UAB Institutional Biosafety Committee

Handling practices for animals administered material of human origin.

Background

Because of the potential for human cells and tissues to harbor infectious and bloodborne pathogens, animals that have been engrafted with or administered cells of human origin pose a potential risk to personnel handling the animals. Practices and procedures must be in place to minimize risks of the material to laboratory and animal care staff handling these animals. General guidance for minimizing these risks may be obtained from OSHA's Bloodborne Pathogen Standard (29 CFR Part 1091.1030)[1] and CDC's Biosafety in Microbiological and Biomedical Laboratories[2].

OSHA's Bloodborne Pathogen Standard is primarily based on exposure to hepatitis B virus (HBV) and human immunodeficiency virus (HIV), although it is not limited to these agents. OSHA defines "occupational exposure" as reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties. Animals are only mentioned in the standard as related to other potentially infectious materials (OPIM), specifically "…blood, organs, or other tissues from experimental animals infected with HIV or HBV." Regardless of the immune status of a mouse, for example, HIV and HBV are not permissive in mouse cells[3]. Therefore the risk of "occupational exposure" becomes negligible once the human tissue is implanted in a mouse. OSHA leaves the determination of the possibility of "occupational exposure" up to the employer by performing an exposure assessment in order to identify those job tasks where "occupational exposure" to (human) blood or OPIM may be reasonably anticipated[4-6].

Acknowledging that the majority of cells or tissues procured for xenograft experiments are not tested for human pathogens and the infectious disease status of their human donors cannot often be verified, UAB's Institutional Biosafety Committee performed a risk assessment on animal handling practices for human xenograft experiments using mice. The risk assessment was based on the possibility of xenografted mice being engrafted with human tissue harboring the most likely encountered human pathogens that pose the greatest risk to care staff (HIV, Hepatitis B & C). The risk assessment concluded that the Animal Resources Program's (ARP) standard handling practices for mice are appropriate for these experiments. All handling practices, administrative controls, engineering controls (e.g., contained cage changing areas and HEPA-filtered dump stations), and use of adequate PPE meet the ABSL2 standard as defined in the 5th edition of CDC's BMBL[2]. The risk assessment also concluded that current practices for bedding disposal and cage washing as set forth in the Guide for Care and Use of Laboratory Animals are adequate for these animals and cages[7].

Guidelines and procedures

Projects involving the administration of cells/tumors of human origin to animals or the use or housing of such animals must be registered with UAB OH&S before initiation. Any indication,

from either pathogen testing or donor health status/history, that a specimen may harbor a human pathogen will require that animals administered this material be handled using ARP's standard ABSL2 practices that includes autoclaving bedding and cages prior to disposal and cage washing. Xenograft experiments using modified animals with increased permissiveness for human pathogens will also require ARP's standard ABSL2 practices. For xenograft experiments using non-murine species, handling practices will be determined on a case-by-case basis. For all other mouse xenograft experiments using non-suspect human material, ARP's standard handling practices will be employed.

Signage (ABSL2-Human) informing personnel of their potential for exposure to animals containing human material will be posted on the door of all spaces housing human xenografted animals. Additionally, animal care staff will be educated on this potential risk in their training regimen and instructed to practice standard precautions for all cages in posted rooms, since individual cages are not marked.

1. 29CFR Part 1910.1030, OSHA Bloodborne Pathogen Standard. 1991.
2. Centers of Disease Control. Biosafety in Microbiological and Biomedical Laboratories, 5th edition. 2010.
3. Gaska JM, Ploss A. Study of viral pathogenesis in humanized mice. Current Opinion in Virology. 2015, 11:14-20.
4. Fairfax RE. (2003). 2003 - 01/02/2003 - Applicability of the Bloodborne Pathogens Standard to the municipal solid waste industry. Retrieved from https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=24375.
5. Fairfax RE. (2007). 2007 - 07/30/2007 - Application of OSHA's Bloodborne Pathogens Standard, 29 CFR 1910.1030, to employees in wastewater treatment plants. Retrieved from https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=25898.
6. Fairfax RE. (2007). 2007 - 08/07/2007 - Determining the presence of blood in mixture that comprises raw sewage. Retrieved from https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=25907.
7. Guide for Care and Use of Laboratory Animals, Eighth Edition, National Research Council, 2011.