Wastewater SARS-CoV-2/COVID-19 Testing with ddPCR Technology:

An accurate approach to absolute quantification

Droplet Digital PCR (ddPCR) technology is a wastewater surveillance approach that offers superior sensitivity and absolute quantification for the detection of outbreaks and specific variants of SARS-CoV-2 in communities.

Compliant with FDA guidance for SARS-CoV-2 quantification.
CDC recommended over bulk quantification methods.
Published as dependable viral quantification method for wastewater by EPA.

COVID-19 Poses Persisting Public Health Challenges

1. Novel variants of COVID-19 continue to emerge and spread
2. Identifying asymptomatic individuals remains a challenge
3. Sensitivity, accuracy, and speed of results can be lacking

ddPCR Testing for Wastewater Surveillance

ddPCR technology uses a water-emulsion droplet system to partition nucleic acid samples and perform PCR amplification within each droplet. It can detect SARS-CoV-2 viral RNA shed in wastewater, providing real-time surveillance of spread at the community level.

In a recent study (Gonzalez et al., 2020), fluctuations in COVID-19 wastewater measurements predicted increases in confirmed case numbers in the area.[1]

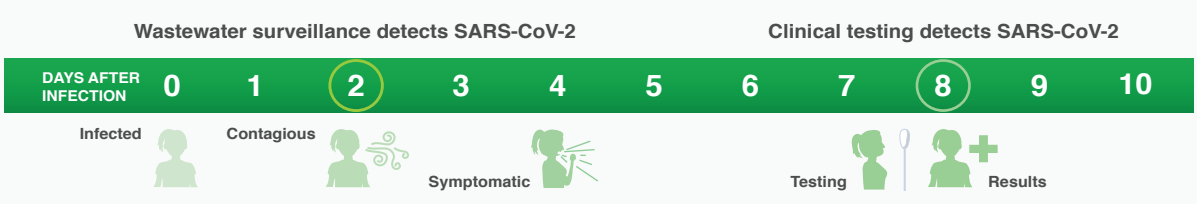
"We can be confident in our detection with Droplet Digital PCR technology — we know each test will be a true positive or negative."

Walter Betancourt, PhD
Assistant Research Professor,
University of Arizona

Benefits of ddPCR Technology

1 Faster Results

ddPCR assays enable scientists to detect coronavirus 6 days before clinical testing.[2]



2 More Sensitive Results

Partitioning allows for enrichment of rare targets.

Detects 1 infected individual in 10,000

3 Absolute Quantification

Directly count DNA molecules and eliminate standard curves.

4 Inhibitor Tolerance

End-point PCR uncouples quantification from amplification and efficiency.

5 Variant Identification

ddPCR assays can accurately discriminate and quantify multiple variants in a sample using a single-well test.

6 Stability of Assay Design

Designed to measure genes that are less mutated and more stable as amplification regions.

Bio-Rad's PREvalence ddPCR SARS-CoV-2 Wastewater Quantification Kit measures the E and N2 genes in SARS-CoV-2 and includes assays for the Murine Coronavirus or Murine Hepatitis Virus (MHV). The test allows for all 3 targets to be detected in a single well.

7 Cost-efficacy

Smaller sample requirements drive down cost.

"We chose ddPCR testing for our wastewater surveillance because it's particularly resistant to inhibition, gives absolute quantification, and is more sensitive than other methods."

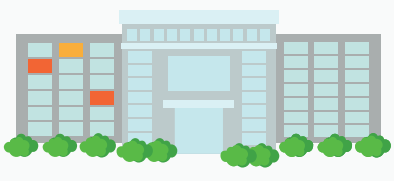
Carol Wilusz, PhD
Professor,
Colorado State University

The ddPCR Workflow

ddPCR testing is a 1-step process where reverse transcription and PCR are performed on individual droplets in the same reaction mixture. This process is considered advantageous since it can reduce RT inhibition compared to bulk solutions.[4]

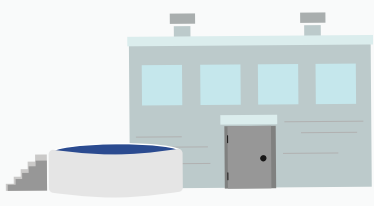
Industries that may Benefit from ddPCR Surveillance

College & Universities



Air Travel

Health Departments & Municipalities



Watch the Webinar

Hear about scientists' experiences building a successful wastewater surveillance system at Colorado State University.

WATCH NOW

Get Started

Contact a specialist today.

LEARN MORE

References

1.Gonzalez R et al. (2020). COVID-19 surveillance in Southeastern Virginia using wastewater-based epidemiology. Water Research, 186 https://doi.org/10.1016/j.watres.2020.116296

2.Medema G et al. (2020). Presence of SARS-Coronavirus-2 RNA in Sewage and Correlation with Reported COVID-19 Prevalence in the Early Stage of the Epidemic in The Netherlands. Environmental Science & Technology Letters, 7(7), 511-516 https://doi.org/10.1021/acs.estlett.0c00357

3.Hart O & Halden R. (2020). Computational analysis of SARS-CoV-2/COVID-19 surveillance by wastewater-based epidemiology locally and globally: Feasibility, economy, opportunities and challenges. Science of The Total Environment, 730 https://doi.org/10.1016/j.scitotenv.2020.138875

4.Wastewater Surveillance Testing Methods. (2021). CDC.gov https://www.cdc.gov/healthywater/surveillance/wastewater-surveillance/testing-methods.html