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ANTIBIOTICS

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Abstract: *Antibiotics are special products produced by the metabolism of some organisms and have high physiological activity against some microorganisms and dangerous tumors, stopping their growth, reproduction or completely destroying them.*

In 1871-1872, Russian scientists Poltenov and Manassin discovered the antagonistic nature of the green gravel fungus. In 1929, Fleming determined the antibacterial effect of a group of cultures of the green gravel fungus in a liquid medium on bacteria.

In the 1940s, scientists Cheyin and Floril, in Russia in 1942 Yermolev obtained penicillin in its pure form and became the cause of the new antibiotic era.

In 1942, one of the scientists, Waxman, recommended the word antibiotic. After that, Waksman and his colleagues set about isolating streptomycin.

Key words: *Antibacterial, antagonistic, temperature, pH, mold fungi, penicillin, streptomycin, tetracycline, chloramphenicol, kanamycin.*

The main part. The rapid development of the development of antibiotics mainly depends on the following:

1. The lack of substitutes
2. It is possible to treat some serious diseases (typhoid, plague, cholera, brucellosis)
3. The formation of patterns of resistance of microorganisms to them.
4. Use in the food industry.

Antibiotics differ from other manufactured products.

1. They have high biological activity.
2. Selective effect on susceptible organisms.

The biological activity of antibiotics is measured by the minimum amount of active substance they show against microbes.

The concentration of dry and liquid antibiotics is 1 gr. measured in micrograms of active substances in the drug or 1 ml of liquid.

Penicillin effect unit (ED) is 0.6 μg of chemically pure crystalline salt of penicillin.

Currently, there are more than 6,000 antibiotics, and about 100 of them are used in medicine.

1 ED = 0.6 μg.

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X 200 ED = 120 μg.

The mechanism of action of antibiotics depends on:

1. Chemical composition
2. To the amount of substance
3. To the type of microorganism
4. In what conditions it is used
5. For the duration of the effect
6. To the microstructure of the cell
7. External factors (temperature, pH.)
8. To the concentration of antibiotics
9. Ingestion or absorption by bacteria.

Antibiotics are divided into 3 depending on the nature of the effect:

1. Bacteriostat
2. Bacterial
3. Bacterolytic

The classification. Antibiotics:

1. By origin
2. By chemical composition
3. By the mechanism of action on the microbial cell
4. By the antimicrobial spectrum, i.e., by the scope of action.

I. Depending on the biological origin:

1. Antibiotics absorbed by bacteria
2. Antibiotics obtained from fungi
3. Antibiotics obtained from antinomycetes
4. Antibiotics obtained from plants
5. Synthetic antibiotics, i.e. polysynthetic antibiotics
6. Antibiotics obtained by combination

Antibiotics are obtained in natural and artificial conditions. Obtained in natural conditions, ie: bacteria, fungi, antinomycetes, plants. In artificial conditions: include synthetic antibiotics.

1. Antibiotics obtained from bacteria:

a) Pseudomonas - pyosanin viscosin

b) From cocci - streptococcus lactis - nizin, Diplococcus - diplomycin

c) Escherichia coli - colicins

d) g) From bacilli - brevis - gramicidin subtilis - subtilin polynyxa - polymyxin

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2. Antibiotics obtained from fungi:

a) Mold fungi - fungi belonging to the genus Penicillium (Penicillium chrysogenum).

Cephalosporin:

1. Penicillin.
2. Griseofulvin.

The penicillin group also includes several antibiotics.

b) Streptomyces - griseus – streptomycin rimosis - tetracycline spheroids - novobiocin levomycetin, kanamycin, erythromycin, etc.

3. Antibiotics obtained from plants: Phytocides
4. Synthetic polysynthetic antibiotics:

1. Antibiotics based on penicillin:

Oxocillin Ampicillin and others

2. Antibiotics based on tetracycline:

Merfocycline Rondomycin and others.

3. Antibiotics obtained by combination:

Oleontetrin, Erythromycin

P. Depending on the chemical composition:

I. Beta-lactam ring nitrogen-containing heterocyclic compounds - beta-lactam antibiotics.

1. Antibiotics belonging to the penicillin group (penicillin, toxocillin, ampicillin, methicillin)
2. Polysynthetic antibiotics of the cephalosporin group (cephaloridine, cephalexin, etc.)

II. Tetracycline and its polysynthetic compounds:

Oxytetracycline Chlortetracycline Morphocycline Metacycline.

III. Aminoglycosides:

Streptomycin group antibiotics (streptomycin and its derivatives)

Tomycin, Monomycin, Kanamycin.

3. Macrolides erythromycin, omondomycin.
4. Levamisetin - chloramphenicol
5. Rifamycin - rifamycin
6. Polyene antibiotics - nystatin, levarin, amophterin.

III. Depending on the mechanism of action on the microbe:

1. Antibiotics that inhibit cell wall synthesis - penicillin, cephalosporin.
2. Inhibit the function of the cytoplasmic membrane: Polymyxin, Nystatin, Levorin.
3. Antibiotics that selectively affect nucleic acid synthesis:
4. RNA synthesis inhibitor - kanamycin, neomycin, griseofulvin

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5. DNA synthesis inhibitor - bruneomycin, sarcolysin, mitomycin.
6. Inhibit purine and pyrimidine synthesis: Azoserine, Sarcomycin.
7. Inhibit protein synthesis: Streptomycin, Tetracycline, Levomycetin, Kanamycin, Neomycin, Erythromycin.
8. Stops breathing: Pyocyanin, Colicin, Oligomycin.
9. Those that affect metabolism - furanomycin.
10. Antibiotics of immunodepressant type: Actinomycin C

IV. Depending on the scope (spectrum) of biological influence:

1. Short-spectrum antibiotics:

a) Penicillin that affects gr+ bacteria.

b) cephalosporins, macrolides, which affect staphylococci and streptococci.

2. Broad-spectrum antibiotics: Tetracycline, Levamycin, Polymyxin

Polysynthetic antibiotics. The effect of antibiotics on individual organisms is called the range of action of these drugs against bacteria.

The concept of chemotherapy.

Chemotherapeutic agents have been known since ancient times, and the bark of the quinine tree was used by the Indians of Peru against various infections.

Leprosy was treated with mercury. Modern chemotherapy was founded by German scientists Paracelsus (15-16 centuries), Ehrlich (19-20 centuries), the Russian scientist Romanovsky and others.

Chemotherapy is the treatment of infectious diseases using various chemical agents. But now it is used not only for the treatment of the sick, but also for the prevention of diseases, that is, it is called chemoprophylaxis. I.I. Mechnikov also worked on chemical agents.

He concluded that:

1. Chemical agents should have a special effect. (Specific).
2. Therapeutic effectiveness should be high, that is, maximum.
3. They should have a minimal toxic effect on the body.

Unlike disinfectants, which are protoplasmic poisons, when injected into the body, chemical agents selectively affect the cells of bacteria without affecting the cells of macroorganisms. Treatment of infectious diseases with chemical agents began to be carried out in the 19th century. The Russian scientist D. A. Romanovsky contributed a lot to this. According to Romanovsky, chemical remedies should have a strong and good effect on parasitic, that is, pathogenic microbes, and a weak organotrope, that is, a weak effect on the human body.

Chemotherapeutic (therapeutic) agents are divided into several classifications.

It is divided into 3 based on the sources of acquisition.

1. Salts of heavy metals.
2. Substances obtained by synthesis.
3. Substances obtained from natural sources.

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1. Salts of heavy metals:

a) Arsenic salts - Novarsenol - typhoid Miarsenol - relapsing typhus. Osarsol

b) Bismuth salts - Bismuth nitrate - wound Xerofarm - enterocolitis Bioquinol

c) Antimony salts - Stibazon - Surmin - Leucismaniosis Solyusurmin

d) Mercury salts - mercury salicylate - wound

Iodized mercury - in purulent diseases

e) Silver salts - Silver nitrate

2. Substances obtained by the synthesis method.

PASK - para amino salicylic acid

Ftivazide Tubazid Nicotine

Isonicotinic acid derivatives.

Sulfonamide preparations.

3. Substances obtained from natural sources.

1. From plants: Quinine Alkaloids

2. From fungi: Antibiotics and substances obtained from other microorganisms are included.

P. Depending on which microorganisms are used:

1. Anti-virus:

Interferon

Retantadine

DNA

RNA - aza

Gaunidin

Thymidine derivatives

Antibiotics are also divided based on which group of microorganisms they affect:

1. Against bacteria - Penicillin Tetracycline.
2. Against tuberculosis - Streptomycin, Kanamycin, Cycloserine.
3. Against fungi - Nystatin, Levarin, Griseofulvin, Amphotericin.
4. Anti-inflammatory - Actinomycin C, Mitomycin, Bruneomycin, Olivomycin

The effect of chemotherapeutic substances should be strong and durable, because resistant bacteria are formed.

In this case, bacteria are not affected by the drug, they can change their external form, that is, their morphological, biochemical, and cultural signs change. The transition of bacteria to this state complicates their diagnosis.

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According to the results of the research: In order for chemical medicinal substances not to have a negative effect on the body:

1. Chemotherapeutic drugs should be used selectively (not all of them can be used).
2. It is necessary to use a certain amount (dose).
3. In order to prevent the formation of resistant microbial flora, several chemical drugs are often used in combination.
4. A low dose of chemotherapeutic drugs does not stop the growth of microbes, but rather increases their multiplication, and then even large doses of drugs do not affect these microbes, and as a result, infectious diseases relapse and become chronic. In order to prevent the formation of resistant microflora, it is often necessary to administer the substance a second time and to administer it in combination.

For the first time in 132 G. Domach used red and white streptocide as a chemical treatment against bacteria. The substance that exerts the effect of streptocide is considered to be a sulfonamide group. Therefore, these drugs are called sulfonamide drugs. These include a large number of drugs. streptocide, etazol, norsulfazol, etc.

These are the diseases caused by many gr + and gr- bacteria, which have a bacteriostatic effect and are quickly removed from the gastrointestinal system and leave less complications. There are theories on the mechanism of action of sulfanilamd drugs:

1. As a result of the bacteriostatic effect of the drugs, the processes of biological synthesis in the microbial cell, i.e. protein synthesis, are disrupted, as a result of which the microbes cannot get the biological substances necessary for their growth and reproduction.
2. According to some scientists, sulfanilamide drugs reduce the activity of energy-carrying coenzymes of bacteria, and the growth of bacterial cells that do not receive energy stops. Currently, synthetic sulfanilamides obtained by synthesis are being developed.

Depending on the mechanism of action:

1. We can take penicillin based on antibiotics that stop cell wall synthesis. Penicillin is effective against Gr+ bacteria. Because peptidoglycan is 40-90% in the cell wall of gr+ bacteria and gr- bacteria. Penicillin's effect mainly leads to disruption of the synthesis of this peptidoglycan layer.
2. Since peptidoglycan is 5-10% in Gr- bacteria, it does not affect them. After the effect of penicillin on the synthesis of the cell wall, the cell rapidly enlarges and enters various forms, including the spherical L-form. In this case, the synthesis of oxyls in the cytoplasm of the cell does not stop.
3. If antibiotics affect the cell membrane, substances from the external environment break into the cell, that is, the permeability of the membrane is broken. M: gramicidin.
4. Antibiotics that inhibit protein synthesis: Streptomycin, tetracycline.

Protein synthesis mainly occurs in ribosomes - this is the main function of ribosomes. Unlike penicillin, streptomycin affects gr+ and gr- and acid-resistant bacteria and resists protein synthesis in cell ribosomes.

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Conclusion. Adverse effects and complications of antibiotics.

1. Some antibiotics are toxic to the body when used for a long time.

M: streptomycin: affects the auditory nerve, vestibular apparatus, and Kanamycin affects the auditory organs. Tetracycline series - affects the gastrointestinal system, Erythromycin Oleontomycin - affects the liver.

2. The use of antibiotics increases the sensitivity of the body to these antibiotics and causes various allergic reactions.

Antibiotics themselves do not play an antigenic role. However, they can sensitize the body. This sensitization will react even if a single antibiotic is subsequently administered.

3. The use of antibiotics causes intestinal dysbacteriosis and leads to:

a) antibiotic-resistant bacteria multiply and poison the body with decay products.

b) proliferation of bacteria resistant to antibiotics - diarrhea - this is called staphylococci or necrobiotic mold.

c) the reduction of normal intestinal microflora leads to avitaminosis.

4. Effect of antibiotics on immunogenesis

5. A complication of the main antibiotics is the formation of pathogenic bacteria that are resistant to these antibiotics.

Prevention of defects and complications.

- Always determine the sensitivity of microbes to antibiotics. (paper disc, diluted method)
- Use of antibiotics in combination - depending on the range of spectrum.
- Determination of sensitivity to antibiotics in humans.
- By swabbing
- Probing between the skin.
- Use antibiotics in combination with various general restorative walls. M: vitamins.
- Use of antibiotics in combination with antifungal antibiotics when they are used a lot.
- Start finding new antibiotics.

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