



## Supplement F: Laboratory Guidance

### Appendix F5

#### Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with SARS-CoV

##### Key Messages

- Clinical laboratories performing routine hematology, urinalysis, and clinical chemistry studies, and microbiology laboratories performing diagnostic tests on serum, blood, or urine specimens should follow standard laboratory practices, including Universal Precautions, when handling potential SARS-CoV specimens. For additional information, see [http://www.osha.gov/SLTC/bloodbornepathogens/index.html#revised\\_standard](http://www.osha.gov/SLTC/bloodbornepathogens/index.html#revised_standard).
- Microbiology and pathology laboratories performing diagnostic tests on stool or respiratory specimens should handle potential SARS-CoV specimens using standard Biosafety Level (BSL)-2 work practices in a Class II biological safety cabinet.
- A detailed description of recommended facilities, practices, and protective equipment for the various laboratory biosafety levels can be found in the CDC/NIH Biosafety in Microbiological and Biomedical Laboratories (BMBL) manual at [www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4s3.htm](http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4s3.htm).

Although routine clinical laboratories around the world have processed an estimated several thousand diagnostic specimens from patients with SARS, no cases of SARS-CoV disease among laboratory workers performing diagnostic assays have been reported to date. However, there have been two reported cases of SARS-CoV disease in workers in research laboratories where SARS-CoV was being propagated. Until more information about the transmission of SARS-CoV in the laboratory setting is known, precautions should be taken in handling specimens (e.g., respiratory and stool specimens, unfixed lung tissue, viral cultures) that might contain large quantities of SARS-CoV.

Effective and timely communication between clinical and laboratory staff is essential to minimize the risk incurred in handling specimens from patients with possible SARS-CoV disease. Such specimens should be labeled accordingly, and the laboratory should be alerted to ensure proper specimen handling. Biosafety guidelines for handling SARS-CoV specimens, by specimen type, are provided below. Guidelines on implementing a medical surveillance system for laboratory workers are provided in Appendix F6.

##### ***A. Blood (blood, serum and plasma) and urine specimens***

- Handle these specimens using Universal Precautions, which includes use of gloves, gown, mask, and eye protection. For more information on Universal Precautions, see [http://www.osha.gov/SLTC/bloodbornepathogens/index.html#revised\\_standard](http://www.osha.gov/SLTC/bloodbornepathogens/index.html#revised_standard).

## Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with SARS-CoV

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- Any procedure with the potential to generate fine-particulate aerosols (e.g., vortexing or sonication of specimens in an open tube) should be performed in a biological safety cabinet (BSC). Use sealed centrifuge rotors or sample cups, if available, for centrifugation. Ideally, rotors and cups should be loaded and unloaded in a BSC. Perform any procedures outside a BSC in a manner that minimizes the risk of exposure to an inadvertent sample release.
- After specimens are processed, decontaminate work surfaces and equipment. Use any EPA-registered hospital disinfectant. Follow manufacturer's recommendations for use-dilution (i.e., concentration), contact time, and care in handling.

### ***B. Other specimens (e.g., respiratory secretions, stool, or tissue for procedures performed in microbiology or pathology laboratories)***

- The following activities may be performed in BSL-2 facilities with standard BSL-2 work practices:
  - Pathologic examination and processing of formalin-fixed or otherwise inactivated tissues
  - Molecular analysis of extracted nucleic acid preparations
  - Electron microscopic studies with glutaraldehyde-fixed grids
  - Routine examination of bacterial and mycotic cultures
  - Routine staining and microscopic analysis of fixed smears
  - Final packaging of specimens for transport to diagnostic laboratories for additional testing. Specimens should already be in a sealed, decontaminated primary container.
- The following activities involving manipulation of untreated specimens should be performed in BSL-2 facilities and in a Class II BSC:
  - Aliquoting and/or diluting specimens
  - Inoculating bacterial or mycological culture media
  - Performing diagnostic tests that do not involve propagation of viral agents in vitro or in vivo
  - Nucleic acid extraction procedures involving untreated specimens
  - Preparation and chemical- or heat-fixing of smears for microscopic analysis

Work surfaces should be decontaminated on completion of work with appropriate disinfectants. All disposable waste should be autoclaved.

Laboratory workers should wear personal protective equipment (PPE), including disposable gloves and laboratory coats.

Any procedure or process that cannot be conducted in a BSC should be performed while wearing gloves, gown, eye protection, and respiratory protection, (see Supplement I, Section III.D.5).

Acceptable methods of respiratory protection include: a properly fit-tested, NIOSH-approved filter respirator (N-95 or higher level) or a powered air-purifying respirator (PAPR) equipped with high-efficiency particulate air (HEPA) filters. Accurate fit-testing is a key component of effective respirator use.<sup>1</sup> Personnel who cannot wear fitted respirators because of facial hair or other fit limitations should wear loose-fitting hooded or helmeted PAPRs.

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<sup>1</sup> Respirators should be used in the context of a complete respiratory protection program, as required by the Occupational Safety and Health Administration (OSHA). This includes training, fit-testing, and fit-checking to ensure appropriate respiratory selection and use. To be effective, respirators must provide a proper sealing surface on the wearer's face. Detailed information on a respiratory protection program can be found at:

[www.osha.gov/SLTC/etools/respiratory/](http://www.osha.gov/SLTC/etools/respiratory/).

## Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with SARS-CoV

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Appropriate physical containment devices (e.g., centrifuge safety cups; sealed rotors) should also be used. Ideally, rotors and cups should be loaded and unloaded in a BSC.

- The following activities must be performed in a BSL-3 facility using BSL-3 work practices:
  - SARS-CoV propagation in cell culture
  - Initial characterization of viral agents recovered in cultures of SARS specimens

Any procedure or process that cannot be conducted in a BSC should be performed while wearing gloves, gown, eye protection, and respiratory protection (see Supplement I, Section III.D.5).

Acceptable methods of respiratory protection include: a properly fit-tested, NIOSH-approved filter respirator (N-95 or higher level) or PAPR equipped with HEPA filters. Accurate fit-testing is a key component of effective respirator use.<sup>1</sup> Personnel who cannot wear fitted respirators because of facial hair or other fit limitations should wear loose-fitting hooded or helmeted PAPRs.

Centrifugation should be carried out using sealed centrifuge cups or rotors that are unloaded in a BSC.

- The following activities must be performed in Animal BSL-3 facilities using Animal BSL-3 work practices:
  - Inoculation of animals for potential recovery of SARS-CoV from SARS samples
  - Protocols involving animal inoculation for characterization of putative SARS agents

Consideration may also be given to referral of specimens to a suitably equipped reference laboratory.

**Note:** Packaging, shipping, and transport of specimens from possible and known cases of SARS-CoV disease must follow the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations at ([www.iata.org/dangerousgoods/index](http://www.iata.org/dangerousgoods/index)) and US DOT 49 CFR Parts 171-180 ([hazmat.dot.gov/rules.htm](http://hazmat.dot.gov/rules.htm)). Step-by-step instructions on appropriate packaging and labeling are provided at: <http://www.cdc.gov/ncidod/sars/pdf/packingspecimens-sars.pdf>

For more information, visit [www.cdc.gov/ncidod/sars](http://www.cdc.gov/ncidod/sars) or call the CDC public response hotline at (888) 246-2675 (English), (888) 246-2857 (Español), or (866) 874-2646 (TTY)

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<sup>1</sup> Respirators should be used in the context of a complete respiratory protection program, as required by the Occupational Safety and Health Administration (OSHA). This includes training, fit-testing, and fit-checking to ensure appropriate respiratory selection and use. To be effective, respirators must provide a proper sealing surface on the wearer's face. Detailed information on a respiratory protection program can be found at: [www.osha.gov/SLTC/etools/respiratory/](http://www.osha.gov/SLTC/etools/respiratory/).