Interim Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with Middle East Respiratory Syndrome (MERS)

To date, little is known about pathogenic potential and transmission dynamics of Middle East Respiratory Syndrome Coronavirus (MERS-CoV). Until more information becomes available, precautions should be taken in collecting and handling specimens that may contain MERS-CoV.

Timely communication between clinical and laboratory staff is essential to minimize the risk incurred in handling specimens from patients with possible MERS-CoV infection. Such specimens should be labeled accordingly, and the laboratory should be alerted to ensure proper specimen handling. General and specific biosafety guidelines for handling MERS-CoV specimens are provided below.

For additional detailed instructions please refer to the following:

Biosafety in Microbiological and Biomedical Laboratories (BMBL) -Fifth Edition
http://www.cdc.gov/biosafety/publications/bmbl5/

Laboratory Biosafety Manual -Third Edition
http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_CSR_LYO_2004_11/en/

Universal Precautions
http://www.osha.gov/SLTC/bloodbornepathogens/index.html#revised_standard

I. General Guidelines (for working with potentially infectious materials)

- **a.** Laboratory workers should wear personal protective equipment (PPE) which includes disposable gloves, laboratory coat/gown, mask, and eye protection when handling potentially infectious specimens.
- **b.** 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. 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. Personnel who cannot wear fitted respirators because of facial hair or other fit limitations should wear loose-fitting hooded or helmeted PAPRs. Detailed information on a respiratory protection program can be found at http://www.osha.gov/SLTC/etools/respiratory/
- **c.** 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 Class II Biological Safety Cabinet (BSC). Appropriate physical containment devices (e.g., centrifuge safety buckets; sealed rotors) should be used for centrifugation. Ideally, rotors and buckets should be loaded and unloaded in a BSC.
- **d.** Perform any procedures outside a BSC in a manner that minimizes the risk of exposure to an inadvertent sample release.
- **e.** After specimens are processed, decontaminate work surfaces and equipment with appropriate disinfectants. Use any EPA-registered hospital disinfectant. Follow manufacturer's recommendations for use-dilution (i.e., concentration), contact time, and care in handling.
- **f.** All disposable waste should be autoclaved.

II. Specific Guidelines

A. The following activities may be performed in BSL-2 facilities using standard BSL-2 work practices:

1. Pathologic examination and processing of formalin-fixed or otherwise inactivated tissues
2. Molecular analysis of extracted nucleic acid preparations
3. Electron microscopic studies with glutaraldehyde-fixed grids
4. Routine examination of bacterial and mycotic cultures
5. Routine staining and microscopic analysis of fixed smears
6. Final packaging of specimens for transport to diagnostic laboratories for additional testing. Specimens should already be in a sealed, decontaminated primary container.
7. Inactivated specimens (e.g., specimens in nucleic acid extraction buffer)

B. The following activities involving manipulation of potentially infected specimens should be performed as above and in a Class II BSC:

1. Aliquoting and/or diluting specimens
2. Inoculating bacterial or mycological culture media
3. Performing diagnostic tests that do not involve propagation of viral agents in vitro or in vivo
4. Nucleic acid extraction procedures involving potentially infected specimens
5. Preparation and chemical-or heat-fixing of smears for microscopic analysis

C. The following activities must be performed in a BSL-3 facility using BSL-3 work practices:

1. MERS-CoV propagation in cell culture
2. Initial characterization of viral agents recovered in cultures of MERS-CoV specimens

D. The following activities must be performed in Animal BSL-3 facilities using Animal BSL-3 work practices:

1. Inoculation of animals for potential recovery of virus from MERS-CoV samples
2. Protocols involving animal inoculation for characterization of putative MERS-CoV agents

III. Packing, Shipping and Transport

Packaging, shipping, and transport of specimens from suspect cases of MERS-CoV infection must follow the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations at: http://www.iata.org/whatwedo/cargo/dgr/Pages/index.aspx.

Step-by-step instructions on appropriate packaging and labeling are provided at: http://www.cdc.gov/sars/lab/packing.html