

Risk Assessment

Human Sperm

Background and Purpose

Sperm is the haploid male reproductive cell containing half of the genetic information passed to one's offspring. It is formed in the testicles and ejaculated from the penis. The head of the sperm cell is approximately 5 microns in diameter. Unique to human cells, sperm protrude a 50 micron tail. This appendage aids in cell movement by rotating in an elliptical cone.

Sperm cells may last up to five days post-coitus in the partner's vagina. The Wheeler lab is interested in separating sperm cells from vaginal epithelial cells. Samples are procured from Ontario's Centre for Forensic Sciences.

Materials and Equipment

- Samples from Ontario's Centre for Forensic Sciences
- Microcentrifuge tubes and spin baskets
- Micropipette with tips
- Microcentrifuge
- +4°C Fridge
- Optoelectronic Tweezer Setup

Personal Protective Equipment (PPE)

Proper laboratory PPE, including lab coats and gloves, should be worn at all times in the laboratory. Eye protection should be implemented when handling large volumes of liquid or using samples with infectious agents.

Any breach of the skin (scratch, cut, wound) needs to be protected from contact with biological agents. Cover open wounds, cuts, scratches, and grazes with waterproof dressings and gloves. If you exhibit any open wounds (broken skin) in areas that cannot be covered by dressings or clothing, re-evaluate the work in process. Suggestions for mitigating the exposure in the case of broken skin that cannot be covered include, for example where the wound is on the face, work with a full-face shield; work in the BSC, or have someone else do the work.

Risk Assessment: BIOSAFETY LEVEL 2 Human bodily fluid

When we use human sperm, it is classified into two cases:

Screened Samples – are those obtained through the hospitals or sample bank that undertakes screening of their samples for harmful pathogens. Where these samples are proved to be negative for harmful

pathogens, the material can be handled at Biosafety Level 1. When samples are screened and are shown to contain a pathogen, they should be handled at the appropriate Containment Level for that pathogen.

Unscreened Samples – human materials that do not come from a screened source must be regarded as potentially infectious (e.g. HIV). They must therefore be handled at Biosafety Level 2. If a sample is shown or discovered to be infected at a later date, then the risk assessment should be revisited and the Biosafety Level altered accordingly.

Exposure Risk

Healthy sperm samples are generally not toxic. However, many people suffer from sexually transmitted infections (STI) and may not be aware of infections. Some of the most common STIs are chlamydia, genital herpes, gonorrhoea, hepatitis B, trichomoniasis, scabies, and syphilis. When using semen samples that haven't been screened by Ontario's Centre for Forensic Sciences, assume possible risk and handle the samples with Biosafety Level 2 procedures. When working with samples, take care to minimize splashing and generation of aerosols.

Decontamination/Disposal Procedures

General Level 2 good laboratory practices of decontamination of all work surfaces daily and appropriate chemical disinfection (e.g. 1% hypochlorite) of all liquid cultures and laboratory glassware will successfully contain any recombinant virus produced in the lab. Use 70% ethanol to clean work surfaces. Single use objects that have come in contact with the semen sample should be soaked in 1% hypochlorite before disposal into biohazard waste. For multiple use items, soak in 1% hypochlorite for 30 min, then rinse thoroughly. Make sure to wear proper protective equipment, such as gloves, eye ware, and lab coat. If using paper towels to wipe up the location, they must be disposed of in biohazard waste.

Summary

Human sperm samples can contain various biological agents. While sperm from healthy individuals is not toxic or infectious, precaution is required when handling patient samples. Sperm samples may contain harmful biological agents such as sexually transmitted infections. Most screened samples from Ontario's Centre for Forensic Sciences can be treated with more relaxed procedures, however caution is still advised.

Precautions for laboratory workers handling human body fluids

All work with human materials needs to be risk assessed before it begins. Biosafety level 2 practices and procedures are required as a minimum for any work with human body fluids and tissues, even screened material. There may be pathogens present that have not been detected by the screening process and therefore the material should always be handled with care. The risk assessment must be reviewed regularly, and particularly following an accident or any change to the work. The main controls required are as follows:

- The entrance to the laboratory should be marked with Biohazard signs.
- Authorised access only is allowed.

- Laboratory coats, or appropriate protective gowns should be worn in the laboratory and fastened properly. Lab coats and gowns should be removed when leaving the laboratory to go to offices, tearooms, cafeterias, toilets or seminar rooms.
- There should be no eating, drinking, application of cosmetics, mouth pipetting or storage of food within the laboratory. All hand-mouth/eye/nose contact must be minimized.
- The use of sharps should be avoided. If it is necessary to use sharps an appropriate assessment of the risks should be carried out, and control measures put in place to reduce the likelihood of cuts/needlestick injuries. For example, using snub nosed scissors instead of pointed scissors, using chain mail gloves for high risk cutting procedures, and safe sharps disposal for needles. There is further information on sharps safety below.
- Work with human material, if carried out within a large facility, should be confined to a quiet, marked area of the lab, where there will be little interference from other lab users.
- Any open wounds, lesions etc should be covered with a waterproof dressing. Disposable gloves should be worn.
- The work area should be uncluttered and should be decontaminated before and after work takes place.
- Hands should be washed immediately in the event of contamination, and should always be washed after removing gloves, and before leaving the laboratory.
- Care should be taken to prevent contaminated gloves coming into contact with door handles, telephones and other surfaces that may be touched by people not wearing gloves.
- The use of glassware should be reduced to a minimum, and disposable plastic equivalents used instead. This includes the use of Pasteur pipettes. Plastic Pasteurs should be used, unless there is a good scientific reason for using glass, which should be justified by the risk assessment.
- All samples must be labelled, and stored in secondary containment to prevent leaks, within their designated refrigerator or freezer.
- In the event of a spill all contamination must be cleaned up immediately and the incident reported.
- If there is a risk of splashing eye and mouth protection may be needed.
- All procedures likely to generate aerosols, such as sonication, homogenisation etc, should be carried out within a microbiological safety cabinet. Where equipment is placed within a safety cabinet to contain aerosols an operator protection test should be carried out to ensure that the containment of the cabinet is not compromised.
- Sealed tubes should be used for centrifuging, and where at all possible sealed buckets should also be used to contain any aerosols in the event of tube breakage. The sealed bucket can then be removed and taken to a safety cabinet for decontamination. Disinfection with 1% Virkon is recommended for contaminated rotors and bowls, unless it is known or suspected that Mycobacterium tuberculosis is present, in which case an appropriate disinfectant, known to be effective against the MTb, must be used. Because Virkon is corrosive to metals, it should not be left in contact with the metal surface for a prolonged period, but should be washed off with water. Alternatively, a disinfectant such as Trigene, with no known corrosive properties may be used, if it is appropriate to do so.
- All waste should be carefully disposed of, particularly any sharps which should be placed directly into yellow sharps bins for ultimate disposal by incineration.
- Individuals should NEVER work on their own cells – if cells are transformed in culture the body's immune response may not provide protection in the event of re-exposure through a needlestick or other accident.

