

LABORATORY ERGONOMICS

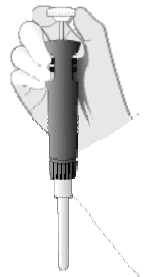
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Laboratory researchers who perform repetitive tasks for lengthy periods of time are at increased risk for repetitive motion injuries. Examples of repetitive tasks include pipetting, working with microscopes, operating microtomes, using cell counters, and performing data entry. Each of these tasks may involve sustained use of a few muscles or using more force than normally required for certain muscles of the hands, arms, and back. In addition, depending upon the laboratory layout, employees may find themselves standing for long periods of time leading to muscle fatigue. This SOP provides guidance for reducing the risk of Musculoskeletal Disorders (MSDs) resulting from common repetitive laboratory tasks

Pipetting

Pipetting involves several ergonomic risk factors, including thumb force, repetitive motions, and awkward postures, especially of the wrists, arms, and shoulders. To reduce the risk of MSD:

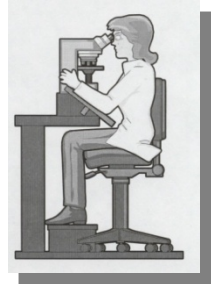
- Use pipettes with newer trigger mechanisms requiring less force to activate, and use the pointer finger to aspirate, and the thumb to dispense.
- Use pipettes that fit comfortably in the user's hand.
- For tasks such as mixing or aliquotting, use an electric or cordless pipetter with mixing functions.
- Use a multichannel pipetter for large aliquotting tasks.
- Use shorter pipettes. This decreases hand elevation and consequent awkward postures.
- Use low profile waste receptacles for used tips. They should be no higher than the top of the tubes being filled.
- Take micro-breaks of three to five minutes for every 20-30 minutes of pipetting. Mild hand exercise and stretches are beneficial.
- Clean pipettors on a regularly scheduled basis – this reduces "sticking."
- Adjust the workstation so an individual isn't put in a position where they have to work with their arms in an elevated position. Work with the arms close to the body. Keep samples and instruments within easy reach. Use an adjustable stool or chair with lumbar support when sitting at a lab bench.
- If possible rotate between pipetting activities and other laboratory activities and tasks. Try to choose activities where an individual can change hands to avoid working with only one hand. If it is necessary to stand for long periods of time during pipetting, obtain anti-fatigue matting.
- Use thin-wall pipette tips that fit correctly and are easy to eject; and, use minimal force when applying pipette tips.



Microscopy

Operating a microscope for extended periods of time can put strain on the neck, shoulders, eyes, lower back, and arms/wrists.

- Set up microscope stations in a manner that allows good posture to be maintained while looking into the equipment. This will necessitate an adjustable chair, scope, or bench.
- Adjust the workstation to allow leg room and install footrests where needed.
- Maintain good posture, keeping the natural curve of the spine in place. Keep the neck neutral and do not jut the chin forward when looking into the microscope. Avoid raising the shoulders and bending the neck while looking through the eyepiece of the microscope. Position microscope as close to the body as possible and adjust the eyepiece to a height that allows a neutral (upright) head and neck posture. If possible use an extended eye tube and/or variable height adapter to achieve proper neck and head position.
- Avoid static positions for long periods of time. Move around.
- Make sure knobs on the microscope turn easily and are clean and avoid awkward finger and hand positions when turning them.
- Do not work with elbows winged – keep elbows close to sides.
- Try, as much as possible, to work with wrists in (straight) neutral position.
- Avoid forearm and wrist contact pressure. Pad sharp edges with foam, or pad wrists and forearms to reduce pressure.
- Make sure scopes remain clean and lighting is of proper intensity.



Biosafety Cabinets

The following preventative measures will help reduce the risk of MSDs when working with biosafety cabinets:

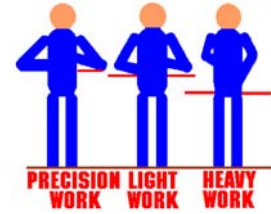
- Avoid extended reaching by placing materials as close as possible but without disturbing proper air flow. Items must be placed at least 4" inside the working face of the cabinet to ensure proper containment.
- Use a chair that is equipped with back support, adjustable seat angle, and height adjustability between 28 to 33 inches.
- Consider adjustable height cabinet stands.
- Use footrests for individuals whose feet do not rest comfortably on the floor.
- Use a small turntable to store equipment near the worker. This reduces excessive reaching and twisting, which places an increased load on the lower back.
- Use anti-fatigue matting when standing for extended periods of time.
- Take frequent mini-breaks to perform stretching exercises.

Workbenches

Laboratory workbenches can expose researchers to a variety of ergonomic risk factors. Workbenches present similar ergonomic hazards to those discussed above that are most likely due to the lack of adjustability and legroom. Most workbenches are at fixed heights and cannot be raised or lowered. Workbenches are designed using the following general

guidelines suggested by the National Institute of Occupational Safety and Health (NIOSH):

- Precision work** - workbench height should be above elbow height.
- Light work** - workbench height should be just below elbow height.
- Heavy work** - workbench should be 4-6 inches below elbow height.



Observing the following preventative measures while working at laboratory workbenches will help reduce the risk of MSDs:

- Guidance provided above for biosafety cabinets related to chairs, leg room, footrests, turntables, positioning of equipment and supplies, anti-fatigue mats, and breaks is also applicable to workbenches.
- If possible, install foam padding to the front edge of the workbench. Movable armrests may be installed external to the edge of the workbench to provide support for the arms and still maintain the required airflow. This reduces contact forces by increasing the surface area that comes into contact with the forearm and therefore reduces the chances of impinging nerves, tendons, or blood vessels.

Working at a Computer

Lab work can require several hours of data entry. Often, computers are located on the laboratory benches, which are too high and require the lab worker to elevate their arms and excessively flex their wrists while inputting data. Dedicated computer work stations are advised, with the added benefit of reducing potential for contamination.

- Use adjustable keyboard trays.
- Provide fully adjustable seating with adequate lumbar support.
- Place the monitor so the user's viewing distance is between 20 and 30 inches and the top of the screen is approximately eye level. This allows the eyes to naturally gravitate toward the center of the screen.
- Use a document holder placed adjacent to or in front of the computer screen.
- Provide foot rests, where possible, in order for employees to change leg positions throughout the day.
- Encourage mini-breaks every hour or two when keyboarding or using the mouse. These breaks can be spent doing mild hand exercises and stretches.