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RESUMO - HUMANA

SIMPLE, LOW-COST AND LONG-LASTING FILM FOR VIRUS INACTIVATION USING INFLUENZA A VIRUS (H1N1) MODEL AS CHALLENGE

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COVID-19, caused by SARS-CoV-2 infection, is inequitably distributed and more lethal among populations with lower socioeconomic status. Direct contact with contaminated surfaces has been one of the virus sources, as it remains infective up to days. Several disinfectants have been shown to inactivate SARS-CoV-2, but they rapidly evaporate, are flammable or toxic and may be scarce or inexistent for vulnerable populations. The American Society for Testing and Materials (ASTM) provides a guidance pointing out the viruses that may be used in SARS-CoV-2 research focusing on environmental survival and decontamination strategies. Influenza A Virus (IAV), strain H1N1 was listed as a potential surrogate by ASTM, as it follows the criteria: enveloped and

respiratory viruses, availability, mammalian origin, categorized as BSL2. Therefore, this study aimed to evaluate the ability of two proposed films to inactivate IAV (H1N1) infectivity. One film was developed for applying into inanimate surfaces and another one to be used on hands. The film for inanimate surfaces was prepared by diluting the detergent in distilled water (2:1 ratio). The film for hand application was prepared using detergent and soybean oil (20:1 ratio). Both formulas were tested immediately after preparation (new film) and 7 days after preparation (late film). IAV strain H1N1 (BRMSA0099) was used in this study. Polystyrene petri dishes (85 mm diameter) were covered with a thin layer (200µL) of film formulations and dry at room temperature for 40 min. Both films were exposed to 105.3 EID50 of IAV in 200µL for 10 min. After, the film surface was washed with 1.8mL of transport media containing antibiotics, and 0.2mL of the recovered virus suspension was inoculated into allantoic cavity of six to eight 11-day-old SPF embryonated chicken eggs. IAV positive control and controls of film toxicity, diluent sterility and embryos quality were included. The eggs were incubated at 37°C, candled daily for 5 days. Allantoic fluid was individually tested by hemagglutination (HA) test. The recovered virus suspension from both film formulations (surface and hands) presented no virus infectivity, when tested as 'new film' and 'late film'. All controls presented expected results. The proven efficiency of 'late film' indicated a residual protective effect. The antiviral activity of the films can be mostly attributed to the biocidal action of the surfactants present in the detergent. The mechanism probably involved the denaturation of envelope or nucleocapsid proteins. This study demonstrated the efficacy of virus inactivation using a simple, low-cost and easy to prepare long-lasting detergent film, which may be applied on surfaces, in public areas, and may constitute an excellent alternative to mitigate the spread of SARS-CoV-2, particularly in populations of low-income countries. Further analysis will be performed regarding the hand application and using SARS-CoV-2 as model of challenge.