Theme 4. Health promotion in equilibrated nutrition and prevention of food – stuffs’ contamination.

Plan

1. Human nutrition, quantitative and qualitative aspects of human nutrition, equilibrated nutrition, the role of endoecosystem, pyramid of healthy nutrition
2. The state of human nutrition, natural and social – economic factors with influence on the state of human nutrition.
3. Align substances in food – stuffs and the problems of health promotion.
4. Health promotion in the problem of food additives.
5. Health promotion in the problem of prophylaxis of foods’ contamination.
### Essential amino acids

1. Tryptophan  
2. Leucine  
3. Lysine  
4. Isoleucine  
5. Methionine  
6. Phenylalanine  
7. Valine  
8. Threonine  
9. Histidine  
10. Arginine

### The biologic role of proteins:

1. Plastic role  
2. Catalytic role  
3. Hormonal role  
4. Security of the organism’s specificity  
5. Lipotropic role  
6. The role of transport for some substances  
7. Energetic role  
8. Role in the protection and enhancement of the resistance of the human organism  
9. The influence of electrolytic balance and repartition of the liquids in the organism  
10. Role in the maintaining of pH  
11. Antitoxic role  
12. Role in the sight’s security.

### Classification of lipids:

<table>
<thead>
<tr>
<th>I. Simple lipids:</th>
<th>II. Complex lipids:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Glicerides (neutral fats)</td>
<td>1. Fosfatides:</td>
</tr>
<tr>
<td>2. Sterides:</td>
<td>a) lectines</td>
</tr>
<tr>
<td>a) Zoosterols</td>
<td>b) cefalines</td>
</tr>
<tr>
<td>b) Fitosterols</td>
<td>c) serinphosphatides</td>
</tr>
<tr>
<td>c) Mycosterols</td>
<td>d) inositolphosphatides</td>
</tr>
<tr>
<td>3. Cerides</td>
<td>2. Sphingolipids:</td>
</tr>
<tr>
<td></td>
<td>a) sphingomielines</td>
</tr>
<tr>
<td></td>
<td>b) sphingoglycolipides</td>
</tr>
</tbody>
</table>

### Essential fatty acids:

<table>
<thead>
<tr>
<th>I. Class omega – 6:</th>
<th>II. Class omega – 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Linoleic acid</td>
<td>1. Linolenic acid</td>
</tr>
<tr>
<td>2. Gamma – linoleic acid</td>
<td>2. Eicosapentaenoic acid</td>
</tr>
<tr>
<td>3. Arahidonic acid</td>
<td>3. Docosahexaenoic acid</td>
</tr>
</tbody>
</table>

### The biological role of lipids:

1. Energetic role  
2. Plastic role  
3. Function of mechanical protector  
4. Influence upon digestive organs  
5. Influence upon security with some macroelements  
6. They are a source of liposoluble vitamins  
7. Influence upon the structure of nervous system, especially CNS  
8. Influence upon the function of internal organs  
9. Influence upon the synthesis and accumulation of the water in human organism  
10. Influence upon the metabolism of some hydrosoluble vitamins (B₁, B₆, C)  
11. Influence upon the elasticity of the sanguine vessels, upon the skin’s regeneration  
12. Influence the contents and metabolism of cholesterol  
13. Influence upon prostaglandins’ synthesis  
**Classification of carbohydrates**

<table>
<thead>
<tr>
<th>I. <strong>Digestible:</strong></th>
<th>II. <strong>Indigestible:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Monosaccharide</td>
<td>1. Insoluble hemicelluloses</td>
</tr>
<tr>
<td>2. Disaccharides</td>
<td>2. Lignins</td>
</tr>
<tr>
<td>3. Polysaccharides</td>
<td>3. Pectins and others</td>
</tr>
<tr>
<td></td>
<td>Cellulose</td>
</tr>
</tbody>
</table>

**The biological role of carbohydrates:**

1. Energetic role
2. Role in the activity of CNS
3. Protection of proteins
4. Influence of lipids’ metabolism
5. Influence of carbohydrates
6. Influence of endocrine system
7. Influence of digestive system

**The role of dietary fibers:**

**Insoluble:**
1. Significantly accelerate the colon advancement
2. Hydrophilic properties (connect the water and, in result, the volume of intestinal contents is increased)
3. Form compounds with metals, biliary acids, cholesterol (then they are removed from organism)

**Soluble:**
1. Form the viscous solutions
2. Delay the gastric removing and absorption from intestines
3. Normalize the intestinal flora
4. Decrease the putrefaction flora
5. Connect the cholesterol and in this way decrease its absorption in intestines
6. Decrease the absorption of glucose in intestines preventing glycemia
7. Form compounds with heavy metals and radionuclide removing their from organism.
THE ROLE OF THE CALCIUM:
1. Plastic role - enter the structure of the bony system and teeth.
2. Interfere the blood coagulation.
3. Activate a great number of enzymes-cholinesterase, lipase.
4. Activate the intrinsic factor and facilitates the absorption of the vitamin B12 (from the ileum).
5. Participates at the mechanism of the muscle contraction and at the controlling of the membrane permeability.
6. It has simpatico-mimetic effects in antagonism with potassium.
7. Together with magnesium diminishes the neuromuscular excitability, in its way being widely used in neuropsychiatry.

THE ROLE OF THE PHOSPHORUS:
1. Enter the structure of the nucleic acids that interfere in the protein synthesis.
2. Cell multiplication and in the transmitting of the hereditary characteristics.
3. Enter the structure of the cell membranes.
4. Control the transport of the solutions through the cell membranes.
5. Activates most of the vitamins of the B group.
6. Participate in buffer system that ensure the constant pH.

THE GENERAL CHARACTERISTICS OF FAT SOLUBLE VITAMINS:
1. Are soluble in fats and their solvents.
2. Are practically insoluble in water.
3. Are found in the alimentary fats.
4. Are lost in very small quantities during food washing and maintaining in water.
5. The coefficient of digestive utilization of the fat-soluble vitamins is dependent on the digestion and absorption of the food fats. The hepatobiliary affections and the lack of lipase diminish the vitamin concentration in the body.
6. Ingested in quantities larger than the daily necessary, they will deposit in the tissue lipids and especially in the hepatic ones.
7. In this way some reserves are formed which are used during the food deficiency period.

THE ROLE OF THE VITAMIN A IN NUTRITION:
1. Influence on the growth of the organism.
2. Enter in the structure of the two retinal pigments: rodopsin and iodopsin.
3. It is indispensable for maintaining the integrity of the epithelial cells of the teguments and mucous membrane.

THE ROLE OF VITAMIN E IN NUTRITION:
1. It is a strong antioxidant of the fat acids and vitamin A implicated in membrane biosynthesis.
2. Protects and maintains the structure and the normal function of the reproduction organs, hence the name of the fertility vitamin.
3. Ensures the trophycity of the muscular system and other organs and tissues, many researchers call it an antidistrophic vitamin.
4. It has a role in the synthesis of nucleic acids, in the cell proliferation.
5. It has a role in the oxidative phosphorylation and in the transformation of the creatine into phosphogene.

THE ROLE OF VITAMIN K:
- all the K type vitamin interfere in blood coagulation by favoring the hepatic synthesis of the:
  - protrombin (factor II);
  - proconvertin (factor VII);
  - Christmas factor (factor IX);
  - Stuart factor (factor X).

THE ROLE OF THE VITAMIN B₁:
1. Has an important role in the metabolism of carbohydrates.
2. Participates at the oxidative decarboxylation of the pyruvic acid resulted from the anaerobic metabolism of the glucose.
3. Participate directly to the ribose synthesis through transketolase (ribose is a substance, which enter the structure of the nucleic acids and nucleotides and the glucose oxidation as well).
THE ROLE OF VITAMIN B₁₂ IN NUTRITION:
1. Stimulates erythropoesis.
2. Interfere in the metabolism of methionine – helping transfer of the group methyl – but also in the metabolism of some other acids.
3. Prevents the hepatic steatosis (lipotrop role).
4. May be coenzyme of many other enzymes which interfere in the aminoacid metabolism. Is named also the extrinsic factor described by Castle.

THE ROLE OF VITAMIN PP IN NUTRITION:
1. Enter the structure of some enzymes that take part in multiple oxidoreduction reactions.
2. Take part in the discharging of energy which is present into the molecules of glucides, proteins, lipids, ethylic alcohol.

THE ROLE OF VITAMIN C IN NUTRITION:
1. Participates at the energy discharging processes, being a powerful reducing factor in the body.
2. Increases the capillary resistance with vitamin P (C2).
3. Prevents the accumulation of peroxides and free radicals, favors the passing of the trivalent iron into the bivalent one (an easier absorbable form).
4. Interferes in the activation of the folic acid into the tetrahidropholic one saves or protects the B group vitamins.
5. Catalyses the forming and maintaining of the collagen, a basic component of the fundamental intercellular substances.
6. Interfere in the protein synthesis by converting prolin into hydroxiprolin participates at the development of the cartilage and dentine.
7. Is found stored in high quantities in the hypophisys, suprarenal and yellow body (corpus albicans), having a role in the synthesis of the steroid hormones.

## PROTEIN SUPPLIERS

<table>
<thead>
<tr>
<th>Food</th>
<th>Proteins quantity/100 g of digestible food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat (beef, pork, chicken, fish)</td>
<td>15-22</td>
</tr>
<tr>
<td>Salamis, sausages</td>
<td>10-20</td>
</tr>
<tr>
<td>Cheese</td>
<td>15-30</td>
</tr>
<tr>
<td>Cow milk</td>
<td>3,5</td>
</tr>
<tr>
<td>Eggs</td>
<td>14</td>
</tr>
<tr>
<td>Bread</td>
<td>7-8</td>
</tr>
<tr>
<td>Macaroni, rice, flour, corn flour</td>
<td>9-12</td>
</tr>
<tr>
<td>Beans, peas (dried)</td>
<td>20-25</td>
</tr>
<tr>
<td>Soy</td>
<td>30-33</td>
</tr>
<tr>
<td>Nuts</td>
<td>17</td>
</tr>
</tbody>
</table>

## FOOD WITH HIGH CONTENT OF LIPIDS

<table>
<thead>
<tr>
<th>Food</th>
<th>Lipid quantity/100 g of food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil, fat, melted butter</td>
<td>100</td>
</tr>
<tr>
<td>Butter, margarine</td>
<td>65-82</td>
</tr>
<tr>
<td>Cream</td>
<td>20-35</td>
</tr>
<tr>
<td>Fat cheese (Swiss Cheese)</td>
<td>20-30</td>
</tr>
<tr>
<td>Pork, sheep, duck meat</td>
<td>10-30</td>
</tr>
<tr>
<td>Beef, turkey, chicken meat</td>
<td>5-25</td>
</tr>
<tr>
<td>Fat fish</td>
<td>15-20</td>
</tr>
<tr>
<td>Salamis, sausages</td>
<td>20-40</td>
</tr>
<tr>
<td>Nuts, peanuts</td>
<td>40-35</td>
</tr>
<tr>
<td>Chocolate, khalva, cream cakes</td>
<td>20-35</td>
</tr>
</tbody>
</table>
### AVERAGE CONTENT IN PROTEINS AND LIPIDS OF SOME NUTS

<table>
<thead>
<tr>
<th>Nuts</th>
<th>Proteins</th>
<th>Lipids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuts</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>Peanuts</td>
<td>26</td>
<td>45</td>
</tr>
<tr>
<td>Chestnuts</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Olives</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td>Walnuts</td>
<td>20</td>
<td>60</td>
</tr>
</tbody>
</table>

### GLUCIDS CONTENT OF FRUITS AND VEGETABLES

<table>
<thead>
<tr>
<th>Glucids (g %)</th>
<th>Fruits and vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 g %</td>
<td>cucumber, endive, green onion, cauliflower, vegetable marrow, radish, lettuce, spinach, tomatoes, aubergines, pepper, orache</td>
</tr>
<tr>
<td>5.1-10 g %</td>
<td>green beans, carrots, bellpepper, turnip, dill, parsley, celery, cabbage, nettle, red beet, strawberries, grapefruits, lemons, water melons</td>
</tr>
<tr>
<td>10.1-15 g %</td>
<td>dried onion, green peas, parsnip, bilberry, raspberry, bananas, apricots, apples, peaches, oranges, cherry, blackberry, quince, pineapple.</td>
</tr>
<tr>
<td>15.1-20 g %</td>
<td>nuts, peanuts, potatoes, pears, plums, grapes</td>
</tr>
<tr>
<td>20 g %</td>
<td>walnuts</td>
</tr>
</tbody>
</table>

### FOOD WITH GLUCIDS CONTENT

<table>
<thead>
<tr>
<th>Food</th>
<th>Glucids quantity/100 g of food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flour, rice, biscuits, maize, macaroni</td>
<td>70-75</td>
</tr>
<tr>
<td>Bread, croissants</td>
<td>40-45</td>
</tr>
<tr>
<td>Beans, peas</td>
<td>50-55</td>
</tr>
<tr>
<td>Potatoes</td>
<td>18-20</td>
</tr>
<tr>
<td>Grapes, plums, cherry, apple, pears</td>
<td>12-18</td>
</tr>
<tr>
<td>Honey</td>
<td>70-80</td>
</tr>
<tr>
<td>Sugar</td>
<td>100</td>
</tr>
<tr>
<td>Candies</td>
<td>55-75</td>
</tr>
<tr>
<td>Jelly, jam</td>
<td>20-40</td>
</tr>
<tr>
<td>Chocolate</td>
<td>50-60</td>
</tr>
</tbody>
</table>

### VITAMIN C AVERAGE CONTENT
<table>
<thead>
<tr>
<th>Vitamin C quantity</th>
<th>Vegetables</th>
<th>Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 mg</td>
<td>dried onion, cucumber,</td>
<td>bananas, apricot, bilberry,</td>
</tr>
<tr>
<td></td>
<td>aubergine, red beet,</td>
<td>cherry, quince, peach, pear,</td>
</tr>
<tr>
<td></td>
<td>vegetable marrow, celery</td>
<td>melons, blackberry</td>
</tr>
<tr>
<td>15-30 mg</td>
<td>potatoes, green beans,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lettuce, green peas,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tomatoes, garlic, radish</td>
<td></td>
</tr>
<tr>
<td>31-45 mg</td>
<td>green onion, nettle</td>
<td>raspberry, gooseberry</td>
</tr>
<tr>
<td>46-60 mg</td>
<td>white and red cabbage</td>
<td>grapefruit, orange</td>
</tr>
<tr>
<td>61-75 mg</td>
<td>cauliflower, turnip, orache</td>
<td>strawberry, lemon</td>
</tr>
<tr>
<td>76-150 mg</td>
<td>green pepper, dandelion,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dill</td>
<td></td>
</tr>
<tr>
<td>151-200 mg</td>
<td>parsley leaves</td>
<td></td>
</tr>
<tr>
<td>&gt;200 mg</td>
<td>red pepper</td>
<td>roseberry</td>
</tr>
</tbody>
</table>

**EQUILIBRIUM BETWEEN MACROORGANISM AND ENDOECOSYSTEM**

1. The normal biological activity of the human organism is possible only if the equilibrium between organism and endoecosystem exists. Endoecosystem is presented by intestinal microflora (nonsporulated forms of anaerobs and facultativ aerobes).

2. Local and systemic functions of endoecosystem are:
   a) antibacterial, b) regulatory, c) metabolic.

3. On the different factors of risk, especially, pollutants of different origin endogen microflora is modified quantitatively and qualitatively causing changes of the functions and structures of different organs.

4. In the result of different modifications saprophyte microflora can plays the role of initiator in the appearance and development of different diseases or in the chronicization of existent diseases.

5. It was established experimentally and clinically that different diseases of internal organs are caused by disturbances of natural technologies. These disturbances appear in the result of disturbance of equilibrium between the whole organism and endoecosystem.
FOOD – STUFF

A. Nutritive and biological active substances

B. The substances without biological value:
   1. Antinutritive substances
   2. Toxic substances:
      a) of natural origin;
      b) pollutants,

contaminants

Groups of align substances
1. Food additives that are not permitted or permitted food additives in big doses.
2. The substances from food – stuffs obtained in the result of new technologies or from the utilization of the raw material of low quality.
3. Pesticides in big doses.
4. Substances in food – stuffs obtained in the result of irrational using of fertilizers or sewage.
5. Substances in animal food – stuffs in the result of using of veterinary drugs, stimulators of growth.
6. Substances from equipment, instruments, dishes, wrapping.
7. Substances in the result of usual technologies.
8. Mycotoxins
9. Substances in food-stuffs from the environment.

10 tips to healthy nutrition
1. Eat a variety of nutrient-rich foods.
2. Enjoy plenty of whole grains, fruits and vegetables.
3. Maintain a healthy weight.
4. Eat moderate portions.
5. Eat regular meals.
6. Reduce, don't eliminate certain foods.
7. Balance your food choices over time.
8. Know your diet pitfalls.
9. Make changes gradually.
10. Remember, foods are not good or bad.
Food Guide Pyramid
A Guide to Daily Food Choices

Fats, Oils, & Sweets
USE SPARINGLY

Milk, Yogurt, & Cheese Group
2-3 SERVINGS

Vegetable Group
3-5 SERVINGS

Meat, Poultry, Fish, Dry Beans, Eggs, & Nuts Group
2-3 SERVINGS

Fruit Group
2-4 SERVINGS

Bread, Cereal, Rice, & Pasta Group
6-11 SERVINGS

KEY
- Fat (naturally occurring and added)
- Sugars (added)

These symbols show fat and added sugars in foods.

Source: U.S. Department of Agriculture/U.S. Department of Health and Human Services
Cross-Contamination

Cross-contamination is the transfer of harmful substances or micro-organisms to food by:

- Hands that touch raw foods and then touch cooked or ready-to-eat foods.
- Food-contact surfaces that touch raw food, are not cleaned and sanitized, and then touch food that is ready-to-eat.
- Cleaning cloths and sponges that touch raw food, equipment, or utensils; are not cleaned and sanitized; and are then used on surfaces, equipment, and utensils for ready-to-eat foods.
- Raw or contaminated foods that touch or drip fluids on cooked or ready-to-eat foods.

Food-contact surfaces include any equipment or utensil surface which normally comes in contact with food or which may drain, drip, or splash in food or on surfaces normally in contact with food. Cutting boards, knives, and splash areas are examples of food-contact surfaces.

Factors most often named in food borne outbreaks

1. Failure to properly cool food. (This is the leading cause of food borne outbreaks.)
2. Failure to thoroughly heat or cook food.
3. Infected employees who practice poor personal hygiene at home and work.
4. Preparing food a day or more in advance of being served.
5. Adding raw, contaminated ingredients to food that receives no further cooking.
6. Allowing foods to stay for too long at temperatures favorable to bacterial growth.
7. Failure to reheat cooked foods to temperatures that kill bacteria.
8. Cross-contamination of cooked food by raw food, improperly cleaned and sanitized equipment, or employees who mishandle food.
What is inspected

- Purchasing food from approved sources and in wholesome, sound condition.
- Observing the rules of time and temperature, controlling them throughout the flow of food.
- Providing facilities and equipment to maintain safe internal food product temperatures.
- Observing the rules for preventing cross-contamination.
- Restricting employees with infections who pose a hazard to food.
- Requiring strict personal hygiene of all employees.
- Installing hand sinks that are accessible to employees working in food preparation, ware washing, and service areas.
- Using proper sanitizer concentrations for all equipment, utensils, and food-contact surfaces.
- Providing a safe water supply and waste disposal system.
- Installing proper plumbing to prevent cross-connections, backflow, and black siphon age.
- Using measures to control and kill insect and rodents.
- Properly storing and labeling all cleaning agents and toxic materials.

Hygiene in food services and at public catering establishments

Main rules

Personal hygiene.

1. Carry clean clothes!
2. Cooking on kitchen always cover hair!
3. Put on a special attire!
4. Remove ornaments (rings, bracelets) and hours before the work beginning!
5. Hands it is necessary to wash each time prior to the beginning of work, after each break and especially after toilet visiting!
6. If you have at least one of following painful signs - yellowness, a diarrhea, vomiting, high temperature, a sore throat, suppurations (the abscesses, the inflamed damages of a skin etc.), allocation from ears, eyes and a nose, inform on it to the senior on kitchen prior to the beginning of work!
7. Cuts and other damages of the skin of hands should be tied up carefully with waterproof material!
8. Turn away from food and cover nose and mouth when you cough or sneeze!
9. Don't smoke in the working premise!

**Hygienic processing of foodstuff.**

1. Perishable foodstuff should be stored in the refrigerator!
2. Carefully defrost the frozen meat and bird before preparation!
3. Delete all liquid formed during defrosting of meat and bird, and carefully wash refrigerator regiments, working surfaces and utensils on which such liquid could get!
4. Carefully cook food!
5. Hold the cooked food hot - at temperature not less than 60°C!
6. Cool and freeze the cooked food in superficial ware!
7. Cooked food warm up to temperature not less than 70°C!
8. Store the prepared foodstuff separately from the crude!
9. At preparation of the mixed dishes which will submit in a cold kind, for example, potato or macaroni salads, always cool the prepared components before to add in them others!
10. All actions on preparation of perishable food should be carried out quickly!
11. The cooked food shouldn't be touched!

**Kitchen premises and utensils**

1. Keep clean kitchen premises and adjoining to them!
2. Contain kitchen in a tidy look and don't block up it!
3. Clean often your kitchen!
4. Clothes and towel which contacted with products, ware and utensils, it is necessary to change daily!
5. Protect kitchen and warehouse from insects and parasites!
6. Store the dangerous/poisonous substances for example washing both, disinfectants, out of kitchen premises in the capacities closed and supplied with labels!
7. Don't overload refrigerating machinery!
8. Don't break instructions concerning the set operating time/operating mode/temperature of the dishes washing machine!
Prophylaxis of foods’ pollution with toxic metals.

- Use only food-grade containers.
- Use metal and plastic containers and items only for their intended uses. For example, do not use refrigerator shelves that may contain cadmium as makeshift grills or to store unwrapped meat.
- Use only proper foodservice brushes on food, never wire brushes or ordinary paintbrushes.
- Do not use enamelware, which may chip and expose the underlying metal.
- Do not allow carbonated water in soft-drink mix systems to flow back into copper water intake lines. The carbonation may leech the cooper into the water used to mix drinks (see Plumbing in Chapter 9 for ways to avoid backflow).
- Do not use galvanized (zinc-coated) containers for preparing or storing juices, lemonade, tea, or salad dressing.
- Do not use lead or lead-based products, including lead-glazed ceramics, in food preparation areas.

### Classification of pesticides

<table>
<thead>
<tr>
<th>Acaricides</th>
<th>Algidices</th>
<th>Antifeedants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avicides</td>
<td>Bactericides</td>
<td>Bird repellents</td>
</tr>
<tr>
<td>Chemosterilants</td>
<td>Fungicides</td>
<td>Herbicide safeners</td>
</tr>
<tr>
<td>Herbicides</td>
<td>Insect attractants</td>
<td>Insect repellents</td>
</tr>
<tr>
<td>Insecticides</td>
<td>Mammal repellents</td>
<td>Mating disrupters</td>
</tr>
<tr>
<td>Molluscicides</td>
<td>Nematicides</td>
<td>Plant activators</td>
</tr>
<tr>
<td>Plant growth regulators</td>
<td>Rodenticides</td>
<td>Synergists</td>
</tr>
<tr>
<td>Virucides</td>
<td>Miscellaneous</td>
<td>Chemical classes</td>
</tr>
</tbody>
</table>