Risk Assessment
SARS-CoV-2 Inactivated Virus

Background

In December 2019, a novel severe acute respiratory syndrome coronavirus (SARS-CoV-2) was found and isolated from patients with pneumonia in Wuhan, China. SARS-CoV-2 is closely related to SARS-CoV and the origin of the virus is not entirely clear. Angiotensin converting enzyme 2 (ACE 2) is the membrane receptor used by SARS-CoV-2 for entry into human cells. The virus and subsequently viral RNA has been detected in nasopharyngeal and throat swabs, serum, blood, rectal swabs, saliva, urine, and stool. Clinical symptoms of those infected with SARS-CoV-2 are fever, cough, fatigue, and dyspnea. The virus is transmitted very easily and has a higher mortality rate than other viruses such as the flu. More information on SARS-CoV-2 is available daily. Current incubation periods are approximately 5-14 days.

Risk Considerations

Based on the government of Canada biosafety advisory,[1] SARS-CoV-2 is biosafety level 2 and should be handled in a Biosafety Level 2 cabinet. SARS-CoV-2 will be inactivated prior to use in the lab. **In the lab, SARS-CoV-2 will specifically be used for antigen and antibody assays which based on the government of Canada's biosafety advisory from above states that biosafety level 2 is appropriate.** It should be noted that the government of Canada only requires biosafety level 3 containment for the following activities: procedures with human or animal primary specimens to intentionally concentrate or isolate SARS-CoV-2 for research purposes, culturing specimens, preparatory work for in vivo activities, processing a culture known to contain SARS-CoV-2 for packaging and distribution to laboratories, preparing inoculum, inoculating animals, and collecting specimens from experimentally infected animals. **None of these activities that require biosafety level 3 will be performed in the lab.**

As mentioned, SARS-CoV-2 will be inactivated by someone else, in a biosafety level 3 lab, prior to entry into the lab. The procedure for inactivation will be adapted from a report describing how to make several coronaviruses non-infectious.[2] Briefly, the virus will be heated for 90 minutes at 56 °C, 60 minutes at 67 °C, and 30 minutes at 75 °C. While the virus will be inactivated and non-infectious, it should still be handled as potentially infectious.

Exposure Risk

Proper PPE (lab coat, gloves, goggles/glases, mask) will be worn when handling this material. Work must be performed in a Biosafety Level 2 safety cabinet. Particular care will be made to not aerosolize the virus during lab work.

Decontamination

1% sodium hypochlorite and wipe down all surfaces with 70% ethanol.

References

1) https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/biosafety-directives-advisories-notifications/novel-coronavirus-january-27.html
2) Duan, S. M., et al. "Stability of SARS coronavirus in human specimens and environment and its sensitivity to heating and UV irradiation." *Biomedical and environmental sciences: BES*16.3 (2003): 246-255.

Tentative Assessment: BIOSAFETY LEVEL II