Laboratory ERGONOMICS

UBC, Human Resources
Workplace Health Services
http://www.hr.ubc.ca/health/ergonomics/laboratory/

Ergonomics related injuries account for 41% of injuries in BC research labs.

Injuries can impact your ability to work & your home & leisure activities.

Ergonomic related injuries include:
- **Overexertion** (e.g. lifting something too heavy), &
- **Repetitive Strain Injuries (RSI)** (e.g. repeating an activity too many times without allowing sufficient rest).
Ergonomics (MSI) Requirements

- **Ergonomics** is about the relationship between the worker and their work environment to optimize human well-being & overall system performance.

- **WorkSafeBC OHS Regulations**: Ergonomics (MSI Requirements (4.46 - 4.53) places a legal duty on employers to identify and assess risk factors & to eliminate/minimize the risk.

Meeting is more than an legal obligation: those complying have not only reduced injury rates but also increased morale, productivity & quality.
Employer Responsibilities

Consultation 4.53(1):
- consult with workers regarding MSI symptoms

Education 4.51(1):
- educate workers on the risk, signs of injury & how to avoid

Risk Identification 4.47:
- identify factors in the workplace that may expose workers to MSI risks

Risk Assessment 4.48 & 4.49:
- Assess Risk Level

Develop & Implement Control 4.50:
- Eliminate/Minimize Risk

Training 4.51(2):
- Train workers on safe work practices & equipment

Evaluation 4.52:
- Monitor Effectiveness
Employer Responsibilities

For help meeting the WSBC Ergonomics MSI Requirements contact UBC’s Ergonomics Advisor:

Ergonomics.info@ubc.ca
(604) 822-9040
Employee Responsibilities

Under the workers compensation act employees have the following responsibilities:

**Know**: MSI Risk Factors & Injury Signs & Symptoms
**Participate**: in education & training on safe work procedures
**Follow**: MSI prevention policies & safe work procedures
**Cooperate**: with employer, reps & WSBC prevention officers
**Report**: MSI signs/symptoms to supervisor/1st aid & unsafe acts/conditions (e.g. broken equipment)
Musculoskeletal Injuries:

Musculoskeletal Injuries (MSI) refers to injury or disorder of the muscles, tendons, ligaments, joints, nerves, blood vessels or related soft tissues including a sprain, strain and inflammation.

Examples of MSIs:

- Muscle Strain (Neck & Back)
- Epicondylitis (Medial & Lateral Elbow)
- Rotator Cuff Tendinitis (Shoulder)
- DeQuervain’s Tendinitis (Thumb)
- Carpal Tunnel Syndrome (Wrist)
- Cubital Tunnel/ulnar nerve irritation (Elbow/Wrist)
MSI Signs and Symptoms

Signs:
• Redness
• Heat
• Swelling
• Reduced range of motion

Symptoms:
• Pain and/or localized discomfort
• Stiffness/Heaviness
• Tender to Touch
• Weakness
• Numbness/Tingling

REPORT SYMPTOMS EARLY!!!
Risk Factors

- Awkward Postures
- Force
- Repetition and Static loads
- Duration
- Contact Stress
- Environment & Vibration
- Psychosocial
Microscope Work:

**Hazards:** Neck flexion, Improper lumbar support, forearm contact pressure

**Risk Level:** Moderate to High (if 2+hrs/day)

**Injuries:** Neck/Back muscle strain, pinched nerve, ulnar nerve damage

Bay Optical

Wedgeease
Microscope Set-Up

Solutions:

• Work in area with proper leg clearance
• Position microscope near the edge of the table
• Chair should be height adjustable
• Adjust chair and microscope height so that:
  – Head Upright
  – Sight Line: 30-45° below horizon
  – Back should be supported
  – Feet should be firmly supported on the floor, foot ring or footrest

Take frequent micro-breaks
Microscope: Available Tools

Position microscope so you keep a relaxed neck & shoulder posture

You may require additional equipment:

- Positioning Plate to Tilt Microscope

Pictures from [Wedgeease](http://www.wedgeease.com) and [marketlab.com](http://www.marketlab.com)

- [Bay Optical](http://www.bayoptical.com) and [microscopeyu.com](http://www.microscopeyu.com)

Positioning Plate to Tilt Microscope

Pictures from [Market lab Inc.](http://www.marketlab.com)
Leg Clearance

– Ensure there is enough space to pull in close
– Feet should be properly supported

Insufficient Leg Room
Results in twisting
→ muscle strain

Proper Leg Room
Results in good positioning
Micro-Pipetting

Solutions:
• Work in area with proper leg clearance
• Use low profile tip garbage and angle it towards you
• Anti-fatigue matting for standing
• Chair should be height adjustable with feet & Back supported
• Use correct Tools & Techniques

Take frequent micro-breaks
Pipetting – Shoulder Posture

Hazards: Shoulder abduction and flexion

Risk Level: Moderate (depending on time)

Injuries: Neck/Shoulder strain, Rotator Cuff Tendinitis or nerve impingement,

Extended reaching strains the neck & shoulder

Position items close
Keep arms close to your side
Use padded supports as needed
Micro-Pipetting Technique:

Volume Change: Use 2 hands

Avoid resting elbows on sharp edges; if necessary use padding

Pictures courtesy of Sartorius-Biohit Pipetting Academy
**Micro-Pipette Design:**

**Ergonomic considerations** should be included when purchasing pipettes.
Choosing the Right Pipette

- Manual Vs. Electronic & Single Vs. Multi-channel

**5 ergonomic points to consider when choosing a pipette**
- Tip Insertion Force:
- Plunger & Tip Ejection Trigger Force & Digit Involved:
- Force & the # of revolutions required to change volume
- Hand & Arm positioning when operating the pipette
- Usability (primarily a concern with electronic pipettes):
- Other Considerations
Pipetting – Shoulder Posture

Extended reaching strains the neck & shoulder

Choose equipment that promotes neutral postures

Ergonomic Pipette Aids & Shorty seriological pipettes
Laptops in the Lab

If using laptop >2hrs/day; obtain external keyboard & mouse

UBC has online resources for more on how to set up your computer
Wrist Positioning

Bending the wrists increases muscle strain & is a risk factor for carpal tunnel syndrome.

Keep wrists neutral
Use step stool to improve arm angle
Lifting

Determining a safe weight depends on:
- How close it is to the body
- Is it at waist level, on the ground or above shoulder level
- Is it stable &/or does it have good handles
- Does the lift involve twisting or good posture

Store heavy items within mid-thigh to waist level
Case Study: Pouring Liquids

Risk Factors:
- Weight = 48.4 lbs
- Mid-shin to Waist Level
- Poor Handles
- Side Bending/Twisting
- Sustained holding to pour
- Design promotes forward stooping because legs cannot sustain a partial crouched posture
Solutions

• **Engineering Solution** (preferred): Obtain pump

  Optifix Dispensers

• **Administrative Solutions** (should be supplementary not primary solution): Teach Safe Lifting Mechanics

  ✓ Maintain neutral spine; bend knees
  ✓ Support container on shelf to eliminate need to hold
  ✓ Keep load close to body
  ✓ Face work rather than twist
Pouring Solutions

Examples of devices that can reduce injury risks when pouring liquid from containers

**Optifix Dispensers**  
**Poly Drum Draining Truck**  
**Morse Drum**
Lifting a Carboy:

Risk Factors:
- Weight = 47 lbs
- Awkward - no handles

Possible Solutions:
- Use cart, level with bench - push/pull rather than lift
- Use smallest size reasonable
- Use design that is easier to physically handle
Best Practices: MMH

- Maintaining a neutral spine
- Test Load
- Keep load close
- Use dolly/cart rather than carry
- Push rather than pull
- Organize work area so that items are easily accessible

WorkSafe BC
Pushing & Pulling

This cart and handle are not suitable for going outside - use inside only.

Push rather than pull.
What kinds of Tools are available?

Know what tools are available in your department. Use the right tools for the job.

- Cylinder Carts
  - Stable; back wheels need to be far enough back
  - Face work squarely

Praxair

Global Industrial
What kinds of Tools are available?

- Do not carry large, awkward or heavy items up/down stairs
- Contact your PI or Facility Manager for the safe procedure
- Stair Climbers: Building Ops has labourers to do this with equipment
What kinds of Tools are available?

- Mechanical Lifting Aids & Overhead Cranes:

  When to Use:
  - Items above WorkSafe BC lifting guidelines
  - Items awkward to grasp, unstable
Psychosocial Factors Contribute to Injuries

The interaction between psychosocial and physical risk factors is complex. A brief summary is as follows:

High psychosocial factors result in

• (a) increased muscle tension and a mechanical load are increased, which directly increases risk of musculoskeletal injury, this is of particular importance because trapezius musculature is known to respond to stress;

• b)cortisol level (stress hormone) which, when constantly elevated, is linked to numerous health disorders including heart disease and diabetes;

• (c) sleep is generally poorer (deep sleep is needed for muscle recovery
Positive Psychosocial Factors

Positive factors such as autonomy, rewards/recognition and co-worker/supervisory support have a protective effect.

What can you do to improve the positive factors within your work environment?

Available Resources:

<table>
<thead>
<tr>
<th>Staff &amp; Faculty</th>
<th>Students</th>
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<td><strong>UBC EFAP Program</strong></td>
<td><strong>UBC Counseling Services</strong></td>
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<td>Employee &amp; Family Assistance Program</td>
<td>(Brock Hall)</td>
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<td><strong>Responding with Respect</strong></td>
<td><strong>UBC Mental Health Network</strong></td>
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<td>Free interactive training for departments</td>
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<td><strong>Thrive.ubc.ca</strong></td>
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<td><strong>Healthy UBC Newsletter</strong></td>
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<tr>
<td>Free Newsletter</td>
<td>Student resources for healthy living</td>
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Risk Control

• Engineering Controls:
  – Adjust and adapt the workstation to promote optimal work postures

• Administrative Controls:
  – Task Rotation; Move the body

Engineering controls should be considered first
Stretch Breaks

• Research suggests that taking an extra 5 minute break every hour can significantly reduce symptom reports without negatively impacting productivity.

• Those who didn’t take breaks were found to work at a slower rate and make more errors in the last hour (7.5 hour shift).

• UBC Stretch Guide
• WorkSafe Sam (computer program stretch break)
Try to Fit in at least 1 stretches every 20-30 minutes

Stretches

Keep Stretches Comfortable

upper body

UPPER BODY: Interlace fingers and reach above with palms facing ceiling. Hold for ten seconds and relax arms down.

NECK: Tilt head forward and bring chin to chest. Hold for ten seconds and relax.

SHOULDERS: Raise shoulders to ears. Hold for ten seconds and relax down.

NECK: Reach right arm out to the side, palm facing forward. Look to left shoulder and hold for ten seconds. Repeat on opposite side.
Stretches Cont’d”

HANDS: Spread fingers wide for two seconds, then make a fist and squeeze tight for two seconds.

FOREARM/WRISTS: Stretch arm straight and point fingers down. Pull hand back for added stretch. Repeat with fingers pointing up. Stretch both hands.
Stretches Cont’d”

BACK: Sit on edge of chair and gently reach for toes. Hold for ten seconds in a comfortable stretch and relax.

UPPER BACK: Clasp hands behind head with elbows out to side. Focus on bringing shoulder blades closer together. Hold for ten seconds and relax.

HAMSTRING: Pull knee into chest and hold for ten seconds. Repeat on opposite side.

GLUTEUS: Cross right leg over the left knee and gently pull knee to chest. Hold for ten seconds and repeat on opposite side.
Questions?

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Resources:
Office Ergonomics
Lab Ergonomics