PSDS
PATHOGEN SAFETY DATA SHEET

SARS-CoV-2

CHARACTERISTICS

Synonym or Cross Reference	Formerly known as 2019 novel coronavirus (2019-nCoV); also the virus responsible for COVID-19 or the COVID-19 virus
Disease	COVID-19 ranges in severity from asymptomatic to fatal. It is estimated that one quarter to one third of SARS-CoV-2 infections are asymptomatic. Children and adolescents younger than 19 years are often asymptomatic, and when symptomatic, have fewer and milder symptoms compared to adults >25 years. Although the risk of severe COVID-19 disease and death increases with age, asymptomatic infection is common in the elderly.
Morphology	SARS-CoV-2 is an enveloped, positive-sense, single-stranded RNA virus, ranging in size from 60 to 140 nm. Coronavirus virions have distinctive club-shaped spikes on their surface giving the appearance of a solar corona, hence the viral family name.
Zoonosis	Zoonotic transmission from farmed mink to humans reported in the Netherlands and Denmark. Reverse zoonotic transmission has occurred in multiple feline species, pet dogs, ferrets, mink, otters, beavers, white-tailed deer, hyenas, coatimundi, and gorillas, following known or suspected contact with infected humans.

RISK GROUP & CONTAINMENT REQUIREMENTS

ABSL-3	Animal procedures involving SARS-CoV-2 are handled in an ABSL-3 facility.
BSL-3	Containment Level 3 facilities/equipment/operational practices for all in vitro activities outlined in the WHO's COVID-19 Lab Biosafety Guidance document. Non-propagative diagnostic or clinical activities can be conducted at containment level 2 with additional requirements as specified in the WHO guidelines.
Risk Group 3	SARS-CoV-2 is a Risk Group 3 human pathogen. Current precautions outlined by the CDC should be followed.

LABORATORY HAZARDS

Primary Hazards	Inhalation of infectious material or exposure of mucous membranes to infectious material.
Sources	Diagnostic samples include nasopharyngeal, oropharyngeal, or nasal swabs, bronchoalveolar lavage fluid, saliva, or sputum; stool, urine, serum, blood, and tissue samples may also be used.
Lab Acquired Infections (LAIs)	At this time, there are no reported cases of laboratory-acquired SARS-CoV-2 infections.

PERSONAL PROTECTIVE EQUIPMENT

Additional Precautions	It is suggested that SARS-CoV-2 could survive in liquid nitrogen/ nitrogen vapor used to cryopreserve biological samples. Sample cross-contamination and/or infection of lab workers might occur.
Minimum PPE Requirements	Wear dedicated lab clothing or don full coverage protective wear over street clothing. Remove jewelry. Don additional protection when infectious materials are directly handled (e.g., solid-front gowns with tight fitting wrists, gloves, and respiratory protection). Wear splash goggles where there is a risk of exposure to splashes.

SPILL PROCEDURES

Large	Immediately notify all lab personnel and clear the area. Remove any contaminated PPE/clothing before exiting the lab. Lock all entry doors, post warning signage, and deny entry. Call DPS (213-740-4321) and ask to notify EH&S. Inform the PI and/or Lab Manager/Supervisor.
Small	Notify all lab personnel lab. Remove contaminated PPE and don new PPE. Cover spill area with absorbent material and add fresh 1:10 bleach:water. Allow 20 minutes (or as directed) contact time. After 20 minutes, clean up and dispose of materials.

VIABILITY

Disinfection	Effective SARS-CoV-2 disinfectants include sodium hypochlorite, i.e., bleach (1,000 ppm [0.1%] for general surface disinfection, and 10,000 ppm [1%] for disinfection of sample spills), 70% ethanol, 7.5% povidone-iodine, 0.05% chloroxylenol, 0.05% chlorhexidine, and 0.1% benzalkonium chloride. Methanol (100% and ice-cold) and paraformaldehyde (4%) can inactivate virus in infected cells.

VIABILITY

Survival Outside Host	SARS-CoV-2 can survive for extended periods at room temperature on different surfaces such as vinyl, steel, glass, paper and polymer banknotes (up to 28 days); cotton cloth (up to 14 days); polymer surfaces (up to 13 days); plastic, face masks, latex gloves (up to 7 days), and cardboard and wood (up to 2 days).

HEALTH HAZARDS

Host Range	Humans are the primary SARS-CoV-2 host
Incubation Period	Estimated incubation period ranges from 2-14 days, with a median of 5-6 days from exposure to symptom onset.
Infectious Dose	The human infectious dose of SARS-CoV-2 is unknown. Non-human primate research estimates human infectious dose via inhalation is 36-179 viral particles (plaque forming units).
Modes of Transmission	SARS-CoV-2, a respiratory virus, is transmitted by respiratory droplets and aerosols. Exposure routes: Inhalation of respiratory droplets and/or aerosols. Direct exposure of mucous membranes (e.g., mouth, nose, or eyes) to splashes or sprays (e.g., coughing), Contact with contaminated surfaces (which act as fomites). Transmission by fomites is considered low. Other potential sources: urine and feces, contaminated sewage, and contaminated bioaerosols produced by plumbing connecting apartments.
Signs and Symptoms	Chills, fever, new or worsening cough, fatigue, myalgia, headache, and gastrointestinal symptoms (e.g., nausea, vomiting, diarrhea). Less frequent symptoms: shortness of breath/difficulty breathing, sore throat, and loss of smell and/or taste. Rare symptoms include skin and/or eye manifestations. SARS-CoV-2 may also impact other organ systems to cause a multitude of extrapulmonary symptoms that may result in fatal extrapulmonary complications.

EXPOSURE PROCEDURES

Medical Follow-up	Visit USC's designated healthcare provider. Bring a copy of this PSDS.
Mucous Membrane	Flush eyes for 5-10 minutes at eyewash station.
Other Exposures	Immediately wash affected area with soap and water for 15 min.
Reporting	Immediately report incident to supervisor, notify EH&S, and complete Manager's Report.

MEDICAL PRECAUTIONS/TREATMENT

Prophylaxis	Pre-exposure: Monoclonal antibody cocktail specific for SARS-CoV-2 spike protein for moderate to severe immunocompromised individuals who may not respond to SARS-CoV-2 vaccines, and for individuals for whom such vaccines are contraindicated. No post-exposure prophylaxis measures currently.
Surveillance	Reverse transcription–polymerase chain reaction (RT-PCR) assay to detect viral ribonucleic acid. RT-LAMP (RT-loop mediated isothermal amplification) assay for viral nucleic acid. Test for viral antigens in clinical samples. Use in situ hybridization or immunohistochemistry in tissue samples to detect virus.
Treatment	Treatment may include antiviral remdesivir, oxygen therapy, airway management, steroids, management of septic shock, depending on disease severity, and management of co-infections.
USC Requirements	Immediately report any exposures to EH&S.
Vaccines	Multiple COVID-19 vaccines have been approved for the active immunization of the general population.

REFERENCES

BMBL
http://tiny.cc/cdc-bmbl

CDC
https://www.cdc.gov/

WHO
http://tiny.cc/who-covid-lab-guide

Canadian PSDS
http://tiny.cc/canada-gov-psds

NIH Guidelines
http://tiny.cc/nih-bio-secure

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