long-term static stress due to lack of or inefficient seat device. A trailer are adversely affected by weather conditions. During plowing a trailer in the breathing zone air creates significant dust and various chemicals may be etched during sowing seeds in the air.

To prevent overheating of the body when agricultural work is necessary to arrange a shaded space for recreation (greenery, under a canopy), allow you shower, bath, body perfusion, loose, light clothing, wide-brimmed hat, the delivery of the chilled drinking water. Work should begin in the early morning hours, and outages to arrange during the hottest hours of the day. Cabs of agricultural machines is recommended to cover the insulating materials. To prevent hypothermia in cold weather, you need to provide warm clothes running in the rain - waterproof capes or cloaks. In the northern areas should provide heating cabins of tractors and other agricultural machinery exhaust. It is necessary to supply the farmers with hot food and boiling water.

To combat the dust in the air cab satisfied with forced ventilation. In order to prevent air pollution by exhaust fumes exhaust pipe output over the cabin roof.

Harvesters should have the control sites comfortable seats with a protective umbrella and shelter all combine nodes, whose work is accompanied by considerable dust emissions. For a trailer must be equipped with seat and backrest cushioning. The workplace is necessary to shelter from dust, wind, rain. When trailers are replaced by hinged, eliminated the profession of a trailer. To reduce the vibration of the tractor is arranged upholstered seat with armrests and backrest.

Most rational prophylactic measure in cattle breeding is the mechanization of labor-intensive processes. Also important is the improved indoor climate, where there are animals, and ventilation equipment.

In order to prevent occupational infections in livestock farms should be organized sanitary-veterinary supervision with the vaccination of livestock and destruction of dead animal carcasses in accordance with the sanitary rules. Farm workers must observe the rules of personal hygiene (washing hands with soap and water, use of disinfectants).

Pesticides used in agriculture for the control of plant diseases and pests. When working with poisons must comply with the safety rules in the special instructions.

**Methods of sampling and organoleptic research of the food products and ready meals**

The hygienic examination of food products and ready meals is made in following situations:

- regularly, by the plan;

- sporadically during raid control of nutrition units, catering objects;

- urgently if the cases of food poisonings, alimentary caused diseases, severe violations of nutrition units sanitary regimen (canteens, cafes, restaurants, hospital nutrition unit and etc.) are registered;

The hygienic examination of food products may have the following purposes:

* determination of products commercial qualities, drawing up of certificates;
* detection of the falsification, imbalance of the products’ chemical composition;
* to control the realization terms of products;
* determination of the degree of product deterioration during storage and possibility for further storage;
* determination of epidemiological and toxicological danger of products (microbial contamination, pollution by pesticides and other toxicants, barn parasites, mold etc.);
* determination of harmfulness of package, crockery, equipment, inventory and others.

Methods of sampling for laboratory analyses depend on the type of products, (free-flowing, by the pieces, liquid, in or without the package and etc.). The average sample representing the quality of all food lot has to be selected.

The free-flowing and solid food products (cereals, grain, flour, solid fats etc.) are selected with special probes, knives (see fig. 28.1), scoops from different sites of package or food cargo (up to 10 examples from which the average sample with mass up to 1 kg is formed).

At first the liquid and soft food products are mixed (by twirling stick and shake), selected from the different packages, product cargos and the average sample is received.

Closed preserved products are selected from the cargo by the piece, in the first place – the suspected units (blown cans, with damaged package).

The meat is sampled by cutting from the carcass, semi-carcass with obligatory sampling of the bones, joints.

Free-flowing, solid products without package and by the pieces are selected into plastic sacks, liquid – into glass package. The samples obligatory are sealed. The act of sampling is drawn up and signed by the person who performs the sampling and the responsible person of the nutrition unit. The accompanying form is enclosed in the sample. The following data are contained in this form: the nutrition unit ratings, specimen sample mass or quantity, laboratory research purpose, laboratory address where the samples are headed for, date and time of sampling, signature of the person who performed the sampling.

The organoleptic research of food products (and ready meals) does not need special equipment, may be performed both in the laboratory and at the nutrition unit during sampling.

At first it is necessary to get acquainted with the nutrition unit’s documentation, bills, certificates for the product cargo, delivery date. Then the storage conditions, products processing, presence of refrigerators, object sanitary condition, conditions of packages, marking (terms of product sale and storage etc.) are examined.

The appearance of product samples (in daylight), their color, tints as the signs of staleness, spoiling or falsification, suspected impregnation, spots, different from the color of the product etc. are also examined. The presence of barn parasites, cysticercuses is determined with the loupe and trichina grubs – with compressorius.

The constitution is determined by palpation – pressing on the product (bread-crumb, meat). The pit smoothens if the product is fresh or stays if the product is stale.

If the food products are fresh their smell is pleasing, specific. The stale products have objectionable even putrefactive smell. Some fresh products have to be odor-free at all.

The taste is tested the last after making sure that the product is safe. The taste is not tested if the product is suspected of spoiling or contamination with microorganisms, toxic agents.

Sometimes the hearing may also be used (splashing in the cans if they are filled incompletely, no fizzing in carbonated beverages, fizzing during fermentation etc.).

The boiling test of broths from research products first of all from meat is used in the laboratory during the organoleptic research.

**Appendix**

**Tests for control**

1. What indexes needs for the complex estimation|appraisal| of natural illumination|lighting| in the class of secondary school (the area is 4,0×12,0 m, three windows are, size of each is 1,8×2,2 m, the upper part of the window is in the distance 2,5 m from a floor|sex|, the window-sill is in the distance 0,8 m from a floor)?

A. An angle of falling

B. Coefficient of natural illumination, a angle of falling

C. Light coefficient|ratio|, coefficient|ratio| of deepening

D. An angle of aperture, coefficient|ratio| of deepening

E. \* Light|photic| coefficient|ratio|, coefficient|ratio| of deepening, coefficient|ratio| of natural illumination

2. In the radiological department of hospital the closed sources|springs| of ionizing radiations are used for treatment of malignant formations. What measures|steps| need to use for personnel protection during work with them?

A. Systemic cleaning of surfaces from the radiocontaminants, reduction|abbreviation,shortening| of work-time

B. Hermetic equipment and organization of ventilation of apartment

C. Screens|springs| and |utillizing|individual protective means|protection| of respiration

D. Increase of distance to|by| the source|spring| and rules of individual hygiene

E. \* Reduction|abbreviation,shortening| of work-time and screening of source|spring|

3.There is increase level of manganese in atmospheric air, drinking water and agricultural food. What is action|act| of factors on the population health?

A. Additional

B. Combined

C. \*Complex

D. Synergistic

C. Separate

4. A doctor|physician| must define an intensity of ultraviolet radiation by a biological method. A biodozimeter was situated in area of lower|bottom| third of stomach of child that took a sunbath. Time of irradiation of skin in the first window is 2 min, in the second is 3 min, in the third is 4 min, in the fourth is 5 min, in the fifth is 6 min, in the 6th is 7 min. In 8 hours after the irradiation a medical sister found two red strips on skin. What is|indicates| the biological (erytemic|) dose of ultraviolet irradiation?

A|but|. 30 seconds

B. \*6 minutes

C. 3 minutes

D.5 minutes

E. 10 minutes

5. A doctor|physician| must define an intensity of ultraviolet radiation by a biological method for prophylactic. A biodozimeter was situated in area of lower|bottom| third of stomach of child that took a sunbath. Time of irradiation of skin in the first window is 1 min, in the second is 4 min, in the third is 5 min, and in the fourth is 6 min. In 8 hours after the irradiation a medical sister found 3 red strips on skin. What is|indicates| the prophylactic (antirachitic) dose of ultraviolet irradiation?

À\* 30 seconds

B.60 seconds

C. 2,5 minutes

D.5 minutes

E. 10 minutes

6. A patient is 67 years old. He has nonspecific polyarthritis. Additional complaints appeared on the eve of sharp change of weather. Complaints were the shortness of breathe, edema of joints, head|leading| pain|anguish| and pain|anguish| in area of heart, rash, albumen and blood in urines, high temperature. What are meteo-depending clinical symptoms except shortness of breath, cardiac|hearty,kind| and head|leading| pains|anguishs|?

A. High temperatures of body

B. Rash

C. Albumin in urine

D. \*Edema of joints

E. Hematuria

7. During the inspection of studies conditions in a technical institute there was estimation of|evaluates| condition of visual analyzer work of students that study from 9.00 to 15.00. What index of natural illumination|lighting| will be most informing and adequate to the task?

À. The combined side| illumination|lighting|

B. Light|photic| coefficient

C. Coefficient|ratio| of deepening

D. Time of insolation of room

E. \*Coefficient|ratio| of natural illumination

8. Sportsman is alpinist. He has returned after the ascent on the snow top of mountain just. He has complaints: feeling of "sand" in eyes, impossibility to look at bright light. Objectively: hyperemia and edema of conjunctiva. The sportsman lost protective glasses|points| at the beginning of|in the beginning of| ascent. What is diagnosis? What factor entailed this disease?

A|but|. Cataract. Infrared

B. Phototoxicosis|. White snow

C. Photoallergy. Ultraviolet

D. \*Photo-ophthalmia. Ultraviolet

E. Conjunctivitis. Bright sunlight

9. The medical personnel of roentgens diagnostic use such shields as glasses with lead, the big and small mobile protective shield, a veil and protective gloves from rubber with lead. What is shield necessary else?

A. Boots from lead rubbers

B. Restriction of duration of the working day

C. \* The Breast apron from lead material

D. Distance steering roentgen-apparatus

E.It is enough specified actions

10. In a radiological department for internal therapy the gamma-ray irradiation plant «Agate»is used, source - isotope of cobalt, which is in a steel ampoule. What need to use for protection of staff?

\*А. Screening of a source and workstation

В. Capsulation of installation

С. Planning measure (zones of a location)

D. Equipment of locations by effective cooling

Е. Usage of resources of individual protection and cleansing of staff

11. The student estimates|evaluates| parameters of microclimate in an educational room. What does not necessary determine, because it is not the parameter of microclimate?

A|but|. \*Illumination

B. Humidity of air

C. Temperature of air

D. Speed of air movement

E. Radiation temperature of surfaces

12. A patient with alcoholic intoxication after several hours| lying in a snowdrift was hospitalized in a hospital with a diagnosis: "General|common| hypothermia". What way of heat-return prevailed in this case|specified|?

A|but|. \*Conduction

B. Convection

C. Radiation

D. Perspiration

## E. Chemical

13. The size|value| of biodoze of ultraviolet irradiation of patient is measured in minutes. What is apparatus?

A|but|. \*Apparatus of Gorbachev|

B. Ultravioletometer

C. Actinometer

D. Radiometer

E. Catatermometer

14. The microclimate of apartment is characterized|described| by following|its| parameters: the temperature of air is 40 ОC|; humidity|moisture| - 70 %; the speed of air movement is 0,1 m/c; radiation temperature - 80-90 оC|. What is the pathological condition may be in this microclimate?

A. Decrease of capacity

B. \*General hyperthermia (heatstroke)

C. Disorders physiological consisting of the system of blood circulation

D. Disorders of physiology state of respiratory system

E. Local hyperthermia|

15. For determination|definition| of influencing microclimate on the functional state of body the followings physiological indexes of functions tension of organs and systems which take part in heat-exchange processes were founded: pulse, arterial presser`, amount|quantity| of distal| motions|movements| in minute, temperature skin of forehead and hand, size|value| of perspiration| in minute, speed of visual and auditory reactions. Name|calls| an index that most objectively represents processes of thermoregulation|:

A. Speed visual and auditory reactions

B. Pulse, arterial presser

C. Amount breathings in a minute

D. |Perspiration in a minute

E. \*Temperature skins of forehead and hand

16. Varied lampshades are used for lighting the apartments. What type of lampshade is most rationally used for lighting the educational apartments?

A. Lamp-shades the dissipated light

B. Lamp-shades direct light

C. Lamp-shades the semireflected light

D. \* Lamp-shades reflected light

E. Lamp-shades combined light

17. At the dozimetric control of apartment of the built therapeutic department external Gamma-radiation makes 0,6 mk3b/year (60 mkR| /year). Estimate|evaluates| a level irradiation by comparison to possible for the apartments with permanent|constant| stay of people.

A. Increase in 4 times

B. Increase in 3 times

C. \*Increase in 2 times

## D. Increase in 6 times

E. Norma

18. The individual effective dose of doctor|physician|-roentgenologist|radio-therapist| is 30Mzv /year (3 Ber|/year). For a hygienic| estimation|appraisal| choose the limit|quota| of year dose and individual irradiation, set for this category of persons.

A|but|. \*50 Mzv (5 Ber|/year|)

B. 100 Mzv (10Ber|/year|)

C. 200 Mzv (20 Ber|/year|)

D. 300 Mzv (30Ber|/year |)

E. 400 Mzv (40Ber|/year|)

19. On territory of the city N |town| during 1 day there was the increase|rise| of frequency of intensifying by ischemic illness of heart at the change of weather (strengthening of wind is to 10 m/c, changes of temperature and atmospheric pressure - on 8 оC |and 12 mm| of hg|; Vibrations of the electromagnetic field). Define the type of |weather.

## A. Stimulate

B. \*Acute

C. Spastic

D. | Hypoxemic

## E. Unstable

20. Specify|indicates| the limit|quota| of effective dose for|after| a year for a category A |but|(persons are constantly or temporally working directly|immediately| with the sources|springs| of ionizing radiations) according to norms|standards| of radiation safety (NRS–97|)

\*A|but|. 20 Mzv/year (2 ber|/year)

B. 40Mzv/year (4 ber|/year)

C. 2Mzv/year (0,2ber |/year)

D. 10 Mzv/year (1ber |/year)

E. 5 Mzv/year (0,5ber |/year)

21. An accident has place on the atom-electric station, which was accompanied by ejection of radiation fuel in an atmosphere, the contamination of major territory by radionuclides was held which have reduced in rise of a background of ionizing radiation. What disease in the population living in these territories is necessary to expect in the future?

А. Disease of a gastrointestinal tract

В. Cardiovascular diseases

\*С. Neoplasm malignant

D. Ears - disease

Е. Eye illnesses

22. Military regiment stopped for rest after long march. From data of sanitary-epidemiological secret service a few|a little| sources|springs| of water are exposed. It is necessary to choose a source|spring|, which answered hygienical norms to|by| the drinking water in the fields’ terms.

1. Water from springs|spring|
2. Water from river
3. \*Water from artesian drill- holes
4. Rain-water
5. Melted water

23. With the purpose of study of microclimate influence on the body of man it necessary organizes the systematic looking after the temperature of air during|for| 3 days. Choose an apparatus, what allow register|permits| temperature most exactly:

A. Psychrometr August

B. Alcohol thermometer

C. Mercury thermometer

D. \*Thermograph

E. Psychrometr Acmana

24.There are exceeding levels of noise, of EMF, of dust (iron, molybdenum, silicon dioxide) on a factory. The worker of this factory has nervosas, nevrocirculatory dystonia, and disorders of an endocrine regulation. The reason is:

A. \* EMF

B. Noise

C. A ferruginous dust

D. Molybdenum dust

E.Silicon dioxide

25. The worker does an assembly of accumulator. He is hospitalized in surgical department with complaints to sharp colic pains in a stomach, nausea, weakness, loss of appetite, vomiting. Objective: pulse 60 b in 1 min, cardiac sounds are clear, respiration is vesicular. The stomach draws in, palpation poured morbidity, mainly in the field of the navel. Signs of a boring of a peritoneum are negative. Skin is pale with grayish color, border of gums with gray strip. Analysis of blood: anemia, reticulocytosis, and basophilic graininess of erythrocytes. Anamnesis: a peptic ulcer of duodenum. He connects the pain with drinking alcohol. What is diagnosis?

А. Acute appendicitis

B. Acute pankreatitis

С. Acute cholecystitis

Д. Perforation of ulcer

\*Е. A saturnism (lead colic)

26. A man suddenly lost consciousness during work in a hot workshop. Objective: temperature of body is 40,6 ос|, skin is dry and hot, a pulse and breathing speed-ups. A diagnosis is Thermal defeat, heavy form|shape|. What mechanism of heat-return does not work?

A. Evaporation

B. Conduction and Convection|

C. \*Conduction and Convection, Evaporation

D. Convection|

E. Conduction

27. A worker loads sand in carriages at the railhead. His|its| work was behaved to the 3d degree of difficulty. What from criteria can estimate|appraisal| the work?

1. Time of active actions|acts|, percent of duration of changing.

B.Size|value| of the static loading during|after| changing.

C.\*Maximal mass of load|freight|, which moves.

D.Intellectual tension.

E.Time of passive supervision, percents to|by| duration of changing.

28. The workers of refrigeration’s workshop work in the conditions of low temperatures - from -5 ос| to -15 ос|. What changes in the worker’s organism are characteristic|characters,typical| in that conditions?

A|but|. \*Contraction vessels of skin and muscles

B. Increase needs in oxygen

C. Speed-ups breathing

D. Changes of systole volume to blood

E. Changes minute volume of blood

29. The fisherman works in the conditions of low temperatures - from -5 ос| to -15 ос|. What diseases of organs and systems more frequent workers have of these conditions?

A. Lever

B. Cardiac systems

C. Blood

D. \*Respiratory systems

E. Stomach- intestinal disease

30. The mechanic works on the soldering of details with usage of a solder. He does not have complaints to state of health. But during medical examination sings of diseases were founded: astenovegetativ syndrome, in blood - erythrocytes with basophilic graininess and little amount of reticulocytes, in urine - delta –aminolevulin acid. The complex of symptoms testifies the first stage of a chronic intoxication by:

\*А.Lead

В. Manganese

С. Mercury

Д. Tin

Е. Arsenic

31. At a mechanic factory the turner of merry-go-round machine works in a condition high|acts| noise levels that | exceed LPL. The profession neurosensitive deafness can develop in 6-8 years of work in such condition. Name|calls| the most meaningful prophylactic measures?|steps|

A. Planning measures|steps|

B. \*Technological |nature| measures

C. Technical measures|nature|

D. Methods of individual protection|protection|

E. Medical prophylaxis measures

32. The effective measure|step| of preventive cases of pneumoconiosis| at workers, which work in the conditions of fibrogenic| |appearances|dust, |is|appears| the maximal decrease contains dust at breathing zone of workers|zone|. It can be attained by a way:

A. Ventilations of working| apartments during|for| a working day

B. Dilution dust by clean air

C. Make partitions between the different types of equipment, which is|appears| a source|spring| of dust|

D. \*Distant technological process control from other apartments

E. Irrigation air by water

33. Shift-work of workers makes 85 % of full time job at hothouses during gathering harvest. Parameters of microclimate are|received|: temperature of air + 35 ОС|, temperature of walls + 18 ОС|, humidity|moisture| - 98 %, speed of air movement is 0 m/c. What way of heat-return prevailed in this case|specified|?

A|but|. Conduction

B. Convection

C. \*Radiation

D. Evaporation

## E. Chemical

|

34. The patient is 38 years old. He has complains: pain and feeling of compression in breast, shortness of breath at the physical work, cough without sputum|. Objectively: regional emphysema of lungs, bronchitis, at a test with loading - functional insufficiency of respiration and cordially - vascular systems. What stage of silicosis are these complaints and symptoms characteristic|characters,typical|?

A. Stage of recover

B. 2nd stage

C. 3rd stage

D. Latent period

E. \*1st stage

35. M-r М. repaired a car in garage indoors. He has strong headache, giddiness, nausea, weak muscle, and sleepiness after that. What is the most probable diagnosis?

\*А. Intoxication by oxide carbon (CO)

В. Intoxication by a dioxide carbon (СО2)

С. Intoxication by benzene

Д. Intoxication by oxide of nitrogen

Е. Intoxication by oil-aerosol

36. Workers have an unfavorable|adverse| microclimate at the hothouse: the temperature of air makes 31 0C, temperature of walls – 23 0C, relative humidity|moisture| – 95%, the speed of air movement is 0,2 m/c. What way of heat-return prevailed in this case|specified|?

A|but|. Conduction

B. Convection

C. \*Radiation

D. Evaporation

## E. Chemical

37. A worker of glass-blower factory has complaints: headache|anguish|, irritation, weak sight, he sees surrounding objects as though through a net. Objectively: hyperemia of sclerotic, thickening cornea, decrease|lowering| transparency of pupil, sharpness of sight of the left eye 0,8, right - 0,7. The worker does not use individual facilities of protection|protection|. What is the most probable|probable| diagnosis?

A|but|. \*Cataracta

B. Conjunctivitis

C. Keratitis

D. Blepharospasm|

E. Progressive myopia|

38. A concentration of dust in air of working place|zone| increases LPC in 4-8 times at the production of coke (coal). Name|calls| the disease, which most probably develops.

1. \*Antracosis
2. Bissinosis
3. Asbestosis
4. Silicosis
5. Siderosis

39. Workers|| work standing, bend on a corner 32 degrees 300 times during|after| shift-work. They synchronously look after 5 objects. Duration of operation is 2- 4 sec. The active work makes 87 % duration of shift-work. What indexes, which indicated|specified| in the task, help to define monotony of work?

A. The amount|quantity| of looked objects (5)

B. \*Time of operation (2-4 sec)

C. Percent of active action|act| (87 %)

D. Working pose

E. Amount|quantity| of bend (300 for|after| shift-work)

40. The auto-chamber line’s operator of bus factory works standing, bending on a corner more than 30 degrees about 400 times during|after| shift-work, he spend energy 25 Vt|. During work operator’s pulse is near 110/m. In the end of|at close| shift-work attention is decrease, and endurance is reduced. What from the indicated|specified| indexes most probably testifies to hard of work?

A. Pose of work

B. Amount of pulse

C. Bend of body|body|

D. \*Spend energy

E. Reducing endurance

41. Workers work at conditions of high dust levels. Chemical (contents of silex) and physical properties|virtues| of dust aerosols have matter for appear professional dust diseases|. What is the main physical property of|virtue| dust aerosols for appears pneumoconiosis|?

A. Ionization

B. Magnetism

C. Electrocharge

D. Solubility

E. \*Dispersion

42. Work in conditions of influencing electro-magnetic waves can cause|calls| functional disorders of organism’s systems. What systems are|appears| most sensible at the action|act| of electro-magnetic waves of radio frequencies?

A. Cardio-vascular system and water-salt exchange

B. Stomach-intestinal and respiratory systems

C. Cardio-vascular system and respiratory systems

D. \* Nervous and cardio-vascular systems

E. Nervous system and stomach- intestinal system

43. A worker is 39 years old. He visited a doctor|physician| with complaints about aching|whining| pain|anguish| and feeling of numbness in hands and forearm, decrease |lowering|of hands muscle| force|arms|, disorders dream, irritation|irritability| and decrease|lowering| of ear. P|data|rofessional anamnesis: the worker worked as a borer (бурильщик) during|for| 12 years, using a drill (weight 20 kg) Objective: the skin of hands has a blue| tint; the edema of finger-tips, effaced of skinning|skin| picture, easy|light| deformation of interphalangeal joints, decrease|lowering| of tactile, temperature and pain|anguish| sensitiveness|noted|. What is diagnosis?

A. Vibratory illness, predefined by influencing of general|common| vibration

B. \* Vibratory illness, predefined by influencing of local vibration

C. Raynaud’s disease

D. Neurocirculatory dystonia

E. Rheumatoid arthritis|

44. Results of periodic medical examination|survey| of workers - polishes of artistic are |revealed|arear40 % workers with long|prolonged| experience of work in age 30-45 years old have neuritis of elbow nerve, 21 % have vegetative-sensible polyneuritis|, and 12 % have vegetomyofascitis| of hands|limbs|. Workers polish wares by a circulating abrasive disk. What unfavorable|adverse| factor is the reason of these diseases?

A. Dust

B. Uncamfortable microclimate

C. \*Vibration

D. Noise

E. EMF

45. During cleansing works in a mine the concentration of coal dust in air working area|zone| is 450 mgs /m3 (MPC| - 10 mgs /m3). What professional disease of respiratory system is possible developed?

A|but|. \*Antracosis

B. Allergenic rhinopharyngetic

C. Bissinosis

D. Siderosis

E. Talcosis

46. Different facilities are used with the purpose of removal dust| and industrial gas, however their effect is not always good. What is necessary followed at established periodicity of control after the state of air of working area|zone|?

A. Technology of production process

B. \*Condition of systems and facilities for dust| and gas removal

C. Mechanism of dust formation

D. Class danger of harmful matters, which are selected

E. Concentration dust and chemical matters in air

47. The amount|quantity| of |accidents|rhinitis, vasorhinitis|, pharyngitis, and dermatitis is increased at the factory of production synthetic cleansers|detergents|. There is dust of cleansers in air working area|zone||detergents|. Specialists consider that dust influences| to clinical displays and growth|height| of morbidity. What features of dust action|act| laid in the base of|underlays| pathogenesis?

A|but|. \*Allergenic action|act|

B. General toxicological action|act|

C. Fibrogenic action|act|

D. Carcinogenic action|act|

E. Mutagenic action|act|

48. The new synthesized matter (DFK-4) is| entered to toxicological laboratory. Such results are got: CL50 - 650 mgs/m3 (2 cl|.), DL50 - 250 mgs/kg (3 cl|.), CVD - 2 (4 cl|.), Zone|zone| of acute action|act| - 5,0(1 cl|.), ОSLA| - 2,0 mgs/m3 (3 cl|.) during toxicological researches and estimation|appraisal| indexes of toxicometric| at THE State Standard| 12.1.007 -76 "Harmful matters. Classification and commons requirements of safety.” What index of toxicometric| is|appears| limiting at determination|definition| of class danger in this case?

A.ОSLA

B. DL50

C. CL50

D. CVD|

E. \*Zone|zone| of acute action|act| |act|

49. Audiometrical research of auditory function of worker (turner-токарь) discovered that at the end of|at close of| shift work the change of threshold auditory sensitiveness made 5dB on both ears. How can estimate these functional changes in the auditory analyzer of worker?

A. Hypoacusis

B. Weariness

C. Overfatigue

D. \*Adaptation

E. Fatigue

50. A worker (steelmaker) is in the conditions of air temperature +26,0 o C, relative humidity|moisture| of air is 30 %, speed of air movement 0,5 m/c and radiation temperature 35,0 0. Physical work is characterized|described| as the middle degree of difficult. In these microclimate the return of heat by an organism is impossible:

A. Perspiration

B. Convection

C. Conduction

D. \* Radiations

E. Perspiration from mucous of respiratory tracts

51.Substituting of toxic materials by untoxic, equipment of general exchange ventilation, using facilities of individual protect|protection|, reductions|abbreviations,shortening| of work-time, decrease|lowering| difficulty of work are planned at the chemical plant with the purpose of optimization work. What measures are|steps| behaved to primary-prophylactic?

A. General exchange ventilation

B. \*Exchange toxic materials|fabrics| by untoxic materials|fabrics|

## C. Using facilities of individual protect|protection|

D. Reductions|abbreviations,shortening| of work-time

E. Decrease difficulty of work

52. In a smithy-press factory, the hard physical work is connected with unfavorable|adverse| microclimate (temperature of air +40 - +50 O C and intensive infrared radiation). One worker lost consciousness. The doctor |physician|found: pale face, humidity|moisture| of skin, increased sweating|, shallow breathing by frequency – 50/min., pulse – 100/min. weak filling, the temperature of body is 39,9 О| C. Diagnosis in this case is:

## A. Neurocirculatory dystonia

B. Sunstroke|kick|

C. Convulsive illness

## D. Hypertensive illness

E. \* Heat stroke|kick|

53. During the hygienical inspection of air at foundry|founding| machine-building plant, concentration of dust|ground|, which contains|maintains| a Silicon dioxide, makes 12 mgs/m3. What type of pneumoconiosis can be in this case?

A.Antracosis

B.\*Bissinosis

C.Asbestosis

D.Silicosis

E. Siderosis

54. Man is 40 years old. He works as a steel-maker at a metallurgical combine. He visits |by|a doctor|physician|. His complaint is depraved vision. O|data|bjective research: transparency of lens of the eye is diminished; acuity of vision of both eyes makes 0,6, and hyperemia of sclera. What are diagnosis and an etiologic factor, which caused|calls| the disease?

A|but|. Photo-ophthalmia, influencing of ultraviolet

B. Cataract, influencing of ultraviolet

C. Cataract, influencing of visible spectrum

D. \*Cataract, influencing of infrared

E. Photo-ophthalmia, influencing of visible spectrum

55. High noise-level and pollution| air of working area|zone| by anhydride sulphur are registered|grizzle|. What type of the harmful action|act| on an organism can render these factors?

A|but|. \*Combine

B. Separated

C. United

D. Complex

E. Specific

56. On motor transport firm| for|after| the last 5 years morbidity of lumbosacral radiculitis grew from 5,3 to 6,8 cases|accidents| on 100 workers. At the same time on 1,2 day middle duration of diseases grew. What group of factors in this case most probably stipulated these negative| displays?

A|but|. \*Condition of work

B. Condition of life

C. Level of pay |

D. Heredity

E. Condition and character|nature| of rest

57. For protecting|protection| of personnel of the radiolocations stations from the short-wave radiation in the apartment foreseen: screening of workplaces|jobs| by screens from lead-| glass, use|utillizing| of combination and glasses|points|, short|short| workers day of operators. What measures|steps| yet need to be inculcated?

À. Necessity in protecting|protection| from the short-wave radiation it is not

B. \*Necessary screening of workplaces|jobs| by metallic nets

C. All measures answer the hygienical requirements

D. The use|utillizing| of insulating suit|outfit| is needed

E. The use|utillizing| of gas mask and gloves

58. Test 12. In galvanic shop of a machine-building factory, where the women’s work, takes place hand-held periodic (up to 2 times in one hour) moving of the produced details. What limiting norm of rising and moving of loads should be recommended to the women according to the specifications predicated by MHP of Ukraine?

А. 20 kg

B. 15 kg

C. 7 kg

D. 5 kg

\*Е. 10 kg

59. In air of founder’s working zone there is an aerosol of condensation with the size of dust particles 2 nanometers (90 %), 2-5 nanometers (2 %), over 5 nanometers (6 %), to 2 nanometers (about 2 %). Characterize disperse of dust.

\*А. Small-disperse

B. Middle-disperse

C. Large-disperse

D. Ultrasmalldispersive

E. Fog

60. The dust content in air of a working zone in drilling of wells in granite quarry exceeds maximum permissible concentration 6-10 times. Driller N (the length of service is 10 years) complains of dyspnea in loading, pain and feeling of discomfort in the chest, cough; at X-ray examination – intensification of diffuse process in parenchyma of lungs. What’s specific action of this dust?

\*А. Fibrogenous

B. Allergenic

C. Irritable

D. Acute

E. Carcinogenic

61. During of sweeping grain in July temperature of fresh air has made 31 0С; in a cabin of a combine temperature – 35 0С, speed of air movement - 0,2 m/s, relative humidity of air - 55 %, temperature of walls and ceiling – 45 0С. To normalize a microclimate in a cabin it is obviously possible by a way

А. Increasing of speed of air movement

В. Cooling of air

С. Increasing of air humidity

D. Decreasing of air humidity

\*Е. Heat isolation of walls and ceiling

62. M-r N works during 12 years at the factory. There is the increase content of heavy metals, oxide carbon and nitrogen in air of a factory. He has astheno-vegetative syndrome, sharp abdominal pains, constipations, pain in the field of liver. Analysis of urine: aminolevulin acid and kaproporfirin. Analysis of blood: reticulocytosis, lowering of level of hemoglobin. The reason of this intoxication is:

\*А. Lead and its salt

В. Tin

С. Oxide of Carbon

Д. Oxide of nitrogen

Е. Zinc

63. At the inspection by the workshop doctor|physician| of workers of blast-furnace workshop, who have long experience, the cases|accidents| of disease by a primary cataract are marked|noted|. What was the reason|cause|?

А. High noise level

В. High level of vibration

\*С. Infrared Radiation

D. UV radiation

Е. Radiation of a visible spectrum

64. In one of room of chemical firm the constant violation of a microclimate takes place; for support of an industrial microclimate in the given location at a level answering the hygienic requirements, it is necessary to recommend:

А. Equip to the room by potent exhaust cooling

\*В. Equip to the room by the air conditioner

С. Making of effective affluent cooling

D. Making effective ventilation

Е. Equip to the entrance door of apartment by an airily thermal curtain

65. Workers of granite quarry work in conditions of a high level of dust pollution that promotes occurrence of silicosis. What substance contenting in dust can cause this disease?

\*А. Silicon dioxide

B. Aluminum oxide

C. Carbon monoxide

D. Nitrogen oxide

E. Sulfur dioxide

66. The worker of foundry shop of an electromechanical factory visited to polyclinic with the complaints on a pain in the chest of permanent character, breathlessness at physical loading, and cough. In X-ray examination the bilateral nodal derivations of the incorrect rounded form, legible are found out, but with rough outlines, periodically during the last year temperature increases up to 37-380C. What is probable diagnosis?

А. Bilateral chronic bronchitis

В. Nonmalignant tumor

С. Malignant tumor

\*D. Silicosis

Е. Foundry fever

67. Driver, man is 58 years old, repaired a car|vehicle| in a garage with closed door. He has strong headache, giddiness, nausea, weak muscle, and sleepiness after that. Anamnesis - trauma of a head was 3 years ago. Objective: pulse and respiration becomes more frequent, excitement, hypertension, and mania of prosecution. What is the most probable diagnosis?

\*А. Intoxication by charcoal gas (CO), an average degree of gravity

В. Intoxication by a dioxide carbon (СО2) of an average degree of gravity

С. Intoxication CO, a heavy degree of gravity

Д. Aftertraumatic encephalopathy

Е. A hypertonic syndrome

68. The locksmith| Í., 42 years, during|for| five years works in a workshop; he make heavy big size| details, using hand|manual| and pedal levers which need considerable physical effort. What measures|steps| of prophylaxis of osteoarthrosis| is it necessary to recommend?

À. Exercise of heavy athletics

B. Protein-carbohydrates diet

C. Protein-vitamins diet

## D. Rest on the Black sea coast

E. \*Limited hard physical work

69. On a factory, where red lead is made|produced|, the brigade of doctors’ specialists is formed for | periodical physical examination of workers. What from doctors|physicians| must be necessarily|of course| in composition a brigade?

À. Dermatologist

B. Gynecologist

C. Psychologist

D. \*Neuropatologist

E. Otolaryngologist

70. The worker of the petrol station with experience of work 15 years, has contact with ethyl-| petrol|benzine|. He has decline|lowering| of memory, bradycardia|, feeling of hairs in to the mouth, skinning|skins| paresthesias. This intoxication is caused:

À. Tetra-ethyl-lead

B. Chloride lead

C. Phosphor organic substances

## D. \*Benzol

1. Nitrobenzol

71. A noise-level on a workplace|job| is 121 dB|. What effect is|appears| most credible|probable| at workers?

A|but|. \*Irritated action|act|

B. Acoustic trauma

C. Deafness

D. Galoppirative currencies| |stream,current| of chronic diseases

E. Increase of traumatism

72. In the blacksmith-pressing workshop of machine-building plant an equivalent noise-level exceeds MPL| on 12 dB| (2 degree of harmfulness and danger), the temperature of air exceeds the legitimate values on 6,0 C (2 degree of harmfulness and danger), maintenance of oxide of carbon and oxide of iron exceeds MPC| in 1,5 time (1 degree of harmfulness and danger). Give the complex estimation|appraisal| of condition| and character|nature| of work.

À. Extreme

B. \* Harmfulness and dangerous to a 1 degree

## C. Harmfulness and dangerous 3 degree

D. Harmfulness and dangerous 2 degree

E. Permissible

73. On the workplace|job| of steelmaker |sanitary-hygienic researches is discovered|revealed| 4 chemical productions factor of 1st degree of harmfulness and danger, 2 psychogenic| to the 2nd degree, 1 physical factor of 3rd degree. Give the complex estimation|appraisal| of condition and character|nature| of work.

## À. Harmfulness and dangerous 2 degrees

## B. \* Harmfulness and dangerous to a 1 degree

### C. Harmfulness and dangerous 3 degrees

D. Extreme

E. \*Permissible

74. Under act of production loading the proof|firm| decline|lowering| of capacity at miners is present; the signs of diseases are absent|absents|. Estimate|evaluates| condition and character|nature| of work.

A|but|. \*Optimal

## B. Harmfulness and dangerous

C. Permissible

## D. Extreme

## E. Impermissible

75. It is discovered|revealed| at the analysis of results of deep physical examinations of students|, that prevalence of pathology of locomotorium apparatus is 36,4 cases/100, nervous system and sense-organs - 22,9 cases /100, cordially - vascular system - 11,6 cases /100, organs of digestion - 9,8 cases /100. What factor of risk prevails?

A|but|. \*Wrong working pose

B. Irrational feed|nourishment|

C. Excessive moving activity

## D. Unfavorable|adverse| microclimate

E. Wrong schedule|occupations|

76. The workplace|job| of proof-reader of printing-house is equipped by a writing desk and arm-chair|armchair| with the managed|regulable| parameters of seat|seats| and back. Working day is 8 hours. Level of load|loading,boot| of working day is 96 %. Development of what professional pathology is possible?

## À. Myocardial ischemia

B. Osteochondrosis

C. Coordinational neurosis

## D. \*Varicose veins

E. Myopia

77. Workers-metallurgists have influence of steam-disengaging microclimate. What type of thermal professional pathology can be?

À. Thermal burn|

## B. \*Overheating

## C. Cataract

D. Obliterating endarteriitis

E. Electro-ophtalmia

78. At the chemical plant the acute group poisoning by the oxides of nitrogen took place with a mortal cases|outcome|. For investigation of this poisoning|accident| a commission is created. Who must lead the commission?

A|but|. \*Main doctor|physician| of the sanitary-epidemiological station

## B. Specialist on organ’s pathology of management by a health care

C. President of state supervision and labor protection

D. Owner (leader) of the chemical plant

E. President of trade-union organization

79. Workers of packing area of hormonal preparations of pharmaceutical factory have complaints about headache|anguish|, lacrimation, a rasping feeling| in a throat, skinning|skin| itch, turning red of areas of skin on face, neck, forearm, nausea, general|common| discomfort. What is the action|act||calls|?

A|but|. \* Allergenic

B. Specific

C. Toxic

D. Irritable

E. Carcinogenic

80. In mechanical shop the turner near the revolving machine tool is exposed to effect of high levels of noise. In 6-8 years of work at him the neural bradyacuasia can be developed. Name the most meaning preventive measures:

A. \* Measures of technological character

B. Planning measures

C. Measures of technical character

D. Measures of individual protection

E. Measures of medical prophylaxis

81. The condition of work in a blast-furnace workshop was characterized|described| by the high levels of dust|, and gassed by sulphuric and carbon (CO) monoxides, high-frequency noise (95 dB|). What measures|steps| of prophylaxis are most effectively protected from noise pathology?

A. Normalization of voice pressure

B. Periodical medical examinations

C. \*Antinoises

## D. Noises choke

E. Change of technological process

82. The harmful matters which are characterized|described| by the effect of one way| action|act| are secreted in air of working area|zone| of repair service car factory: oxide of carbon in the concentration 10 mg/m3 *(*MPC| 20 mg/m3*)* and dioxides of nitrogen in the concentration 1,0 mg/m3 (MPC|- 2 mg/m3*).* Estimate|evaluates| contaminations of air of working area|zone| taking into account the possible additive action|.

## A. Increase in 1,2 time

## B. Normal

C. Increase in 2,2 time

D. \* Increase in 1,4 time

### E. Increase in 2,5 time

83. One of widespread professional disease among car building workers is|appears| bronchial asthma. Name|calls| the matter, which can cause development of professional bronchial asthma.

## A|but|. \*Colophony (rosin)

B. Hydrochloric acid

## C. Ferrum oxides

D. Nitrogen oxides

E. Silicon dioxide

84. In a rental|rolling| workshop tension of infrared is 2300 Vt/m2. Work is heavy (95 Vt|). At research of microclimate in a warm period of year on workplaces|jobs| such results are got|received|: the temperature of air is 35,0 ОС|, relative humidity is30 %, speed of air movement is 0,08 m\c. Ventilation is absent|absents|. What violations in the organism of workers are possible?

## A|but|. \*Heat stroke

B. Hyperhidrosis

C. Nephropathy

## D. Amnesia

E. Diarrhea

85. Steel founders (сталевары) have asteno-vegetative symptoms; disorders of respiration, squeezing in ears, headache, tremor of hands, common fatigue. They work nearly with big compressor. What industrial factors must be corrected first of all for prophylaxis of these symptoms?

A. Electromagnetic fields

B. \* Infrasound

C. Uncomfortable a microclimate of a heating type

D. Dust

E. Increase of Carbon oxide

86. The worker works 10 years in conditions of high frequency of noise. On the periodic physical examination the diagnosis ‘Professional deafness’ is revealed. What examination is a basis for such diagnosis?

A. \* Audiometria

B. Time of work

C. The characteristic of noise

D. Research of CNS

E. Research of a state of internal ear

87. At preparation and use|utillizing| of forming mixture moulders of casting|founding| workshop work in the conditions of dust| air higher than the permissible concentration. Dust is badly water-soluble, small| and middle-disperse, | electro-charged, polymorph|. What properties|virtues| of dust have the decision value|importance,meaning| for development of pneumoconiosis|?

A|but|. \* Disperse

## B. Electro-charged

C. Water-soluble

D. Conductivity

E. Form of dust

88. In grinder’s working zone there is a lot of dust. In the shop there is common natural and mechanical outflow local ventilation. Workers use respirators for protection of respiratory organs; follow a regimen of work and rest. What preventive measures effectively limit penetration of dust into respiratory tract?

\*А. Local outflow ventilation

B. Common natural ventilation

C. Common mechanical ventilation

D. Usage of respirators

E. Regimen of work and rest

89. In workers of foundry shop of the metal plant, having mainly physical work, muscular convulsions of upper and lower extremities periodically occur. The reason of convulsions development in these conditions is:

\*А. Loss of liquid by sweating

B. Use of a large amount of liquid

C. Considerable physical exertion

D. Considerable nervous - emotional exertion

E. Loss of liquid by urinating

90. An electric welding’s worker welds large constructions in an uncomfortable working pose, having bent, in unfavorable acustical condition (Leq. = 83,2 dB at MPL - 80 dB). The concentration of harmful substances in air of working zone exceeds MPC 3-4 times. What are primary measures on improvement of working conditions?

\*А. Local outflow ventilation

## В. Aeration

С. Facing of premises by sound-absorbed materials

D. Rationalization of the mode of work and rest

Е. Usage of resources of individual protection

91. Student Í wants to estimate|appraisal| sound level in the workshop of the cold stamping. What device he uses?

1. Analyzer of spectrum of noise
2. \*| Noise-vibration-meter.
3. Audiotestmeter.
4. Actinometries

E. Pyranometer

92. In a computer hall | of Technical| institute|institution| workplaces|jobs| of laboratory assistants – operators are located near the front panels of monitors. Under action of hyperfrequency electro-magnetic waves operators are working all days. The special danger is presented|represented| by the action|act| of electro-magnetic waves of the indicated|specified| range of frequencies on:

A|but|. \* Visual analyzer

## B. Acoustic analyzer

C. Tactile sensitiveness

D. Olfactory analyzer

E. Pain sensitiveness

93. The worker of factory on the production of paints complains about an unfavorable taste in to the mouth, colic | stomachaches, constipations which are not taken out by anesthetics. Objectively: Skin of person pale-grayish colors, on the edge|place| of gums near teeth is red-gray|grizzle| strip. At laboratory research is detected: in a blood an anemia, reticulocytosis, basophile graininess of erythrocytes, boosted contents of bilirubin; in urine - boosted contents of a porphyrin. |||What is disease?

А. Chronic poisoning by mercury

В. Chronic poisoning by benzol

С. Chronic poisoning by manganese

\*Д. Chronic lead poisoning.

Е. Chronic poisoning by perchloromethane

94. The worker of a factory complains of sleeplessness, irritation, boosted sweating, blooding of gums. Objective: a spasmodic and asymmetric tremor of fingers of hand, boosted irritation of the vegetative nervous system, red dermographism, gingivitis, stomatitis, cyanotic bar along edges gums. At a blood analysis are detected a lymphocytosis and monocytosis. What disease is possible for the worker?

А. Chronic lead poisoning

В. Chronic poisoning by benzol

С. Chronic poisoning by manganese

Д. Chronic poisoning by perchloromethane

\*Е. A chronic poisoning by mercury

95. In air of work | area|zones| the concentration of silicodangers | dust considerably exceeds MPC|. What from prophylactic measures|steps| is|appears| most effective in this case?

À. Periodic physical examinations

B. Use glasses|points| closed type

C. \* Use|utillizing| of the special space-suite

## D. Use alkaline inhalations

E. Use industrial vacuum cleaner setting

96. On the workplace|job| of tester of aviation engines aerodynamic noise of level 102 dB| is registered. What from prophylactic measures|steps| is|appears| most effective in this case? |

A. Installation of a drive noise-isolation the base

B. Precise adjustment of details of drive

C. Rationalization of a duty and rest

D. \* Usage of individual noise-protection stitches

E. Usage of silencer

97. The citizen P. 1942 year, visits the doctor with complaints on pain|anguish| in a lower|bottom| jaw. Objectively: patient is hyposthenic|nourishment|, skin|skins| is pale|pallid|, hot at the touch, bad smell from a mouth breath, bleeding gum |. The phenomenon of osteoporosis is on roentgenogram of jaws. Patient more than 29 years|stream,current| worked on a chemical firm. What disease is probable|probable|?

А. Poisoning with perchlorate of potassium

В. Poisoning by metylmercury

С. Fluorosis

\*Д. Chronic poisoning with phosphorum

Е. Chronic osteomyelitis of a mandible

98. The workwoman of poultry factory has labor experience 18 years|stream,current|. The work’s conditions are characterized by the high contents of organic dust. What pathology can occur?

\*А. Exogenic allergic аlveolitis

B. Silicosis

C. Anthracosis

D. Mesothelioma of pleura

E. Toxocarosis

99. Woodcutters| of timber industry work with help petrol-saw| (mass is 15 kg) during|for| 6 hours per day. Woodcutters| | work standing, by hands squeezes the rubbers handles of petrol-saw| | with by force 150-200 H, which holds at the level of loin. Name|indicates| the type of vibration.

À. Technical A|but|

## B. Transporting and technical

## C. \*Local

D. Transporting|transport|

E. Technical B

100. The working conditions of hothouse’s workers are characterized: temperature of air is 32.0-35.0 0 C, relative humidity - 99 %, speed of air movement - 0,01 m/s. Name the way of heat-return by a body of the workers in these conditions.

A. Conduction

B. Convection

C. \* Radiation

D. Evaporation

1. Conduction –convection

101. A worker works with a laser emitter, which on the degree of danger of radiation behaves to the IV class. What measure of protection|protection| will be most effective in this case?

A|but|. \*Distant management by the laser setting

B. Local ventilation

## C. Closing protective glasses|points|

D. Screening of bunch of radiation

E. Protection suit

102. The case|accident| of acute professional poisoning happened at the chemical factory|owing to|. Where must doctor send “The Emergency notice about acute poisoning or professional disease “ |physician|?

A|but|. \*Â sanitary-epidemiological station

B. Administration of factory

## C. The trade-union committee of factory

D. Medical and sanitary department of factory

## E. The Ministry of health protection of Ukraine

103. Capacity of the computer’s programmer was examined. “Time of simple|idles| visual-motor reaction was increased in the middle of examination on 30 % in relation to|toward| a level at the end of|at close of| 1st hour of work. C|indicates|hange in what system of organism cause|calls| the state of fatigue?

1. In muscular system |
2. \*In central nervous system
3. In respiratory system|
4. In cordially – vascular system
5. In peripheral nervous system

104. Workwoman packs children' toys in cardboards boxes. Duration of one operation is 20 seconds; one operation |it| contains|maintains| 5 varied elements. She works in sitting pose. Decrease of capacity level is registered at the beginning of|in the beginning of| 3d hour of work. What is possible to explain such fast growth of fatigue?

1. By influencing of production noise
2. By the working pose
3. By a hypodynamia
4. \*By monotony of work
5. By influencing of production vibration

105. Chronometrical looking after work of mason (brick-layer) show |bricklayer| that time of work occupied|borrows| 80 % of shift, and|but| 20 %|borrows| of unregulated interruptions. What is cause of growth fatigue and low capacity of mason|bricklayer|?

À. Stream of impulses in CNS|

##### B. Big concentration of suckling acid in muscles

C. Deficit of oxygen in muscles

D. \*Accumulation of CO2 in muscles

##### E. Decrease of power resources

106. At the aviation plant treatment of materials|fabrics| is conducted with the use of optical quantum generators. It is set that setting radiates in a visible spectrum the levels of laser radiation on workplaces,|jobs| which exceed MPL|. |indicates| What organs will be struck?

1. Liver
2. Skin
3. \*Eyes
4. Spleen
5. Kidneys|kidneys|

107. Drying of wood is conducted with help the electromagnetic fields of radio frequencies. The level exceeds MPL|. What material|fabric| is necessary to use for protective screens?

A. From tree

1. \*From metallic
2. From bricks
3. From plastic
4. From glass

108. Polishing machines|vehicles| are|appears| the source|spring| of local vibration at the factory. What is most effective prophylactic measure|steps| for decrease harmful influence on the organism of workers?

À. Educational work| among workers

B. Preventive and periodic physical examinations

C. Massage of hands

D. Taking warm baths for hands|arms|

E. \*Usage of gloves which extinguish the vibration

109. A document|paper|, on which a level and structure of morbidity with the temporal loss of capacity is analyzed, is wrote at factory every year. What|indicates||its| is correct name of document?

A|but|. \*Report about reasons|causes| of temporal disabled (form|shape| № 23 |)

B. List of temporal disability

C. Report about the amount|quantity| of the diseases, registered at patients, which live in the district|region| of maintenance of medical establishment

D. Card of account of temporal disability

E. Statistic card coupon for registration of final (specified) diagnoses (form|shape| ¹ 025-2/0)

110. In air at the factory of producing mercury thermometers the pair|couples| of mercury are discovered in the concentrations, which exceed maximum possible. Name|indicates| the basic|main| way of mercury receipt|entrance| in the organism of workings.

1. Through a stomach and intestinal tract
2. Through skin
3. Through the damaged skin
4. \*Through the organs of breathing
5. Through mucous membranes

111. In a woodshop, sawing of wood on boards is conducted. It is set at the study of conditions of work, that equivalent sound-levels in a workshop exceed maximum possible. Noise is inconstant, irregular, wide-strip|, high frequency. What specific changes| organism of workers can arise up under the conditions?

À. Neurotic states

B. Vegetovascular dystonia

C. Hypertension illness

D. Ulcerous illness of stomach

E. \*Neurosensory hypoacusis

112. Conditions of blacksmith’s work were examined. An equivalent noise level on his|its| workplace|job| is 95 dB| (possible equivalent level - 80 dB|). He works without usage|utillizing| protection |protection|. What is the most effective prophylactic measure|step| in this case?

À. Increase distances between the production equipment

B. Decrease noise level in the source|spring| of education|formation|

C. \* Usage of individual measures|steps| of protection|protection|

D. Periodic physical examination

E. Usage|utillizing| of noise barriers

113. This is discovered|revealed| at periodic physical examination of workers-rivets of aviation factory: 40 % persons have vegetovascular dystonia, 20 % - Hypertension illness, 5 % - vegetomiofascitis|. What is the reason of the state of workers’ health?

À. Electromagnetic radiation

B. High level of dust

C. High temperature of air

D. \* Vibration

E. Infrared radiation

114. Estimating|evaluating| the state of health of drivers and | traffic inspectors doctors|physicians| exposed at the traffic-controller of traffic|movement|: headache|leading||anguish|,| sleep’s disorders, decline|lowering| of memory and attention, shortness of breath, pain|anguish| in area of heart. Blood laboratory examination: maintenance of carboxyhaemoglobin is exposed. What factor of environment is the most probably reason|cause| of such changes in an organism?

1. \*Oxide carbon.
2. A sulphureous anhydride dioxide of carbon.
3. Oxide of nitrogen.
4. Aromatic hydrocarbons dioxide nitrogen.
5. Oxide nitrogen 3, 4-bezpiren

115. M-r S is 60 years old. He works in boiler-house. He has such complaints as headache and weakness. Objectively: Carboxyhemoglobin is in his blood. What is the reason of these symptoms?

А. Manganese

## B. Lead

C. Mercury.

\*Д. Carbon oxide

Е. Chlorine

116. Doctor gave recommendation to the patient with a diagnosis ‘Infarct of myocardium’. Recommendation: to drink 50 - 75 ml of different drinks 7-8 times per day in the first 2 days. What from drinks is forbidden|banned| used to the patient?

1. \*Vine|grape| juice
2. Decoction of wild rose
3. Semisweet tea
4. Mineral| alkaline waters without gas
5. Rare|thin| kissel

117. Patient X. was hospitalized |with a diagnosis: urolithiasis. The chemical analysis: stone|rocks| consist from salts of urinary acid (urats|). What products must be decreased in food at this pathology?

1. Corn products
2. Dairy products
3. \*Meats|fleshes| products
4. Eggs products
5. Green-stuffs and fruit

118. Canned goods were brought in child's camp of rest. The external examination of canned goods: cans have deep dents, at pressure incurve in side|, not immediately go back into initial position, a blight is not present, cans is smeared by technical fat. Define a bombage.

A. Physical| and chemical

B. Chemical

###### C.Biological

D. Mixed

E. \*Physical

119. A baby is 9 months old. He has a delay of development of teeth| |noted| and delay of terms of closing| of cranial fontanel, weakness and sweating|. What type of hypovitaminosis| is in this case?

1. Hypovitaminosis C
2. \*Hypovitaminosis D
3. Hypovitaminosis B1
4. Hypovitaminosis B6
5. Hypovitaminosis A|but|

120. The boy is 10 years old. He visited a doctor|physician|. He has complaints about a general|common| weakness, rapid|quick,fast| fatigueability, overirritation|irritability|, and decline|lowering| of capacity. Objectively: bleeding of gums, petechiae| on arms and legs|limbs|. What vitamins insufficiency can take place in this case?

A. Vitamin A

B. Thiamin

C. Riboflavin

\*D. Ascorbic acids

E. Vitamin D

121. A patient was hospitalized |diseased| with complaints about worsening of vision (fog is in eyes, doubling), disorder of swallowing. A doctor|physician| set a diagnosis “ Botulism “|. The day before|on the eve| the patient ate milk, cheese, curd, can meat| of home preparation, green vegetables. What product can be reason|cause| of the food poisoning?

1. \*Can meat of home preparation
2. Milk
3. Curd (raw)
4. Groats
5. Green vegetables

122. The bacteriological laboratory of SES did the test of cream and confectionery products from the confectioner’s shop. Research founded a presence of coagulative | staphylococcus in 0,01 g of the product. What is the main source|spring| of contamination of cream by pathogenic staphylococcus?

1. Butter
2. Condensed milk
3. Flour|torment|
4. Sugar or castor sugar
5. \*Workers of shop

123. A woman is 55 years old. Her complaints are diarrhea|, decorticating and pigmentation of the opened areas of body (neck, brushes and feet), overirritation and anxiety|trouble|. What vitamin insufficiency is in this case?

1. Retinol|
2. \*Nicotine acid
3. Thiamine|
4. Riboflavin
5. Pantothen

124. General|common| symptoms of disease were founded during inspection of group of persons, which live on same territory: darkly-yellow pigmentation of enamel of teeth, diffuse osteoporosis of bone,| ossification of ligaments|trusses|, ossification of joints. Surplus of what microelement in products or drinking water can be the reason|cause|?

1. \*Fluorine
2. Copper
3. Nickel
4. Iodine
5. Cesium

126. In child's preschool establishment such foods are included in a menu: porridge with milk, macaronis with forcemeat, lettuce from cucumbers, kissel, bread. What from |enumerated| dishes is necessary to withdraw from menu?

1. Bread rye
2. Porridge with milk
3. Kissel
4. \*Macaronis with a forcemeat
5. Lettuce from cucumbers

127. A girl is 14 years old. Her daily feed ration contains:|maintains| the vitamin À is 1,5 mgs, the vitamin B1 is 1,8 mgs, vitamin B2 2,0 mgs, the vitamin B6 is 2,0 mgs, the vitamin C 20 mgs. Her physical examination: a girl has middle mass of body, physical development is harmonious, biological age corresponds to the calendar, mucous membranes and skin without the changes. The girl has often sharp respiratory-viral diseases after which is observed|exists| numerous points hemorrhage in the places|seats| of friction of clothes (cuffs, elastics, belts). Name a correct diagnose.

A. \* C-Hypovitaminosis |

B.|Hypovitaminosis |

C. B1– Hypovitaminosis |

D. B2– Hypovitaminosis |

E.B6– Hypovitaminosis |

128. A girl was hospitalized. Objective: the temperature of body 36,0 0*,* skin and mucous membranes are pale|pallid|, girl has general adynamia |, she languidly answers on questions, mydrriatic pupil, the reaction on light is decrease, voice is hoarse, the mucous membrane of mouth is dry, water is outpoured through a nose, two days there was no defecation. She ate porridge buckwheat, borsch, meat dumplings, fried eggs, smoked sausage, cucumbers of the home canning, fried potato. What disease is the most probably?

1. \*Botulism
2. Salmonelles|
3. Staphylococcus intoxication
4. Dyskinesia| constipation
5. Infectious encephalopathy|

129. |keeping|Germinating or becoming green potato has a bitters taste. What poisonous substances that contained|maintained| in such potato, can be source of food poisoning?

1. Gelvenlov| acid
2. Fasin|

C.\*Solanine

D.Muscarine

E. Muskaridin|

130. What gastroenterology diet is used as an alimentary| medical factor during complex therapy?

1. № 5
2. № 2
3. № 3
4. № 4
5. \*№ 1

131. Disease is began suddenly in 2 – 3 hours after the use in food the curd that prepared from sour milk, in child's preschool establishment. All patients had the abundant frequent vomiting, stomachache, liquid defecating, and pallor of skin. Some patients had increase temperature (not more 37,3 0 C*)*. The clinical displays passed for a daylong. What is the most possible diagnosis?

A. Sharp intestinal infection

B. \*Staphylococcus toxicosis|

C. Food toxic infection|

D. Mycotoxicosis|

E. Poisoning by salts of heavy metals

132. Disease is began suddenly in 2 – 3 hours after the use in food the curd, which prepared from sour milk, in child's preschool establishment. All patients had the abundant frequent vomiting, stomachache, liquid defecating, and pallor of skin. Some patients had increase temperature (not more 37,3 0 C*)*. The clinical displays passed for a daylong. What is the most possible diagnosis?

A. Poisoning by salts of heavy metals

B. \*Bacterial toxicosis|

C.Sharp intestinal infection |

D. Mycotoxicosis|

E. \*Food toxic infection

|

132. The patient 45 years old. His diagnose is a hypomotoric dyskinesia of thick intestine. How can change a food ration with the purpose increase|rise| motoric| function of intestine?

1. To increase an amount|quantity| of vegetative proteins, dairy products, calcium in hypoenergetic| diet
2. To increase an amount|quantity| of vegetable, soul-milk products and tannic matters in a rational diet.
3. To increase an amount|quantity| of vegetative proteins, animals fat, potassium in a rational diet
4. \*To increase an amount|quantity| of food fibers and soul-milk products in a rational diet
5. To increase an amount|quantity| of animals fat and magnesium in a |reducing protein – vegetable diet

133. Test 46.A driver was admitted to ICU with sharply expressed general intoxication, hepatorenal failure and high level of blood transaminases. A patient ate mushrooms, which were bought at occasional seller 3 days ago. The symptoms of disease have appeared in 12 hours after eating. What mushrooms caused alimentary poisoning most probably?

\*А. Amanita palloides

B. A mushroom - umbrella

С. Cep

D. False honey agaric

Е. Fly-agaric red

134. There was alimentary poisoning in the factory eating-house. The clinical signs specified to staphylococcal etiology. 15 persons got ill. What materials from the patients should be sent for research in the laboratory for confirmation of alimentary poisoning?

А. Urine

В. Cerebrospinal fluid

\*С. Vomiting masses

D. Blood (clinical analysis)

Е. Blood on hematological culture

135. The patient has hemeralopia. The diet contents some of vegetable products: spring onions; red sweet pepper; lettuce; green peas, liver. What of listed products is necessary first of all?

А. Spring onions

\*В. Liver

С. Lettuce

D. Green peas

Е. Red sweet pepper

136. During of medical examination the doctor has paid attention to student (stature is 176 cm and weight is 68 kg, 24 years old), He complained of lost ability to legible vision of surrounding subjects at evening time. Xeroderma, hyperkeratosis is observed. Such contents of main vitamins as vitamin A - 0,5 mg, vitamin В1-2, 0 mg, vitamin B2 -2,5 mg, vitamin B6 -2 mg, vitamin C - 70 mg are detected in his daily menu. Define the diagnosis of disease.

А. В1 - hypovitaminosis

В. В2 - hypovitaminosis

C. В6 - hypovitaminosis

\*D. A - hypovitaminosis

Е. C – hypovitaminosis

137. During of medical examination the doctor has paid attention to student (stature is 162 cm and weight is 59 kg), He complained of lost ability to legible vision of surrounding subjects at evening time. Xeroderma, hyperkeratosis is observed. Such contents of main vitamins as vitamin A - 0,5 mg, vitamin В1-2, 0 mg, vitamin B2 -2,5 mg, vitamin B6 -2 mg, vitamin C - 70 mg are detected in his daily menu. Define the diagnosis of disease.

А. В1 - hypovitaminosis

В. В2 - hypovitaminosis

C. В6 - hypovitaminosis

\*D. A - hypovitaminosis

Е. C - hypovitaminosis|

138. The group of workers, who suffer by the chronic diseases stomach - intestinal tract is taken on a clinical account at a periodic medical examination|survey|. What type of processing meal|food| is contraindicated to these patients?

1. \*Fry|
2. Boiling
3. Extinguishing
4. Baking
5. Blanched

139. Periodic physical examination found workers, who suffer by the cardiac- vessels | diseases. What nutrient must be included in diet?

1. Protein
2. \*PNSFA|
3. Fat
4. Mono- and disaccharide|
5. Artificial sugar|

139. Four groups of workers are selected during medical examination|: healthy, risk group, patients with the chronic nonspecific diseases and workers with the harmful condition of work. What nutrition|nourishment| is for workers with the harmful condition of work?

1. \*Treatment| – prophylactic
2. Rational
3. Preventive
4. Dietary
5. Treatment|

140. In June during medical examination of population at 27 % persons were defined decrease|lowering| of capacity and increase fatigue. Objective: edematous friable gums, bleeding during massage. What is the most probably diagnosis?

1. B1  -Hypovitaminosis |
2. Paradontosis
3. A-Hypovitaminosis |
4. \*C - Hypovitaminosis |
5. Polyhypovitaminosis |

141. A patient has complaints the decrease|lowering| of capacity, fatigue. Objectively: edematous and friable, soft gums. What research is the most expedient to use for defining of reason|cause| of disease?

1. Activity of seroplasmin| is in the serum of blood
2. Night| adaptation
3. \*Urine| excretion of vitamin of C
4. Contents of vitamin of À is in the serum of blood
5. Urine| excretion of vitamin Â

142. At physical examination of population 27 % of persons were found out the signs of C-vitamin insufficiency: edematous, friable and soft gums, bleeding during massage, on skin|skins| is follicle hyperkeratinization without dryness of skin. What products must be in diet for treatment?

À. Bread products

B.Â. Meat and fishes|fish| products

C. Daily and eggs products

D. \*Vegetable and fruit

E. Sweet products

143. A patient’s mass of body is higher than a norm|standard| on 40 % at the index of Ketle – 29. Mass of body of patient is estimated|evaluated| as:

À. 1st degree of obesity

B. Superfluous mass of body

C. \*2nd degree of obesity

D. 3d degree of obesity

E. 4 degree of obesity

144. At physical examination of workers of cotton factory 30 % of persons was found with increase|rise| of body mass on 5-14 % from normal. The index of Ketle is from 22 to 25. For normalization of body mass at this group of persons in a ration, is necessary to decrease:

1. \*Mono- and disaccharides|
2. Proteins
3. Fats
4. Polysaccharides
5. Food fibres

145. Workers of factory have the contact with radionuclides| and ionizing radiation. This group of workers must receive|receives| the treatment-and -prophylactic nutrition|nourishment|:

A|but|. \*Treatment-and -prophylactic ration № 1

B. Dairy products and pectin

C. Milk as protective product

D. Vitamins preparations

E. Treatment-and -prophylactic № 3

146. During medical examination of a group of the population in 30% of persons the increased body mass (5-14 % above the norm) is detected, Kettle’s index is 26. For normalization of body mass for this group of persons it is necessary to reduce a contents of:

\*А. Bread products

В. Vegetables

С. Fruit

D. Milk and dairy products

Е. Meat and fish products

147. |A patient is hospitalized with the diagnosis Diphyllobothriasis |. What fish is the reason of disease?

1. \*A river carp
2. A see perch |naval|
3. A see halibut |naval|
4. A tuna|
5. Flounder

148. A patient is on stationary treatment with a diagnosis hypertensive illness of 2-B stage. Anamnesis: he works in factory, work is related to nervously – emotional loadings. What from |enumerated| products do not excite the nervous system and can be in his|its| ration |nourishment|?

1. Mushroom decoctions
2. Meat-broth
3. \*Milk
4. Vegetable decoctions
5. D|rinks with gas

149. A patient complained on pain|anguish| in an epigastric| area, especially after rough|rude| and fat food. A doctor|physician| diagnosed gastritis with secretor insufficiency in the phase of indemnification|compensation|. The doctor gave dietetics recommendations. What food is necessary included in his ration?

1. \*Soups with meat|fleshes| and fish|fish| broth
2. Milk
3. Fats of animal origin
4. Fishes|fish| can foods
5. Vegetable oil

150. A patient complains on pain|anguish| in joints. Anamnesis; a patient gives|returns| like meat|flesh| and fat food. His diagnosis is gout. What products or diet are recommended to the patient?

1. Meat|flesh| of youths animals and birds
2. \*Milk and vegetable diet
3. Liver|
4. Bobs|beans|
5. Fats of animal

151.For organization of health resort nutrition|nourishment| for persons which suffered during Chernobyl catastrophe|disaster|, nutrients must be included, which are competitors with radionuclides| and prevent their absorption in a gastrointestinal tract. What are these nutrients?

1. Oil soluble |vitamins, animal proteins
2. Iron, zinc, unprotective| carbonhydratess
3. Vegetable oil, food fibers
4. \*Potassium (K), calcium (Ca). Food fibers
5. Magnesium. Phosphorus. Vegetable proteins

152. A woman is 55 years old. She has pulmonary dyspnea during walking. Her stature|height| is 159 sm|q.v.|, weight77 kg .She sit all her workday, and the method of her life is not mobile, without the physical activity. Feeds regularly: on breakfast of porridge, tea or coffee with open sandwiches; dinner in restaurant\_- always consists from three dishes; the supper in home hot dish and tea with cake. She like sweet. What diet must recommend |physician| to the patient in her age?

A|but|. 4 times: breakfast - 35 %, second breakfast - 15 %, dinner - 35 %, supper - 15 %

B. 4 times: breakfast - 25 %, second breakfast - 15 %, dinner - 45 %, supper - 15 %

C. 4 times: breakfast - 30 %, second breakfast 10 %, dinner 35 %, supper 25 %

D. \*4 times: breakfast - 25 %, second breakfast - 15 %, dinner - 35 %, supper - 25 %

1. 4 times: breakfast - 25 %, second breakfast - 10 %, dinner - 40 %, supper - 25 %

153. The case|accident| of food poisoning was characterized|described| with the classic clinical picture|painting| of Botulism. The day before|on the eve| all patients ate borsch, chops, boiled sausage, can vegetable marrow of home preparation, jam from apricots, ice-cream. What product is the most probably caused|calls| poisoning?

1. Jam
2. Chops
3. Ice-cream
4. Boiled sausage
5. \*Can vegetable marrow of home preparation

154. The patient’s diagnosis is “atherosclerosis”. A doctor|physician| recommended a treatment, which included|switches| the dietotherapy. It was directed on removing cholesterol from an organism. What is the anti-atherosclerotic | substance?

1. Hemicelluloses |
2. Cellulose from vegetables
3. \*Pectin
4. Cellulose
5. Lignin

155. A man 60 years old. He has the pale of skin, gum’s bleeding, and petechia. Laboratory: blood НЬ-110| g/l, Er-3, 8 x1012/l, CI| - 0,9, the amount|quantity| of vitamin C in the blood serum and in day's urine is decrease. Power value of day's ration of nutrition|nourishment|, day's amount|quantity| of proteins, fats; carbohydrates are normal for a man. The content ascorbic acid is 30 mgs in a ration. What product must be included in ration?

1. \*Blackberry
2. Liver
3. Home curd
4. Baked potato
5. Carrot

156. A seaman has cheilitis, angulit,| and dry skin. Mass of body is normal|values|. How is needed to estimate|evaluates| food status of seaman?

1. Increase
2. \*Insufficient
3. Adequate
4. Usual
5. Optimum

157. Student is 20 years old. She has an acute caries. Her body mass is 55 kg. Her ration: 40 g protein, 50 g fat and insufficient amount|quantity| of calcium. What products must be in a ration?

1. Carrot
2. Meat|flesh|
3. Kidney bean
4. \*Curd
5. Honey

158.Trichanella was found during examining meat|flesh| in one of two tests of muscles from the legs of diaphragm |. Your|yours| suggestions|sentences| in relation to the use|utillizing| of this meat|flesh|:

1. To freeze to –12 0 C
2. To burn
3. To boil thoroughly at 1,5 atm presser|.
4. To salt in a 10% solution salt
5. \*Technical utilization

159. The patient has urate| diathesis and signs of hypovitaminosis| A. The vegetable diet was recommended: onion, a pepper is red sweet, lettuce; a pea is green, carrot. What from the products is|appears| the basic|main| source|spring| of carotin?

1. \*Carrot
2. A pepper is red sweet
3. Lettuce
4. A pea is green
5. A onion

160. A woman is 23 years old. She is accountant. Her diet: proteins: fats: carbohydrates \_- 1:1,1:5,6. What correction| is necessary in the ration?

1. To multiply maintenance of fats
2. \*To decrease the amount|quantity| of carbohydrates
3. To multiply maintenance of albumens
4. The correction is not needed
5. To increase the amount|quantity| of carbohydrates

161. A man has “geographical tong”|tongue|. These symptoms say about insufficient of |nourishment|:

1. Vitamin of À
2. \*Vitamins of group B
3. Vitamin of C
4. Vitamin of Ä
5. Vitamin of РР|

162. The children|kids| began to complaint about nausea, vomiting, and small pain|anguish| in epigastria in 45 hours after dinner at boarding school. Children|kids| ate potato soup with meat broth, pancakes|blins| with meat|flesh|, fruit compote from fruit on dinner |. Pancakes|blins| were with boiled meat|flesh|, which was mince on a meat grinder by the cooker, which suffers by a panaritium, and heat treatment was not added. What is diagnosis in this case?

1. Aflotoxicosis|
2. Botulism
3. Salmonelesis|
4. Esherichiosis|
5. \*Staphylococcus intoxication

163. During of medical examination the doctor has paid attention to student (stature is 162 cm and weight is 59 kg), He complained of lost ability to legible vision of surrounding subjects at evening time. Xeroderma, hyperkeratosis is observed. Such contents of main vitamins as vitamin A - 0,5 mg, vitamin В1-2, 0 mg, vitamin B2 -2,5 mg, vitamin B6 -2 mg, vitamin C - 70 mg are detected in his daily menu. Define the diagnosis of disease.

А. В1 - hypovitaminosis

В. В2 - hypovitaminosis

C. В6 - hypovitaminosis

\*D. A - hypovitaminosis

Е. C - hypovitaminosis

|

164. A 35-years-old woman has diagnosis: alimentary-constitutional obesity of ІІІ stage. The patient does not observe the rules of balanced diet: frequently overeats, last meal is held 10-15 minutes before sleep, prefers food rich in fat and carbohydrates. What of listed nutritional risk factors is the main for obesity?

\*А. Energy excessive of nutrition

В. Increased use of carbohydrates

С. Increased use of fats

D. Insufficiency use of cellulose

Е. Disorder of nutrition regime

165. A case of alimentary bacterial poisoning took place on July 20 in a family after the use of fried cutlets from veal (calf was sick within a week and killed without veterinary permission). Main symptoms of disease are an incubation interval 12-16 hours, high temperature, strong pains in area of stomach, vomiting, frequent liquid stool, weakness, headache. The most probable agent of the given poisoning is:

А. Enterotoxigenic staphylococci

В. Pathogenic serotypes of E. coli

D. Cl. botulinum

\*С. Salmonella

Е. Bacteria of sort Proteus

166. Two children (age 4 and 6 years) |kids| are hospitalized from one family with complaints about nausea, | vomiting, and frequent liquid defecating. The disease began soon|before long| after the use of potato, which cooked in peel. Examination of the potato used in food by family discovered|revealed| much germinating and green potato. The most credible|probable| causal factor of poisoning:

1. Fagin|
2. Fazin|
3. Amygdalin|
4. \*Solanin
5. Hydrocyanic acid

167. |well-dish| Vomiting, diarrhea, thirst, cramps, | pain|anguish| in area of liver, icterus, somnolence, multiplying a liver, oliguria| were in a patient after eating mushrooms. Death was on the third days at the phenomena of cardiac|hearty,kind| insufficiency. Define a mushroom.

1. Champignon
2. \*Amanita phalloides
3. Fly-agaric
4. Woolly milk cap|
5. Morels

168. A patient has an irregular feed|nourishment|. He has decline|lowering| of capacity, sharp sense|feeling,sentiment| of hunger and fatigue, periodic headache|leading||anguishs|. What interval|space| between the receptions food a doctor|physician| must recommend to him?

1. 6 – 7 hour
2. 5 – 6 hour
3. \*3 – 4 hour
4. 7 – 8 hour
5. 8 – 9 hour

169. There was the flash of food poisoning with the clinical picture|painting| of food toxicoinfection in town X|by|. |. What factor is necessary founded in the selected food?

1. \*Microbial contamination|
2. Eksotoxin|
3. Aflotoxin|
4. Solanine
5. Muscarine

170.The flash of food poisoning is registered. Diagnosis "Botulism" is set on the basis of clinical picture|painting| of disease. What from products is necessary took for the analysis for confirmation of diagnosis?

1. Cabbage
2. Potato
3. Milk is pasteurized
4. Meat|flesh| is boiled
5. \*Can foods

171. The home flash of the food poisoning was with symptoms of gastroenteritis and intoxications in May. What is the reason of the poisoning|, if such products were included in day's ration of family members: macaronis, germinating and green potato, cabbage, beet, carrot, vegetable oil, tea, sugar?

1. \*Solanine
2. Fazin|
3. Temulin|
4. Muscarine
5. Muscaridin|

172. A patient ate canned mushrooms three days ago |. He has disorder of vision (diplopia, mydriasis|), disorder of speech, violations of swallowing |noted|. What food poisoning takes place?

1. Poisoning of mushrooms |
2. Food toxicoinfection |
3. Fuzariotoxicosis|
4. \* Botulism
5. Poisoning by salts of lead

173. |maintains| The ration of adult man: 30g of protein, 37 g of fat, 137 g of carbohydrates, 15 mgs of vitamin C, 0,6 mgs of Thiamin| (B1). A ration is not balanced on:

1. Protein
2. \* Vitamin C
3. Fat
4. Carbohydrates
5. Thiamin |

174. This is discovered|revealed| at the analysis of student’s diet in a sanatorium-preventive clinic: calorie content of breakfast is 40 % daily caloric|, dinner – 40% and supper 20 %. What must be done for hygienical optimization of student’s diet |enumerated|?

A|but|. \*Decrease calorie content of breakfast

B. Decrease calorie content of supper

C. Decrease calorie content of dinner

D. Increase calorie content of supper

E. Increase calorie content of breakfast

175. A patient is on stationary treatment with a diagnosis: Acute Cholecystitis. His feeding irregularly, he gives|returns| advantage to fat and carbohydrate food uses the sharp seasonings. What from |enumerated| foods is forbidden to use to the patient?

A. Nonfat types of fish

B. Soups

C. Omelette

D. Sweet fruit juices

E. \*Biscuit

176. During laboratory diagnostics of group flash of "Botulism" in the town N, |oddments| botulinic toxin is | exposed as type E in product and biological material|fabric| from patients. What product is prepared with violation of hygienic rules?

1. Vegetable
2. Meat|flesh| and meats|fleshes| products
3. \*Fish| and fish products |
4. Bird and chicken|
5. Cake

177. A patient is on stationary treatment with a diagnosis: Acute pancreatitis. A doctor|physician| allowed to the patient to eat on the third day after hunger regime:

A. Milk

B. Soup from chicken meat|flesh|

C. Chops

D. \* Alkaline mineral water without gas

E. Vine juice

178. The clinical urine examination found increase amount of calcium salts of phosphoric acid. The patient’s food|its| ration: rye and wheat bread, macaroons, vegetable oil and butter|oil|, mashed potatoes, milk, curd, coffee, tea, decoction of wild rose, kissel. The caloric of food corresponds to the daily energy allowance|. What needs to be limited in a ration?

1. Kissel
2. \*Milk and curd
3. Macaroons and bread
4. Decoction of wild rose and kissel
5. Coffee and tea

179. A woman is 60 years old with normal mass of body. She gets|receives| with day's ration: 50 g of protein, 70 g of fat, and 300 g of carbohydrates. Grain products|, enough green-vegetable, but limited amounts|quantity| of milk and dairy products, in spring sorrel and pie plant prevail in a ration |rhubarb|. What disease can develop?

1. \*Osteoporosis
2. Atherosclerosis
3. Obesities
4. Hypertensive illness

E. Urolithiasis

180. The analysis of day's set of products is conducted in child's preschool establishment. Menu|logins|: milk, butter|oil|, meat|flesh|, mushrooms, fish. By what from the transferred|enumerated| products is it necessary to withdraw from menu of child's preschool establishment?

1. \*Mushrooms
2. Fish|
3. Meat|flesh|
4. Butter
5. Milk

181. What criteria is the following complex of signs|appears|: size| of body and organs, mass, ossification| of skeleton, tooth development, development of endocrine glands, degree of pubescence?

1. Food status
2. \*Biological age
3. Genetic development
4. Psychical development
5. Sexual development

182. What vitamin is deficient, if present such complaints as rapid|quick,fast| fatigue, a bad appetite, constipations, polyneuritis|. The patient eats white bread, macaronis wares, refined sugar, polished rice and others like that.

1. Caciferols
2. Riboflavin
3. Retinol
4. \* Thiamin | |
5. Nicotine acid

183. Food | toxicoinfection can be caused|called| by a presence in food products:

1. Dysentery|
2. Staphylococcus
3. Choleric vibrion
4. Botulism
5. \*Proteus |

184. A 5-years-old boy was hospitalized with symptoms: increased sweating, hypersalivation, lacrimation, profuse diarrhea, cerebral disorders, dizziness, confusion of consciousness, excitation, delirium, hallucination, gait of drunk man. The child gathered mushrooms in a wood together with his parents the day before|on the eve|. What is the reason of alimentary poisoning?

\*А. Fly agarics

B. Cep

С. False honey agarics

D. Belladonna

Е. Amanita phalloides

185. In 1 hour after feeding a baby by diary mixture there were followings symptoms of disease in a child: cyanosis of lips & mucous membranes, nails, face, nausea, hypersalivation, pain in abdomen, vomiting, diarrhea. A pediatrist has revealed symptoms of cardiac and pulmonary insufficiency. The diary mixture was prepared with water taken from well. What is diagnosis?

\*A. Nitrate-nitrite intoxication

B. Alimentary toxic infection

C. Staphylococcal toxicosis

D. Alimentary poisoning by chlorine-organic pesticides

E. Alimentary poisoning with heavy metals

186. Physical examination of drivers (men): 10 % persons have increase of optimum body mass on 65 %. (IMB is 39,3 kg/m2 of body mass). What energy status persons have?

1. Obesity of 4th degree
2. Normal energy status (adequate feed|nourishment|)
3. Obesity of 1st degree
4. Obesity of 2nd degree
5. \*Obesity of 3d degree

187. As a result of deep physical examination of military school students found out persons with the destroy of night vision, conjunctivitis, dryness and decorticating of skin, pigmentation and fragility of nails, cornification of skin in area of elbows and knee joints. What food product must be increase in food ration of students?

1. Meat|flesh|
2. Grain|cereals|
3. \*Liver
4. Fish|
5. Bread from bran

188. Patient A|but| is on stationary treatment concerning a urolithiasis (oxaluria|) in the phase of aggravation. What products need to be fully excluded from the ration of patient?

1. Vegetable oil|oil|
2. Brown bread
3. Vegetable soups
4. Boiled meat|flesh|
5. \*Chocolate

189. During investigation of the food poisoning a diagnosis is set: food toxicoinfection caused|called| by a parahemolytic| vibrio. What from the transferred|enumerated| products and food can be the most |probable| reason|cause| of this poisoning?

1. Pasteurized milk
2. \*Sea products |
3. Sausage |
4. Can mushrooms
5. Vine|grape|

190. The patient С. is hospitalized in treatment-and-prophylactic establishment with the diagnosis “diphyllobotriasis”. A reason of disease is the usage food, which is not enough thermally treated:

А. Pork

В. Mutton

\*С. Fish

D. Beef

Е. Chicken

191. A patient М. has disorder of purine metabolism, which manifested with acute arthritis of first interphalangeal joint. Give the most optimal recommendations for the patient’s diet.

A. \*To limit the usage of meats|fleshes| and bobs|beans| products

B. To limit the usage of dairy products

C. To limit the usage of free liquid

D. To limit the usage of bakeries and macaronis wares

E. To limit the usage of vegetables and fruit

192. On a diary farm the tests of milk were selected for examination of maintenance chlorine-organic pesticide (lindan)|. In a toxicological laboratory was found, that the maintenance of lindan exceeded MPK| in 4 times. Give a conclusion|inference,withdrawal| about quality of milk.

1. Falsified
2. Good quality
3. Conditionally suitable
4. \*Bad quality
5. Biologically valuable product

193. A patient is hospitalized in treatment and| prophylactic establishment with diagnosis “Trichinellosis”. |appears| The usage of what product with insufficient culinary treatment is a reason|cause| of this disease?

1. \*Pork
2. Fish|
3. Mutton
4. Beef
5. Chicken

195**.** The test of milk was done in laboratory. Following results are got: color - whitish, smell - without peculiarities, taste - characteristic for milk, density - 1,038, acidity – 350 Terner, fat - 3,2 %. Define a degree of quality of milk.

\*А. Milk is bad quality

B. Milk is good quality

С. Milk is of the reduced quality

D. Milk is adulterated

Е. Milk is conditional - suitable

196. During the laboratory research of maintenance of radionuclides| (caesium-137, strontium-90) in milk and potato from local farm, the increase MPC of caesium-137 in milk was found out. What from the technological receptions with the purpose of diminishing of radionuclides’ maintenance in milk is the most effective?

1. Processing of milk on soft|mild| cheese
2. Pasteurization of milk
3. \*Processing of milk on the boiled butter
4. Processing of milk on hard cheese
5. Processing of milk on sour cream

197. Trichinellae are revealed in microscopy of pork in 24 sections. The meat must be subjected:

\*А. Technical utilization

В. Boiling by small pieces

С. Strong freezing

D. Processing on sausage products

Е. Realization through the network of public catering

198. At the restaurant the food products|productions| was not realized during a supper. It was became cool for 4,0 0С| and it|it| was saved in a refrigerator during|for| 12 hours. The second|secondary| thermal treatment was conducted in the morning. What period food must be realized?

1. \*1 hour
2. 3 hour
3. 5 hour
4. 8 hour
5. 12 hour

199. At the analysis of milk freshness a test on reductase| and on a capacity for settling. What from the resulted indexes say about freshness of milk?

1. Density
2. \*Acidity
3. Dry rest|remainder|
4. Fat
5. Table of contents of extraneous signs

200. 20 cows with positive tubercular reaction were revealed during veterinary inspection at a cattle-farm. Define possibility of milk usage from such animal:

\*A. Usage for meal after pasteurization at temperature 850C during 30 minutes

B. Usage for meal without preliminary processing without limitations

C. Usage for feeding of animals

D. Technical utilization

E. Destruction