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THE ANTIBACTERIAL ACTIVITY OF ANTIBIOTICS AND CHEMOTHERAPEUTIC – HISTORY, GENERALITIES

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Abstract. Antibiotics are substances produced mainly from microorganisms such as actinomycetes, molds and bacteria, of biological origin, and they can be used in anti-infective therapy, such as in very low concentrations they can prevent the growth of pathogens, or to destroy them, thereby interfering with their metabolism. The chemotherapy has also the same qualities, but they are produced by chemical synthesis. Anti-infective chemotherapy was a remarkable achievement in medicine. Their action is not exercised fast as in the case of disinfectants and antiseptics. It takes some time to appear consequences of their activity on the pathogen agent. Fleming has characterized them as "slow-acting antiseptic". The primary acquiring of antibiotics and chemotherapeutic agents is their activity against pathogenic microorganisms, misappropriation conditioning their use in therapy.

Key words: antibiotic, chemotherapy, antibacterial

History

With the development of bacteriology it is signaled the aquisition of microorganisms to hamper the development of others.

Anti-infective chemotherapy has changed profoundly the infectious pathology, contributing to the emergence of new traits of modern human life in terms of its duration and quality of life. [1]

In 1877 Pasteur and Joubert noted certain antagonist effect on aerobic plate count coal bacteria growth. In 1885 Victor Babes is the genius who anticipated that inhibitory action due to certain chemical substances produced by micro-organisms antagonist which could be used in practice. [2] The practical application did not fail to appear, then the alert of those looking for anti-infective weapons was channeled into work chemosynthesis's Ehrlich, who discovered salvarsan used in fighting syphilis and germanium used to combat trypanosomiasis. The appearance of first sulfa drugs (Prontosil), a special event in the history of synthetic chemotherapeutic agents, is due to Domagh (1935), a medicinal preparation especially useful in some diseases of streptococcal origin. [1,2]

The beginnings of antibiotics were blurred by the great interest that has been aroused by new synthetic products.

Fleming's observation of 1929 on the lysis of staphylococcal colonies that were accidentally contaminated with mold Penicilliumnotatum remained for a long time just a simple lab observation. However, starting 1940, the research conducted by Florey, Abraham and Chain with chemicals and technology studies have used Fleming's observation and isolation of penicillin application in medical practice. [3]

In this manner the era of antibiotics was open. Waksman, the streptomycin creator, gave the name of antibiotics. Subsequent, there are thousands of cultivated species of microorganisms in order to seek new and new antibiotics.

After a series of surveys of thousands of strains of actinomycetes, in 1944, streptomycin had appeared, which was extracted from Streptomyces griseus. Search of 6000 samples of earth and research of 20000 Streptomyces strains made possible the discovery in 1947 of cloromicetinavenezuelae. [1]

From Streptomyces Aureofacienswas extracted first tetracycline in 1948, following the other two to be discovered in 1950 and in 1953. The first macrolide, erythromycin, is extracted from Streptomyces eritreus by Finlay in 1950.[2,4]

A huge step was made by improving processes of directed biosynthesis, using special environmental conditions, some nutrients and adequate of precursor chemicals, irradiation to obtain mutants etc.

The steps by which the active ingredient is isolated from fermentation rooms are: filtering, elution, absorption, chemical extraction etc.

The medicinal product is carried out during the

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pharmaceutical phase, after the biological and chemical step which requires a long series of animal experiments, as only then will be introduced into the clinic. [5]

They have been discovered many chemotherapeutic agents whose action spectrum has been expanded to various other organisms from bacteria, metazoan, even tumor cells.

Definitions

Antibiotics are substances of biological origin that can be used in anti-infective therapy in very low concentrations so as to prevent the growth of pathogens by interfering with the metabolism. [2, 6]

Chemotherapy are chemically synthesized substances with the same anti-infective capabilities.

Their action is not exercised fast as in the case of antiseptic disinfectant substances. It is necessary a certain period of time after that the consequences of that action appearing on the pathogen. Therefore, Fleming has characterized them as "slow-acting antiseptic". [1,7]

Antibiotics and chemotherapy are different from antiseptic and disinfectant because their effect on microorganisms is faster, brutal, with compromised host cells to a significant extent. For this reason, applications are used only on the surface of the skin, mucous membranes and natural cavities (antiseptic) and ambient physical environment (disinfecting). In some cases there is a rapprochement between antiseptic and chemotherapy, reducing the difference in some cases. [8]

Thus, the compounds of oxichinoleina and other "intestinal" antiseptics can be considered chemotherapy, and on the other hand, the antibacterial effect of antibiotics such as polymyxins and tyrothricin, approaching by the speed and mode of action, the effect of cationic surfactants detergents. [9]

The difference between antibiotics and chemotherapeutic is no longer of interest because the chemical synthesis can replace in appropriate circumstances biosynthesis, and in practical terms, it is no longer of interest because dosage, therapeutic effects, side reactions, mode of action for both groups overlapping.

Bring them together under the name "antimicrobials" has no impact because this term doesn't separate them, on the one hand antiseptic and disinfectant, which are also antimicrobial, on the other hand the restriction action on microbes leave aside antibiotics and chemotherapy, active against other pathogens such as chlamydia, rickettsiae, mycoplasmas, protozoa, viruses. [10]

The name of "anti-infective substances" was not imposed, trying to give it some more extensive features than those we have.

The intervention of antibiotics and chemotherapy drugs target first term of the tripod pathogen-host-environment conditions with specific treatment with biologicals products (vaccines, serum, immunoglobulins). [11] Following the first successes landslide of antibiotic it was considered resolved the anti-infective treatment with overpricing on the pathogen, but even in the presence of a bactericidal effect, not only bacteriostatic, healing is achieved ultimately by mobilizing the means of defense and recovery of the body through competition and other therapeutic interventions. [12]

The antibacterial activity of antibiotics and chemotherapeutic

Antibiotics and chemotherapy have two modes of action: bacteriostatic, which means stopping microorganism and micro-bicide development, meaning its destruction. The two modes of action are not sharply demarcated being able to intervene many other factors such as multiplication rate of microorganisms, the combination of antibiotics, antibiotic concentration at the site of infection etc.

Antibiotics with bactericidal mode of action are indicated to be used in fast-evolving severe infections and infections that occur on land with low resistance or immune suppressed, as in the case of newborns, premature infants, elders, etc. In such situations body mobilization defense mechanisms can be brought forward to riding acute condition. [13]

Beta-lactams prevent bacterial wall synthesis and antibacterial effect that is driven by intense multiplication of pathogens, since it is particularly active the process of wall synthesis. The destruction of the wall provides resistance to bacteria beta-lactams as if spheroplasts training (forme L). The antibiotics that interfere with the cytoplasmic membrane (polymyxins B and E) have the same bactericidal effect, but the effect is not linked to the pace of bacterial multiplication.[2,14]

Aminoglycosides and rifampin also have a bactericidal effect, intervening at multiple stages of the biosynthesis of nucleic acids and proteins. They are more effective when the metabolism of the bacterial cell is highly active and they are also effective in the resting phase of the microorganisms. The association between aminoglycosides and beta-lactams has synergistic effect. The explanation is given that the penetration of bacterial aminoglycoside to the site of action in the body is facilitated by the bacterial cell wall removal. [1,15]

Bacteriostatic are effective in treating mild or medium infections, in which the body's defense against infection is aided by stopping pathogen multiplication. Both in bacteriostatic effect, but also of the microbicide effect, the condition is removed ultimately through the intervention of host defenses. [16]

DST is required to be carried out in accordance to the recipes standardization regarding the quality and quantity of the nutrient medium, germs tested, micro-comprimate of the antibiotic used, expression results, etc., and it can be obtained in this way particularly useful information in therapy.

Knowing the antibiotics which are not active or are doubtful is particularly useful because you can select the assets, eventually. So in other words, we must consider the action spectrum, and spectrum antibiotics inactivity.

The spectrum of activity is represented by all the microorganisms on which an antibiotic is effective. [2,17] Antibiotics may have a wider or narrower action. After a while, with their excessive use is noted that the initial spectrum is reduced by the acquisition of secondary resistance by certain strains or species of microorganisms. Certain bacterial species, such as beta-hemolytic Streptococcus, Treponemapallidum, and to a lesser extent Pneumococcus and Neisseria,

pathogenic, the antibiotic sensitivity were unchanged, namely to penicillin G. [18]

In the case of staphs penicillinase producers, the vast majority of gram-negative bacilli, enterococci and not only, it is necessary to determine their chimio-sensitivity.

Microbial resistance to antibiotics is clinical correlated, considering that resistant microbes are those which are not "disturbed" by the sanguine and tissue concentrations which are obtained after an antibiotic is administered in doses that do not harm the body. [18,19,20]

It is known a primary resistance, which means that there is no prior contact with the antibiotic, some strains within a bacterial population, which is generally sensible. There is also a secondary or acquired resistance which is the consequence of selection of strains with primary resistance under antibiotic treatment.

Spontaneous or natural resistance of a particular species is a genetic trait, and it is due to a metabolic links or structure upon which antibiotics act or to a non-penetration of antibiotic or enzyme that inactivates the antibiotic used. [21]

The resistance due to the circular DNA extra-chromosomal molecules containing factor R antibiotic resistance is encountered in microbial populations that have not been in contact with any antibiotic, but have been "infected" with genetic material derived from other strains or certain species. This phenomenon was as described above especially in the intestinal flora. [14,22]

The possibility of bacteria to develop resistance or hereditary transfer resistance from one cell to another leads to antibiotic failure.

Acquisition of chemo resistancecan be made in various ways, as in the known biochemical mechanisms as the base, which makes resistance to a particular antibiotic to manifest to antibiotics of the same family to which they are related. This is the so-called cross-resistance. [21]

In order to prevent the installation of antibiotic resistance it is necessary to respect certain rules such as: restricting prophylactic antibiotic, the choice of active antibiotic, limiting antibiotic only when it is strictly necessary, the antibiotic as sensitivity testing required, avoid underdosing, avoiding prolonged treatment more particularly where rapid onset resistance, the addition of antibiotics to prevent resistance as in the case of an-tuberculosis therapy. [23]

Initiation of an antibiotic treatment should be rigorously studied given the efficiency on the one hand, and actual substantiated and risks of treatment with enough side effects. [24]

It should also be pointed out that healing ultimately depends on a complex of therapeutic measures, and the chemotherapy is a method of great importance, but not the only one.

Applying a correct antibiotic requires the doctor to have knowledge of infectious pathology, bacteriology and pharmacology. [13,25]

The use of chemotherapy has to be made only in certain diseases caused by susceptible pathogens. Often it is wrongly recommended an antibiotic treatment in patients suspected infectious, patients with viral diseases. An error is also the prophylaxis and which is made in certain medical situations, especially surgery, for a false security that actually brings more harm. [13,26]

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