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Canine Parvovirus Type 2c in the United States

Dr. Ben Hatler, NEOTECH, LLC

For many years vaccinated dogs have suffered and died due to canine parvovirus (CPV) infections. Since vaccination failed to protect these dogs, people speculated that a new form of CPV was in our midst. Their speculation has been substantiated by a recent press release from Oklahoma State University which stated that a new strain of CPV (CPV-2c) has been identified in dogs across the United States by the Oklahoma Animal Disease Diagnostic Laboratory1. The press release stated that the 2c strain affects puppies and adults, can attack the heart and intestines, and that the mortality can be quite high. The most alarming aspect of the press release is its implication that currently available vaccines are not protective against this lethal CPV-2c strain. This is obviously troubling news for all dogs owners. So we must ask, "Is the press release completely true, or does it contain exaggerations intended to whip up unnecessary hysteria?"

The press release is based on the results of a study published by Dr. Kapil and his colleagues in the Journal of Clinical Microbiology2. In this study, tissue and fecal samples were collected between February 2006 and August 2007 from 54 dogs with confirmed CPV infections. Canine parvovirus type 2c was identified in 48% of the dogs while CPV-2b was identified in 46% of the dogs. The researchers also reported that 66% of the dogs infected with various strains of CPV had previously received a vaccination.

Since implications of the press release are so frightening, we must dig deeper into the CPV-2c story to fully understand what it means for dog owners and breeders. The emergence of this new strain of CPV is not surprising considering the history of CPV and the high rate of viral evolution associated with its initial emergence in the 1970's. Since the emergence of CPV type 2 (CPV-2) in the 1970's, the virus has mutated. The virus mutated into 2 strains known as CPV-2a and CPV-2b. In 2000, scientists in Italy were the first to report the emergence of CPV-2c in dogs. Since that first report, CPV-2c has also been detected in Western Europe, Asia, and South America.

Now that a new strain of CPV is present throughout the world, the question arises: What is meant by the term "new strain"? We need to realize that the term "new strain" actually means "genetic variant". In order for a strain of parvovirus to be labeled a "new strain", at least 1 of its approximately 5000 nucleotides must be different from a previously identified strain. This is the case of CPV-2c identified in the United States. Genetically speaking, CPV-2c differs from CPV-2b by only a few nucleotides. In other words, from a genetic standpoint, the "new strain" (CPV-2c) is over 99% identical to the "old strain" (CPV-2b).

So, there is very little genetic difference between CPV-2a, CPV-2b, and CPV-2c. Does this slight genetic variation make CPV-2c biologically different from CPV-2a or CPV-2b? The most prolific researcher of CPV-2c in Italy concluded in a research report that the CPV variants (2a, 2b, and 2c) have similar biological behaviors3. In that research report, tissue distribution of CPV was similar across all 3 genetic variants of CPV. Canine parvovirus type 2a, 2b, and 2c were all found in the intestines and in the heart. So the fact that CPV infects the heart and intestines is not new information and is not specific to only CPV-2c. In another paper that investigated the occurrence of CPV-2c in the United States, researchers stated that dogs infected with CPV-2c exhibited clinical signs and outcomes that were similar to those exhibited by dogs infected with CPV-2a and CPV-2b4. So death of dogs

due to CPV infection (be it 2a, 2b, or 2c) is not new information and it is erroneous to suggest that CPV-2c is more lethal than older CPV strains.

Since CPV-2c has been discovered in the United States, what are dog owners and breeders to do? According to the press release, new vaccines should be formulated since previously vaccinated dogs have contracted CPV-2c. Should you switch vaccines? Should you demand that vaccine manufacturers make a new vaccine that protects against CPV-2c? The answer to the previous 2 questions would be "yes" if we did not have some suitable vaccines currently available for use. With the information now available in the scientific literature, I believe that there is no reason to suggest that the currently available effective vaccines will not protect against CPV-2c. Let me explain why I believe this to be true.

First, a recent research report indicated that one of the original modified live CPV vaccines (based on an old strain of CPV) was protective against CPV-2c. This study reported that after CPV-2c challenge, vaccinated pups did not become ill while unvaccinated pups showed clinical signs of canine parvovirus5. In other words, one of the first vaccines, which was formulated years before CPV-2c was identified, was able to induce protection against this new genetic variant known as CPV-2c. (paper continued on back)

Second, certain effective CPV vaccines protect puppies against both CPV-2a and CPV-2b. Since there is very little genetic variation and no known biological difference between CPV-2a, CPV-2b, and CPV-2c, why wouldn't these effective CPV vaccines protect against CPV-2c? To my knowledge, no one has data to definitively answer the question posed above.

Third, **NEOPAR®** has been tested in a kennel in Oklahoma where this new genetic variant was diagnosed by the Oklahoma Animal Disease Diagnostic Laboratory. **NEOPAR®**, when used properly, stopped the CPV-2c outbreak in its tracks just like it stops a CPV-2a and CPV-2b outbreak.

One disturbing aspect of the press release and Dr. Kapil's paper was the implication that vaccines do not protect against CPV-2c. In Dr. Kapil's study, 66% of the dogs with CPV were previously vaccinated. It is important to realize that not all vaccines stimulate protection after just one, or multiple, doses. Immunity is often not stimulated by vaccination if the animal is stressed, has a suppressed immune system, or if the vaccine used is sub-potent (few vaccine particles per dose). Unfortunately, the complete vaccination history for each dog in Dr. Kapil's paper was not provided. So, it is possible that these dogs could have been vaccinated after they were exposed to CPV or they may have been vaccinated with a sub-potent vaccine prior to CPV exposure. Many sub-potent vaccines are on the market today and were not formulated to work in the face of the high level of maternal antibody that is present when pups are first vaccinated at 5 to 7 weeks of age. This high level of maternal antibody can render a sub-potent vaccine ineffective. Another important point of Dr. Kapil's study to consider is that vaccinated dogs were infected with CPV-2b and CPV-2c. Of the 36 vaccinated dogs in which CPV was identified, type 2b was present in 15 dogs and type 2c was present in 19 dogs. So, not only did vaccination fail to protect these dogs against CPV-2c, vaccination also failed to protect them against the older genetic variations of CPV. Clearly, vaccines do not immunize 100% of vaccinated dog and this is also not new information.

At the present time, we know very little about CPV-2c. However, information present in the scientific literature suggests that CPV-2c is very similar to CPV-2a and CPV-2b; and, that vaccines developed prior to the discovery of CPV-2c protect dogs from CPV-2c challenge. Even though the full CPV-2c story has not yet been established, this has not stopped people from making predictions of doom and gloom. Let's not get bogged down by press releases intended to whip up hysteria in hopes of creating an economic opportunity for a research institution. Let's wait until we have more relevant facts about this genetic variant before we recommend changing the

existing vaccination protocols that have been so successful for so many years. In essence, all that the Dr. Kapil's report stated is that CPV-2c (along with other old genetic variants of CPV) has been identified in previously vaccinated dogs in the United States. So the implications in the press release of widespread death due to an extremely pathogenic new strain of CPV are a bit far-reaching. Let me be clear, Dr. Kapil's study is scientifically sound and the results are clear and straightforward, but the press release is an exaggeration of what is known and speculates on what we do not know.

References

1http://www.cvhs.okstate.edu/index.php?option=com_content&task=view&id=437&Itemid=291

2Kapil, S., Cooper, E., Lamm, C., Murry, B., Rezabek, G., Johnston III, L., Campbell, G., Johnson, B. 2007. Canine parvovirus types 2c and 2b circulating in North American dogs in 2006 and 2007. J. Clin. Microbiol., 45(12):4044-4047.

3Decaro, N., Martella, V., Elia, G., Desario, C., Campolo, M., Lorusso, E., Colaianni, M. L., Lorusso, A., Buonavoglia, C. 2007. Tissue distribution of the antigenic variants of canine parvovirus type 2 in dogs. Vet Microbiol. 2007 Mar 31;121(1-2):39-44.

4Hong, C., Decaro, N., Desario, C., Tanner, P., Pardo, M. C., Sanchez, S., Buonavoglia, C., Saliki, J. T. 2007. Occurrence of canine parvovirus type 2c in the United States. J. Vet. Diagn. Invest. 19:535-539.

5Spibey, N., Greenwood, N. M., Sutton, D., Chalmers, W. S. K., Tarpey, I. 2008. Canine parvovirus type 2 vaccine protects against virulent challenge with type 2c virus. Vet. Microbiol. Apr 1;128(1-2):48-55. Epub 2007 Oct 2.