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**DEPARTMENT OF GENERAL HYGIENE
AND PHYSICAL CULTURE**

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FOOD POISONINGS AND THEIR PREVENTION

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Methodical manual for medical students

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This training manual contains material that reflects modern hygienic ideas about food poisoning and their prevention. The data on the classification of food poisoning, on the characteristics of the occurrence, epidemiology, and clinical manifestations of food poisoning of both microbial and non-microbial etiology are presented. Information on the consequences of the ingestion of foreign chemicals is provided.

The manual is supplied with tables, test items, a list of basic and recommended additional literature to facilitate the assimilation of the material.

The methodological manual "Food poisoning and their prevention", prepared according to the discipline "Hygiene" in accordance with the Federal State Educational Standard of Higher Professional Education for students studying in the specialty Medicine (31.05.01).

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Food poisonings - mainly sharp diseases resulting from consumption of food, massivno obsemenenny microorganisms or the microbic and not microbic nature containing toxic substances.

Alcoholic intoxication, poisoning for the purpose of murder or suicide, food allergies, poisonings owing to excess receipt in an organism of vitamins and medicinal substances do not belong to food poisonings

Modern classification divides food poisonings into 3 groups:

- Microbic origin (up to 95% of all cases);
- Not microbic origin;
- Not specified etiologies.

Common features of food poisonings of microbic origin are:

- the sudden beginning against the background of full health;

- unlike intestinal infections, the short incubatory period (estimated for hours);

- mass character;

- communication with meal;

absence contageousness - are not transferred from the sick person to healthy, have only a food way of transfer.

Classification of food poisonings

Nosological form	Etiologichesky factor
I. Microbic poisonings	
Toksikoinfektion	Opportunistic microorganisms *Proteusmirabilisw vulgaris,* enteropatogenny, entero-invasive *E. soy, Bac.cereus, Cl. perfringensrma* A, *Sir. faecalisvar. hquefaciensw zymogenes, Vibrioparahaemolyicus,* other poorly studied bacteria *(Citrobacter, Hafnia. Klebsiella, Edwardsiella, Pseudomonas. Aeromonasvi* other)
Toxicoses	
Bacterial	The bacterial toxins produced *Staphylococcus aureus* and *Cl. botulinum.*
Mikotoksikoza	Mycotoxins, developed microscopic mushrooms of childbirth *Aspergillus. Fusarium, Penicilhum. Clavicepspurpureaa* other.
H. Not microbic poisonings	
Poisoning poisonous fabrics of plants	Wild-growing plants (a henbane, a dope, boligol, the belladonna, milestones poisonous, akonit, elder, etc.); seeds of weeds, cereals sacktour (Sophora, trikhodesma, heliotrope and dr). Poisonous mushrooms (pale toadstool, fly agaric, devilish mushroom, etc.); conditionally edible fungi which are not subjected to the correct culinary processing (a milk mushroom, a coral milky cap, valuy, morels and DR)
Poisoning poisonous tissues of animals	Bodies of some fishes (marinka, man with a big mustache, Sevan hromulya, iglobryukh, etc.)
Poisoning with fabrics of plants poisonous under certain conditions	The kernels of kostochkovy fruits (a peach, apricots, cherry, almonds) containing amigdalin; nuts (a beech, a tung tree, ritsinin), the sprouted (green) potatoes containing solanin; the beans of crude haricot containing fazin
Poisoning with tissues of animals poisonous under certain conditions	The fish containing saksitoksin, siguaterotoksin, biogenous amines; a liver, calves and milk of some species of fish during the period spawning (burbot, pike, mackerel, etc.); honey bee when collecting by bees of nectar from poisonous plants
Poisonings with impurity of chemicals	Nitrates, biphenyls, pesticides; salts of heavy metals and arsenic; the nutritional supplements entered in the quantities exceeding admissible; the connections migrating in foodstuff from the equipment, stock, a container, packing materials; other chemical impurity
III. Unspecified etiology	
Alimentary paroksizmalno-toxic mioglobinuriya (Gaffskaya, Yuksovskaya, Sartlandskaya disease)	Lake fish of some regions of the world in separate years

I. Microbic food poisonings

Food toksikoinfektion (PTI)

PTI activators are potential and pathogenic microorganisms. These are widespread microbes in the environment, being frequent inhabitants of digestive tract of the person and animals (colibacillus, proteas, an enterokokka, pathogenic galofilny microorganisms, some sporoobrazuyushchy bacteria, etc.). Poisonings with these microorganisms arise only in the presence of favorable conditions:

- Contents in products of a large number of microbes of certain strains (serotypes) - takes place at gross violations of rules of storage, preparation and terms of realization of ready dishes. Any microorganisms at their reproduction in products to high level can be the cause of PTI.
- Decrease resistance human body under the influence of various diseases, violations of food (starvation, overeating, etc.), heavy physical activity, intoxications, etc. At the same time against the background of a snizhaorganism resilience niya arises carrytelny increase in pathogenicity microorganisms.

In foodstuff of a bacterium gets from allocations of the person or animals in the course of production, storage, transportation and realization of a product and also owing to insanitation of catering department. Increase in cases of diseases is noted in summertime of year.

Clinical picture PTI is quite often similar: incubatory the period (3-12 hours), the gastroenteritis phenomena, skhvatkoobrazny pains in epigastralny areas, vomiting, liquid repeated chair with slime impurity, are more rare than blood, subfebrilny temperature. Duration of a disease is more often than 1 - 3 day. Exact diagnosis is possible only on the basis of laboratory data.

Prevention of food toksikoinfektion - is based on diverse actions which can be united in 3 main groups:

The actions directed to prevention of infection foodstuff and food PTI activators:

• identification of carriers of pathogenic forms intestinal paslochka, protea and other conditionalpathogenic flora and timely treatment of workers, patients kolikobakterialny diseases;

• identification of obsemenenny raw materials and sterilization of spices;

• observance of rules of machining of products;

• exception of contact of raw materials and finished goods;

• strict observance of rules of personal hygiene and sanitary mode of the food enterprise;

• disinfection of the equipment and stock, fight against insects and rodents.

1. The actions aimed at providing the conditions excluding massive reproduction of microorganisms in products:

• storage of products and ready food in cold (at a temperature below 6 °C);

• realization of ready food (the first and second courses) at a temperature over 60°C, cold appetizers - it is below 14 °C;

• strict observance of terms of product sales; storage and realization of canned food according to rules.

2. Sufficient heat treatment of foodstuff for the purpose of destruction of microorganisms:

• neutralization of conditional and suitable products according to rules:

• sufficient thermal treatment of products and culinary products (before achievement 80°C in a product).

Food toxicoses

• Treat food toxicoses bakteriotoksikoza and mikotoksikoza. In pathogenesis of toxicoses major importance has receipt in a human body as a part of food of the toxins steady against effect of gastric secretion.

Bakteriotoksikoza

• *Botulism* - the serious food poisoning arising at consumption of the food supporting CI.Botulirium. The name comes from armor."botulus" what is meant by "sausage" as poisoning cases at the beginning of the 19th century in Germany at consumption of liverny and blood sausages are for the first time described.

• Causative agents of botulism are widespread in the nature. Vegetative forms and disputes are found in intestines various house and in particular wild animals, waterfowl, fishes. Getting to the external environment (the soil, silt of lakes and rivers), they in sporogenous state it is long remain and collect. Practically all foodstuff polluted by the soil or contents of intestines of animals, birds, fishes may contain disputes or vegetative forms of causative agents of botulism.

• CI.Botulirium - the anaerobic microorganism producing the toxins surpassing other toxins in force. Favorable anaerobic conditions for its reproduction are created in hermetic cans. In the past poisoning Cl.Botulinum it was observed at consumption of thick sausages, salty fish. Now poisonings arise at consumption of preserved foods of house preparation (can mushrooms, marrow caviar, sun-dried fish, gammon) more often.

• Distinguish 7 serological types Cl.Bolulinum (A, B.C,D,E,F,Y). Use of polyvalent and specific serums, especially at early introduction, allows to reduce considerably lethality (on average 20%).

• In spread of botulism the extremely important role belongs to sporoobrazuyushchy properties of the activator and high stability a dispute. They can maintain boiling during several hours. Final fracture a dispute requires heating at 100°C within 5-6 hours. Disputes also are steady against low temperatures, and against usual methods of conservation of foodstuff: to a pickles, smoking, etc. Germination a dispute high concentrations of table salt, sugar and acidic environment detain.

Optimum temperature for accumulation botulotoksina 20 is°C most intensively - at 37 °C. Botulotoksin it can be formed in any products of an animal and a phytogenesis which are exposed to long storage.

The major factor used in fight against botulism is the instability of toxin to high temperature. So, heating in the liquid environment inactivates toxins at 100°C in 15 minutes. Heating time (up to 50-60 min.) increases depending on product thickness.

Botulinum toxin is steady against low temperatures (at-79°C within two months) and high concentration NaCl.

It is established that botulinum toxin strongly communicates nervous cages. At the same time also the nervous terminations are surprised and motor-neurons forward horns of a spinal cord.

Botulotoksin influences holinergchesky parts of the nervous system, owing to what neuromuscular transmission of vozbuzhdeniye (paresis, paralyzes) is broken. In the first eyesred the innervation of muscles is broken eyesdvigatelnoho deviceand, muscles drinks and throats). Result of defeat motor-neurons is as well oppression of function of the main respiratory muscles, up to paralysis.

The incubatory period at botulism proceeds about one days, up to 2-3 days more rare, seldom to 9 and even 12 days. The incubatory period is shorter, the extent of defeat is heavier.

The most typical early symptoms of botulism are violations of visual acuity, dryness in a mouth and muscle weakness. Patients complain of "fog in eyes", "a grid before eyes", badly distinguish nearby objects, cannot read at first a usual font, and then - large. There is a doubling in eyes. Develops ptoz (omission of an upper eyelid) various degree of expressiveness. Height and a timbre of a voice change, the twang is sometimes noted. When progressing a disease the voice becomes hoarse, the hoarseness can pass into an aphonia. In initial stage of a disease the short-term phenomena of a sharp gastroenteritis are noted.

Quite typical symptom of botulism is the Nswallowing arusheniye. Appear oshchushcheniye of a foreign matter in a drink, swallowing difficulty in the beginning firm, and then and liquid write, waters. In hard cases comes full afagiya. In attempt to swallow water, the last pours out through a nose. In this period it is possible aspiration write, waters, saliva with development of aspiration pneumonia, purulent trakheobronkhit.

Important symptoms are violation of a salivation (dryness in a mouth), the progressing weakness, a resistant lock.

Duration of a disease is 4-8 days. Death comes usually from paralysis of the centers of breath or heart. Early use of polyvalent protivobotulinichesky serum sharply reduces lethality.

Prevention of botulism:

1. Strict sanitary inspection on fisheries; use of refrigeration units for fast freezing of fish; fast removal of an interiory fishes.

2. Strict observance of the mode of sterilization of canning production and selection bombazhny cans.

Measuresy individual prevention botulism:

- to eat canned food of industrial preparation or canned food of high qualities independently prepared in house conditions.

- strict observance of production requirements at production of home-made sausages, sun-dried and salty fish;

- not to buy preserved foods from strangers, which origin is not known to you.

- fish after a catch needs to be drawn, washed out quickly flowing water and to store in cold conditions;

- vegetableand, fruit, berries and mushrooms have to be well washed from earth particles;

- it is inadmissible to preserve the vegetables long ago removed, spoiled, fruit, berries and mushrooms,

- addition of acetic acid in canned food with low acidity;

- before consumption of preserved foods it is better to boil them within 20-25 minutes (botulism toxin during this time decays);

- before вскрытие^ banks with canned food need to be examined - at development of the causative agent of botulism in them inflation of a bottom and cover of cans is noted (bombazh).

Staphylococcal bakteriotoksikoza - Activators are enterotoksigennys Staphylococcus strains aureus. Sources of distribution are:

1. The milk received from the cows sick with mastitis.

2. Personnel of the food enterprises with diseases of a piodermiya, furunkulezy, etc. pustulous diseases. The aerogenic way of transmission of infection at the sharp catarrhal phenomena in a nasopharynx by means of porridges is also possiblela, sneezing.

Main foodstuff, being the favorable environment for reproduction of staphylococcus and formation of toxin: dairy products, creams, cakes, ice cream, meat farsh. Withtafilokokk are steady against high concentrations of sugar, salt. The incubatory period - 2-4 hours. Main symptoms: vomiting (repeated), diarrhea (seldom), general weakness, dizziness, decline of warm activity.

Prevention.

Careful veterinary sanitary inspection for animals on purpose identifications bolny; providing sanitary, the mode when receiving milk; control for lethal cattle, slaughter processes, obrabot hulks and examinationsand meat.

2. Providing the high sanitary security in the course of production of foodstuff at the enterprises of the food industry: milk plants, meat - fish factories, etc.

3. Strict implementation of health regulations of technology izgotovleniye of foodstuff and dishes not exposed to repeated thermal treatment.

4. Constant observance of the sanitary mode on a food object: storage of products and ready food in cold separately from raw materials and semi-finished products, strict observance of established periods of realization of products, transportations of products in to special container and on to speptransporta, obligatory observance of rules of production and personal hygiene.

5. Timely identification among workers of food objects of carriers of pathogenic bacteria and their sanitation.

6. Intensive repeated thermal treatment before the use.

Mikotoksikoza

Mikotoksikoza - alimentary diseases, aboutagreed consumption products solepzhanshkh mycotoxins — toxins of microscopic mushrooms (pleseny).

To distribution mycotoxins in foodstuff promote humidity and temperature. Almost all vegetable products can to a slto live a substratum for growth of mushrooms and the subsequent education by them mycotoxins. Selskokhothe zyaystvenny animals consuming polluted mycotoxins forages, are also exposed to direct toxic action. Besides, toxins at the same time get to milk and meat, creating an additional way of impact on the person. Also other ways of influence, for example,

under production conditions — through air are possible.

Mycotoxins are highly toxic, many of them possess mutagen, teratogenny and cancerogenic properties. More than 250 species of the microscopic mushrooms producing about 100 toxic metabolites causing alimentary toxicoses in the person and animals are known. To to mikotoksikoza belong: ergotizm, fuzariotoksikoz and aflatoksikoz.

Ergotizm (angry posing, "Saint Anthony's fire") - the disease developing as a result of consumption of products from the grain containing an ergot. The ergot represents sklerotion of a microscopic fungus Claviccps purpurea, which strikes mainly ears of a rye, wheat and barley. Toxic action is caused by existence of a number of alkaloids - ergotamine, an ergotoksina, etc., possessing adrenalinopodobny action. The use of grain products from the grain containing an ergot causes poisoning an ergotizm. Ergotizm can proceed in convulsive or gangrenous forms.

Convulsive (convulsive) fthe orma of an ergotizm is characterized by defeat of nervous system, with: display of tonic spasms of various muscular groups. In hard cases hallucinations and disorders of consciousness are observed. Withabout sides of digestive tract - nausea, vomiting, gripes.

Gangrenous fthe orma is characterized defeatI eat neurovascular device. It is shown by cyanosis, severe pains in the lower extremities. In hard cases of an ergotizm gangrene with the necrosis phenomenon develops.

Now the disease practically does not meet in connection with careful purification of grain of an ergot which content in flour according to the sanitary legislation of the Russian Federation should not exceed 0,05 %. However under certain conditions there can be separate flashes of an ergotizm. For example, in 1981 — 1982 and the central Africa after a three-year drought, a crop failure and hunger the population used in I write the barley struck with ergot sklerotion.

Fuzariotoksikoza. To to fuzariotoksikoza belong:

1) alimentary and toxic aleykiya;

2) poisoning with "drunk bread".

Alimentary and toxic aleykiya or septic andthe ngina is a serious illness,

developing as a result of grain consumption, perezimovavshy in the field, at the expense of intensive infection with microscopic mushrooms from a sort Fusarium, forming toxic substances.

The haematogenic bodies are surprised, develops aleykiya. An early indicator of a disease – blood change. Myeloid and lymphoid tissues of marrow up to complete cessation are surprised krvoyetvoreniye.

The main symptomy diseases: necrotic processes in tonsils, a back wall of a throat; polymorphic hemorrhagic rash; baboutleznenny bubbles on skin, small serous and bloody bubbles on a mucous membrane of a mouth and language.

Only measure of prevention alimentary and toxic aleykiya prevention of use is for food rewintering in the field of grain.

Poisoning with "drunk bread" - results from use in food products IS the grain struck with a microscopic fungus Fusarium graminearum. The mushroom develops on cereals during growth and also in granaries, especially at rainy weather, when moistening and molding grains.

The clinical picture of poisoning is similar with picture of alcoholic intoxication excitement, euphoriaI (laughter, singing), incoordination of movements. Excitement is replaced by a depression and breakdown. Can to be preciselythat, vomiting, diarrhea. Long use of the struck grain can to bring to development of anemia and mentallyx frustration.

Aflatoksikoza - the poisonings caused aflatoxins, which are formed by microscopic fungi of a sort Aspergillus Flavus. Aflatoxins possess the strongest hepatotoxic and gepatokantserogenny action.

Development of mushrooms and producing aflatoxins most often occurs in nuts of peanut and groundnut meal. They come to light in a number of cereals (wheat, a rye, barley, corn, rice) and also in bean and oil-bearing crops, grains coffee, milk, meat, eggs, etc.

At to aflatoksikoza cirrhosis and primary cancer of a liver develops, at a sharp current the necrosis and fatty infiltration of a liver is possible. It is observed neurointoxication, damage of kidneys, gemorragiya, ascites, diarrhea.

Prevention:

- Aboutbrabotka of fields fungicides;

- Careful harvesting;

- Bookmark on storage of the dried grain, beans and nuts and providing storage conditions, preventing moistening and molding product;

- Use in food of products from good-quality (without mold) raw materials, the ban on use in food of the grain rewintering in the field;

- Sanitary examination of the suspicious grain (which is late removed from fields damp, mouldy) on contents mycotoxins

- Sanitary education of the population about the risks caused by a mouldy product and a forage for animals.

II. Not microbic food poisonings and their prevention.

Treat food poisonings of not microbic nature: poisonings with products, poisonous by the nature, poisonings with products, poisonous under certain conditions and poisonings with impurity of chemicals.

Food poisonings products, poisonous by the nature

Products of plant origin - in this group zabolevaniye include poisonings gribam and wild-growing plants.

Poisonings with mushrooms. Distinguish a little raznykh types of poisonings:

- poisonous gribam;

- conditionally edible grthe iba which did not pass due culinary processings and therefore kept toxins;

- the substandard products infected with pathogenic flora;

- the good-quality mushrooms which grew on the soil polluted by poisonous substances.

Now there are about 80 species of poisonous mushrooms, and many from edible fungi have poisonous doubles (false honey agarics, slippery jacks, etc.) Most often food poisonings a pale toadstool, lines meet; more rare - fly agarics, false honey agarics.

Lines - spring mushrooms (April-May) belong to conditionally edible fungi.

After 15 minutes of boiling and removal of water lines are harmless. Incubatory period 8-10 hours. Them toksIna possess hemolytic and hepatotrophic action, are capable to kumulirovatsya in an organism. The main symptoms - nausea, vomiting, pains in crude turpentines, development of jaundice. Lethality is up to 30%.

Pale toadstool (lethality - 50% and more) Toxins possess hepatotrophic and neyrotropny properties. Incubatory period – 10-12 hours, gastrointestinal break rapid developmentthe eniye accepting holeropodobny character, are followed by unrestrained vomiting, ponosy, organism dehydration. In the subsequent jaundice, an anury, coma and a lethal outcome develops.

Fly agaric *(Amanita muscaria)* contains alkaloids muskarin and mikoatropin, rendering neurotoxic (holinergichesky) action. Poisoning comes in 1-4 hours. Symptoms: salivation, vomiting, diarrhea, narrowing of pupils, hallucinations, nonsense, spasms, coma, flewnost 2- 3%.

Prevention of poisonings with mushrooms - explanation to the population about poisonous properties inedible mushrooms, sortirovkand by types with participation opytnoyu spetsiatist.

Poisoning with poisonous plants.

1) Nicotinosimilar syndrome. Milestones poisonous *(Cicula virosa L):* root contains tsikutoksy Spotty Boligolov *(Conium maculatum*): the root, leaves, fruits contain alkaloid koniin.

Symptoms: obmorochny state, gnashing by teeth, cyanosis, the complicated breath, salivation with blood, spasms, lowering of blood pressure. In 1,5-3 hours breath paralysis, toxic gastroenetrit.

2) Atropinopodobny syndrome. Black henbane *(Hyoscyamus niger L),* dope *(Datura stramonium L.)* and belladonna *(Atropa belladonna L.)* (this. *Selanaceae):* leaves, root, seeds, berries contain tropane alkaloids: atropine, giostsiamin, skopolamin, blocking parasympathetic nerves. Symptoms: dryness in a mouth, a hoarse voice, hyperaemia, expansion pupils, excitement, concern, confusion of consciousness, nonsense, visual hallucinations, paresis and paralyzes, withypdrunk gait, the increased temperature, spontaneous urination and defecation.

Withpetsfichesky complication of poisonings with atropine - trophic violations in a look hypostases undertoozhny kletchatkand, persons, in forearms and shins. Death in the 1st days from paralysis breath. At youzdorovleniya - amnesia. *Prevention:* sanitary education of the population.

Agrestal toxicoses. Heliotrope seeds *(Heliotropium lasiocarpum)* contain hepatotrophic alkaloids neuroparalytic actions - geliotropin, laziokarpin and tsinoglossin. Symptoms of geliotropny toxicosis (toxic hepatitis): 1st stage (gastroenteritis, diarrhea, gepatomegaliya, temperature normal) - up to 3 months; 2nd stage (ascites, iskhudaniye, weakness, the increased temperature) - 2-4 months; 3rd stage (hepatic coma, deadly outcome or recovery). Seeds trikhodesma gray-haired *(Trichodesma)* (alkaloids andTax CodeandNin, trikhodesmin, and - oxide inkanina). Symptoms trikhodesmotoksikOz (local encephalitis): preciselythat, vomiting, arterial blood pressure 55/80, gemoglobinemiya, bulbarny paresis. *Prevention:* use of herbicides in agriculture for destruction of weeds, sorting of sowing material, sanitary education of country people.

Poisonings with poisonous plants (henbane, Osladonna etc.) it are noted to a bowl among children, is more rare among adults.

Preventive measures include timely informationyu about poisonous plants, first of all, among children, parents and tutors of child care facilities.

Animal products. Blaasop - *(Fugu ocellatus obscurum):* liver, calves, milts, intestines, toOsh contain tetrodotoksin (LD_{50}=0,008 mg/kg), possessing neurotoxic hypotensive action. Lethality is 60% in the first days. Tetrodotoksin vyderzhivat boiling 4 hour., does not collapse when frying, it is resistant to gastric juice and bile. Fugue it is used in food only after 30-staged processing.

Are poisonous caviar and a pierki some species of fish (marinka etc.). Poisoning is similar to poisoning with a belladonna, are possible holeropodobny symptoms (vomiting, diarrhea). Marinka (*Schizothorax)* and Ottoman *(Diptychus):* are poisonous calves and peritoneum. Eels *Miraena, Anguilla, Conger,* lamprey, tench, tuna, carp: blood is poisonous.

Prevention of poisonings with fish: sanitary education of the population on

questions consumption of certain species of fish, especially during the period spawning when virulence of bodies fishes increases.

It is known also that for people dishes from glands internal se are toxickretion lethal animals (especially adrenal glands and pancreas) that, probably it is connected with existence in them of considerable concentration of substances with high biological activity. Drugy endocrine glands (testicles, thyroid gland) do not possess poisonous properties also can be used in food without restrictions.

Food poisonings products, poisonous under certain conditions.

Products of plant origin.

Food poisonings solaniny potatoes. Solanin is a part healthy potatoes, and its greatest number is in a peel. At germination of potatoes and it pozeleneniya, concentration corned beef sharply increases. The probability of poisoning solaniny increases in cases of consumption of a large number of the sprouted potatoes cooked with peel. Solanin is hemolytic poison. Poisoning is followed by nausea, vomiting, intestines dysfunction.

Food poisonings faziny crude haricot. Fazin - toksalbumin, hemagglutinating substance. Developing of poisonings is possible when using in food of bean flour and food concentrates the Disease is shown dispepticheskу phenomena of various intensity.

Food poisonings amigdaliny. Bitter almonds and kernels of kostochkovy fruits (apricots, peaches, cherries) contain amigdalin, split in a stomach of the person with formation of hydrocianic acids. 50 mg of hydrocianic acid are caused in the person by deadly poisoning. Death ongoes from breath paralysis. Cases of poisoning of people are known at use of 20-40 kernels stones of an apricot, containing 1 mg amigdalina. In mild cases poisoning is shown headache and nausea.

Application bitter almonds in confectionery production is exposed to restriction. It is limited also long insisting of kostochkovy fruits in production of alcoholic drinks. Sale stones and kernels of apricots and peaches it should not be allowed. They have to to be used thatlko for receiving oil.

Food poisonings faginy beechen nuts. Poisonings cause only crude nuts. Fried

thoroughly the nuts or nuts used in confectionery production, which are exposed thermal to processing, the danger is not constituted. Poisoning faginy head is shown pain, nauseaoh, intestines dysfunction.

Animal products.

Poisonings with poisonous tissues of fishes. Are connected mainly with consumption of caviar and milts, and also liver, getting during certain periods poisonous properties (burbot, pike, man with a big mustache, mackerel). Manifestation of toxic properties is more often connected with the spawning period and also change of plankton serving food for fishes. Poisonings are characterized by the phenomenon of sharp gastroenteritis, accepting sometimes holeropodobny current.

Poisonings with mollusks (mussels) and Crustacea are observed at massive timemultiplication of planktonic microorganisms which mussels eat Saksitoksin and its analogs collecting at the same time in mussels and crabs have neurotoxic effect that can lead to a lethal outcome during 24 h.

Poisoning with honey. Poisonous is a honey gathered by bees from poisonous plants (a rhododendron, a Labrador tea, an oleander and dr.).

Poisonings with impurity of toxic agents

The pesticides, nutritional supplements and impurity migrating and pizzas from a container, stock, the equipment belong to these substances.

Pesticides - toxic chemicals used in agriculture for pest control wide use of pesticides (toxic chemicals) made possible emergence slucht poisonings with their residual quantities in food. The food way of intake of toxic chemicals to a human body is the basic.

To destination pesticides happen:

- for destruction of insects - insecticides;
- for extermination of ticks - acaricides;
- for extermination of roundworms - nematocides;
- for destruction of mollusks - limatsida;
- for extermination of rodents - a zootsida;

- for destruction of mushrooms - fungicides;
- for destruction of bacteria - bactericides;
- for destruction of weeds - herbicides;
- for destruction of leaves - defoliants;
- for dehumidification of plants - dessikant;
- for preservation of seed grain - fumigants;
- against beating down - rotardant;
- for attraction of insects - attraktant;
- for scaring away of insects - repellents.

There are also other types of toxic chemicals. By the nature and chemical structure razlichit following toxic chemicals:

- organochlorine (HOS);
- fosfororganichesky (FOS);
- rtutyorganichesky (GREW);
- carbamates (derivatives carboamine, tio-and dithiocarboamine acids);
- cupriferous;
- tsiaN - and rodansoderzhashchy;
- fluorinated;
- karbominovy acids and their derivatives;
- derivative urea and guanidina;
- nitro - and chlorderivative phenols;
- carbohydrates, aldehydes and their derivatives;
- heterocyclic compounds.

In food remain the quantities of pesticides which received the name residual, admissible contents which ARQ (admissible residual quantity) is normalized in a look.

HOS assessment. (DDT, aldrin, lindane, tiodan, herbicide 2,4,5-T) represents special imipyust, as are highly toxic, steady in the environment and are capable to kumulirovat in fabrics fat-rich and lipoidam. HOS change excitability of nervous

cages, damaging motor nervous ways, and at higher concentrations touch neurons; strike inrinkhimatozny bodies (liver, kidneys), block dykhatelny enzymes of cages. They can be allocated with milk of animals and nursing mothers, eating the products polluted by HOS.

Clinic of poisoning: nausea, vomiting, pains in the top part of a stomach, the general weakness, nakedspinning, nervousness, insomnia. At sharp poisonings prevail symptoms from nervous system, and at chronic - with withtorona of parenchymatous bodies (liver, kidneys).

FOS assessment. It octamethyl, metadion, metilmorkaptofos, carbophos, hlorofos, etc. They are highly effective as insecticides, are rather quickly inactivated in the environment, have low toxicity and therefore are very perspective. It is applied most widely. Fosfororganichesky connections (FOS) selectively inhibit to atsetilkholinesterach. what leads to accumulation in acetylcholine organism owing to what all receptor system is excited, first of all holinergichesky (antidotes - holinolitik like atropine and reaktivator cholinesterases). Symptoms: dispepticheskу frustration, further distinguish the severity zr depending on quantity of FOS.

Easy degree (symptoms - in 15-30 min.): headache, dizziness, oyezriya short-sightedness, fear, breath difficulty, constraint in a breast. Objectively: mioz, perspiration, salivation, short wind.

Average degree: excitement change by block, coma. Objectively: msh, the strongest perspiration and salivation, bronkhoreya, attacks bronchospasm, aspiratsionno obturatsionny frustration, phenomena of a hypoxia (cyanosis), arterial hypertension.

Heavy degree: hyper tone, spasms, hypoxia, paralysis of intercostal muscles (breath by diafragmalny muscles). Death from sharp respiratory insufficiency of Holinesteraznaya activity of blood reduces to zero. Possible complications: toxic otgya lungs (at inhalation poisoning), gepatopatiya, intoksikatsionny psychoses and polyneuritis

Main actions for prevention of poisonings with pesticides:

1) Complete elimination of residual content of the pesticides steady in the

external environment of Ne possessing expressed by cumulative properties.

2) Existence in foodstuff of admissible sufficient content of pesticides or their metabolites, i.e. in the quantities which are not exerting an adverse effect.

3) Application for processing of food crops toxic chemicals with a short half-life period of the products providing liberation of an edible part from remains pesticide by the time of approach of their commodity maturity and removal of a harvest.

4) Strict implementation of instructions for use of this or that pesticide and observance the terms of "expectation" providing release of products from the remains of pesticides.

5) Control for content of residual amounts of pesticides in products food and prohibition of excess established DOCK.

Nutritional supplements Nitrites and nitrates are used as food additives in production of sausages (for fixing of pink color), as preservatives at production of cheeses and sheep cheese. Nitrates collect in vegetable and melon cultures because of use of nitrogen and nitrogenous fertilizers. Plants - concentrators of nitrates: sugar beet (especially leaves), spinach, salad, cabbage, carrots (especially root). Nitrates turn at deprivation and processing of vegetables into nitrites, and intake of nitrites leads to education meto tgamoglobina in blood that is followed by breath violations, cyanosis, weakness and friendmi symptoms. Danger of intake of nitrites in an orgnizm of the person it is connected also with nitritovaniye nitrosamines, dressing cancerogenic action. In our country strict control of use of these nutritional supplements and residual quantities is exercised nitrites and nitrates in foodstuff.

Prevention: observance of health requirements to use of fertilizers in rural oratory, sanitary examination of vegetable foodstuff on nitrate content (DSD = 300-325 mg/kg), crops of root crops concentrators on the fertilized soils in several years, sanitary education of the population. According to hygienic standards content of nitrites in a pier of py sausage products should not exceed 50 mg/kg of a product.

Salts can get to food to tyazhaly metals (lead, copper, zinc, etc.) from the ware applied to its preparation Misheio container and equipment.

Swineets. Sharp poisonings with lead are rare since a large number for this purpose is required lead salts. Perhaps chronic poisoning at long receipt in an organism small doses owing to kumuliruyushchy thestvo svinets. Lead gets to the food stored in kustarno to the made pottery covered with glaze or in tinned ware; in the phytogenesis food which is grown up close automagiciansstraly due to subsidence lead-bearing exhaust gases of motor transport at use benzina with an anti-detonator (ethyl liquid); in a liver and kidneys of ruminant animals but to food chains.

The main symptoms of poisoning with lead are: anemia, a lead border on edge gums, phenomena from nervous system.

Copper. Wipedavleniye copper are also rare - during the using and storage of sour food in copper I will pissde with it is brokeny surface. Salts of copper have the cauterizing effect and cause kolikoobrazny belly-aches, tenezma, diarrhea, sharp weakness.

Zinc. Pandshchevy poisonings with zinc are possible at application of ware from galvanized gland, storage in such ware of sour food is especially dangerous. Salts of zinc work irritating and the cauterizing image on a mucous membrane of a stomach also cause the phenomena sharp gastroenteritis.

The general in a clinical picture of sharp food poisonings impurity of chemicals (metals) are: the short incubatory period - of several minutes till 2-3 o'clock; metal smack in a mouth; vomiting, a diarrhea, blood impurity in the emetic masses and excrements.

Food poisonings of an unspecified etiology.

With an unspecified etiology treat diseases alimentary paroksizmalnotoxic mioglobinuriya and urovsky disease.

Alimentary paroksizmalno-toxic mioglobinuriya (gaffsky disease). The disease occurs only among the coastal population of certain reservoirs that formed the basis to consider it the reason consumption of fish (a pike, a perch, a pike perch, etc.). For the first time flash of alimentary paroksizmalno-toxic mioglobinuriya it was noted in 1924 among inhabitants of the gulf Frishes Graff Baltic Sea. In this regard the disease received the name gaffsky diseases.

The disease is shown by suddenly coming attacks of sharp muscular pains, so strong that the patient completely loses mobility. Attacks can repeat at the same persons up to 3 — 7 times through uncertain terms. Duration of an attack 2 — 4 days. During an attack change of coloring of urine in brown and brown color owing to dysfunction of kidneys and emergence is noted mioglobinuriya. Death during an attack can come from asphyxia as muscles of a diaphragm and intercostal are surprised. The disease proceeds at a normal temperature.

Diseases are the cornerstone dystrophic and necrotic processes in muscles and also dysfunction of kidneys and violation of the central nervous system. The chemical composition and structure of the poisonous beginning are not established yet. However it is known that it does not collapse when heating in the autoclave up to the temperature of 120°C within an hour and it is steady in the course of storage.