

Biological risk assessment for human endothelial tissue samples

Background

Human endothelial biopsies are supplied to us by our clinical collaborators, and collected from actual patient populations. The samples are frozen after collection, but not otherwise treated.

Risk considerations

As with any real human tissue and/or blood, there is a risk of exposure to pathogens, including but not limited to hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C virus (HCV), human T-lymphotropic virus (HTLV), Epstein-Barr (EBV), human papillomavirus (HPV), and cytomegalovirus (CMV). All untreated human tissues should be handled as potentially containing the above infectious agents, and should be used under Biosafety Containment Level 2 conditions, which include appropriate personal protective equipment and use of a certified biological safety cabinet (BSC).

Due to the persistence of some infectious agents in the environment (e.g., HBV, which survives in dried blood for weeks and on surfaces for at least seven days), all surfaces must be decontaminated after working.

Due to the existence of a safe, effective vaccine for HBV, it is required that all individuals working with human tissue samples be vaccinated for HBV. For those with prior (e.g., childhood) vaccinations, a serum titre should be taken to confirm immunity, and booster shots administered if recommended by a physician. Arrangements for bloodwork and vaccinations can be made via the U of T Health and Wellness Centre.

No person should ever work with autologous samples.

Exposure risk

Exposure routes include accidental puncture and transmission through direct/indirect contact with skin and mucous membranes.

Specific precautions for reducing puncture risk:

- Replace needles and scalpel blades with non-sharp instruments wherever possible.

- Do not recap needles after use. Opt for safety-engineered sharps wherever possible.
- Fill sharps containers only 2/3 full.

Specific precautions to avoid direct/indirect contact:

- Work within a BSC. For proper use, refer to the BSC standard operating protocol.
- Wear safety goggles, a lab coat, gloves, and long pants and socks. A face shield is recommended if risk of splashes and aerosolization is high. Use gloves appropriate to the work at hand: nitrile gloves are recommended over latex for general use due to lower frequency of allergic responses and higher chemical resistance.
- Remove gloves and lab coats prior to leaving the Containment Level 2 area.
- Wash hands after working.

Decontamination/disposal procedures

Due to the possible presence of HIV and HBV, decontamination procedures must be effective against these viruses. **This means 70% ethanol alone is not acceptable.**

The use of 1% hypochlorite for decontamination is recommended. Bleach solutions must be made fresh daily, and contaminated articles should be submerged in bleach solution for at least 20 minutes. The items may then be removed from the solution and disposed of as biohazardous waste, **but under no conditions should bleach itself ever be disposed of in biohazard waste. This poses a serious hazard during autoclaving.**

Summary

Human samples should always be treated as potentially infectious. This means adequate use of PPE, working within a BSC, and use of disinfectants effective against HIV and HBV.

Tentative assessment: Risk Group 2

Further reading

This risk assessment was prepared based upon the following sources, which should be perused for more detailed information:

- Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition, Centers for Disease Control and Prevention
- Practical Disinfection Guidance for the Clinical Laboratory, Association of Public Health Laboratories
- Biosafety Policies and Procedures Manual, 2007, University of Toronto