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Are quaternary ammonium disinfectants effective against parvo and calicivirus?

Question:

The company, Health Technologies, is claiming Kennel Care disinfectant is an effective parvocidal agent and that it can be assumed to be effective against calicivirus as well... Do you have any suggestions on where best to reference outside literature to back up or disprove these assumptions? Or do you have any personal experience with Kennel Care?

Answer:

Parvo, panleukopenia and calicivirus are all "unenveloped viruses" - this means they lack the fatty envelope that most viruses have. That fatty envelope makes a good target for disinfection, so the fact that un-enveloped viruses don't have it means they tend to be quite a bit harder to kill than the enveloped viruses such as feline herpesvirus or canine distemper. Calicivirus is not quite as durable in the environment as parvo and panleuk, but is still resistant to many of the same disinfectants. Quaternary ammonium compounds have been repeatedly labeled as effective against un-enveloped viruses, then found not to work in independent studies, then reformulated and relabeled as effective, then found not to work, etc. Three studies are given below in reverse chronological order. Kennel Care is among the compounds that has been relabeled since the last time the quats were found ineffective, and has neither been dis-proven nor proven in independent studies, last I checked. However, given the long poor track record of quaternary ammonium compounds against un-enveloped viruses and the relatively high cost of this disinfectant at "parvocidal" concentrations, I generally suggest use of a more reliable agent during times when un-enveloped viruses are known or suspected to be a threat (or following application of a quaternary ammonium with a reliable parvocidal). Disinfectants known to be effective include household bleach, freshly made up and applied to a clean surface, at 1/2 cup per gallon, bleach related compounds such as calcium hypochlorite (e.g. Wysiwash) and sodium dichloroisocyanurate (e.g. Bruclean), potassium peroxydisulfate (e.g. Trifectant R or Virkon-SR), and accelerated hydrogen peroxide (e.g. Accel HP). When un-enveloped viruses are not a concern or if you follow up with a known parvocidal disinfectant, a general use quaternary ammonium compound is a fine choice for routine shelter disinfection.

For more information, see our "[general cleaning considerations](#)" protocol under information sheets in the shelter health portal.

Selected studies on efficacy of quaternary ammonium disinfectants on un-enveloped viruses:

Eleraky, N. Z., L. N. Potgieter, et al. (2002). "Virucidal efficacy of four new disinfectants.-" J Am Anim Hosp Assoc 38(3): 231-4.

Virucidal efficacy was evaluated for four recently available disinfectants: chlorine dioxide, potassium peroxydisulfate, a quaternary ammonium compound, and citricidal (grapefruit extract). Sodium hypochlorite (3%) and tap water were used as positive and negative controls respectively. Feline herpesvirus, feline calicivirus, and feline parvovirus were exposed to the manufacturers' recommended dilutions of the evaluated disinfectants. Both chlorine dioxide and potassium peroxydisulfate completely inactivated the three viruses used in this study. These disinfectants can aid in controlling nosocomial transmission of viruses with less of the deleterious effects of sodium hypochlorite. The quaternary ammonium compound evaluated in this study and citricidal were not effective against feline calicivirus and feline parvovirus.

Kennedy, M. A., V. S. Mellon, et al. (1995). **"Virucidal efficacy of the newer quaternary ammonium compounds."** Journal of the American Animal Hospital Association 31(3): 254-8.

The virucidal activity of several disinfectants containing newer generation quaternary ammonium compounds (QACs) as their active ingredients was evaluated. Disinfectants were used at the manufacturers' recommended dilutions with isolates of feline herpesvirus, feline calicivirus, and canine parvovirus, and a contact time of 10 minutes at room temperature. Detoxification of virus/disinfectant solutions was done by dialysis prior to virus assay in cell cultures. Two of four disinfectants completely inactivated feline herpesvirus, and two significantly reduced the titer of this virus. None of the disinfectants that were tested completely inactivated feline calicivirus. Canine parvovirus was not inactivated significantly by any of the QAC disinfectants. Sodium hypochlorite completely inactivated all viruses.

Scott, F. W. (1980). **"Virucidal disinfectants and feline viruses."** Am J Vet Res 41(3): 410-4. Thirty-five commonly used commercial disinfectants (disinfectants, antiseptics, sanitizers, and detergents) were evaluated for their virucidal activity against three feline viruses; feline viral rhinotracheitis virus (a herpesvirus)-, feline calicivirus, and feline panleukopenia virus (a parvovirus). Disinfectants were diluted as recommended by the manufacturer and were reacted with virus for 10 minutes at room temperature. Viruses were separated from disinfectants by gel filtration in special centrifuge tubes, and were assayed for infectivity in feline cell cultures. All 22 products tested were virucidal for feline viral rhinotracheitis virus, 11 of 35 were virucidal for feline calicivirus, but only 3 of 27 tested were effective against feline panleukopenia virus. A 0.175% sodium hypochlorite solution was the most effective and practical broad- spectrum virucidal product used alone or in combination with other disinfectants/-detergents. (Note from Kate; none of the quaternary ammonium compounds showed complete efficacy against calicivirus, and none were among the three parvocidal compounds. The three parvocidal compounds were sodium hypochlorite (bleach), formaldehyde and glutaraldehyde. None of the alcohols were fully effective against panleuk either; ethanol showed the greatest activity of the alcohols against calicivirus

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