Wastewater Intelligence and Application to Public Health Decisions

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Southern Nevada Water Authority

Participating Wastewater Treatment Plants

Funding

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A role for cilia in development and disease

- Anosmia
- Cognitive defects
- Retinal degeneration
- Craniofacial abnormalities
- Respiratory defects
- Polydactyly
- Hearing loss
- Obesity
- Sterility
- Renal and pancreatic cysts

Gerdes et al., Cell 2009
Defects of cilium have been implicated in a number of human diseases

Genomic tools to discover mutations that cause disease

- Nephronophthisis (NPHP)
- Oral-Facial-Digital Syndrome (OFD)
- Bardet-Biedl Syndrome (BBS)
- Meckel-Gruber Syndrome (MKS)
- Senior-Loken Syndrome (SLS)
- Jeune Asphyxiating Thoracic Dystrophy (JATD)

Ciliopathies: An expanding group of overlapping clinical entities
COVID-19
April 2020
Wastewater SARS-CoV-2 RNA levels can be used to monitor case counts.
Southern Nevada

<table>
<thead>
<tr>
<th>Sewershed</th>
<th>Population</th>
<th>Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>900k</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>90k</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>800k</td>
<td>42</td>
</tr>
<tr>
<td>4 (Composite)</td>
<td>--</td>
<td>21</td>
</tr>
<tr>
<td>4A (Grab)</td>
<td>135k</td>
<td>15</td>
</tr>
<tr>
<td>4B (Grab)</td>
<td>115k</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>250k</td>
<td>20</td>
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<tr>
<td>6</td>
<td>16k</td>
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WELCOME TO THE NV EMPOWER PROGRAM

NV Enabling the Management of Public health Outcomes through Wastewater Resources

GET STARTED
Select a location on the map, then hover over the graph to see more information.
Nevada governor announces an immediate end to mask mandate

In making his announcement, Sisolak cited a decline in overall cases, hospitalizations and the amount of virus detected during wastewater testing. At the height of the omicron variant surge on Jan. 10, Nevada recorded 7,865 new cases; that number has declined to about 1,280 in recent days.
Variant Abundances of Reported Clinical Cases

Avg Estimated WWTP Variant Abundances
Detection of the Omicron BA.1 Variant of SARS-CoV-2 in Wastewater From a Las Vegas Tourist Area

Van Vo, PhD; Richard L. Tillett, PhD; Katerina Papp, PhD; Ching-Lan Chang, BSc; Anthony Harrington, PhD; Michael Moshi, BSc; Edwin C. Oh, PhD; Daniel Gerrity, PhD
Monitoring shelters, airports, dorms, hotels, stadiums...
MPOX - public health emergency in 2022

U.S. Mpox Case Trends Reported to CDC
Data as Reported to CDC as of 15 Feb 2023 2:00 PM EDT

Beginning February 1, 2023, the data below will be updated every two weeks.

Trends of mpox cases reported to CDC during the 2022 outbreak by date

Daily Mpox Cases and 7 Day Daily Average

Legend
- 1 to 10
- 11 to 50
- 51 to 100
- 101 to 500
- >500
Case Counts by Event Date

n = 286 monkeypox cases to date
Case onsets range from 10 Jun 2022 to 16 Nov 2022

Area 11
Public health and wastewater genome sequencing

Public health surveillance

Wastewater surveillance

Custom
We’re bringing immunizations to your neighborhood
Summary and Future Directions

- PCR and WGS from complex matrices can help determine viral load and identify variants
- Collaboration with community partners (really essential) to continue and grow surveillance program
- Extend program to monitor microbial content and analytes/metabolites

Questions

- What is the sensitivity of wastewater monitoring?
- How can my communities benefit from this tool?

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