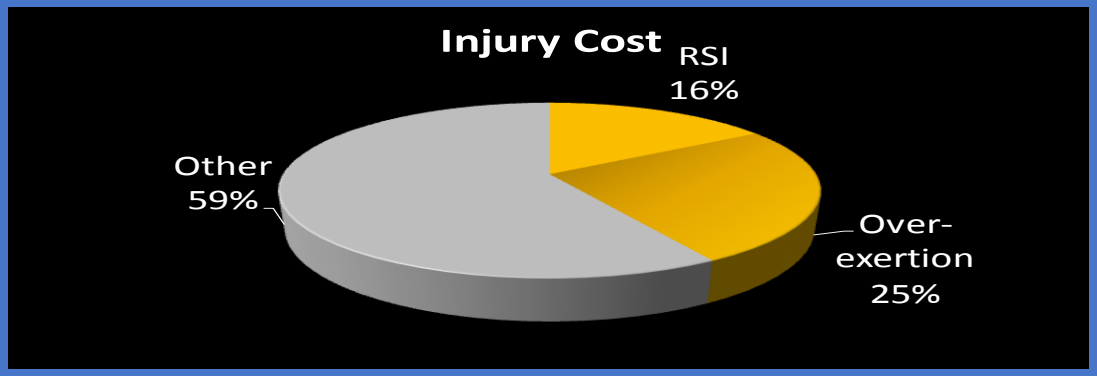
# Laboratory ERGONOMICS

UBC, Human Resources
Workplace Health Services

http://www.hr.ubc.ca/health/ergonomics/laboratory/

# WorkSafe BC Statistics (2010): Research Labs




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

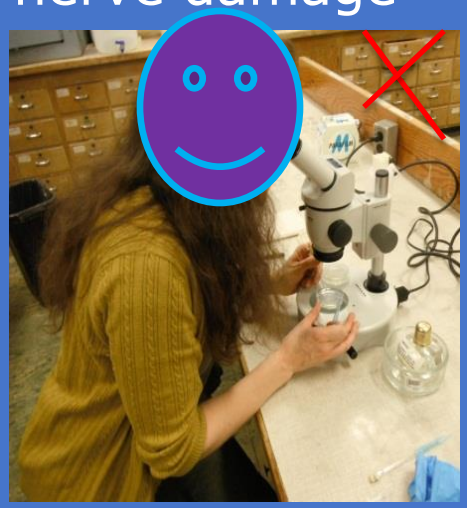
- **Awkward Postures**
- **Force**
- **Repetition and Static loads**
- **Duration**
- Contact Stress
- Environment & Vibration
- Psychosocial

# 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: 30-45º below horizon
  - Back should be supported
  - Feet should be firmly supported on the floor, foot ring or footrest

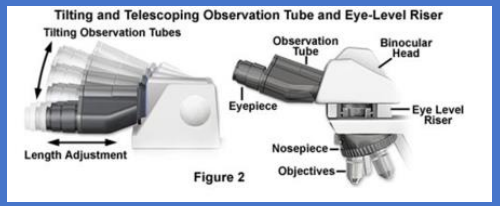
**Take frequent micro-breaks**

# Microscope: Available Tools

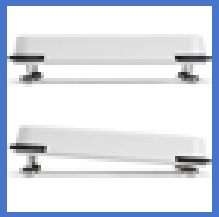
Position microscope so you keep a relaxed neck & shoulder posture

You may require additional equipment:


- Pictures from Wedgeease and marketlab.com


Pictures from Bay Optical and microscopeyu.com

Positioning Plate to Tilt Microscope
Pictures from Market lab Inc.

# 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



Pictures courtesy of Sartorius-Biohit Pipetting Academy

Avoid resting elbows on sharp edges; if necessary use padding

# Micro-Pipette Design:

Ergonomic considerations should be included when purchasing pipettes

Thumb is closer

Angled Head

Index Finger Trigger

Swivel Finger Hook

Thermo Fisher Finnpipette

# 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

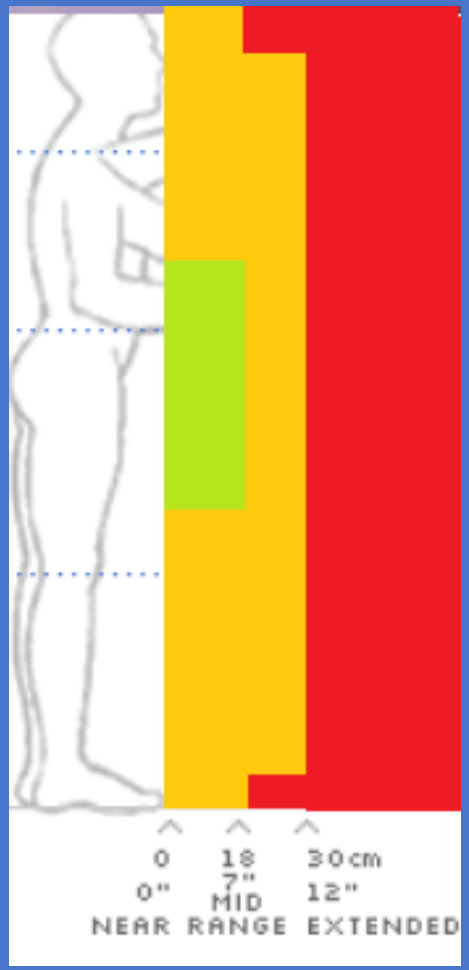

Bending the wrists increases muscle strain &

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:**

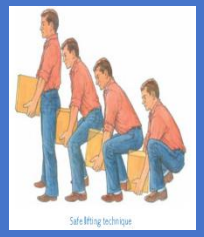
- Weight=48.4lbs
- Mid-shin to Waist Level
- Poor Handles
- Side Bending/Twisting
- Sustained holding to pour
- Design promotes forward stooping because legs cannot sustain a partial crouched posture

# Solutions

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

Optifix Dispensers

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



WSBC

- ✓ 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=47lbs
- 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


40 liter carboy

VWR Carboy

# Best Practices: MMH


WorkSafe BC

- 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

# 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

Praxair

Global Industrial

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

# What kinds of Tools are available?

Battery Operated

Global Industrial

Escalcra

- 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?

R & D Ergo Solutions

- 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:**

| Staff & Faculty | Students |
|---|---|
| UBC EFAP Program<br>Employee & Family Assistance Program | UBC Counseling Services<br>(Brock Hall) |
| Responding with Respect<br>Free interactive training for departments | UBC Mental Health Network |
| Thrive.ubc.ca<br>Building mental health at UBC | Thrive.ubc.ca<br>Building mental health at UBC |
| Healthy UBC Newsletter<br>Free Newsletter | Live Well to Learn Well<br>Student resources for healthy living |

# 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

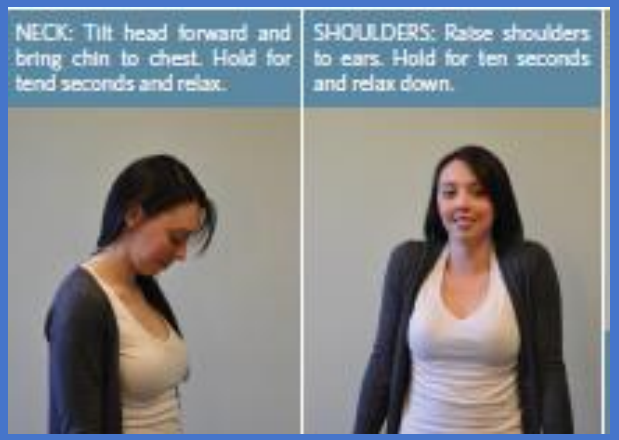
- Research suggests that taking an extra 5 minute break every hour can significantly reduce symptom reports without negatively impacting productivity

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

- UBC Stretch Guide
- WorkSafe Sam (computer program stretch break)

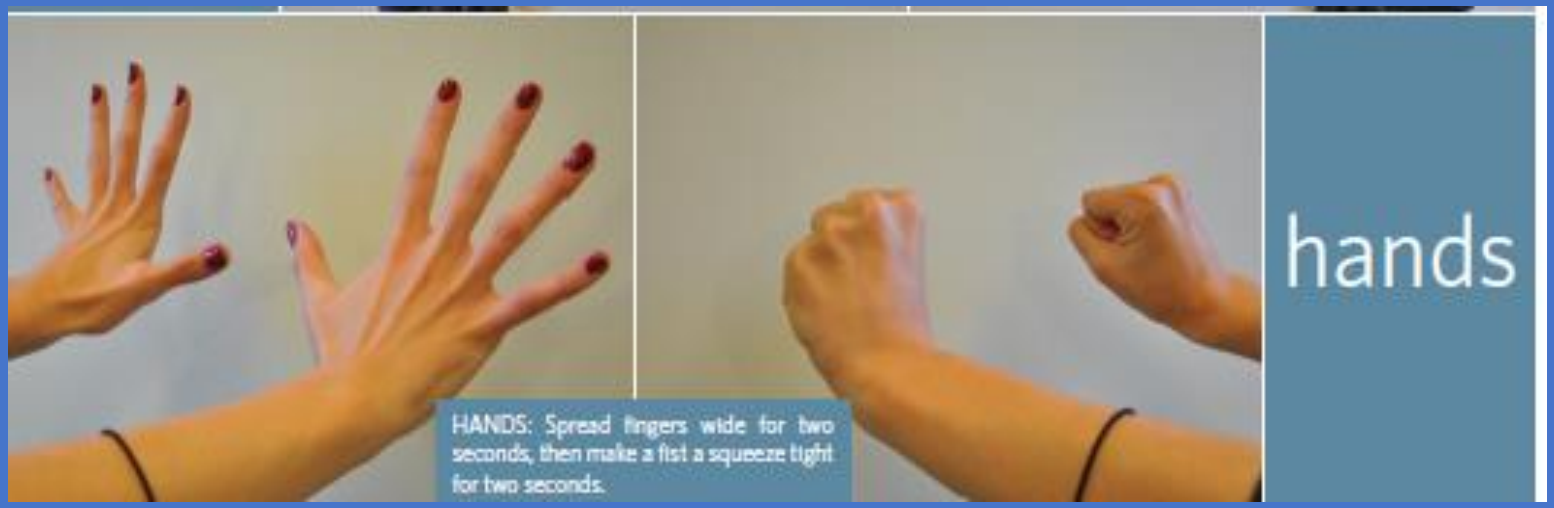
# Stretches


Try to Fit in at least 1 stretches every 20-30 minutes




Keep Stretches Comfortable

# Stretches Cont'd"




# Stretches Cont'd"

# Questions?

Abigail Overduin
Ergonomics Advisor
604-822-9040
Ergonomics.info@ubc.ca

**Resources:**

Office Ergonomics

Lab Ergonomics