Guidance Document on the Use of Human, Non-human Primate and other Mammalian Cells and Tissues

Background: In 1991, the Occupational Safety and Health Administration (OSHA) issued the Bloodborne Pathogens (BBP) Standard to protect employees who have occupational exposure to human blood or other potentially infectious materials. While human blood, most body fluids, unfixed human tissues and organs were clearly included within the scope and application of the standard, the inclusion of human cell lines was ambiguous.

In 1994, OSHA issued an interpretation of the applicability of the BBP Standard towards human cell lines. According to the interpretation, human cell lines are considered to be potentially infectious and within the scope of the BBP Standard unless the specific cell line has been characterized to be free of hepatitis viruses, HIV, Epstein-Barr virus, papilloma viruses and other recognized bloodborne pathogens. In alignment with this interpretation, the American Type Culture Collections (ATCC) recommends that all human cell lines be accorded the same level of biosafety consideration as a line known to carry HIV. ATCC also states “However, in general, we do not test for animal viruses, therefore not all of our cell lines have been tested for animal viruses and should be treated accordingly.”

ATCC assigns biosafety level (BSL) designations for the purposes of safe shipment, according to whether or not at the time of accessioning it is known that the cell lines is harboring any known virus or any portion of a virus which causes human disease. “While ATTC does provide the biosafety level for each ATCC culture, we do not provide information on biosafety practices. Each researcher should determine the appropriate BSL using a risk assessment based on the characteristics of the cell line and how the cell line will be used.” This includes, but is not limited to, laboratory manipulations employed during its handling.

Moreover, the 5th Edition of the CDC publication, Biosafety in Microbiological and Biomedical Laboratories (BMBL), recommends that human, non-human cells and tissues should be handled using Biosafety Level 2 (BSL2) practices and containments. There is a growing consensus among universities that the handling of mammalian cells should be at the BSL2 level of containment.
Human, primate or mammalian cell lines, even in the absence of overt contamination, may contain adventitious viruses and/or other opportunistic pathogens or zoonotic agents. Since it is extremely difficult to screen for every pathogen, all human, primate and mammalian cell lines must be handled with standard precautions i.e. treated as though they are contaminated with infectious agents and utilize BSL2 practices. 

In addition to viral and bacterial threats, the European Union – European Medicines Agency document “Viral Safety Evaluation f Biotechnical Products Derived from Cells lines of Human or Animal Origins” also indicates the potential for the introduction of bovine spongiform encephalopathy prions (BSE) contamination into established cell lines via use of contaminated animal-derived products (including animal serum products) and/or through the use of improper work methods. However, in contrast to most of the infectious agents, prions are particularly difficult to inactivate. In fact, no method can guarantee total inactivation of these agents. So, one should bear these considerations in mind when using growth media of bovine origin.

In consideration of the aforementioned regulatory interpretations, consensus guidelines, best practices, and other factors, the CU Institutional Biosafety Committee has adopted the following guidance:

- All cell and organ cultures of human origin, including well established cell lines, human bodily fluids, non-human primate and mammalian cells and tissues will be handled in accordance with the OSHA Bloodborne Pathogens Standard and under Biosafety Level 2 (BSL2) containment.

Members of the research team working with these agents take Clemson University online training for Bloodborne Pathogens (BBP) at: 
http://www.clemson.edu/research/safety/

If working with human cell lines, tissues, bodily fluids, enrollment in the CU Medical Surveillance Program is also required.

References:

1. OSHA Letter of Interpretation, URL: 
2. American Type Culture Collection Frequently Asked Questions, URL: 
Human Viral Testing, 

3. American Type Culture Collection Frequently Asked Questions: URL: Testing Cell Lines for Viruses before Use, 


5. Biosafety in Microbiological and Biomedical Laboratories, 5th Edition, URL: 
http://www.cdc.gov/biosafety/publications/bmbl5/


8. Belgian Biosafety Server, Animal Cell Cultures: Risk Assessment and Biosafety Recommendations, February 28, 2006, 