
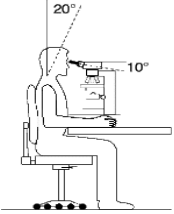

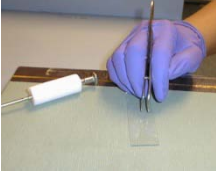



# Ergonomics in the Laboratory

Task	Risk Factors	Preventative Measures
<p><b>Pipetting</b></p> 	<ul style="list-style-type: none"> <li>• Repetitive motion - of the hands, forearm and thumb, or fingers</li> <li>• Bending and twisting of the wrist</li> <li>• Winged elbows - elbow held at an elevated position away from the body</li> <li>• Awkward and static postures</li> <li>• Excessive force of the thumb</li> <li>• Overreaching</li> </ul>	<ul style="list-style-type: none"> <li>• Rotate pipetting tasks among several people or between laboratory tasks</li> <li>• Limit continuous pipetting periods to 20 minutes or less</li> <li>• Take micro-breaks of 2 minutes for every 20 minutes of pipetting. Mild hand, arm and shoulder exercises and stretches are beneficial</li> <li>• Use pipettes with newer trigger mechanisms requiring less force to activate, and use the pointer finger to aspirate, and the thumb to dispense</li> <li>• Use pipettes that fit comfortably in the user's hand</li> <li>• Use thin-wall pipette tips that fit correctly and are easy to eject</li> </ul>
<p><b>Microscopy</b></p> 	<ul style="list-style-type: none"> <li>• Awkward and static posture of the lower back, neck and head</li> <li>• Lack of adequate leg and knee clearance under worktable</li> <li>• Working with elbows winged</li> <li>• Pinch grip when adjusting the focus and changing fields</li> <li>• Wrist and palm contact pressure in the carpal tunnel area</li> <li>• High repetition</li> <li>• Eyestrain and fatigue</li> </ul>	<ul style="list-style-type: none"> <li>• Use an ergonomically designed chair that provides adequate back support, adjustable height, and adjustable seat angle</li> <li>• Avoid jutting your chin forward or bending your neck down when using the microscope</li> <li>• Adjust the height of your microscope, workbench or chair as needed to avoid bending or tilting your neck</li> <li>• Avoid leaning on hard edges or use a pad to cushion the edges</li> <li>• Provide sloping arm rests to support the operator's forearms while using adjustment knobs</li> <li>• Keep elbows close by your sides</li> <li>• Work with wrists in straight, neutral positions</li> <li>• Pull the microscope toward the edge of the work surface to position the operator in a more upright posture</li> </ul>
<p><b>Microtome/Cryostat</b></p> 	<ul style="list-style-type: none"> <li>• Repetitive work in placement of specimens and turning the trimming wheel</li> <li>• Turning microtome's wheel also requires force or forceful exertion</li> </ul>	<ul style="list-style-type: none"> <li>• Purchase an automatic microtome to replace manual unit</li> <li>• Reduce force when operating hand wheel</li> <li>• Use motorized cutting</li> <li>• Use an external control unit like a foot pedal instead of the hand-operated wheel</li> <li>• Avoid leaning on hard edges or use a pad to cushion the edges</li> <li>• Use an ergonomically designed chair that provides adequate back support, adjustable height, and adjustable seat angle</li> <li>• Pull the microtome toward the edge of the work surface to position the operator in a more upright posture</li> </ul>
<p><b>Micromanipulation</b></p> 	<ul style="list-style-type: none"> <li>• Repetitive use of the extensor and flexor muscles of the fingers and wrist</li> <li>• Pinch Grip</li> </ul>	<ul style="list-style-type: none"> <li>• Use plastic vials with fewer threads to reduce twisting motions during capping and uncapping lids</li> <li>• Use small pieces of foam, similar to the type used on pencils and pens to prevent soreness on the fingertips</li> <li>• Practice using forceps between the first and second digits instead of using the thumb and the first digit. Then try alternating between the two positions to reduce the use of the thumb extensors and flexors</li> <li>• Rotate repetitive movements from one hand to the other</li> <li>• Tilt storage bins toward the worker to reduce wrist flexion while reaching for supplies</li> </ul>
<p><b>Biosafety Cabinets</b></p> 	<ul style="list-style-type: none"> <li>• Repetitive motions of the hands, wrist, and forearms, especially when pipetting is involved</li> <li>• Constrained knee and leg space</li> <li>• Contact pressure on the forearms, wrists and knees, or legs</li> <li>• Awkward and static posture of the neck, torso, legs, arms and wrists</li> <li>• Working with elbows winged</li> <li>• Overreaching</li> <li>• Prolonged standing in unnatural positions or in restricted postures</li> </ul>	<ul style="list-style-type: none"> <li>• Use an ergonomically designed chair that provides adequate back support</li> <li>• Use footrests for individuals whose feet do not rest comfortably on the floor</li> <li>• Apply closed-cell foam padding to the front edge of the biosafety cabinet (away from the downdraft) or workbench</li> <li>• Raise cabinet couple inches upward to create a more conformable leg and thigh clearance</li> <li>• Position materials in laboratory hoods/biosafety cabinets as close as possible to avoid extended reaching.</li> <li>• Use a turntable to store equipment near the worker.</li> </ul>