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The treatment of Canine Parvovirus and the vaccine improve

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Abstract. Canine Parvovirus (CPV) is common in dogs, with 50% of dogs infected with CPV and 80% of affected dogs likely to die. The main cause of death was myocarditis or enteritis caused by canine parvovirus. However, there is currently no good treatment for CPV infection, only vaccination can prevent it in advance. When dogs receive the inactivated vaccine, the mortality rate can be reduced to 1.25%. At present, there are several methods to treat canine parvovirus, such as inactivated vaccine, attenuated vaccine, gene vaccine and so on. The popular prevent of CPV is to inoculated pentavaccine, a kind of inactivated vaccine. But it needs to inoculated twice. So now, scientist focus on to invent genetic engineering vaccine, that use CPV-2, the DNA of CPV to invent a kind of DNA vaccine, its simple operation and efficient expression of antigen proteins, and some vectors can also be used as biological adjuvants to enhance the immune effect, which are unmatched by traditional vaccines. Inoculated Penta vaccine is the most popular way to prevent CPV but DNA vaccine will become the best way to prevent CPV virus. This paper introduces the vaccine can be used available for Canine parvovirus.

Keywords: Canine Parvovirus, Dogs, Vaccine.

1. Introduction

Canine Parvovirus (CPV) is cause by a kind of virus named Parvovirus virus. Parvovirus is a kind of DNA virus. CPV have a kind of antigenic named CPV-2 that is the main cause to lead Canine parvovirus. Dogs are the main natural host of Canine parvovirus, and the dogs of all of age can infection CPV, but puppies are the most susceptible. CPV can be lead because the long-time transportation, cold and crowded. Sick dog is the main source of infection, there have a lot of viruses in their vomiting, saliva and feces. Rehabilitation dogs can still detoxify through feces for a long time, healthy dog have direct contact with sick dogs or dogs with poison, or through contaminated feed and drinking water through the digestive tract. People and lice can also be the mechanical carriers of CPV. The type of dog infected canine parvovirus is initially depressed, anxious, and occasionally high fever, soft stools or mild vomiting, after a few days, dog will begin o frequent vomiting and severe diarrhea. The stools in the beginning are gray, yellow of milk lily with jelly-like mucus [1]. Canine parvovirus can lead a lot of kinds of disease like myocarditis or enteritis that also the leading cause of death in dog [2].

Demographic data: The infection rate of dog is 46.61%-100% and the death rate of Canine parvovirus up to 3.9%-95.8%, most of dog will die after they infection Canine parvovirus. After dogs inoculated inactivated vaccine, death rate down to 1.25% [3].

In now there have a few methods that can be used to treatment Canine parvovirus such as to inoculate some kinds of vaccine, like inactivated vaccine, attenuated vaccine and scientist is focus on research

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Canine parvovirus gene vaccine but it cannot resolve this problem effectively. Invective vaccine is the best treatment in now. The antibody level was 2 to 4 times higher than that of heterogenic vaccine, and the immune period was also 2 to 4 times longer. Attenuated vaccine is to extracted a kind of virus named CR86106 that can overcome the interfere of material antibody it has a few heredities. Most of vaccine in now is improved on the basis of CPV-2, which can effectively prevent and control Canine parvovirus and resist the attack of variant strains such as CPV-2b. And gene vaccine is the new research, it uses some proteins in Canine parvovirus virus gene to made antibody to lead immune response. After dogs inoculate vaccine there also have high infection rate to infect Canine parvovirus. In now, there only have vaccine but did not have specific medicine [4].

This paper introduces what is the Canine parvovirus, what is the symptom of Canine parvovirus, why Canine parvovirus is dangerous what can people do after dog infection Canine parvovirus, highlight the treatment can be used available for Canine parvovirus like inactivated vaccine, focus on to invent a new kind of vaccine can oppose Canine parvovirus.

2. Therapies for Canine parvovirus

CVP is belongs to the genus parvovirus of parvoviridae family the virions do not have capsular membrane, and the nucleocapsid is an isoaxisymmetric 20-hedronround or hexagonal under click to view electron microscopy [5], with a diameter of 21nm~24nm [6]. Canine parvovirus can survival in 65 degrees for 30 min, long-term storage at low temperatures had no significant effect on infection. CVP can survival at 4 degrees to 10 degrees for 6 months. It can survival at room temperature for 3 month only slightly decreased infection, can survive in feces for months to years. The main source of infection, vomit, saliva, feces contain a lot of viruses. More than 50 percent of dogs which infect CPV was infection with other dogs by the feces or infection by air [7].

The most effective disinfectants for CPV are formalin, B-propanolactone, oxidant and so on. D. 5% formalin, 0.5% peroxyacetic acid, 5%-6% sodium hypochlorite, etc. can be used as disinfectants for this virus. can be used as disinfectants for this virus [8]. In addition, ultraviolet light can also inactivate it. In the beginning, people use formalin to made inactivate vaccine to precaution. After inactivation with formalin, its hemagglutination remains almost unchanged [9]. Inoculated pentavaccine is the most popular way to guard against dogs' infection CPV. Pentavaccine include Canine Rabies, Canine Distemper, Parainfluenza, Adenovirus Disease and Microvirus Disease [10]. Infect pentavaccine also a good way to protect people [11]. Rabies is an acute infectious disease caused by the rabies virus, and is a common human-animal disease, most commonly seen in dogs, wolves, cats and other carnivores, and people are mostly infected by bites from sick animals. Rabies is mainly transmitted by dogs, and domestic dogs can be asymptomatic carriers, so apparently "healthy" dogs can be very dangerous to human health. The case fatality rate of rabies in humans is nearly 100% [12]. Other kinds of disease in pentavaccine cannot spread in human but that all have high death rate of dogs.

Without inactivation vaccine, there have other kinds of vaccine like attenuated vaccine and genetic engineering vaccine. The vaccine is produced domestically in inactivated canine microvirus disease vaccine [11]. Domestically produced inactivated canine microvirus disease vaccines are used in combination with other vaccines. When using canine five weak venom vaccine, dogs 30 to 90 days of age should be injected three times, and dogs over 90 days of age should be injected twice, with an interval of 2 to 4 weeks. The interval between each injection is 2 to 4 weeks [10]. Interferon inhibits the activity of viral neuraminidase and the replication of viral DNA and RNA, thus inhibiting the propagation and spread of viruses in cells. Pentavaccine can inhibit the propagation and spread of viruses in cells, at the same time can stimulate the body's B cells and T cells, enhance the function of lymphocytes to kill the target cells, has a broad-spectrum. It has a broad-spectrum antiviral effect. It is also effective against mutated canine smallpox virus. Transfer factor and thymic peptide can lift the immunosuppression caused by long-distance transportation of dogs. It allows sick dogs to raise antibody level by themselves and shorten the course of treatment.

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3. Vaccine for Canine parvovirus

Two kinds of immunization can response CPV. In active immunization, there have two ways to get immune response, the first is natural active immunity, it is antibodies produced by natural infection with a virus, another is artificial active immunity like inoculate vaccine. Passive immunization also has natural active immunity and artificial active immunity. But for passive immunization, natural active immunity is like maternal antibody and artificial active immunity is like immune sera. That the two main ways of creature can increase their immune response [13]. Most of the vaccine used in recent years are live vaccine improved on the basis of CPV-2(there can extract a kind of virus in matrix which is CR86106)Maternal antibodies do not provide adequate protection (Nicola Decaro et al. concluded that HI 80 provides full protection), and many dogs become infected within the first week of life Neutralization tests have demonstrated that different antigenic types result in different levels of antibody, which may be clinically important when the maternal antibody is at a minimal protective titer, and also interfere with immunization, resulting in failure of the immunization [14]. CR86106 can overcome the interference of maternal antibody, genetic stability, good immune effect, has become a weak vaccine strain to prevent CPV in the world. CPV-2 has a minimum duration of immunity of more than 3 years, indicating that all available vaccines provide good protection and do not need to be repeated annually. But in now, researchers don't know the specific data about how long to inoculate this vaccine [9].

3.1. Inactivated vaccines (inactive the CPV virus)

Preventing CPV infection with inactivated vaccine of canine origin is also a good way. The antibody level is 2 to 4 times higher than that of heterologous vaccine, and the immunization period is 2 to 4 times longer, once of them can valid nearly 98 days, and it need to inoculate very year [15]. But CPV inactivated vaccine cannot stimulate dogs to produce enough local antibodies in the gastrointestinal tract, and it becomes a hidden carrier of the virus [15]. However, CPV inactivated vaccine cannot stimulate dogs to produce enough local antibodies in the gastrointestinal tract, so it is a hidden carrier and becomes a source of infection in the dog population. But in now, the inactivated vaccine is not common in to treatment CPV, and there only have a fill kinds of inactivated vaccine like attenuated vaccine. Puppy body CPV resistance for puppies early maternal antibody against CPV infection plays a main role, but the disturbance of maternal antibody is the main cause of CPV immune failure, in order to overcome the effects of maternal antibody Many scientific research personnel of unremitting efforts, the drop degree of CPV weak poison vaccine can to a certain extent, overcome the impact of maternal antibody; CPV-2b strain 29-97/40 could overcome the influence of maternal antibodies to a certain extent. Intranasal inoculation of CPV vaccine can also overcome the influence of maternal antibodies to a certain extent, and nucleic acid vaccine can overcome the influence of maternal antibodies [16].

3.2. Genetic engineering vaccine (use the VP1 gene of CPV)

Genetically engineered vaccines are made by isolating the protective antigen gene of a pathogen using genetic engineering methods or molecular cloning technology, and transferring it into the prokaryotic or eukaryotic system to express the protective antigen of the pathogen, the RNA vaccine is a kind of genetic engineering vaccine [17]. The vaccine is made by expressing the protective antigen of the pathogen in a nuclear or eukaryotic system, or by deleting the virulence-related genes of the pathogen to make a gene-deficient vaccine without the virulence-related genes. Or the virulence-related gene of the pathogen can be deleted to make a gene-deficient seedling without the virulence-related gene. There did not have specific medicine now, people only can use vaccine to prevention Canine parvovirus. The gene of CPV such as VP1 and VP2 can product antibody response. The CPV gene like CDV, CPV, CAV can structure the attack of the gene of CPV. The oral route of administration is also the main direction for the future development of DNA vaccines. And oral route of administration is also a major future development for DNA vaccines but the effect of oral route need be increase. In now scientist focus on to improve genetic engineer vaccine. There has success experiment dog until. That dog can avoid to infect CPV virus. Scientist use different kinds of virus to expression CPV VP2 protein and CPV VP2 DNA, that all can obtain great immune response. VP2 protein can response with CPV positive antibody

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and can product specific antigen-antibody reactions. that can against CPV virus effective. And can also use recombine grain or Eukaryotic expression plasmid technology to product vaccine. Scientist constructor pIRCDV-H, pIRESVP1and pcCAV-F and use them to product vaccine [18]. For the result, he three immunizing plasmids were purified and mixed to immunize 15 dogs, all dogs vaccinated with the mixed gene vaccine were able to produce high antibody levels after 2 immunizations, and most of the dogs were able to resist the 3 potent toxins after attack, while the control dogs developed severe disease. Most of the dogs were able to resist the attack of the three viruses after the attack, and the control dogs had severe morbidity [18]. But it cannot to solve the problem about immune CPV virus completely.

3.3. DNA vaccine

Pentavaccine include inactivated vaccine and attenuated vaccine, it is the most popular and useful vaccine in now and it focus on invent DNA vaccine. DNA vaccines, also known as nucleic acid vaccines or gene vaccines, clone the main antigenic genes into eukaryotic plasmid expression vectors, and then inject the recombinant plasmid DNA directly into animals, so that the exogenous genes can synthesize antigenic proteins through the host cells, and then induce the host to produce specific immune responses [11].

After DNA vaccination, the plasmid is taken up by surrounding tissue cells (e.g., myocytes) antigen-presenting cells (APCs) or other inflammatory cells, and the absorbed plasmid synthesizes mRNA under the action of the organism's promoter and is degraded by the enzyme complex in the cytoplasm, the proteasome, to form amino acid peptides, which are then transported via antigenic transport proteins (TAPs) to the lumen of the endoplasmic reticulum for further modification into amino acid short peptides These short peptide fragments are then transported to the endoplasmic reticulum lumen by the antigen transporter protein (TAP) for further modification into short amino acid peptides. These short peptide fragments bind to the antigenic binding groove of newly synthesized MHC-I molecules in the endoplasmic reticulum lumen to form antigenic peptide-MHC-molecule complexes, which are transported to the cell surface as immunogenic signal peptides for CD8+ cytotoxic T-cells (CTLs) to recognize, resulting in their activation, value-added, and differentiation into effector CTLs with the capacity of killing and inducing strong cellular immune responses. The CPV genome encodes mainly VP1 and VP22 structural proteins. Changes in several key bases and specific amino acids on VP2 will change the antigenic properties and host range, all the antigenic determinants that bind neutralizing antibodies are in VP2. The sequences of VP1 and VP2 are basically the same, except that the amino-terminal of VP1 has more amino sequences than that of VP2, which contains T-cell recognition epitopes, and it is able to stimulate cellular immunity, and cell-mediated immune response is an important mechanism for gene immunity to induce the body to resist the attack of pathogens. The cell-mediated immune response is an important mechanism for gene immunity to induce the body to resist pathogen attack. Therefore, VP1 and VP2 can be used as the main antigenic genes in DNA vaccines. DNA vaccine have prior success, the dog used in experiment were all survive. But the usability and availability of DNA vaccine also need to verity [19].

4. Challenge and improvement

4.1. Side effects of conventional treatments

After dog inoculate Canine parvovirus vaccine that also have the possible to infection Canine parvovirus. In new after dogs inoculated CPV, CDV, CAV triple vaccine dog also has low rate to infect CPV. And all of dogs need to inoculate twice even thrice, that can promise dogs be scarcely possible be infect. Inactivated vaccine is a kind of popular vaccine. It can promote immune system product antibody and that is more than other vaccine 2-4 times. It cannot carry about all of body of dog, it also has some where is easy to spread. After dogs inoculated triple vaccine, they will appear some adverse reaction like weakness, depression, etc. More serious, it will appear fever, vomiting, and diarrhea. If dog was sick before inoculate triple vaccine, it will make sick more serious and have possibility cause dogs die [20].

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4.2. DNA transmission

Puppies are most susceptible to infection between weaning and six months of age. Susceptibility depends on the level of systemic protection received from the mother. The level of protection depends on the antibody titer of the colostrum and the amount of colostrum consumed by the individual puppy. In addition, maternal-derived antibodies differed significantly between puppies in the same litter [7]. Puppies inherit antibodies from their mothers that can prevent infection for about 22 weeks, but to be on the safe side puppies should be injected as soon as they reach about 8 weeks of age. So, after puppies both, thy do not have strange immune ability. People need to Take the puppies to get vaccinated in time [9].

5. Conclusion

For this research, people can know that CVP is a kind of high mortality disease and it is easy to infect dogs exactly puppies. Now there have a few kinds of vaccine. First is pentavaccine, it is the most normally vaccine and it is also can preventive other kinds of disease. But it also has possible be infect those vaccine after dogs inoculate this vaccine. Pentavaccine is a kind of inactivate vaccine. In now, scientist was focus on to invent a kind of genetic engineering vaccine. It can be more efficiency than inactivated vaccine. But scientist cannot promise its safety. This research can help people take better carry about their pets and can give new concern of invent vaccine. It also has a lot of aspect need to improve like it is difficult to measure the safety of this vaccine so it was not in market now and it also have the problem about price.

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