

Overuse of antibiotics: current situation and countermeasures

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Abstract

The birth history, role, current situation, and future prediction of antibiotics are summarized. The causes of antibiotic abuse and the harm of antibiotics are outlined through the existing antibiotic problems in society. Through the current data to analyze the solution to the problem of antibiotic abuse, how to avoid and how to treat it after abuse. Using scientific thinking methods such as induction generalization and critical thinking, deepen and apply the concept, understand the essence of biological evolution, and promote the achievement of the literacy of the biology discipline. theoretical and preclinical findings and its rate-limiting enzyme-related adjuvant therapy for colorectal cancer.

Keywords: Phylogeny; Antibiotics; Overdose; Resistance to drugs

1. Introduction:

Since their discovery in widespread use, antibiotics have addressed the adverse effects of most bacterial diseases in humans. However, at the same time, due to the efficient treatment efforts of antibiotics and the lack of medical knowledge in society, a significant problem — antibiotic abuse, was born.

1.1 The definition, history, and functions of antibiotics

Antibiotics refer to the microorganisms (including bacteria, fungi, actinobacteria, etc.) or higher animals and plants produced by the process of life against pathogens or other activities of a class of secondary metabolites can interfere with the development function of other living cells.

In 1929, when British bacteriologist Fleming grew bacteria in a Petri dish, he found that no bacteria grew around the colonies of *Penicillium*, accidentally falling on the medium. He believed that *Penicillium* produced a chemical that was secreted into the medium to inhibit the growth of bacteria. The chemical was the first discovered antibiotic — penicillin. The scientists began to find out that some microorganisms could hinder the growth and reproduction of others, calling the phenomenon anti-growth. This was the earliest discovery of antibiotics.

Antibiotics commonly used in clinics are extracts from microbial culture medium and compounds from chemically synthesized or semi-synthetic compounds. It is usually extracted and isolated from the culture medium of plants or fungi. There are four common antibiotic extraction methods: ion exchange method, solvent extraction method, precipitation method, and adsorption method. For example, different antibiotics will form a chemical state under PH conditions and then be prepared at ultra-low temperature and freeze-drying, mixed with

spores to form strains, and finally freeze-dried at ultra-low temperature.

The mechanism of action of antibiotics is mainly to interfere with the physiological function of pathogenic microorganisms and the biochemical metabolism. The mechanism specifically includes, but is not limited to, β -lactic antibiotics that inhibit bacterial cell wall synthesis. For example, penicillin cephalosporin can block the growth of bacteria, making bacteria unable to reproduce and die. And polymyxin antibiotics can change the permeability of the bacterial cell membrane. Quinolones in antibiotics can inhibit bacterial nucleic acid synthesis. Antibiotics can also inhibit or interfere with protein synthesis in bacterial cells, including aminoglycosides, tetracyclines, macrocodes, etc. Since bacteria require proteins for growth and reproduction, antibiotics can substantially interfere with the efficiency of their use. Antibiotics can also hinder folate synthesis, mainly including sulfonamides. Many antibiotics, such as ciprofloxacin and metronidazole, can inhibit the replication of bacterial DNA because DNA is necessary for the growth and reproduction of bacteria, and the action of these antibiotics can cause bacteria to be unable to grow and reproduce normally, leading to bacterial death. Antibiotics are commonly used as anti-inflammatory methods, forming antibodies in the human body and playing an anti-inflammatory and antibacterial role. Antibiotics were first used to treat transmitted diseases like syphilis and gonorrhea. Later, people found that antibiotics can effectively treat infections caused by bacteria to varying degrees, such as tuberculosis.

In conclusion, the characteristics of antibiotics can directly act on bacterial cells: antibiotics can selectively act on the specific links of bacterial cell DNA, RNA, and protein synthesis system, interfere with the metabolic effects of cells, hinder life activities, stop growth, or

even cause death. This is different from indiscriminate-attack disinfectants and fungicides. Antibiotics also have a selective resistance spectrum: the effects of antibiotics are particular, and other antibiotics have different effects on different pathogens. Antibiotics have effective action concentrations: antibiotics are a physiologically active substance. Various antibiotics can generally act on pathogens at deficient concentrations. At the same time, antibiotics have selective virulence, which is far less harmful to people, animals, and plants than it is detrimental to microorganisms.

1.2 The overuse, harm to the human body, the existing problems, and the influencing factors of antibiotics

In real life, little is known about the dangers of antibiotic resistance. With the improvement in living standards, the proportion of human meat, life pressure, and irregular diet, intestinal problems are becoming more and more prominent. Antibiotics have become the panacea treatment regimen for most diseases caused by bacteria. They are relatively cheap and easy to get them. For various reasons, doctors and patients believe that antibiotics are practical and easy medicine, forgetting the dangers of excessive antibiotics. Antibiotic abuse could lead to emerging superbugs. "Superbugs" are a general term for bacteria resistant to all antibiotics. They are often resistant to multiple antibiotics, also known as multi-resistant bacteria. These bacteria can have a solid resistance to antibiotics and can escape the risk of being killed. Within 10 to 20 years, all antibiotics will lose their effectiveness. At the same time, due to the continuous emergence of new antibiotics, the variety of antibiotics, and the trade name of the same antibiotic, medical staff have some difficulties in mastering the rational use of antibiotics, so the everyday abuse of antibiotics drug-resistant strains also gradually increased. Antibiotic abuse can harm the human body, such as side effects, aggravating the disease, causing secondary infection, or delaying the illness.

One of the most common and severe problems is intestinal dysbiosis, caused by the abuse of antibiotics. For example, Ruijin Hospital digestive Director Professor Yuan in the 2019 World Intestinal Health Day theme seminar and the Intestinal Awareness Month launch meeting: "China colorectal cancer incidence, mortality in all malignant tumors, and new cases of colorectal cancer accounted for 18.6% of the world, has become the world the largest number of new cases of colorectal cancer each year." There are psychosocial and unhealthy lifestyles behind the high incidence of bowel problems. The human intestine harbors about 10 trillion bacteria, and different species control the other substances needed

during human development. It can synthesize amino acids with protein residues, participate in sugar metabolism, and promote the absorption of mineral elements in the human body. These microbes used to live in symbiosis with humans are called the gut flora. According to the number of bacteria, it can be classified as the primary and secondary bacteria groups. The main flora refers to the flora with a large number or density in the intestinal flora, including Bacteroids, I Fido bacterium, Rum into occurs, Eubacteria, the bacteria, and so on, which usually belong to the original flora. They primarily affect the entire microflora's function, dominating the host's physis pathological changes. The number of minor bacteria is small, mainly aerobic and facultative anaerobes, such as Escher Ochoa coli. The secondary flora is potentially pathogenic and more mobile than most foreign flora. The primary and secondary bacteria have different effects on the body, such as weight, immune capacity, and digestive system, and sometimes can control the body's response to drugs.

Because bacteria account for 99 percent of the microbes in the human gut, there are about 100 trillion people alive and diverse. So, these bacteria can be broadly divided into three categories: probiotics, neutral, and harmful. Beneficial bacteria are also the bacteria that positively impact the human body, such as lactobacillus and other bacteria that can synthesize riboflavin, thiamine, niacin, and other vitamins that are beneficial to the human body. Such bacteria can participate in food digestion, promote intestinal peristalsis, inhibit the growth of pathogenic bacteria, and break down harmful substances. Neutral bacteria mostly have dual roles, such as Escherichia coli, enterococcus, etc. Usually, neutral bacteria are beneficial to the body, but when they become eaten or migrate to other parts of the body, they can cause many health problems. Once the number of harmful bacteria is out of control and propagated, it will cause various diseases, produce carcinogens, or affect the regular operation of the immune system. Human health is closely related to the bacterial flora in the gut. Bacteria, host, and environment form an interdependent and mutually restricted system. The abuse of antibiotics causes intestinal dysfunction, which leads to intestinal flora disorders, which is a significant factor. In addition, Li Minjie, a scientist at the Shanghai Institute of Materia MEDICA of the Chinese Academy of Sciences, said that the use of antibiotics in China is impressive, with 162,000 tons of antibiotics a year, and more than 50,000 tons of antibiotics are discharged into the soil environment, which can easily cause intestinal flora disorders. Daily consumption of meat, people may have been given antibiotics due to bacteria infected by animals. In this way, biological

enrichment is generated in the food chain. More antibiotics enter the body through different routes, so antibiotics no longer work on humans.

The reasons why antibiotics are abused are many. In addition to the social causes, the government's management of medical staff is also a significant factor that must be addressed. On the social side, due to the moderate price of antibiotics and simple access to antibiotics, there are many manufacturers of antibiotics, so there is unfair commercial competition. There are disorderly sales, false publicity, using improper means in medical institutions to broaden the sales channels, and other phenomena. In addition, the relevant government departments are not managed enough, which is also the cause of the abuse of antibiotics. Some healthcare workers use antibiotics as a "tranquilizer." They cannot distinguish the essential difference between antibiotics and anti-inflammatory drugs. They cannot understand the harm of the combination, resulting in a variety of antibiotics administered internally, unable to play a due role. Many medical staff need more guidance for patients to use antibiotics, resulting in some patients not grasping the amount and interval of antibiotics and not playing the efficacy usually. The government's poor education in this area is also one reason. People need more knowledge to obtain timely information about some new drugs, the problems of some existing drugs, and new treatment options for certain diseases. They are mistaking antibiotics for the cure for all conditions. Used to medication and blindly medication, thinking that there were similar symptoms before the doctor used a specific antibiotic for its treatment.

1.3 Solutions to address the problem of antibiotic abuse

Antibiotic abuse can be addressed in two ways. Firstly, it can be solved by strengthening the government management or increasing education and popular science. The government can regulate the commercial practices of antibiotics, increase penalties, and increase propaganda against their abuse. For example, standardize the sales channels of antibiotics, normalize the pricing standards of antibiotics, and prevent the false publicity of antibiotics. Enterprises that violate relevant regulations will be punished more severely. In addition, it is necessary to improve the standardized drug use guidance and provide

training and advice on rational drug use for medical personnel. In addition, a drug information system should be set up to help patients correctly choose drugs and treatment methods. Strengthen the supervision of hospital policy implementation to prevent false prescriptions; strengthen financial support to hospitals to prevent hospitals from seeking economic benefits. Strengthen the propaganda of resisting the abuse of antibiotics and add propaganda films and microfilms. We call on the public to use rational and standardized drugs. Secondly, medical re-education can be strengthened. Improving the medical practice level of the medical staff is conducive to the medical staff to correct the previous wrong practices, improve the medication level of the medical staff, and avoid the misuse of drugs and drug abuse. Teaching doctors about good communication with patients can help doctors understand the actual efficacy and the side effects of the medications used and can make improvements to the treatment plan for doctors. At the same time, good communication between doctors and patients can help patients find medication errors in time, eliminate some confusion in the medication process, and prevent patients from using drugs randomly. Strengthen the education of medical ethics of medical personnel and establish a reasonable supervision and reward system of medical ethics to correct the service direction of medical personnel. At the same time, it improves the patient's own sensitivity to antibiotic abuse. A complete measures and supervision system for rational drug use should be established, and medical personnel should be trained and guided on reasonable drug use. In addition, a drug information system should be set up to help patients correctly choose drugs and treatment methods.

1.4 Conclusion and the future prediction of antibiotic abuse

The harm of antibiotic abuse to society and individuals cannot be ignored. It is urgent to eliminate abuse. Solving this problem requires the government to organize and manage actively and the public to cooperate with relevant work. In the future, antibiotic abuse will still be a significant problem in today's society. People should pay attention to the side effects of antibiotics, think seriously about the consequences of abuse, and be responsible for their health. Hopefully, the government and the public can soon work together to address the abuse of antibiotics.