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SYNOPSIS

Review of "Increased stability of SARS-CoV-2 Omicron variant over ancestral strain"

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One-minute summary

- Given the increased transmissibility of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) BA.1 (Omicron) variant, the authors tested if Omicron was more stable on different surfaces compared to ancestral SARS-CoV-2 (lineage A).
- For non-porous surfaces, the authors report percent (%) reduction in viral titres at various periods, including 0.25, 2 and 7 days (for illustration we provide the 7-d viral titre or mean Log_{10}[50% tissue culture infectious dose or $TCID_{50}$/ml] ± standard deviation [SD]) post-inoculation:
    - **Stainless steel:**
        - Ancestral: 95.8%, 99.9%, >99.9% (below assay detection limit)
        - Omicron: 79.9%, 85.8%, 98.2% (3.6 ± 0.30)
    - **Polypropylene:**
        - Ancestral: 95.4%, >99.9%, >99.9% (below assay detection limit)
        - Omicron: 92.3%, 91.5%, 99.7% (3.0 ± 0.27)
    - **Glass:**
        - Ancestral: 96.4%, 99.9%, >99.9% (below assay detection limit)
        - Omicron: 93.2%, 93.9%, 98.8% (3.8 ± 0.10)

- For porous surfaces, the authors report percent (%) reduction in viral titres at various periods, including 15 and 30 minutes (for illustration we provide the 30-min viral titre or mean $Log_{10}[TCID_{50}/ml] \pm SD$) post-inoculation:
    - **Tissue paper:**
        - Ancestral: 99.8%, >99.8% (below assay detection limit)
        - Omicron: 73.0%, 99.3% (2.9 ± 0.40)
    - **Printing paper:**
        - Ancestral: >99.9%, >99.9% (below assay detection limit)
        - Omicron: >99.9%, >99.9% (2.2 ± 0.36)
- Since Omicron is less dependent upon transmembrane serine protease 2 (TMPRSS2) for cell entry, the authors performed the same experiment using TMPRSS2-expressing Vero E6 cells.
- For **stainless steel** using TMPRSS2-expressing Vero E6 cells, the authors report percent (%) reduction in viral titres at various periods, including 0.25, 2 and 7 days (for illustration we provide the 7-d viral titre or mean $Log_{10}[TCID_{50}/ml] \pm SD$) post-inoculation:
    - **Ancestral:** 77.9%, 96.1%, 99.7% (2.7 ± 0.12)
    - **Omicron:** 76.6%, 87.8%, 99.0% (3.4 ± 0.29)
- For **printing paper** using TMPRSS2-expressing Vero E6 cells, the authors report percent (%) reduction in viral titres at various periods, including 15 and 30 minutes (for illustration we provide the 30-min viral titre or mean $Log_{10}[TCID_{50}/ml] \pm SD$) post-inoculation:
    - **Ancestral:** >99.4%, >99.6% (below assay detection limit)
    - **Omicron:** 99.7%, >99.8% (2.0 ± 0.10)
- The authors conclude that Omicron is more stable on a variety of surfaces compared to the ancestral SARS-CoV-2 lineage A, increasing the likelihood of Omicron transmission via the fomite route.

Additional information

- The authors applied 5 µl (10^7 $TCID_{50}$/ml) of each virus on 1-cm^2 treated surfaces and allowed to incubate at 21°C to 22°C for each prescribed time. For surface, incubations were performed in triplicate for each incubation time and virus. After incubation, surfaces were placed in viral transport medium to recover residual infectious virus and then titrated by $TCID_{50}$ assays using Vero-E6 cells (and TMPRSS2-expressing Vero E6 cells for stainless steel and printing paper only). Minimal information about the methods were provided, but a full description is not clearly described in the cited articles (Behzadinasab et al. 2020, Chin et al. 2020).[1,2]

- Study limitations as outlined by authors:

    - The study was performed in a controlled environment and results would likely differ under natural conditions with changing temperatures, humidity and exposure to sunlight.

    - The droplets applied to surfaces in the study do not mimic respiratory droplets; therefore, their results may differ from real life conditions.

PHO reviewer's comments

- This study provides some support for stability of infectious virus on surfaces in laboratory settings. The implications of these findings in real world clinical settings are uncertain. It is notable that when the authors used the TMPRSS2-expressing Vero E6 cells (that better mimic real word clinical settings), there were smaller differences in stability between Omicron and ancestral SARS-CoV-2. This study does not preclude increased infectiousness of other transmission routes (i.e. droplets and aerosols) in addition to fomites. It is likely that more transmissible variants are more infectious by all routes of transmission for which SARS-CoV-2 is known to be transmitted. The findings from this study highlight the importance of layered infection control practices, which includes surface disinfection and hand hygiene in mitigating transmission, but does not support that any change in said measures is required.

References

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