

## Research Progress of Quinolones and Its Application in Veterinary Medicine Issues

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**Abstract:** The properties of quinolones are reflected in the long stay and the drug resistance is not easy to produce and so on. These drugs are more suitable in the clinical treatment of animals, and effectively guarantee the effective solution of many problems in animal clinic, and promote the progress and development of clinical treatment of animal diseases, so they have a good application prospect.

### 1. Introduction

Quinolones have been widely used in veterinary clinic because of their own characteristics and advantages, and their prevention and treatment effect in many kinds of bacteria with mycoplasma disease is extremely remarkable, so the development of quinolones in synthetic antimicrobial drugs is very broad. However, it is worth noting that in the process of the wide use of such drugs, some application problems also followed, only if the application problem can be effectively solved, to ensure that the efficacy of quinolones to match expectations, and then better to provide services for veterinary clinical application. Based on this, this paper expounds the clinical application of quinolones in veterinary medicine, and also discusses its research progress, hoping to help the relevant personnel to better understand this kind of drugs.

### 2. A Brief History of Quinolones

The discovery of the first-generation quinolone drug naphthalic acid was made in the United States in 1962, and since then more researchers have been studying and developing the drug. One of the most studied and developing drugs is the drug. The first-generation products were developed around the 1970s, such as naphthalic acid and oxoquinic acid, which are resistant to G-Major application of bacilli, G+Bacteria and other aspects will not produce effect, but the products developed in this era have been gradually reduced in the current application because of the narrower antibacterial spectrum and more adverse reactions. From the early 1970s to the mid-1980s, the second-generation varieties were developed and marketed, such as neo-oxic acid and thiaquinic acid. Compared with the first-generation antibacterial spectrum and antibacterial effects, the second-generation products were more effective and correspondingly had fewer adverse reactions than the first generation, which were used to treat diseases of the urinary system and intestinal infections. The third-generation drug, developed and marketed in the late 1970s, is a new product similar to the 4-quinolone structure, which is also known as fluoroquinolone because of the presence of fluoride ions in its chemical structure. Compared with the antibacterial spectrum of the first and second generation R & D products, the widening phenomenon of the third generation is more obvious, and the corresponding antibacterial effect is also significantly improved, and the stronger inhibition effect is in G-and G+In addition, the inhibitory effect of *Pseudomonas aeruginosa* is especially good, the drug resistance is not easy to produce in the course of clinical application of the third generation of drugs, and it can guarantee the complete absorption of drugs in the context of oral application, but also has only mild adverse reactions.

Eleven new fluoroquinolones were on the market in the 1990s, seven of which have been approved for veterinary use in various countries, and some have been approved by the Ministry of Agriculture for use in animals[1]. Quinolones have gradually been widely used in veterinary clinic,

and their important role in the prevention and treatment of diseases is especially obvious, but it is worth noting that there are some problems in the process of clinical application, and in the context of extensive application, the attention of society and people to the application of these drugs has gradually increased, and the research and development of these drugs are still continuing, and more and more new varieties are in the stage of development and trial under this background. Happily, the fourth-generation product development and trial of such drugs are characterized by spectral and long-acting, and there are already emerging drugs, such as sparfloxacin, which show a wide range of prospects.



Figure 1 Quinolones

### **3. Quinolones Commonly Used in Veterinary Practice**

#### **3.1. Norfloxacin**

This kind of drug is also called haloperidate, it has a wide spectrum of antibacterial and strong antibacterial effect, and its strong application in veterinary clinic is reflected in the common pathogens, among which mildew body infection is the most significant. The drug can be absorbed quickly and has high blood concentration and less toxicity. It has a good effect on the prevention and treatment of diseases such as chicken septicum and salmonella dysentery. The efficacy of this drug in the treatment of mycoplasma pneumoniae disease in pigs is in line with expectations. The protection rate of haloperidate niacin was 100% in the incidence of paratyphoid infection in piglets. At the same time, it also has a remarkable effect on avian cholera. It is worth noting that this drug cannot be used with furanto, because the combination will have an antagonistic effect.

#### **3.2. Enrofloxacin**

Enrofloxacin has broad-spectrum antibacterial characteristics, and its strong effect is reflected in mycoplasma and staphylococcus. The drug can dissolve in water, withstand high temperatures and pH levels. The absorption is better under oral application. This drug is mainly used in the clinical treatment of various infectious diseases caused by sensitive bacteria, especially in the application of deep tissue infection and genitourinary tract infection, which can effectively control the fungus and common pathogens of livestock[2]. Its cure rate is obvious in the aspects of chicken septicum infection and chicken *E. coli* infection. In the treatment of pig diseases, the drug can be used to prevent and treat many diseases such as dysentery in piglets and *E. coli* in weaning pigs, and also in the treatment of diarrhea and sepsis caused by *E. coli* in calves and respiratory tract infections in dogs and cats.



Figure 2 Prevention and treatment of enrofloxacin in *E. coli* disease in dairy pigs

### 3.3. Ciprofloxacin

Ciprofloxacin, as a spectrum-efficient drug, has obvious effect on the serious infection caused by drug-resistant bacteria. The antibacterial activity of ciprofloxacin to all bacteria is high, and it can be absorbed quickly, and has high bioavailability. The appropriate amount of drugs in chicken cholera prevention is very effective, and in the appropriate amount of drugs and reasonable treatment of disease is also very effective, can be said to achieve 100% of the prevention and treatment effect. This drug is very suitable for the treatment of diseases such as white dysentery and yellow dysentery in piglets.

## 4. Clinical Application of Quinolones in Veterinary Medicine Attention Issues

### 4.1. Toxic Reactions

Cartilage toxicity. Key cartilage diseases in young laboratory animals can be triggered by all quinolones. In the case of high-dose or long-term use of quinolones, diseases similar to cartilage toxicity caused by some drugs may also be reflected in adult animals, but it is worth noting that they will reflect differential toxicity.

adverse reactions in the digestive system. The common adverse effects in humans are vomiting and diarrhea and indigestion, but the adverse effects reflected in each generation are different[3]. Particularly important are the adverse reactions to the digestive system in animals, where the extremely strong bactericidal activity of such drugs is fully highlighted in the case of gram-negative bacteria, which have a devastating effect on the inhibition of gastrointestinal flora interaction, which can have an effect on feed utilization and reduce the weight gain, but in the case of more severe destruction, some severe gastrointestinal reactions are likely to be triggered.

Neurological symptoms. The central nervous system adverse reactions in the third-generation drugs were lower than those in the first and second generation, at about 1%. In animals, nervousness or neurological symptoms often show up, while acute toxic neurological symptoms such as sharp corners and rotation and spasmodic death are present in chicks, and seizures against cats and dogs are also induced.



Figure 3 Acute toxic neurological symptoms in chicks

## 4.2. Drug Resistance

Studies have shown that altering bacterial cell wall permeability is a major manifestation of the resistance mechanism of bacteria to such drugs, with only a few having mutations in DNA spin enzymes. It is worth noting that the application of such drugs in food animals is a controversial issue of whether it will increase the resistance of human pathogens, through continuous observation and exploration, has gradually developed such drug resistance, and it can be seen that consistent food animals and human use of such drugs increased resistance. Therefore, the use of this drug should be cautious and strict restrictions, greatly reduce drug resistance.

## 4.3. Drug Residues

There are few reports of such drug tissue residues in society at present, but in the context of the wide application of drugs, an important and necessary work has developed into such drug residues. Some researchers have probed into the tissue residue of some products in this kind of drugs, and through the specific determination and the application of effective methods, the certain withdrawal period of some products in this kind of drugs has been defined. Consequently, monitoring of drug and drug metabolite residues should be taken into account in the subsequent use of such drugs, especially in tissues such as liver and kidney, and should be discontinued around the established withdrawal period.

## 5. Conclusion

At present, the research on quinolones has been going on for many years. With the improvement of science and technology, the research and application of these drugs still have a wide range of space. It is worth noting that the application of such drugs in livestock and poultry should be based on the actual situation and different drug characteristics, coupled with the application of attention, and then comprehensive consideration of rational use of drugs, so as to ensure the desired application effect.

## Acknowledgements

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