

Tracking wastewater to monitor COVID-19

Masaaki Kitajima, Assistant Professor of Environmental Engineering, Faculty of Engineering, Hokkaido University

E-Mail: mkitajima@eng.hokudai.ac.jp

The ongoing global pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been a Public Health Emergency of International Concern, which was officially declared by the World Health Organization. SARS-CoV-2 is a member of the family *Coronaviridae* that consists of a group of enveloped viruses with single-stranded RNA genome, which cause diseases ranging from common colds to acute respiratory distress syndrome. Although the major transmission routes of SARS-CoV-2 are inhalation of aerosol/droplet and person-to-person contact, currently available evidence indicates that the viral RNA is present in wastewater, suggesting the need to better understand wastewater as potential sources of epidemiological data and human health risks.

This presentation will cover the current knowledge related to the potential of wastewater surveillance to understand the epidemiology of COVID-19 and methodologies for the detection and quantification of SARS-CoV-2 in wastewater SARS-CoV-2. There has been growing evidence of gastrointestinal symptoms caused by SARS-CoV-2 infections and the presence of viral RNA not only in feces of infected individuals but also in wastewater.

One of the major challenges in SARS-CoV-2 detection/quantification in wastewater samples is the lack of an optimized and standardized protocol. To overcome this challenge, our group evaluated recovery efficiencies of murine hepatitis virus, a surrogate of SARS-CoV-2, in wastewater using different virus concentration methods. In addition, we succeeded in detecting SARS-CoV-2 RNA in wastewater samples collected from Australia, Japan, and USA.

Our results of wastewater surveillance collectively indicated that SARS-CoV-2 RNA could be detected in wastewater during the epidemic periods COVID-19 and that wastewater-based epidemiology could be a useful tool to monitor the prevalence of COVID-19 in a given area. There is an urgent need for further research to establish methodologies for wastewater surveillance and understand the implications of the presence of SARS-CoV-2 in wastewater.