Laboratory of Viruses Contaminants of Water and Food

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Report on stability and disinfection of 2019-nCoV

The new coronavirus, known as "2019-nCoV", was first detected in Wuhan City (China) and it is presenting a rapid growing number of infected patients. Like other well-known coronaviruses, the primary modes of transmission appear to be direct mucus membrane contact with infectious droplets and through exposure to formites. This new coronavirus type, has been classified under *Betacoronavirus* genus and, like MERS-CoV and SARS-CoV, has its origins in bats[1].

Several studies proved that closely related coronavirus, SARS-CoV, could be inactivated quite easily with many commonly used disinfectants [2–4]. In particular, SARS-CoV were the most susceptible re-emerging viruses tested against the alcohol-based hand rubs proposed on the WHO guidelines on Hand Hygiene in Health Care [5].

The 2019-nCoV (*Coronaviridae* family) are enveloped viruses about 120 nm in diameter. Like the respiratory syncytial virus (*Pneumoviridae* family) with a 150nm diameter, CoV have surface proteins that mediate the infection of human airway epithelial cells (see figure 1). Those viruses have the ability to survive for many hours on hard surfaces such as tables and crib rails. It typically lives on soft surfaces such as tissues and hands for shorter periods. It is usually transmitted through droplets from the cough or sneeze that contact with eyes, nose, or mouth, or by direct contact with a contaminated surface.

A: *Coronaviridae* (2019-nCoV, MERS and SARS) B: *Pneumoviridae* (RSV)

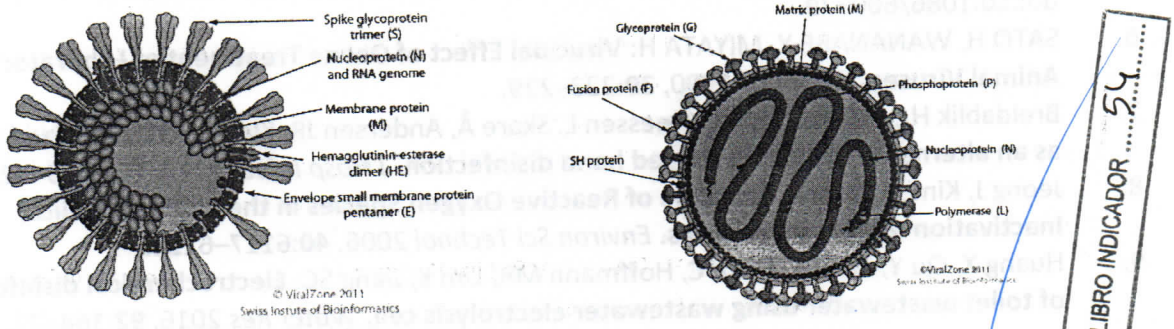

Figure 1: Icon representation of the enveloped and spherical viral particles (Viralzone).

The laboratory of viruses contaminants of water and food, tested for WELLIS Co. Ltd, virus stability over time. Wet and dry viral suspensions were exposed to ozone/d-limoneno treatment using the WADU-02, WELLIS disinfection unit. Virus inactivation was calculated against control viral suspensions, not exposed to the disinfection unit and tested in parallel. The disinfection treatment was able to reduce 99% and 92% of the initial concentration of RSV under wet and dry conditions respectively, after 2 hour of treatment. The air disinfection unit WADU-02, WELLIS (Wellis Co.,

Ltd.), significantly reduced the concentration of infectious RSV from wet and dry droplets under laboratory conditions.

It is well known that ozone, at concentrations above 100ppm and high humidity rates, is an effective disinfection treatment, and specially for RNA-viruses with or without envelope [6,7]. However, high ozone concentrations may be harmful to coexist in habitable urban environments. Reactive oxygen species (ROS) including hydroxyl radicals ([OH]), hydrogen peroxide ($[H_2O_2]$) and ozone ($[O_3]$) have been reported to enhance disinfection efficiencies of several microorganisms [8,9]. In accordance with the results obtained in our laboratories, it can be expected that the efficiency in aerosols and surfaces that hydroxyl radicals generated by the tested WELLIS WADU-02 device, perform an ozone-like disinfectant action, but without the inconvenience of toxicity.

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