COVID-19 Surveillance Update

Presentation to SCCWRP Commission

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Background

- COVID-19 pandemic has made wastewater based epidemiology a focus of public health

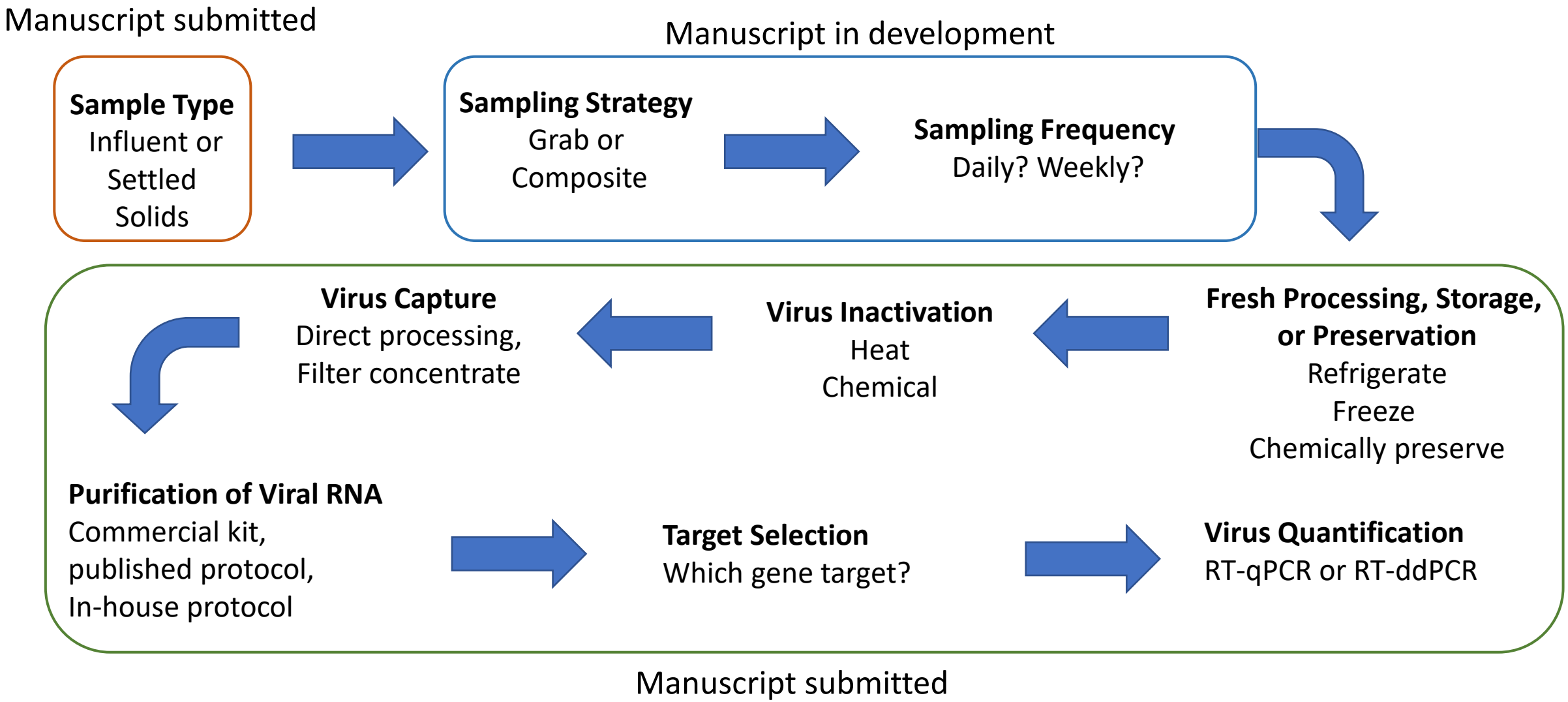
- California's wastewater community continues to be a leader in wastewater based surveillance for SARS-CoV-2
  - More than 50 facilities have monitored for at least 6 months
  - Several facilities (including SCCWRP member POTWs) are approaching 2 years of data

- Urgency of COVID-19 pandemic led to rapid method development, but little synchronization

Three Areas Where SCCWRP is Working to Build Consensus

- Quantifying SARS-CoV-2 in wastewater
- Tracking SARS-CoV-2 variants in wastewater
- Expanding wastewater based surveillance beyond COVID-19

Sources of Variability



Impact Beyond Southern California

- Water Quality Monitoring Council - Wastewater Based Epidemiology (WBE) Committee
- National Wastewater Surveillance System (NWSS) – California Workgroup
- Communicating Sewage Surveillance (CoSeS) Project
- Standards to Support an Enduring Capability in Wastewater Surveillance for Public Health (SWWS)
- Wastewater Surveillance for SARS-CoV-2 Research Coordination Network
  - Data Reporting Standardization Workgroup
  - Methods Quality Assurance/Quality Control Workgroup
- COVID-19 Wastewater-Based Epidemiology Collaborative

Intercalibration Study

- Goal: Data produced by new CA Department of Public Health lab is comparable to existing dataset
- Laboratory intercalibration with laboratories in California
  - Including UC Berkeley, Stanford, SCCWRP, CA DPH, UC San Diego, Verily Biosciences, Zymo Research
- Pilot study starting next week (Verily, Stanford SCCWRP)
  - 3 treatment plants and 4 methods comparison for 1 week
- More comprehensive intercalibration study slated for January
  - 9 treatment plants side-by-side

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Tracking Variants in Wastewater

- Tracking emerging variants has a high public health impact
- Lack of consensus on methods in wastewater
- Two general approaches: PCR-based and Gene-sequencing

PCR-Based Approach

- Examines individual genes of a SARS-CoV-2 variants
  - Same quantitative methods as measuring total SARS-CoV-2 in wastewater
  - Results can be turned around quickly
  - Can quantify very low concentrations

- Challenges:
  - Measure only one gene and one variant at a time
  - Need to know the gene target beforehand

Gene-Sequencing Approach

- Examines Sars-CoV-2 genomes and identifies variants
  - Identify multiple variants at once
  - Look for unknown variants
  - Identify other pathogens in wastewater

- Challenges:
  - Slower than PCR-based method
  - Not quantitative
  - Don’t know level of sensitivity

Variant Work SCCWRP Is Doing

- Comparison of PCR-based assays
  - Different gene targets
  - Best ways to to determine concentration
  - Collaborating with Stanford University, University of North Carolina, Chapel Hill, Bio-Rad, and Verily Biosciences

- Testing sensitivity and precision of Gene-sequencing methods
  - All genes in wastewater (Metagenomic) vs targeted SARS-CoV-2 genomes
  - Combine with PCR-based approach to quantify and understand sensitivity
  - Collaborating with University of California, Irvine, Stanford, and Verily Biosciences

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Expanding Wastewater Surveillance Beyond COVID-19

- California Department of Public Health and CDC building on the last two years' efforts
- Avoiding loss of coordination, knowledge, and community
- Wastewater Based Epidemiology Committee is identifying future targets for wastewater surveillance
  - Pathogen or chemical targets

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