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Application of targeted drugs

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Abstract

Due to localized concentration, high efficiency, low toxicity, controlled release, constant blood concentration, and improved compliance with targeted drugs, targeted drugs are widely used in clinical practice, mainly in antitumor medicines and biological products. In the future, the application of targeted technology in drug delivery systems has broad prospects. However, there are still many problems to be solved. The main problem urgently needs to be solved the poor distribution of liposome-targeted drug delivery systems in vivo. In addition, Traditional Chinese medicine（TCM） -targeted formulations have also attracted much attention in recent years. Possible research directions include strengthening the pharmacodynamics and pharmacokinetics of TCM active ingredients, focusing on developing TCM compound formulations, and finding new drug-carrying materials.

Keywords

Targeted drugs; clinical application; antitumor drugs; biological products.

1. Introduction

Targeted drugs, also known as targeted drug delivery systems, are those that concentrate drugs to target tissues and organs through vectors, antibodies or ligands, local administration, gastrointestinal tract, or systemic blood. This method of drug delivery is mainly based on nanomedicine, using nanoparticle-mediated drug delivery. The drug carriers commonly include emulsions, microspheres, liposomes, and nanospheres [1].

2. Research history

The history of targeted agents can be traced back to 1906, proposed by German scientist Paul Ehrlich. It was not until the late 1970s and early 1980s that people began conducting relatively comprehensive research on targeted agents. In 1970, Bangham and Ryman first introduced liposomes as anticancer drug carriers. In 1988, the first liposomal targeted agent entered clinical trials in the United States [2]. In China, targeted agents have been studied since the 1980s [1]. China also pioneered liposome targeting preparation of TCM.

3. Classification

3.1. Based on treatment objectives

3.1.1 Tissues and organs.

If the targeted drugs can treat tumor tissue, dense neovascularization, low pH, etc., and can concentrate the drugs in the lungs, liver, spleen, stomach, and other organs, they will not spread to other organs and tissues, which can effectively reduce the damage of drugs to the body. This targeted drug can be called having the level of organs and tissues.

3.1.2 Cells.

Targeted medicines have cell levels if targeted drugs can accurately destroy diseased cells without damaging other normal cells. This kind of targeted drug can use some receptors on the surface of diseased cells so that the drug can bind to some receptors of diseased cells to provide specific locations for targeted drugs and then destroy them.

3.1.3 Subcellular.

Suppose the targeted drugs can directly enter the pathological cells or organelles for treatment. In that case, they can be called subcellular levels. This kind of targeted drug is the target drug that has been studied more.

3.2. Basis of action mechanism

3.2.1 Active targeting.

When targeted drugs can actively combine with the target, such as antibodies, nucleic acids, sugar chains, etc., to produce therapeutic effects, this is called active targeting, which emphasizes the initiative of drugs.

3.2.2 Physical targeting.

Passive targeting can be called when drugs can strike the lesion precisely by physical means such as light, sound, and electromagnetic fields.

3.2.3 Passive targeting.

When the structural characteristics of specific organs and tissues are used to achieve the natural and accurate distribution of drugs in the body and precise treatment, it can be called passive targeting.

4. Characteristics Summary

The most prominent feature of targeted drug delivery is the maximum delivery of therapeutic drugs to the target area, which can significantly improve the therapeutic effect. The characteristics of targeted agents can be summarized as follows: concentration localization, high efficiency, low toxicity, controlled drug release, constant blood concentration, improved compliance, etc. [3-4].

5. Clinical Application

5.1. Antitumor drugs

Liposomes, microspheres, microcapsules, nanoparticles, and emulsions have always been the focus of the research on targeted antitumor drug carrier systems abroad. The focus of attention includes screening carrier materials and modifying the carrier, hoping to obtain an appropriate drug release rate and high targeting ability. The world's first antitumor drug liposome was adriamycin liposome. After liposome encapsulation, its targeting ability and toxicity can be significantly improved. The characteristics of low toxicity were found by exploring the biocompatibility of tumor thermotherapeutic Mn0.5, Zn0.5, and Fe2O4 nanoparticles.85% ~ 90% of the drugs are released in the mononuclear macrophage system, which dramatically reduces the toxicity of adriamycin to the heart and bone marrow, and significantly increases the anticancer activity [5-6].

5.2. Biological products

Biological products themselves are volatile. The human body is accessible to hydrolysis or enzymatic hydrolysis and fails. Targeted agents can avoid the damage of protein and peptide drugs by the severe external environment; They can also delay the release of drugs, reduce the administration time and improve the targeting of drugs [5]. For example, using lac-polymer-L-

lysine with sizeable molecular weight as the carrier, Liu Jianfeng et al. prepared the liver targeting yoke of antiviral nucleoside drug ARA-AMP. It has good water solubility, which can ensure the effective dose of ARA-AMP in HBV-infected patients with a small injection volume [7].

6. Precautions

6.1. Greasy and pickled food is prohibited.

Such foods have apparent adverse effects on patients taking targeted drugs. They lack nutrients required by patients but contain carcinogens such as nitrite and benzopyrene, which are very harmful to the human body and destroy the efficacy of targeted drugs.

6.2. Do not eat foods with high naringin content and high salt content.

The substances contained in the targeted drugs will be inhibited by naringin, flavonoids, citrus, and so on, which will affect the efficacy of the targeted drugs on the diseased parts of the human body.

6.3. Eat less or no seafood and spicy food.

Both of these two kinds of food will have a destructive effect on targeted drugs, especially seafood, which contains a lot of parasites. If it is not treated thoroughly, it may cause more significant damage to the human body and damage the body,

6.4. Do not take drugs indiscriminately, and do not increase or decrease at will.

When taking targeted drugs, the dosage of targeted drugs should be kept in mind in strict accordance with the doctor's advice. The dosage should be increased or decreased according to the physical condition. If taken indiscriminately, it will increase the pressure on the body organs and affect the average recovery.

6.5. Eat more digestible food and dark vegetables.

Digestible food can effectively help the intestines and stomach absorb and wriggle, reducing the pressure on the intestines and stomach. Dark vegetables and fruits are rich in dietary fiber, which can supplement the body with many vitamins, repair damaged cells, and help the body detoxify and improve appetite.

6.6. It can be taken on an empty stomach.

According to the clinical manifestations of patients, after fasting or eating for two hours, the body's absorption of targeted drugs will increase, which is more conducive to the efficacy of targeted drugs. But for some patients, taking it on an empty stomach will cause gastrointestinal discomfort. Therefore, patients can also set the medication time according to their actual physical conditions to maximize the effect of the targeted drugs.

6.7. In case of any problem, stop the medication in time.

Each patient's physical adaptation to targeted drugs varies. Some patients may take targeted medicines all the time. Still, some patients may only take targeted drugs for a while. Beyond this time, they may have severe adverse effects on the body, such as stomach perforation, liver and kidney injury, lung disease, etc. When these conditions occur, stop taking targeted drugs immediately.

7. Clinical Application

According to the Summary of the existing relevant research, it is found that the current research hotspot of targeted agents includes the uptake efficiency and uptake mechanism of targeted

agents and the preparation of targeting technology based on biological and physical targeting. The application of targeting technology in drug delivery systems has broad prospects, but the clinical application still lack-accumulation. The main problem that needs to be solved is the poor distribution of liposome-targeted drug delivery systems in vivo. With the continuous exploration of domestic and foreign researchers, nano-agents have made significant progress in targeting different organs and enhancing drug efficacy. Various products, such as paclitaxel liposome for injection and amphotericin B liposome for injection, have been successfully marketed in China [8].

In addition, in recent years, targeted preparation of Traditional Chinese medicine has also attracted much attention. Currently, the research on the targeted practice of Traditional Chinese medicine mainly focuses on the single practical component of traditional Chinese medicine. In contrast, the valuable part of traditional Chinese medicine, especially the compound of traditional Chinese medicine, is rarely studied. And most of the studies are laboratory results with relatively few real-world clinical applications. The future application of targeted TCM preparations must be based on the basic theory of TCM, strengthen the pharmacodynamics and pharmacokinetic research of TCM active ingredients, focus on the development of TCM compound preparations, and find new drug delivery materials to achieve better outcomes [9-10].

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