 <b>NUS</b> National University of Singapore	<b>Department of Medicine</b>	Doc. No:	SOP-Medicine-13
	<b>Standard Operating Procedure</b>	Rev No:	004
	Title: <b>Laboratory Ergonomics</b>	Page:	1 of 4

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## 1. OBJECTIVE

This SOP provides guidance to laboratory employees about controlling laboratory ergonomics risk factors, improving level of comfort while performing jobs, and reducing the risk of acquiring Musculoskeletal Disorders (MSDs).

## 2. SCOPE

This SOP applies to all staff and students involved in sustained and / or repetitive tasks in the NUS Department of Medicine Research Laboratories at MD1, MD6 and NUH.

## 3. RESPONSIBILITY AND ACCOUNTABILITY

- 3.1 Principal Investigator (PI) shall be responsible for ensuring that this SOP is disseminated to all staff and students who need to be aware of reducing the risk of MSDs resulting from common repetitive laboratory tasks.
- 3.2 Staff and students must be aware of risk and proficient in the practices.

## 4. DEFINITIONS

**Ergonomics:** Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. (*International Ergonomics Association*)


**Musculoskeletal disorders (MSDs):** MSDs are illnesses and injuries that affect one or more parts of the musculoskeletal system and can include:

- Sprains
- Strains
- Tears
- Degeneration

## 5. LABORATORY WORKBENCHES

When used inappropriately, laboratory workbenches can expose researchers to a variety of hazardous conditions or ergonomic risk factors depending on the laboratory procedure being used.

- a. Always assume proper sitting or standing neutral posture.
- b. When sitting, use only adjustable chair with built-in foot rest to insure lower back, thigh, and feet support.
- c. Remove drawers, supplies and other materials underneath workbenches to provide leg room.

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- d. Take frequent small breaks to alter repetition, body awkward posture, and muscle static work.

## 6. PIPETTING

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

- a. Use pipettes that fit comfortably in the user's hand.
- b. Avoid elevating arms and elbows above shoulder for lengthy periods to prevent static work of arm, and shoulder strain
- c. Use multi-channel pipettes for microtiter plate applications.
- d. Use electronic pipettes for highly repetitive pipetting tasks to reduce/eliminate contact pressure on thumb.
- e. Use shorter pipettes. It decreases hand elevation and consequent awkward postures.
- f. Take short breaks every 20-30 minutes of pipetting. Mild hand exercise and stretches are beneficial.
- g. Clean pipettors regularly as it reduces "sticking" effect.
- h. Work with the arms close to the body. Keep samples and instruments within easy reach.
- i. Use thin-walled tips when possible to reduce the force needed to eject tips.

## 7. USE OF BIOSAFETY CABINETS / FUMEHOODS

Workers normally stand at fume hoods and sit at biosafety cabinets and laminar flow clean benches. Posture is important when working at these devices.

- a. Prevent extended reaching, place materials as close as possible
- b. Perform your work at least 10-15cm inside the hood or BSC to ensure proper containment.
- c. Always assume a proper posture. Use only adjustable chair or stool with built-in foot and arm rest.
- d. Take frequent short breaks to perform stretching exercises.
- e. Keeping supplies nearby to prevent overreaching
- f. Make sure hood/BSC lighting is working properly, good and proper lighting help reduces eye strain.

## 8. MICROTOMES AND CRYOSTATS

Manual rotary microtome requires performing many repetitive functions. Turning microtome's wheel requires force or forceful exertion. Other repetitive microtome-related functions such as replacement of specimens and use of trimming wheel increase the probability of acquiring MSD.

- a. Place microtome on appropriate workbench (appropriate height). Take into consideration the way work will be performed (standing or sitting).
- b. If sitting is required, make sure the workbench allows enough clearance for leg and thighs.

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- c. Use only adjustable chair or stool.
- d. Make sure sharp edges are not an issue.
- e. Protect wrists and forearms from contact pressure. Pad sharp edges.
- f. Avoid placing utensils such as forceps inside the cryostat
- g. Use less force when turning hand wheel.
- h. Take frequent small breaks from microtome work every 20 minute.
- i. If economically feasible, replace manual rotary microtome with an automatic one.

## 9. MICROSCOPY WORK


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

- a. 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.
- b. Make sure leg and knee clearance under work bench is adequate.
- c. 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.
- d. Avoid static positions for long periods of time. Move around.
- e. Make sure knobs on the microscope turn easily and are clean and avoid awkward finger and hand positions when turning them.
- f. Keep elbows close to sides.
- g. Try to work with wrists in (straight) neutral position.
- h. Avoid forearm and wrist contact pressure. Pad sharp edges with foam or pad wrists and forearms to reduce pressure.
- i. Make sure scopes remain clean and lighting is of proper intensity.
- j. Take frequent small breaks from microscopy work to rest the eyes.

## 10. WORKING AT A COMPUTER

Lab work can require several hours of data entry.

- a. Use an adjustable chair, comfort is important.
- b. Keyboard should be 6 - 7 cm from the edge of desk and lie flat or negatively inclined.
- c. The monitor should be located at a comfortable viewing distance - approximately an arm's length away.
- d. Top of monitor should be at about eye level, or slightly lower to avoid neck extension/flexion.
- e. Computer mouse should be at same level as keyboard and close enough to prevent over extended reaches
- f. Provide foot rests, where possible, in order for employees to change leg positions throughout the day.
- g. Reduce prolonged computer time whenever possible.

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## 11. MEDICAL MANAGEMENT

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Any injury identified and diagnosed as a work-related MSD by a medical professional should be immediately reported to OSHE via the online NUS Accident and Incident Management System (AIMS) @[https://inetapps.nus.edu.sg/osh/portal/eServices/ehs360\\_aims.html](https://inetapps.nus.edu.sg/osh/portal/eServices/ehs360_aims.html).

## 12. REFERENCE

NUS Laboratory Ergonomics Manual (NUS/OSHE/M/12)  
 NUS Office Ergonomics Manual (NUS/OSHE/M/11)

## 13. REVISION HISTORY

Date Revised	Version No.	Author	Summary of Revisions
26-04-2016	001	Yeo Soh Bee	
01-10-2016	002	Yeo Soh Bee	Section 11: Revised Accident and Incident Reporting System (AIRS) to Accident and Incident Management System (AIMS)
15-04-2019	003	Yeo Soh Bee	Section 12: Added NUS Office Ergonomics Manual (NUS/OSHE/M/11)
15-04-2022	004	Adeline Chow	Update of approver (HOD): Prof Anantharaman Vathsala Update of OH clinic email contact.