2025 Special Seminar on The IDEC Institute

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Evaluation of rRNA depletion methods for capturing the RNA virome from environmental surfaces

Abstract

Metatranscriptomic analysis of RNA viromes on built-environment surfaces is hampered by low RNA yields and high abundance of rRNA. Therefore, we evaluated the quality of libraries, efficiency of rRNA depletion, and viral detection sensitivity using a mock community and a melamine-coated table surface RNA with levels below those required (<5 ng) with a library preparation kit (NEBNext Ultra II Directional RNA Library Prep Kit).
Results: Good-quality RNA libraries were obtained from 0.1 ng of mock community and table surface RNA by changing the adapter concentration and number of PCR cycles. Differences in the target species of the rRNA depletion method affected the community composition and sensitivity of virus detection. The percentage of viral occupancy in two replicates was 0.259 and 0.290% in both human and bacterial rRNA-depleted samples, a 3.4 and 3.8-fold increase compared with that for only bacterial rRNA-depleted samples. Comparison of SARS-CoV-2 spiked-in human rRNA and bacterial rRNA-depleted samples suggested that more SARS-CoV-2 reads were detected in bacterial rRNA-depleted samples. We demonstrated that metatranscriptome analysis of RNA viromes is possible from RNA isolated from an indoor surface (representing a built-environment surface) using a standard library preparation kit.
Future Perspective: The high-sensitivity viral detection method established in this study from low RNA yields may lead to the visualization of pathogen risks in built environments. Future applications could promote carbon neutrality and improve public health by optimizing energy usage based on infection risk and reducing the overconsumption of disinfectants and disposable personal protective equipment (PPE), such as masks and gowns.

Date

2026 1/19 Monday
9:00 ▶10:00
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Online

https://00m.in/rkmko

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Venue

Hiroshima University, Graduate School of Advanced Science of Matter Build A, 6F Seminar room601-(2)

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