Environmental Health & Safety
UNIVERSITY OF COLORADO **BOULDER**

Guidance for Working with Human and Nonhuman Primate Materials

Background Information:

Human and nonhuman primate (NHP) materials including tissues, cells (including immortalized human cell lines such as HEK293 and HeLa), and blood samples must be treated with "universal precautions" and handled using Biosafety Level 2 (BSL2) practices and engineering controls. These practices/controls are outlined in the CU Boulder Biosafety Manual that can be found at https://www.colorado.edu/ehs/, the hardcopy located in your laboratory, or the current edition of Biosafety in Microbiological and Biomedical Laboratories (BMBL; https://www.cdc.gov/labs/BMBL.html). Use of these materials should be outlined in the laboratory's Institutional Biosafety Committee (IBC) registration in BioRaft/SciShield. The IBC will want to know where materials are being obtained, if any pathogen testing was conducted on the material, disinfection/disposal methods to be used, and if the materials are or will be fixed.

Bloodborne Pathogens:

Work with human and NHP materials may present a risk of exposure to bloodborne pathogens (BBPs). Such pathogens include hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV). CU Boulder has developed a BBP Exposure Control Plan based on the Occupational Health and Safety Administration (OSHA) Bloodborne Pathogen Standard (29 CRF 1910.1030). Its purpose is to promote safe work practices and to ensure that all workers are protected from exposure to blood borne pathogens and requires employers to minimize the risk of exposure to bloodborne pathogens that are found in blood and other potentially infectious materials. Researchers working with human and NHP materials must complete annual training (https://colorado.bioraft.com/node/2145010), be offered HBV vaccination, and report all exposures (https://www.cu.edu/risk/file-claim). Additional requirements are outlined in the BBP Exposure Control Plan (https://www.colorado.edu/ehs/).

Neural and Lymph Tissue Considerations:

Prions (abnormal, pathogenic agents that are transmissible and able to induce abnormal folding in specific normal cellular proteins called prion proteins; PrP) are found most abundantly in brain and lymphoid tissues. Work with tissues potentially containing prions and prion-like proteins must be approved by CU Boulder's Institutional Biosafety Committee prior to starting work.

For our purposes, prions and prion-like proteins are defined as proteins (human or animal) that fall into one of the below categories:

1. Proteins that can cause infectious proteinopathies:
   Major prion protein/PrP/CD230 (Creutzfeldt-Jakob Disease [CJD], variant Creutzfeldt-Jakob Disease [vCJD], Kuru, fatal familial insomnia, bovine spongiform encephalopathy, Gerstmann-Straussler-Scheinker syndrome)

2. Proteins with demonstrated cell-to-cell spread in the brain:
   Alpha-synuclein (Parkinson's disease), Tau (AD, frontotemporal dementia)

3. Proteins that confer a disease state that is transmissible from cell to cell.
   FUS and TDP-43 (Frontotemporal dementias, ALS)

4. Proteins that have a fibrillar or aggregated form that has been shown to "seed" a pathology associated with a disease.
   Beta amyloid (Alzheimer's), Polyglutamine-containing proteins (polyQ, Huntington's disease), Superoxide dismutase 1 (SOD1, ALS).

The IBC registration must include prion disinfection/decontamination and destruction/disposal protocols, or specific Standard Operating Procedures (SOPs).

Primary hazards in the laboratory :

Although there are no documented laboratory-acquired prion infections, the primary hazard is from accidental parenteral inoculation or ingestion. Cuts and punctures should be avoided, and the use of sharp knives, scalpel blades, and needles should be minimized. If the use of sharps cannot be avoided, cut-resistant gloves should be worn.

Acceptable disinfectants:

Prions are highly resistant to inactivation by conventional methods using heat and chemicals, therefore require special precautions. The following disposal guidelines have been adapted from the BMBL and WHO guidelines:

Liquid waste:

- Mix with NaOH for a final concentration of 1.0 N NaOH and hold at room temperature for 1 hour; or
- Mix with sodium hypochlorite (bleach) for a final concentration of 20,000 ppm available chlorine and hold at room temperature for 1 hour

(Waste should be handled as liquid chemical waste and disposed of through EHS.)

Contaminated surfaces:

- 1N NaOH for 1 hour at room temperature

- Sodium hypochlorite (bleach solution; 20,000 ppm available chlorine) for 1 hour at room temperature

(Paper towels should be handled as biohazard waste, placed in red bag, and disposed of through EHS.)

Contaminated dry waste and reusable instruments:

- 1N NaOH for 1 hour at room temperature
- Sodium hypochlorite (bleach solution; 20,000 ppm available chlorine) for 1 hour at room temperature
- BMBL (6th edition) recommends autoclaving reusable instruments (gravity displacement) at 121° C for 1 hour following chemical disinfection

(Waste should be handled as biohazard waste, placed in red bag, and disposed of through EHS.)

Notes:

- 1 N NaOH = 40 g of NaOH per liter of water
- 6.15% sodium hypochlorite: 20,000 ppm = ~ 1:3 dilution of bleach to water
- 5.25% sodium hypochlorite: 20,000 ppm = 1:2 dilution of bleach to water
- 12.5% sodium hypochlorite (industrial strength bleach): 20,000 ppm = 1:5 dilution of bleach to water
- These solutions should be made and used the same day.
- These solutions are corrosive and appropriate engineering controls and personal protective equipment should be employed.

For additional information and guidance, email ehsbio@colorado.edu.