Federal State-funded Institution of Higher Education
«Volgograd State Medical University»
Ministry for Public Health of the Russian Federation

Department of Hygiene and Ecology

LECTURE:

Food ecology; xenobiotics in food. Nutritional supplements. Biologically active food supplements

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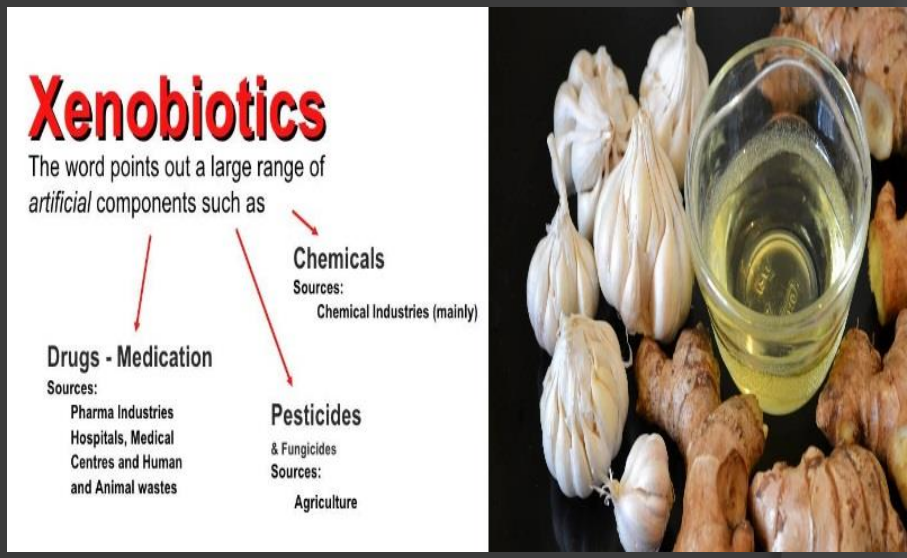
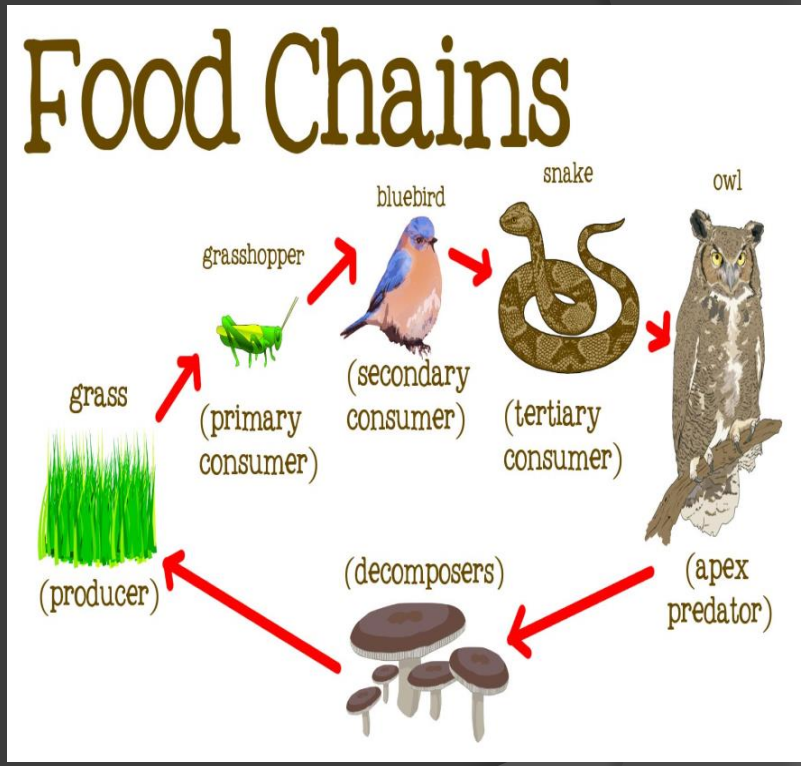
Xenobiotics are foreign chemical substances

They enter in to the human body from the contaminated natural environment through food webs.



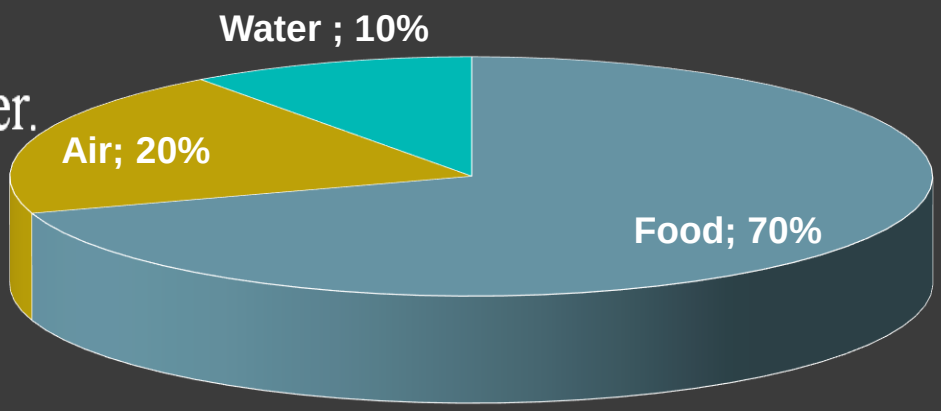
"Food chain" is one of the main forms of relationship between different organisms, each of which is eaten up by another kind.



Xenobiotics intake from the environment

It is established that:

- 70 % of xenobiotic come with food
- 20 % - from air
- 10 % - with water.



Bioaccumulation is the process by which substances not readily broken down or excreted can build up and be stored in living tissue (usually in fatty tissue.)

Biomagnification is the process by which substances become more concentrated in the bodies of consumers as one moves up the food chain (trophic levels).

Xenobiotics entering through the alimentary route

- ***Products containing food additives ,***
- ***Residual amounts of pesticides,***
- ***Metals and other microelements,***
- ***Carcinogenic substances6.***
- ***Mycotoxins are secondary metabolites of microscopic molds*** (aspergillius, penicillium, fusarium). Aflatoxins (AF) belong to the most toxic in foodstuffs.
- ***Radioactive isotopes in foodstuffs.***
- ***Contamination of food products with impurities, migrating from equipment, packaging and packaging materials.***

Food additives

- E100-182 - dyes;
- E200 and further - preservatives;
- E300 and further - antioxidants (antioxidants);
- E400 and further - stabilizers;
- E500 and further - emulsifiers;
- E600 and further - enhancers of taste and aroma;
- E900 and further - antifoaming (antifoam substances).

2. Residual quantities of pesticides

are determined in livestock or crop products obtained using feed or water contaminated with high concentrations of pesticides, or in connection with the processing of animal pesticides.

Pesticides is a conventional collective term for the chemical substances **intended for preventing, destroying, repelling, or mitigating any pest.**

Main Groups of Chemical Pesticides

- herbicides
- fungicides
- insecticides or any other substance used to control pests.

There are several groups of pesticides:

- **Phosphoroorganic pesticides**

- **Chlororganic pesticides**

- **Mercuryorganic pesticides**

- **Arsenic pesticides**

- **derivatives of carbominic acids, etc**

- ***3.Metals and other microelements.***
- These chemicals are among the most commonly found in food from the environment

8 of these (mercury, cadmium, lead, arsenic, copper, strontium, zinc, iron) have been included by the FAO / WHO Commission among those whose content is controlled in international food trade.

- ***4. Carcinogenic substances*** - chemicals and compounds obtained as a result of human activities.

The International Agency for the Study of Cancer conventionally divided all chemicals into three groups.

5. Compounds of nitrates (toxic and carcinogenic)

Most products contain their precursors, which can be turned into carcinogenic nitrosamines (NA) in certain processing methods (cooking, roasting, smoking, salting).

- ***6. Mycotoxins are secondary metabolites of microscopic molds*** (aspergillius, penicillium, fusarium).

  Aflatoxins (AF) belong to the most toxic substance in foodstuffs.

7. Radioactive isotopes in foodstuffs

Food products grown in the presence of significant concentrations of radionuclides in the environment are at greatest risk of contamination with radionuclides.

These are the zones affected by the Chernobyl accident, various nuclear accidents, the ranges at which nuclear weapons were tested, etc.

8. Contamination of food products with impurities, migrating from equipment, packaging and packaging materials

9. Medicines and other foreign substances.