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### PARVO VIRUS [CAT FLU]

- Although established as a name that installs fear into every puppy owner's heart, cat flu is a terrible misnomer for canine parvovirus diarrhoea - It blames the poor cat for a crime it didn't commit.
- Parvovirus comes from the latin word "parvum" meaning small.
- It is a *dog specific virus*, not involving cats at all.
- It was diagnosed in 1978 for the first time

#### **Where does the virus come from?**

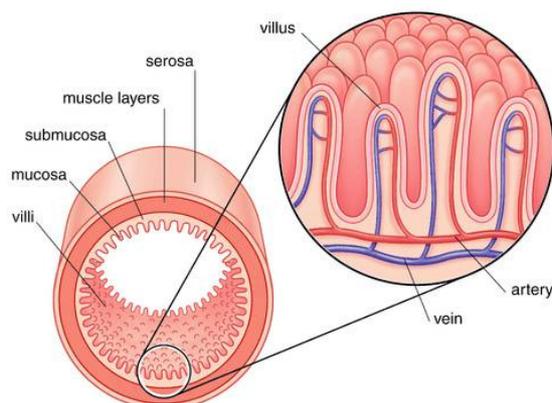
- Infected dogs shed *extremely large numbers* of virus in their stool for the first two weeks after the initial infection. [Theoretically, one sick dog could infect every susceptible dog in South Africa]
- Some dogs without signs of disease are also infected, spreading the virus everywhere.
- The virus is able to *survive in the environment* for extended periods [months to years], thereby increasing the potential for spreading.
- It is *highly contagious*, only a tiny piece of infected stool is needed to infect a susceptible dog
- Household insects, e.g. ants, can carry the virus from place to place.
- This means the *virus is everywhere*, on every floor, carpet and in every garden or park.

#### **Why did your puppy pick up the infection?**

- Whether infection will take place, or not, depends on three factors:
  - Your puppy's immunity against the virus
  - Number of viral particles it is exposed to
  - Environmental factors
- Your puppy's immunity depends on the amount of antibodies against the virus
- Young Puppies: When puppies are born, they are unable to make antibodies against any infectious invader. They would be totally unprotected, but nature has created a system to protect them. The mother secretes colostrum [milk] for the first one or two days after giving birth. It contains all the antibodies that the mother has circulating in her own body and in this way, she gives her own immune experience to her offspring. A puppy absorbs these milk antibodies through "gaps" in the intestinal lining. These "gaps" close after 24 – 48 hours, and no more antibodies can be absorbed. In a poorly or unvaccinated mother, there are few to no antibodies to be transferred to the puppies. If the puppy was not able to suckle during the first day or two from its natural mother, no antibodies could be obtained either.
- Older Puppies: The maternal antibodies obtained from the mother may last between 4 - 12 weeks, depending on the 'dose' the individual received. Birth order and how strong it nurses plays a role in the amount of antibodies obtained. When the antibody count drops to a certain level, they no longer have enough protection, and if they are then exposed to an overwhelming number of viral particles, they will get infected.
- Rottweilers and Doberman Pinchers are at increased risk irrespective of their vaccination status

## What happens in the body?

- Transmission is via faecal – oral contact.
- There is a 3 to 7 day incubation period before the puppy seems obviously ill.
- Upon entering the body, the virus seeks out the nearest rapidly dividing group of cells.
- The Lymph nodes in the throat fit the bill, and the virus sets up here first and replicates to large numbers.
- After a couple of days a significant amount of the virus is released into the bloodstream, targeting more rapidly dividing cells: the bone marrow and the delicate intestinal cells
- Bone marrow: The virus destructs the young cells [stem cells] of the immune system. By killing these cells, it knocks out the body's best defence, and the white blood cell count drops in the body.
- GI Tract: The most devastating effects occur in the intestines. The normal intestine consists of millions of tiny finger – like protrusions [villi] that have a rich blood supply, and are responsible for absorbing nutrients and fluids from the gut. The cells of the villi are relatively short-lived and are rapidly replaced by new cells. The source of these new cells is the rapidly dividing area at the foot of the villi called the crypts. Parvovirus strikes right at the crypt, resulting in the whole inner lining of the gut dying off and sloughing. Without new cells coming from the crypt, the villus becomes blunted and unable to absorb nutrients. Voluminous diarrhoea results.
- Systemic: The barrier separating the digestive bacteria [normal inhabitants of the gut] from the blood stream breaks down. The diarrhoea becomes bloody and the bacteria can enter the body, causing widespread infection. [sepsis]
- Because of the severe gastrointestinal inflammation from the viral damage to the gut lining, the dogs vomit, won't eat and develops bloody putrid smelling diarrhoea.
- Protein levels in the blood drop below acceptable levels due to a loss of protein via diarrhoea, inadequate food intake and absorption. Proteins are necessary in the blood to provide the body with building blocks, as well as keeping fluid in the blood vessels. If the protein count falls below a certain level, the fluid may start leaking out of the vessels and accumulates under the skin and in the lung tissue.
- Dehydration: The combination of inappetance, vomiting and diarrhoea results in severe dehydration. Puppies' bodies consist of 80% water [versus 60% in an adult], they have immature kidneys [don't tolerate dehydration well] and poor body energy reserves [unlike adults], which make them more susceptible to dehydration.
- Fatal: The virus kills in one of two ways:
  - The body goes into shock from the severe dehydration, low blood glucose and death results.
  - The bacteria entering the bloodstream of the body produces toxins, sepsis develops, killing the animal.



### Symptoms to watch out for

- **Dogs of any age can be affected, although the incidence of disease is highest in those under one year of age.**
- *Puppies > 8 weeks: Intestinal form*
  - Lethargy (tired/listlessness)
  - Anorexia (not wanting to eat)
  - Vomiting
  - Diarrhoea (usually bloody and foul smelling)
  - Collapse
- *Puppies < 8 weeks: Cardiac form (Very rare)*
  - Crying, difficulty breathing, gasping for breath
  - Extreme depression
  - Weakness
  - Unwillingness to nurse
  - Irregular heartbeat
  - Unexpected deaths up to 5 months of age

### How is the infection diagnosed?

- History of inadequate vaccinations
- Clinical Signs
- Low white blood cells on blood smear
- Faecal Test: ELISA TEST
  - This test is similar to the home pregnancy test in humans.
  - It tests for the actual virus particles in the stool.
  - It is done at our hospital and usually gives results within 10 – 15 minutes.
  - This test can be negative early in the disease when there are no virus particles in the stool yet.
- Many puppies with Parvo Virus Infection may also have other intestinal parasites, e.g. Hookworm or Coccidia. These infections complicate the disease because it also causes intestinal damage and immune suppression.



severe bloody diarrhoea from a dog with parvovirus infection

### Is Parvovirus Infection treatable?

- Yes, but it is even with the best medical treatment potentially fatal.
- Left untreated, 91% of patients will die.
- Survival rate in hospital with the full medical treatment is +/- 70%.



## Optimum Treatment

- Hospitalisation in an isolated intensive care unit for 4 – 10 days.
- There is no specific treatment that will kill the virus. **Supportive treatment** is the only option, and the goal is to keep the puppy alive long enough for an immune response to generate antibodies to fight the virus.
- *Intravenous Fluids* (drip): To correct the life-threatening dehydration.
- *Electrolytes* (sodium, potassium and chloride): Added to drip to correct losses from the vomiting and diarrhoea.
- *Dextrose* (glucose): Added to drip to keep the body's blood sugar levels stable, preventing weakness and in severe cases coma.
- *Antibiotics*: Given intravenously to combat the systemic infection caused by bacteria leaking from the gut into the bloodstream.
- *Control of nausea*: Added to drip and/ or given intravenously depending on the severity of the vomiting
- *Gastroprotectants*: The chronic vomiting can cause ulceration of the oesophagus and the virus itself ulcerates the stomach and small intestines. We use special medication to prevent the ulcer formation and protect the gut lining.
- *Pain Medication*: To relieve the severe abdominal pain.
- *Oral/Tube Feeding*: Research has shown that feeding these patients despite the vomiting improves the survival rate and gut regeneration. A highly digestible, low residue prescription diet is used which can be liquefied and given by syringe or via a tube that is placed in the nose of the dog, ending in the oesophagus.
- *Plasma Transfusion/ Synthetic Protein* (Hetastarch): Added to drip when the circulating protein levels drop too low in the body. The body proteins (albumins) in the blood vessels are essential to keep fluid within the blood vessels, and thus prevent fluid leakage into the lungs or under the skin.
- *Since these pups lose a lot of potassium and protein, have small liver glucose stores and dehydrate quickly, repeated blood tests are ideal for good management of the patient. We do blood tests routinely in our hospital.*

WE MONITOR OUR PATIENTS EVERY 2 HOURS RIGHT THROUGHOUT THE DAY TO OPTIMISE TREATMENT PLANS AND TO PICK UP ON ANY COMPLICATIONS.

### Are there alternatives to hospitalisation?

- With financial constraints, home treatment can be attempted; however some requirements simply cannot be met at home despite the best efforts.
- Although costs are less than with hospitalisation, it is still expensive, and is very time consuming and intensive. You may need to return to your vet 2 -3 x daily for follow-ups.
- Survival rate is much lower.
- The vomiting and diarrhoea lead to heavy contamination of the home environment, putting all other pets at risk.
- Keep the puppy isolated from all other dogs.
- Disinfect the area regularly.

### What is the prognosis?

- Parvovirus infection is a very serious and life-threatening disease.
- With the correct intensive treatment, infected dogs have a reasonable chance of recovering if given enough time (and money for the treatment)
- However, there are some cases where they do not respond well to treatment, and are unable to mount a strong enough immune response to clear the virus.
- Such cases may die despite the best treatment, and euthanasia may be advised.

## Complications from the infection

Although rare, it is a possibility

- *Septicaemia and Endotoxic Shock*: In severely immuno compromised puppies, the bacteria from the gut absorbed into the bloodstream, causes widespread inflammation and infection. This is characterized by signs such as hypothermia (low body temperature), DIC (blood clots and spontaneous bleeding throughout the body, and jaundice (liver failure)
- *Intussusception*: The profuse vomiting and diarrhoea can cause the bowel loops to “telescope” into each other. It requires emergency surgery.
- *Myocarditis*: Affecting the heart muscle causing sudden deaths. Young puppies < 5 months old that die unexpectedly might have picked up the infection between 3 and 8 weeks of age.
- *Polyarthritis*: The bacteria can sometimes spread to all the joints in the body, causing severe swelling and pain and in some cases irreversible damage to the joint cartilages.
- *Catheter site infections*: Catheters are placed in your dog’s veins through which medication is given directly into the bloodstream, and to which the drip is connected. Every effort is made to keep these sites free of infection (disinfecting the skin and moving the catheter to a new location every few days), but due to the high infective load (bacteria and viruses constantly being spread around through vomition and diarrhoea) an infection may develop in this area. This may be mild, or may require special treatment such as drainage, bandages and photizo (infra-red treatment to increase healing).

**With parvovirus the bottom-line is that prevention is better than cure!!**

### How can it be prevented?

#### **VACCINATION, VACCINATION, VACCINATION!!!**

The only way to prevent Parvovirus Infection is to stay up to date with your puppy’s vaccination protocol. Canine Parvovirus vaccines are extremely effective.



### What about your other animals?

- Other dogs on your property will come into contact with the massive virus load shed by the sick puppy, and develop the infection if they have not enough immunity against the virus.
- Take all the exposed dogs for booster vaccinations, unless they are up to date with their vaccines.
- Disinfect the property properly with F10® disinfectant (available from your veterinarian) or diluted bleach (concentration of 1 part bleach and 30 parts water). This virus is extremely resistant to most antiseptics, heat and drying, making it almost impossible to disinfect the property properly.

### Our vaccination protocol is:

**1<sup>st</sup>**: 6 weeks (5-in-1)

- Parvovirus
- Hepatitis
- Distemper
- Para influenza
- Corona

**2<sup>nd</sup>**: 9 weeks

- 5-in-1

**3<sup>rd</sup>**: 12 weeks

- 5-in-1 and **Rabies**

**4<sup>th</sup>**: 16 weeks

- 5-in-1 and **Rabies**

**Annual**: Every 12 months

- 5-in-1 and Rabies
- Kennel Cough if going to stay in a kennel