CORONAVIRUS 2019 (COVID-19)

Facts and Sampling Solutions

The World Health Organization (WHO) defines coronavirus (CoV) as a large family of viruses that cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). The current occurrence of a new strain known as SARS-CoV-2 (not previously identified in humans) causes coronavirus disease 2019 or COVID-19. On March 11, 2020, WHO publicly characterized COVID-19 as a pandemic (https://bit.ly/2TWbvvM).

How COVID-19 Spreads

The virus that causes COVID-19 is spread mainly from person-to-person and between people who are in close contact with one another (within approximately 6 feet). Respiratory droplets are released in an infected person's coughs/sneezes, similar to influenza. It may be possible for a person to contract COVID-19 by touching a surface or object that has the virus on it and then touching his/her own mouth, nose, and/or eyes.

Cases in the U.S.

The first infection in the U.S. was reported on January 21, 2020. The current count of cases in the U.S. can be found on the CDC website: **https://bit.ly/2HwiKDB.**

Potential Workplace Exposure

The Occupational Safety and Health Administration (OSHA) reports that exposure risk may be elevated for workers in health care, medical transport, mortuary/funeral, laboratory, airline, border protection, and solid waste/wastewater management industries who interact with potentially infected individuals traveling internationally where the virus is spreading. Further information is available at AIHA Coronavirus Outbreak Resource Center.

Symptoms

These range from mild to severe respiratory illness with fever, cough, and shortness of breath. Some people infected with the virus have reported experiencing non-respiratory symptoms. Other people, referred to as asymptomatic cases, have experienced no symptoms at all. Complications, such as pneumonia in both lungs, can arise and lead to death, particularly in the elderly, immunocompromised/immunosuppressed, or in those individuals who have underlying health conditions. The CDC reports that symptoms may appear in as few as two days or as long as 14 days after exposure.

Potential Risk

For the general American public, who are unlikely to be exposed to the virus, the immediate health risk from COVID-19 is considered low at this time. However, risk is dependent on exposure. The CDC reports that at this time, some people will have increased risk of infection such as workers caring for COVID-19 patients and others in close contact with such patients.

SICKNESS PREVENTION

CDC recommends the following basic measures:

- Stay home if suffering from acute respiratory illness, fever of ≥ 100.4 F (37.8 C), and any other symptoms for at least 24 hours.
- Use cough/sneeze etiquette. Cover mouth and nose with a tissue and dispose of it immediately. Alternatively, cough/sneeze into inside elbow.
- Practice hand hygiene. Wash hands frequently with soap and water for at least 20 seconds or use an alcohol-based sanitizer with at least 60% alcohol.
- Avoid touching eyes, nose, and mouth. Avoid close contact with people who are sick.
- Clean and disinfect objects and surfaces frequently using household cleaning spray or wipes.
- Check the latest traveler health notices if traveling to learn the latest guidance/recommendations for each country on your itinerary.

Evaluating COVID-19 in Air

SARS-CoV-2 that causes COVID-19 is a new virus with many unanswered questions. However, scientific professionals can look to previous investigations of coronaviruses such as SARS-CoV and the general principles of evaluating biological contaminants. SARS-CoV investigations focused on identifying environmental contamination in infected areas and the potential for transmission to adjacent areas. Sampling approaches included swab sampling of surfaces and air sampling followed by DNA-based Polymerase Chain Reaction (PCR) analysis.[1]

Listed are some air sampling options for viruses and important details on sampler selection. Consider that viruses are not routinely sampled in indoor air quality investigations because they are typically found in very low levels that are difficult to detect. Viruses are challenging to culture because they require a host cell to grow. SKC recommends that you seek guidance from a qualified environmental microbiology laboratory with expertise in viruses before performing any air sampling or studies.

Air Sampling Options for Viruses

Sampler	Filter Cassettes[2,3,5]	Button Sampler[6]	BioSampler[4,5]
Key Features	Easy, economical, and widely used Small, easy, lightweight sampling train Ideal for personal sampling and placement inside and outside of test areas Used by agencies to sample for SARS-CoV	Superior collection of inhalable-sized bioaerosols Unique inlet and proximity to filter minimizes transmission losses; promotes equal distribution of particles Closely follows the ISO 7708/CEN sampling criteria for inhalable particulate mass Autoclavable	Allows 8-hour sampling if filled with SKC ViaTrap mineral oil (suitable for specific analyses) Can be filled with sterile distilled water or other suitable liquids for PCR analysis Ideal for research studies
Mode of Collection	Filtration, collection onto filter	Filtration, collection onto filter	Impingement, collection into liquid
Media	37-mm, 0.3-µm PTFE Filter used for SARS	25-mm, sterilized Gelatin Filter (growth culturing, maintains viability)* *For short-duration sampling only	Sterile distilled water, physiological saline, phosphate buffered salve (PBS), nutrient broth, or peptone water
Recommended Sample Pump	AirChek® TOUCH	AirChek® TOUCH	BioLite+
			

QUESTIONS?

Contact SKC at skctech@skcinc.com

STANDARDS/GUIDELINES

There are no specific standards that address workplace exposure to COVID-19. The following requirements may apply to prevention.

OSHA

Personal Protective Equipment Standard in General Industry, 29 CFR 1910, Subpart I: Requires use of gloves, eye, face, and respiratory protection

General Duty Clause, Section 5(a)(1) of the OSH Act of 1970, 29 USC 654(a)(1): Requires employers to furnish employment and place of employment that are free from recognized hazards

NIOSH/CDC

Interim U.S. Guidance for Risk Assessment and Public Health Management of Persons with Potential 2019 Novel Coronavirus (2019-nCoV) Exposure in Travel-associated or Community Settings
View at https://bit.ly/2tUgWkq.

Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease 2019 (COVID-19)
https://bit.ly/38irY12

WHO

Online database of the latest international scientific articles on COVID-19. Access at https://bit.ly/2SOqOox.

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[2]Verreault, D. et al., "Methods for Sampling of Airborne Viruses," MMBR, 72 (3), Oct. 2008, pp 413-44, doi: 10.1128/MMBR.00002-08, https://bit.ly/2TFbD15
[3]Ong, S. et al., "Air, Surface, Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) from a Symptomatic Patient," JAMA, March 4, 2020, doi: 10.1001/jama.2020.3227, https://bit.ly/38oW8jn
[4]Cao, G. et al., "Development of an Improved Methodology to Detect Infectious Airborne Influenza Virus Using the NIOSH Bioaerosol Sampler," Jnl. of Env. Mon., 2011, Dec. 13(12), pp 3321-8 Research Gate: 51695684
[5]Nguyen, T. T., et al., "Bioaearosol Sampling in Clinical Settings: A Promising, Noninvasive Approach for Detecting Respiratory Viruses," Open Forum Infectious Disease, 4(1) Winter 2017, https://doi.org/10.1093/ofid/ofw259
[6]Burton, N.C., et al., "Physical Collection Efficiency of Filter Materials for Bacteria and Viruses," Ann. Occup. Hyg., Vol. 51, No. 2, 2007, pp. 143-151, https://doi.org/10.1093/annhyg/mel073

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