

# GUIDELINES FOR WORKING WITH MICROTOMES & CRYOSTATS IN UBC LABORATORIES

## SCOPE

This is a guideline document for UBC faculty, staff and students working with microtomes or cryostats to section fixed or unfixed tissues.

## Purpose

The purpose of this document is to provide general guidance on:

- Minimum safety requirements for microtome or cryostat use
- Training and competency requirements for microtome or cryostat use
- Risk awareness when working with a microtome or cryostat
- Safe work practices when using a microtome or cryostat

## Microtomes and Cryostats

### Microtomes:

A microtome is used to make thin slices of tissue, or sections, that are embedded in materials like paraffin. The sections are mounted on slides for microscopy. Blades can be made of steel, glass or diamond edges, depending on the hardness of material to be sectioned.

### Cryostats:

A cryostat is a device that maintains low cryogenic temperatures of samples mounted in it for frozen sectioning. Helium or nitrogen liquid or vapour are common cryogens used in these devices.

*Hazard Warning: Sharp blades & risk of exposure to infectious substances.*



Figure 1. Example of Microtome



Figure 2. Example of Cryostat

## Minimum Safety Requirements

Microtome and cryostat devices pose risks to users during sectioning, blade changing, and cleaning of the instrument. The blades used are extremely thin and sharp, and the tissues being sectioned can present an opportunity for the user to be exposed to infectious substances. All microtomes and cryostats are made differently, so labs must offer specific training on the exact piece of equipment used in their area. Proper Personal Protective Equipment (PPE) based on the activity is pertinent in any laboratory procedure. The following are best practices when working with a microtome or cryostat. At a minimum, supervisors must:

- Assess hazards by completing a risk assessment. This simply means to break down tasks into steps and apply controls to hazards that may present in each step – each piece of equipment is different and will need to be considered individually.
- Create Standard Operating Procedures (SOPs). Engage your local safety representative and provide a copy to your Joint Safety Committee for review.
- Train and orient staff to the equipment and procedures. Document the training and orientation.
- Implement controls outlined in this guide.
- Know how to contact first aid immediately in the event of an accident. Ensure users are knowledgeable in how to flush cuts or protect broken skin before using the devices.

## Training & Competency

- Ensure all lab members using the equipment are trained on the Standard Operating Procedure (SOP).
- Reiterate to users to check they are not feeling fatigued, are aware of the use of microbreaks, and are aware that the machine could cause serious harm.

- Training must include competency assessment. Users should be able to demonstrate correct use of equipment and materials as well as have knowledge of emergency response protocols.
- Competency should be documented: A [Task Specific Training Documentation Template \(WORD\)](#) is available in the documentation of staff training assessments and completion.
- Ensure new users are supervised.
- Review Safe Operating Procedures on an annual basis or in the event of an injury occurring. Communicate any changes or updates to SOP's to all users. Refresher training is recommended annually.
- If users are returning from a long period of absence, or it is unclear how familiar they are with the equipment, assess their knowledge and competency before using the equipment unsupervised.

## Materials & Equipment

### Safety Mechanisms:

- Where possible, attain equipment with built-in safe-guarding features, such as brakes and guards. Only use compatible guarding recommended by the manufacturer.
- Never allow safety mechanisms to be circumvented.
- Ensure emergency brakes / shut-down buttons are working.
- Guards may need to be moved to enable access while cleaning & maintaining equipment. Ensure guards are in place before and after instrument cleaning or blade changes.

### Equipment Placement & Ergonomics:

- Do not place behind doorways or in high-traffic areas where the operator could be inadvertently bumped while operating.
- Ensure items in frequent use are in a comfortable location to prevent prolonged over-reaching. Consult the [UBC Lab Ergonomics Guide](#) when setting up equipment.
- Position your chair at a comfortable height to avoid neck and back strain.

### Sharps Handling:

- If cleaning or maintenance on the machine does not require the blade to be in place, remove it until the task is complete to lower the risk of injury. Replace the blade only when you are ready to resume work.
- Take special precaution: sectioning blades are extremely sharp and must be handled cautiously.
- Avoid carrying unguarded blades – always carry blades in the container provided by the manufacturer. If using disposable blades, keep a sharps container within arm's reach to easily dispose of used consumables.

- Depending on the procedure, if hands get cold, this may pose a risk of losing grip on the equipment or slipping into the path of the blade.

### Personal Protective Equipment (PPE):

- The minimum PPE requirements that an individual must wear in order to enter a UBC wet laboratory are:
  - Long, loose-fitting pants (long socks, leggings, nylons, and skinny/ripped jeans are not appropriate).
  - Fully covering liquid-resistant shoes (sandals, ballet flats, cloth, and mesh, open-back or open-toed shoes are not appropriate).
  - Lab coat that is buttoned and sleeves rolled down. Fitted cuffs are recommended. Loose cuffs should be taped to prevent getting caught.
- Additional (optional) PPE to consider:
  - Cut-proof gloves. This is up to users to assess the benefits, as dexterity may be reduced. Consider [cut level 6](#) and above.
  - Tools to grab blades with (e.g., tongs and forceps).
  - Safety glasses/goggles.
- Other lab wear best practices:
  - Tie long hair back.
  - Remove dangling jewelry.

### Job Planning & Supervision

- Allow for microbreaks:
  - Especially if the task is repetitive and it is easy to reach a flow state (no longer paying attention to the task being performed). Take time to refocus on the task.
  - Remind yourself to get up and stretch often.
  - Ensure users are aware that it is appropriate to take a break if their hands become numb; there is a risk they may not notice they have cut themselves.
  - Check guards before starting and stopping.
- The longer you spend at the instrument, the more your ability to focus will fade.
- Supervisors should be notified when lab members are tasked with sectioning duties and are being trained on microtomes and cryostats.
- If working alone or in isolation, ensure procedures are in place. See the [SRS website](#) for more detail.

### Infection control

- Tissue prepared for sectioning will differ based on each lab. Ensure this is part of your risk assessment and any exposure prevention controls are included in the SOP and emergency

response protocols. Has validation of fixation for your samples been done? (i.e., have you proved that your method of fixation renders your material non-infectious?)

- Always wash hands thoroughly before entering and after exiting lab space.

## Injuries & Incidents

- Know your first aid and security information: post signage with the room number (if applicable, include directions for first aid to attend) and emergency contact in a visible area near the microtome/cryostat and by lab phones.
- Make the emergency response protocol easily accessible. This should include incident reporting and any serology or tissue testing follow-up required by the SOP.
- All incidents and accidents must be reported to a supervisor and online through the [UBC Centralized Accident/Incident Reporting System \(CAIRS\)](#) as soon as possible following the incident/accident.
- Ensure a pre-determined point of contact is available on-site if a regular supervisor is not available. Managers must be immediately notified of serious injuries.
- Managers of Core Facilities
  - Managers or supervisors of core facilities are responsible for supervision and training of users (see [Safety Supervision at UBC](#) to learn more)
  - Managers or supervisors of core facilities should participate in the investigation of incident/accidents, but also ensure the supervisor of the injured party is notified.
  - Ensure you are aware of SOPs, and participate in the review and distribution of training materials.

## General Tips

### Placement of the Blade:

- Take special precaution with the microtome blade as it is extremely sharp and must be handled cautiously.
- Always set the rotary handle of the microtome in the locked position when changing a paraffin block or the blade.
- Place a new blade in the blade holder and clamp it before the rotary wheel lock is released.
- Once the blade is seated and secured, the rotary wheel lock can be released, and the knife and holder advanced to the specimen block. To avoid misalignment by moving the blade again, ensure the hand wheel lock and blade guard are in place when adjusting the specimen in front of the blade.

### Removal of the Blade:

- Disposable blades must always be removed using forceps or a similar instrument and placed directly into a certified sharps disposal container.

- Do not remove the blade holder from the microtome or transport the housing with a blade present.
- If the blades are reusable, cut resistant gloves must be worn when removing the blade for sharpening or cleaning.

### Cleaning of the Microtome:

- The rotary handle must be locked and blade removed from the holder before cleaning. Ensure that the lock is properly engaged.
- If contact with the blade is possible, wear cut-resistant gloves when cleaning the microtome.
- Use a disinfectant that is effective against potential infectious substances, as advised by the manufacturer.

### Clean up Spills (Slippery Floor Precautions):

- The floor near the Microtome may become slippery because of waxy materials used falling to the floor.
- Clean up all spilt materials on the floor when cleaning the microtome.
- Take extra precautions when walking close to a Microtome.

\*If you have any questions on microtome safety,  
Please contact Safety & Risk Services Monday to Friday, 8:30 a.m. to 4:30 p.m.  
Tel: 604-822-2029      [research.safety@ubc.ca](mailto:research.safety@ubc.ca)

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