



**Monthly Update**

*Issue Contributors:* Kenneth Palladino Jr., DVM, Practice Limited to Internal Medicine @ CCVS

*Editor:* William B. Henry DVM, DACVS

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**WHAT'S THE SCOOP WITH THAT POOP? - CANINE PARVOVIRUS**

**PART 1**

*Kenneth Palladino Jr., DVM*



**HISTORY OF CANINE PARVOVIRAL INFECTIONS**

Canine Parvovirus has been cited as the most common cause of infectious enteritis in dogs worldwide. Other causes of viral enteritis in dogs include canine distemper virus, canine enteric coronavirus, rotaviruses, astroviruses, adenoviruses, caliciviruses and novel viruses that include a norovirus, kobuvirus, sapovirus, and possibly also a circovirus. Canine enteric coronavirus usually causes mild diarrhea in puppies less than 6 weeks of age. It can also be seen in conjunction with other viruses such as Canine Parvovirus. Rarely, canine enteric coronavirus has been found as a cause of more significant diarrhea in young dogs.

Canine Parvovirus caused a worldwide pandemic of illness in dogs. It spread rapidly over about 1-2 years. In the USA, the initial research on the virus was carried out at the Baker Institute in Cornell University. The virus was noted almost simultaneously in other countries including Australia and many in Europe.

For more on the History of Canine Parvoviruses, see attached.

**TYPES OF CANINE VIRUSES**

It is important to note that there are two types of Canine Parvovirus. Canine Parvovirus Type-1 is also called the Minute Virus of Canines and Parvovirus Type 2. Canine Parvovirus-2 has further evolved into type 2a, 2b and 2c.

**CANINE PARVOVIRUS-1**

Canine Parvovirus-1 was discovered in 1968 by Dr. Leonard Binn who isolated the virus from the normal feces of US Army dogs stationed in Germany. (Figure 1) Several retrospective studies later revealed neutralizing antibodies to Canine Parvovirus-1 in commercial canine distemper/hepatitis serum as early as 1956.

Canine Parvovirus-1 is distinct from Canine Parvovirus-2 and the parvoviruses of other species. The complete genomic sequence of Canine Parvovirus-1 has been accomplished on isolates from Korea and the USA. The virus appears more closely related to the bovine parvovirus.



*Figure 1: Three German Shepherd Military Dogs*

*Continued next page*

**CCVS Scan Hours**

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The breakdown of CT charges are as follows:

1. CT Scan, In patient \$905.00 (case already hospitalized at CCVS or referred to CCVS for work up and treatment and has a CT scan)
2. CT Scan, Additional image (if you add an additional scan site \$300.00)
3. CT Scan, Out patient \$985.00 \*\*(case sent to CCVS exclusively for a CT; this includes charges for doctor overseeing case, IV catheter, and fluids post CT).
4. CT "Met Check" \$590.00
5. CT STAT fee, \$50.00 (on top of whatever you are doing).

These charges cover the CT, the contrast, radiologists read, rapid infuser, sevo anesthesia, and technician fee if we need to call someone in for the CT. It does not cover injectable drugs, if needed for IV anesthesia; estimated additional cost \$50.00-\$75.00.

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## CANINE PARVOVIRUS-2

Canine Parvovirus-2 is the strain that emerged in 1978 and caused the worldwide pandemic. Many aspects of the virus itself may have led to such a rapid distribution. The virus is stable in the environment and highly contagious. The principal source of infection was likely feces sent via mail, and on shoes or clothes. Due to movement of dogs, and their owners, in transit by air, land or sea the virus was definitively noted worldwide by 1980.

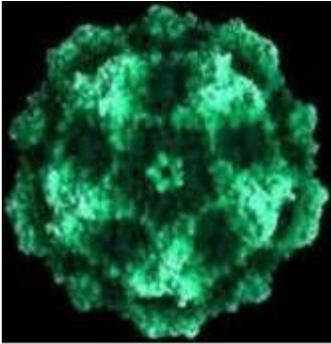
## CANINE PARVOVIRUS-2a, 2b and 2c

Canine Parvovirus-2a emerged around 1979. It was a mutation of the original Canine Parvovirus-2. Dr. Collin Parrish was able to determine that Canine Parvovirus-2a differed from Canine Parvovirus-2 in three amino acid changes in the capsid protein (VP-2) which resulted in antigenic change. Now the pathogenesis and mode of viral growth was affected. Canine Parvovirus-2 did not originally infect cats however Canine Parvovirus-2a was noted to have this ability.

The virus quickly mutated again and in 1984 Canine Parvovirus-2b was discovered. These two strains became the predominant types but their geographical locations differed. Canine Parvovirus-2 underwent yet a third change when in 2000-2001 Canine Parvovirus-2c emerged in Italy. It has since been reported in regions around the world including Spain, Vietnam, Japan, Germany, South America and North America. This strain is highly virulent. It is thought to be the cause of more recent outbreaks, especially in some adult, vaccinated dogs.

**For more on Canine Parvovirus Types, see attached.**

## EPIDEMIOLOGY

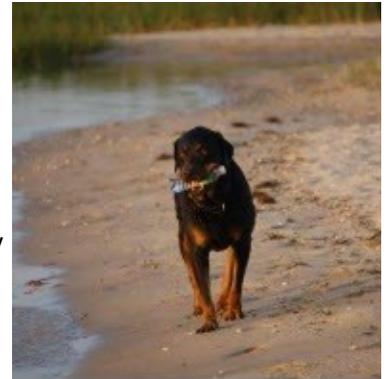


*Figure 2: The icosahedral Shape of Canine Parvovirus.*

Parvoviruses are small, non-enveloped, single-stranded DNA viruses. The name comes from the Latin parvus, meaning small, as the virus is only 20 to 26 nm in diameter. It has an icosahedral symmetry. (Figure 2) They can survive for long periods in the environment, some over 1 year. Contact with the virus that persists in the environment is an important source of transmission. Small rodents and insects may also play a role as mechanical vectors of disease.

Generally, puppies between 4 weeks and 6 months are susceptible. Those under the age of 12 weeks are especially at risk. Even partially vaccinated puppies are at risk due to interference of acquired immunity by maternal antibodies. Certain breeds of dogs have also been reported to be at a higher risk of developing parvoviral

enteritis. These include Rottweilers, Staffordshire terrier breeds, German shepherds, Doberman pinschers, English springer spaniels and Labrador retrievers. (Figure 3) Other risk factors that may play a role in increased susceptibility of certain breeds include breed popularity and lack of appropriate vaccination protocols. The disease may be more rapid or severe with concurrent infection with other enteric viruses such as Canine Corona virus. Intestinal parasites can also play a role in the severity of the disease, adding insult to the intestinal mucosa.



*Figure 3: "Sherman" is a Rottweiler, a breed that has a higher risk of developing parvoviral infection.*

**For more on Epidemiology, see attached.**

## DISEASE TRANSMISSION AND PATHOPHYSIOLOGY

Transmission of the virus is through the fecal-oral route. The virus is shed in the feces or vomit of infected dogs. It is important to remember that the virus can persist on fomites such as clothing, water bowls, even hands. The incubation period for the virus is 7 to 14 days although shorter incubation periods have been reported in experimental infections. Once the virus enters the blood stream, it disseminates and causes damage to areas in the body that have rapidly dividing cells. Areas such as lymphoid tissue, bone marrow, thymus and especially the gastrointestinal tract are most susceptible.

**For more on Disease Transmission and Pathophysiology, see attached.**

## CLINICAL SIGNS

Clinical signs at the onset of the disease are non-specific and can include lethargy, anorexia and fever. Within 24-48 hours most affected puppies will develop vomiting and small bowel diarrhea. (Figure 8) Gastrointestinal signs will usually lag behind viremia by about 2 to 3 days. The vomiting is usually copious and protracted. The diarrhea will often begin as watery and mucoid but will rapidly progress to hemorrhagic. The large amount of fluid losses from the diarrhea and vomiting leads to severe dehydration. Hypovolemic shock often ensues due to the dehydration coupled with severe protein loss through the gastrointestinal tract. Abdominal pain is another consistent finding on physical examination. This can be secondary to severe gastroenteritis or intestinal intussusception.

See next month's article for more on Canine Parvovirus including diagnostics, treatment options and prevention.