Synopsis of Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1

A recently published article in the New England Journal of Medicine contains many instructive points that inform strategic and tactical responses to surface disinfection[1]. For pesticidal label claims, the Environmental Protection Agency requires claimants to conduct rigorous and thorough efficacy testing against specific bacteriological pathogens. If the disinfection claims are not supported by the results, no claim can be made. The EPA distinguishes between porous and hard non porous surfaces. Most disinfection label claims are for pathogens residing on hard non porous surfaces. This is for fungal, viral and bacteriological pathogens.

The referenced correspondence from the NEJM reported on the evaluation of the stability of the SARS-CoV-2 relative to SARS-CoV-1 on different surfaces. The surface will affect the stability and viability of the pathogen. This was clearly borne out in the report. Five different surfaces were evaluated; Aerosol, Copper, Cardboard, Stainless Steel and Plastic. The type of plastic was not specified. While the viruses in the aerosol do not necessarily constitute a surface, it represents the stability one might expect in coughing or sneezing episodes. The two different virus strains demonstrated similar aerosol stability decay behaviors.

Takeaways

1. The virus maintains its highest stability on plastic surfaces. Viable virus capable of infecting a host was detected 48 hours following surface inoculation on plastic and not more than 8 hours on copper. Copper surfaces appear to be a less than favorable surface environment for the virus.
2. Cardboard (a porous surface) also yielded a less than favorable surface environment for the virus.
3. Infectious virus was able to be harbored on stainless steel and plastic for more than 48 hours.
4. The stability of the different strains appear to be similar with the only potentially significant difference being cardboard.

Speculations

1. Copper is a well-known toxin to biological pathogens. Biofilms will not readily form on copper surfaces.
2. It is possible that biofilms contribute to the enhanced stability of the virus on stainless steel and plastic.

[1] The New England Journal of Medicine, Downloaded from nejm.org on March 18, 2020. For personal use only. No other uses without permission.

3. For treatment of stainless steel and plastic surfaces, it is essential to have a solution capable of wetting these surfaces to disrupt the surface contact forces holding the virus and its associated bacteria.
4. If the infectious biome present on the material surface is a biofilm, then a disinfectant must be capable of dislodging, disrupting and destroying the biofilm to get to the underlying pathogens housed in the biofilm.
5. It is important to note the limit of detection. This is explained in the highlighted box on page 2. It is not known what the minimum amount of virus dosage is necessary for an infection to occur.
6. D7 offers surface chemistry capable of all three mechanisms (Dislodging, Disrupting and Destroying) necessary to treat an infected surface.
7. D7 has also been proven effective in elevated filth and organic contamination load.
8. Note the reference to the term "fomite". This is a term of art denoting an entity capable of harboring and transmitting a pathogen. In this case, the fomite is the surface. It's a very good, descriptive term.
9. These results were accumulated in a controlled laboratory environment. Real world environments are full of biofilms. D7 has a biofilm claim.