



RCSI

Laboratory Ergonomics

Many job tasks performed in a research laboratory places RCSI researchers and staff at risk for developing musculoskeletal disorders. Potentially hazardous activities include the use of equipment such as pipettes, microscopes, microtomes, centrifuges, flow cytometers, cryostats, and computers. Prolonged and awkward postures, excessive reaching, lifting and repetitive movements may contribute to the onset of discomfort and eventual injury. Standing and working in awkward positions at laboratory hoods and biosafety cabinets can also present ergonomic problems. The following information sets out support to help you reduce your risk of suffering musculoskeletal disorders (MSDs).

1. Posture

Keeping the normal curves of the spine when in static postures, bending and lifting. Bending your knees and keeping the inward curve in the lower back will help reduce back strain.

- Wear shoes with good support and cushioning if your work requires a lot of standing.
- If standing in one spot for long periods, anti-fatigue mats can help redistribute weight. Resting one foot on a small platform while standing, then shifting to the other foot, can help to relieve lower back strain.



- If your feet are not resting when you sit in lab chair, adjust the foot ring, if possible, or use a footrest.
- Ensure to sit back into the chair to provide and adjust the lumbar support to suit you.
- Try to avoid spending long periods looking down while reading. Use a document holder to elevate documents.

2. Computer Workstation

You may be required to input data on a computer in the lab as well as sitting at your write up desk in an office type environment. In the lab, the bench is higher, which may require you to elevate arms and excessively deviate the wrists. Awkward reaching for mouse may also occur. The same set-up of the workstation to be applied while working in the lab and in your write up office i.e.

- An adjustable office chair / lab chair incl height and back of chair adjustments included
- Keyboard and mouse close to you, avoiding stretching out arm to reach
- Monitor should be placed at arm's length and your eye level should be a top of the screen, therefore the screen in the lab should be adjustable in height.
- Use footrest / foot ring to rest legs and change positions regularly
- Every 30mins and / or more regularly, alternate your posture to stretch and move around to reduce muscle tension and fatigue.

- Alternate work tasks to reduce muscle strain and fatigue e.g. move from keyboard to pipetting or other job tasks as your muscles feel stressed.
- Check out the DSE workstation set up by clicking the link below to procedure:



HSP-03_Workstation
n Setup Procedure_I

3. Storage

Some storage facilities have higher shelves which is not ideal. Try avoid high shelving, which requires a step to access, if possible. Always store:

- The lightest items on the top shelves
- The heaviest items on the middle shelves
- All other items on bottom shelves.
- Use a stable step ladder with a hand hold.
- Request help from a colleague when taking down equipment while on step ladder.

4. Pipetting

Pipetting is one of the most common tasks performed in the research laboratory. It involves several ergonomic stressors of the wrist, arms, and shoulders. The majority of these stressors are caused by excessive thumb force, repetition, and awkward postures. Click on risk assessment below for information on pipetting safely:



Pipetting
RA-General

5. Microscopy

Designing the workstation with the microscope position is important to attempt to suit all persons using it. It should be easily adjustable.

- Avoid long, uninterrupted periods of microscope work. Spread the amount of time needed over the course of the day, switching between tasks.
- Bring the microscope to the edge of the bench. This will help provide a more upright posture.
- Elevate the microscope and place it at an angle, so you can look directly into the eyepiece with your head and neck in a natural upright position. This will reduce rounding of the shoulders and neck.
- Keep your neck in a neutral position and avoid extending the chin forward when using the microscope. You may need to adjust the height of the microscope or the chair.



- Ensure the microscope is set up where there is a cut out below the lab bench so you can move in as close as possible.
- Alternate your posture to stretch and move around to reduce muscle tension and fatigue and blink frequently.

6. Cabinets/Hoods/Lab Benches

Working at safety cabinets, fume hoods and at lab benches present similar ergonomic hazards as mentioned above in section 2, which are mostly due to the lack of adjustability and leg room.

- Refer to section 2 above and
- Ensure you are sitting at a cut out at the lab bench and cabinets etc. removed from underneath cabinets if seating is required
- Position materials close or use a turntable to store equipment near you. This reduces excessive reaching and twisting which places an increased load on the back and can lead to shoulder strain.
- Refer to section 1 above for information on posture and standing for long periods.
- Alternate your posture to stretch and move around to reduce muscle tension and fatigue.



7. Micro-manipulation and Fine Motor Skills

Many laboratory procedures require repetitive use of the extensor and flexor muscles of the fingers and wrists. For example, removing caps and screw-off lids from vials, reaching into bins and the use of forceps all require the use of these small muscle groups and may result in awkward postures. Prolonged repetitive fine motor tasks can cause discomfort in hands and wrists.

- If feasible for your work, use plastic vials with fewer threads. This will reduce twisting motions during capping and uncapping
- Use small pieces of foam to prevent soreness on the fingertips, where fingers and forceps touch. This will distribute the force over a greater surface area, reducing the compressive forces on the soft tissue.
- *Practice using the forceps between the 1st and 2nd digits instead of using the thumb and 1st digit. Then try alternating between the two positions to reduce the use of the thumb.* Many tasks within the laboratory require repetitive motion of the thumb.
- Move and tilt storage bins toward you to reduce wrist flexion while reaching for supplies.
- Alternate work tasks, take mini breaks, and perform mild hand stretches and exercises to reduce muscle strain and fatigue.

8. Microtome and Cryostat

- Add a wrist support pad at edge of desk to rest wrist while operating equipment.
- If manually operating the equipment, ensure the handle is round so hand can wrap around it to reduce wrist action.
- For automated equipment, consider foot operation, especially if frequent performances required.
- As in above sections, use an adjustable chair; ensure cut out in bench below so you can move in alternate work tasks, take mini breaks, and perform mild stretches and exercises to reduce muscle strain and fatigue.

9. Flow Cytometers

The use of a flow cytometer requires frequent lateral bending, neck and back flexion, and extended reaching with the arm. The operator may need to sit in awkward positions in order to see the controls.

- With the lack of adjustable tables/benches, place a block underneath the equipment to raise it to a more suitable height if safe to do so.
- When droplet exposure is a concern, wear a face shield and safety goggles to protect your face.

- Use an adjustable chair.
- Ensure the screen is at approximately eye level or slightly below.

10. Gloves Boxes

Working in glove boxes requires extended static loading on the shoulders. Extending the arms for more than a couple of minutes can become exhausting. In addition to static loading and frequent side reaching, the thick gloves can also cause the user to over-compensate on grip strength.

- Gather all equipment to main chamber at same time to reduce the amount of times side reaching.
- Use highly absorbent hand powder for glove comfort.
- Alternate tasks to avoid using glove box for long periods of time.
- Use an adjustable chair and take mini breaks, and perform stretching exercises to relieve muscle stress from the shoulders.

11. Centrifuges

Centrifuge rotors present a unique lifting hazard. Its rotors can be very heavy and are awkward in shape.

- Request help from a colleague to help lift the rotor and practice a dual lift.
- Use a trolley to transport the rotor.

12. Risk Assessment

A risk assessment is required for all your work tasks in the lab. Include in your risk assessment ergonomic hazards associated with your work and refer to this procedure for control measures. RCSI's Risk Assessment procedure & form below and you can find further templates [here](#).



HSP-01_Risk
Assessment Procedu

13. Further Resources

- Check out these easy stretching exercises on YouTube provided by Eppendorf <https://youtu.be/m7NiDDSM7OY>
- To book a personal workstation assessment at your lab, your write up office location on campus and / or your remote office location, please contact safety@rcsi.ie
- Check out ergonomic risk assessment videos [here](#) – not laboratory specific; however you can adapt the safety measures to your own work environment set up.

Document resources/references:

Health and Safety Authority
UM Healthy programs
Mason Technology
Eppendorf