1. Purpose / Objectives

The purpose of these guidelines is to assist the University to comply with the New South Wales Occupational Health and Safety Act (2000) and OHS Regulation (2001) to provide a safe workplace and reduce work-related musculoskeletal disorders by adapting the work to fit the person, instead of expecting the person to adapt to the work.

The University aims to prevent, evaluate and manage work-related musculoskeletal disorders by the following methods:

- Workplace assessments
  An assessment that identifies jobs and workstations that may contain musculoskeletal hazards, the risk factors that pose the hazards, and the causes of the risk factors.

- Hazard prevention and control
  Eliminating or minimising the hazards identified in the workplace assessment by changing the job design, workstation, tools or work environment to fit the worker.

- Injury management
  The effective use of available health-care resources (eg. physiotherapy, medical) to prevent or manage work-related musculoskeletal disorders using an early intervention approach.

- Training and education
  A method to give both staff and supervisors an understanding of the potential risk of injuries, their causes, symptoms, prevention and treatment.
2. Scope

This guideline applies to all staff and students involved in sustained and / repetitive tasks

3. Definitions

3.1 Ergonomics

Ergonomics is the scientific study of human performance at work. Ergonomics considers the physical and mental capabilities of the worker and how he/she interacts with tools, equipment, work methods, tasks and the working environment. Synonyms for ergonomics are: -

- Work biology
- Human engineering
- Human factors
- Biotechnology

3.2 Musculoskeletal disorders

Musculoskeletal disorders are illnesses and injuries that affect one or more parts of the musculoskeletal system and can include: –

- Sprains
- Strains
- Tears
- Degeneration

Symptoms can include: –

- Discomfort
- Pain
- Muscle fatigue
- Swelling
- Inflammation
- Stiffness
- Numbness
- Tingling
- Burning sensations
- Heaviness
- Weakness or clumsiness in the hands (dropping things)

Other common terms for some musculoskeletal disorders are: –

- Repetitive strain injury (RSI)
- Occupational overuse syndrome (OOS)
- Cumulative trauma disorder (CTD)
- Tenosynovitis
- Tendonitis
- Epicondylitis (tennis elbow/golfers elbow)
- Carpal tunnel syndrome
- De Quervain’s disease
- Rotator cuff tendinitis
- Degenerative disc disease
4. Procedure

4.1 Responsibilities

4.1.1 The University

- A safe system of work is developed and implemented in accordance with the NSW Occupational Health & Safety Act 2000 and the OHS Regulation (2001, Ch. 4, part 4.4 Work Premises and Work Environment).
- All staff and students adopt safe work practices when working with ergonomic risks.
- Training, information and advice on ergonomic principles is provided where appropriate.
- Adequate resources are allocated for implementing training in ergonomic principles and provide ergonomic equipment where necessary to assist with preventing injury to staff.

4.1.2 OHS and Workers Compensation Unit

- Providing ergonomic guidelines to prevent and manage musculoskeletal injuries.
- Completing workplace assessments where ergonomic risks have been identified.
- Conduct training on preventing occupational overuse injury.
- Provide an ergonomic website to assist staff and students.

4.1.3 Deans of Faculties, Directors of Research Centres

- Allocating adequate human, financial and physical resources to the Schools and Centres to ensure compliance with the University’s Ergonomics Guidelines.
- Ensuring that ergonomic issues are considered when planning new facilities, new work functions or relocating to a different location.

4.1.4 Head of Schools and Divisional Units

- The effective implementation, promotion and support of the Ergonomics Guidelines in their areas of responsibility. This shall include the identification, assessment and control of ergonomic risks that could result in musculoskeletal injuries.
- Ensuring that staff receive appropriate information, instruction and training in ergonomic principles by competent persons to help minimise the risk of musculoskeletal injuries.
- Ensure that financial provisions are made within the School/Centre budgets for appropriate ergonomic equipment, materials and training.
- Monitoring staff work load and ensure adequate planning of resources to ensure adequate staff available to meet deadlines, especially in peak periods.
4.1.5 Supervisors

- Implementing and maintaining ergonomic principles in accordance with the University’s Ergonomics Guidelines.
- Ensuring that staff under their control are properly trained in preventing occupational overuse principles.
- Ensuring that staff under their control follow safe ergonomic practices.
- Actively practicing and developing positive attitudes towards ergonomic issues.
- Ensuring that staff under their control use the ergonomic equipment and materials provided.
- Considering workplace layout, ergonomics and individual needs when allocating tasks to staff.
- Monitoring staff work load and ensure adequate planning of resources to ensure adequate staff available to meet deadlines, especially in peak periods.
- Consideration when allocating tasks to ensure task rotation and work breaks are taken to avoid sustained or repetitive postures.
- Encouraging early reporting of occupational over use symptoms.

4.1.6 Individuals

- Cooperating with all ergonomic safety instructions of their supervisor.
- Attending Preventing Occupational Overuse training as directed by supervisor and apply principles to their tasks.
- Making proper use of all ergonomic equipment and materials provided.
- Reporting potential ergonomic hazards, problems and symptoms to their supervisor.

4.2 Risk Management

Refer to the UNSW Risk Assessment and Control Procedure OHS329.

Staff at all levels are responsible for developing an understanding of and becoming competent in the implementation of risk management principles and practices in their work areas.

This is a three-phase process.
1. Risk Identification
2. Risk Assessment
3. Risk Control

4.2.1 Risk Identification

Identification of risks associated with ergonomics should be undertaken by:
- Reviewing the duties to identify ergonomic risks (task variation, work load etc)
- Consultation with staff and students
- Direct observation of work practices
- Inspection of the task or work area
- Reviewing workplace injury records, if possible, to identify where and in what jobs occupational overuse injuries have occurred
- Completing self assessment checklist

### 4.2.2 Risk Assessment

Risk assessment should occur:
- After the risk identification process
- Following the report of occupational over symptoms

And should take into account the following risk factors:
- Workplace and workstation layout
- Working posture and position
- Work environment
- Task variation

### 4.2.3 Risk Control Measures

Risk control is the process of eliminating or reducing identified and assessed risk factors. Such measures could include:
- Provision of alternate equipment
- Job re-design
- Provision of training
- Review resource allocation

### 4.3 Safe Work Practices for Repetitive Tasks

The following information can be used as a guideline for correctly adjusting a computer workstation. In addition to this information, the [Workstation Checklist](#) or [Working from Home Checklist](#) are useful tools to complete to ensure appropriate workstation set up.

#### 4.3.1 Job Design

If possible, the job should be designed to allow the employee to liaise with their supervisor regarding the rate of work and the setting of priorities in order to meet deadlines. In jobs where screen based equipment is used intensively, additional unrelated tasks involving dynamic muscle movement should be included wherever possible. This will increase task variety and allow time for muscles to recover from static muscle strain.

#### 4.3.2 Work Breaks

Operating a computer requires the user to adopt a sustained posture and fixed visual focus. Breaks away from the computer are required at regular intervals to relieve muscle fatigue and eyestrain and to restore the level of concentration. The best means of providing breaks is to vary the tasks through job design and by providing a variety of work and autonomy over the order in which tasks are performed.
Where the job does not provide adequate breaks through task variation, it is recommended that short frequent breaks should be taken during
periods of intensive computer use, i.e. 2 – 3 minutes every 20 – 30
minutes. These breaks should involve whole body movement to restore
circulation to relieve muscle fatigue, including the eye muscles. In
addition, pause / stretch exercises should be frequently completed
throughout the day. Back fatigue is relieved by alternating from a sitting
to a standing posture and walking around.

4.3.3. Keyboarding Duration and Deadlines

Work pressure to meet a deadline can lead to employees working
beyond their physical capacity. A total of 4 hours (not including breaks)
of intensive keyboard work per day is regarded as a “safe working level”
(this may be less for individuals with underlying medical conditions or
injuries, and any recommendations from treating medical practitioners
should be followed). This should not be exceeded in order to meet
deadlines or to overcome staff shortages. Forward planning should
allow peak demand times to be predicted and plans to be made for
additional assistance or sharing of the workload.

Operators returning to work from leave should gradually increase their
workload at the computer, so that muscles have time to become work
conditioned.

4.3.4 Task Rotation

Rotating tasks throughout the day can provide breaks from computer
work. Rostering some tasks within a work group can also provide
variety and breaks away from computer use. Each Unit needs to
identify high volume or repetitive tasks and ensure that adequate breaks
and or task variation are incorporated.

4.4 Workstation Set Up

For information on purchasing appropriate ergonomic equipment please
contact the Return to Work Coordinator on extension 53784 or refer to the
UNSW Ergonomics Web Page.

4.4.1 Posture

The user of Screen Based Equipment (computers) must be able to adopt
a comfortable work posture to avoid muscular fatigue and discomfort.
The design of workplace furniture should be easily adjustable to
comfortably accommodate a large range of body sizes and shapes.

In a comfortable working posture at the computer: -
\- the feet are supported on the floor, or a footrest (if knees are at a
greater than 90° angle).
\- the thighs are supported by the chair seat with no pressure caused
by the front edge of the seat under the thighs
- the upper body is upright with the lower back firmly supported by the backrest
- the shoulders are in a relaxed position and are not hunched
- the elbows and upper arms are close to the body
- the forearms are parallel to the ground (or in a downward sloping position), and the wrists are in a neutral position (straight) when utilising the keyboard and mouse
- the neck remains in a neutral position (i.e. not looking upwards or downwards) when viewing the monitor

4.4.2 Chairs
(Please refer to Australian Standard AS 3590.2-1990)

Important aspects of chair design are:-
- Stability (a 5 star base)
- An easily adjustable height range suited to the workstation
- A stable, independently adjustable backrest
- Adequate lumbar support
- Seat base size is appropriate for the leg length of the user
- Freely moving castors when used on carpet or glides for use on a hard floor surface

Armrests are not recommended, as they are likely to interfere with the ability to move the chair close enough to the work surface when using the keyboard.

4.4.3 Desks

Refer to Australian Standard AS 3590.2

- Height adjustable desks are the preferred option to give the user maximum flexibility in adjusting their work posture. The height adjustment mechanism should be safe and easy to operate. The height to the top of the work surface should be between 580 mm and 730 mm above floor level
- If a fixed height desk is provided, the height to the top of the work surface should be between 680 mm and 720 mm above floor level
- The area of the work surface should be large enough to allow the equipment to be positioned as required by the operator and to provide space for any documents or reference materials used
- The minimum work surface area for mixed tasks (keyboard and clerical work) should be 1500 mm x 900 mm and the maximum bench thickness should be 25 mm. (Refer to AS 3590.2 for diagrammatic demonstration)
- The volume of leg space should be a minimum of 800 mm wide x 550 mm deep x 580 mm high
- The viewing distance to work should be between 350 mm and 750 mm
- There should be no sharp edges, protrusions or rough surfaces
- If an adjustable keyboard tray is fitted, it should be large enough to accommodate both a keyboard and a mouse on the same level
4.4.4 Computer Monitors

The location of the computer screen should take into account the visual needs of the user as well as ensuring a comfortable position of the head and neck.

It is recommended that:
- the screen is located at approximately an arm’s length away from the user (when in an upright seated position)
- the screen is located directly in front of the user and raised if required by a monitor raiser to ensure that the neck remains in a neutral position when viewing
- the top of the screen is at approximately eye level and the bottom of the screen can be read without a marked inclination of the head. This usually means the centre of the screen will need to be near shoulder height
- glare and reflections on the screen are eliminated

![Diagram 1](Guideline for computer workstation set up)

4.4.5 Laptop Computers

Laptop computers have the potential to cause major musculoskeletal and visual problems if used for extended periods. Problems can result as the computer screen normally cannot be separated from the keyboard, resulting in excessive (looking downwards) neck flexion during use. Experience has also shown that people with larger hands may find it difficult to use the small keyboards or the in built mouse in laptop computers.

To minimise these problems, when using the laptop for extended periods -
- Utilise a separate keyboard and mouse
- Position the laptop so that the screen is at a comfortable viewing distance (connecting laptop to a standard monitor may be required)
- Laptop should be positioned at an appropriate height to ensure neutral neck positioning (for example using either a monitor arm, monitor raiser or docking station)
4.4.6 Computer Mouse

A well-designed computer mouse should not cause undue pressure on the wrist and forearm muscles. A large bulky mouse may keep the wrist and forearm continuously at an uncomfortable angle. Pressure can be reduced by releasing the mouse at frequent intervals, by selecting a slim-line, low profile mouse and by using the mouse at a comfortable distance from the body. Repeated or sustained use of the mouse may result in muscular fatigue of forearm and upper body muscles. To minimise fatigue when using the mouse: -

- Place the mouse on a mouse mat (this restricts the area of movement for the hand and arm)
- Ensure the wrist remains in a neutral position and so the elbow is positioned close to the side of the body when utilising the mouse
- The mouse pad should be placed as close as possible to the keyboard to avoid arm extension which will impact on shoulder / neck muscles
- The keyboard and mouse should be positioned at the same level. This will minimise shoulder strain required to elevate the shoulder

4.5 Ergonomic Accessories

Well-designed workstation accessories can be used to improve posture and work efficiency of the computer operator. It is recommended that a workplace ergonomic assessment is conducted. Contact your OHS Coordinator to assist with identifying required ergonomic equipment.

A footrest is recommended when keyboard users are unable to firmly position their feet on the ground, or when there is pressure on the undersides of the thighs, when the chair height is appropriately adjusted (so that wrists, elbows and forearms are in a neutral position). Optimal back and pelvis support is achieved when the feet are firmly supported.

Document holders are useful for assisting the neck to remain in a neutral position when viewing documentation whilst using the computer. Ideally, documentation should be positioned between the keyboard and the monitor. If this is not possible then the document holder should be positioned close to the computer screen at eye level.

Monitor stands and monitor arms can be used to raise the monitor to ensure an appropriate height for viewing (when the neck remains in a neutral position). Monitor arms provide additional flexibility in allowing the screen to be placed anywhere (within an arc) over the workstation surface.

Wrist supports – can be utilised to ensure that the wrist remains in a neutral position when utilising the keyboard and mouse. A wrist support should only be used when the wrist is unable to achieve a neutral position.

Headsets – are important for ensuring that the neck remains in a neutral position, and to minimise unnecessary muscle activity in the arms and shoulders when the phone is used for frequent and or extended periods of time.
**Screen filters** are used to reduce visual discomfort caused by the appearance of reflections and glare on the screen. However, they do reduce the brightness and sharpness of screen characters. Before resorting to a filter, identify the source of the reflections and/or glare and endeavour to provide a solution to control the problem. Common solutions are:

- Change the angle or position of the screen
- Ensure appropriate overhead lighting and diffusers
- Install or adjust curtains or blinds to control natural light

### 4.6 Desk Top Layout

Frequently used items should be positioned so that they can be reached within an arm's distance from a seated position, and so that twisting / rotating of the trunk is not required.

### 4.7 Laboratory Ergonomics

Due to the nature of tasks completed in laboratories, researchers and laboratory workers are exposed to the same ergonomic risk factors as those who utilise computers for extended periods.

Laboratory risk factors include:

- Awkward and sustained postures
- High repetition
- Excessive force

Consequently, the general recommendations advised for preventing musculoskeletal disorders when utilising screen based equipment - work breaks, task rotation and posture, are equally important strategies in the laboratory environment. In addition, the following specific recommendations are advised for the following tasks.

**Pipetting**

i) Consideration of the bench height where the task is completed. The height should allow for the shoulders to remain in a relaxed position, and the forearms should either be positioned so that they are parallel to the ground or in a slightly downwards sloping position. Extended periods of neck flexion (looking downwards) should be avoided. Following consideration of the desk height, determine whether completing the task in a standing or sitting position is more appropriate.

ii) Ensure that the wrist remains in a neutral position (i.e. straight, wrist does not bend).

iii) Ensure that the elbows remain close to the body. When the elbows are in a "winged" position, this results in unnecessary muscle activity in the shoulder.

iv) Where possible rotate with other tasks or obtain assistance from another person to avoid sustained or repetitive postures. If this is not possible, ensure regular **stretch / pause breaks** are completed.

v) Ensure materials (vials, samples, instruments etc) are positioned to avoid unnecessary reaching or twisting.
Microscopy
Utilising a microscope for extended periods can result in muscle strain in the neck, lower back, eyes, arms and wrists. To minimise strain when using the microscope:

i) Posture
   - Utilise a height adjustable chair with adequate back support
   - Feet are flat on the floor or supported by footrest
   - Elbows remain close to body
   - Ensure shoulders and wrists remain in neutral positions (ie. avoid looking down, wrists remain straight) when looking through microscope.

ii) Try positioning microscope close to work surface edge. This will assist the operator in assuming and maintaining an upright posture.

iii) The viewing height and angle should be adjusted for operator.

iv) Ensure adequate room under the desk surface to allow for operator to sit close to the microscope without restriction.

v) Where able, rotate with other tasks to avoid sustained or repetitive postures and or complete regular stretch / pause breaks.

vi) Where possible utilise video equipment to display the microscope image.

Microtome and Cryostat Work
i) Lower workstation to ensure arms remain close to body.

ii) Utilise appropriate ergonomic chair

iii) Where able, rotate with other tasks to avoid sustained posture and or complete regular stretch / pause breaks

iv) Use foot operated cryostat if available

4.8 Other Tasks Requiring Repetitive Actions / Sustained Postures

- Workshop tasks, eg repetitive hammering, repetitive lifting
- Grounds tasks, eg pesticide spraying, lawn care, weeding
- Mailroom tasks, eg mail sorting, pigeonholing
- Library tasks, eg shelving, loans, book return discharging

Tasks involving repetitive actions and sustained postures are major contributors to the development of musculoskeletal disorders. Injuries can be minimised by:

- Using automation where possible, eg electronic pipettes, electric staplers, electronic/hydraulic lifting devices, rollers.
- Changing the job design to include tasks that use different muscle groups and provide relief from repetitive actions, static or awkward postures, excessive forceful exertions and mental and muscular fatigue.
- Job rotation should be used to prevent injury by using different muscle groups and preventing muscle fatigue.

Where the task requires a sustained period of repetitive actions or sustained posture, and significant task variation is not possible, then work pauses should be provided. The exact length and frequency of the pauses will depend on the nature of the task. However, it is generally found that frequent short pauses are preferable to infrequent longer pauses. The need for, and the frequency and
duration of work pauses, should be determined by supervisors in consultation with staff, taking into account factors such as organisation of the work, overall work environment, and the physical capability of the worker. If it is determined that work pauses are required, it is recommended that such pauses be provided.

4.9 Environment

4.9.1 Lighting

The basic requirements for adequate lighting are that the work must be easy to see and the light comfortable to the eyes. Illumination is measured in units of LUX – lumens per square metre.

Suitable light levels based on Australian Standard AS 1680 – 1990 Interior Lighting are:

<table>
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<tr>
<td>General background</td>
<td>200</td>
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<tr>
<td>Routine office work (typing, filing)</td>
<td>400</td>
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<tr>
<td>Work with poor contrast (proof reading)</td>
<td>600</td>
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Overhead lighting should be fitted with glare reducing diffusers. The light should fall from the side rather than the front to avoid reflections on the work surface.

Windows should be to the side of the user if possible, not directly behind or in front of the screen.

4.9.2 Noise

The noise level of most screen-based equipment is well below recommended limits. However, noise from printers or conversations may be a source of distraction in some cases and can lead to annoyance and reduced concentration. Where this occurs, it may be necessary to enclose the noise source or to use sound absorbing material within the office area.

4.9.3 Indoor Climate

Maintaining a comfortable climate indoors is essential for both health and comfort of the worker, as well as ensuring optimum work performance. The factors which most affect comfort are temperature, humidity and air movement. The sensation of comfort varies from individual to individual and the aim is to provide a comfortable environment for the maximum number of people in a particular environment.

Thermal comfort can be affected by nearby windows and the placement of air conditioning outlets and/or heating ducts and fans. Cool draughts around the neck or the feet are particularly unpleasant and can cause muscle contraction. The heat emissions from computer equipment and printers should be taken into account. WorkCover recommended temperatures for sedentary work in summer is between 21° and 24°
Celsius. The preferred winter temperature is usually about 2 degrees lower than in summer.

The relative humidity of the air affects the mucous membranes of the eyes, nose, mouth and throat. The optimum range for relative humidity is 40% – 50%. Relative humidity below 30% can cause dryness of the eyes, nose and throat and may also result in a build up of static charges. High relative humidity above 80% can cause fatigue and may give rise to complaints of stuffiness.

### 4.9.4 Ventilation

Ventilation refers to the movement of air and rate of fresh air input. Air movement of less than 0.1 metres per second can lead to stuffy rooms whereas air movement of more than 0.2 metres per second causes draughts to be felt.

The Australian Standard AS 1668.2 – 1991 *Mechanical ventilation for acceptable indoor-air quality* sets out the absolute minimum requirements for fresh air. For each person, a minimum rate of 10 litres per second per person for general office space or 10 litres per second for every 10 square metres of floor space is recommended.

### 4.10 Training

Refer to the OHS webpage for available training.

#### 4.10.1 Training Objectives

Training objectives should generally include:

- The prevention and control of musculoskeletal injuries, in particular those injuries arising from work practices involving repetitive or forceful movement or both, and/or maintenance of constrained or awkward postures.
- The effective implementation of risk identification, assessment and control procedures.
- The promotion and utilisation of safe work procedures, practices and techniques established for the prevention and control of musculoskeletal injuries.

#### 4.10.2 Structure and Content

The structure and content of any ergonomics training program should be tailored to meet the specific needs and learning requirements of the target group, including the specific needs of employees and students from a non-English speaking background.

Face to face training completed by appropriately competent persons from OHS and Workers Compensation will be supplemented by web based resources including a self-assessment checklist.
4.10.3 Target Groups

Training is an integral part of a preventative strategy. The target groups requiring training are:

- Managers and supervisors of staff whose duties may place them at risk of developing musculoskeletal disorders.
- Staff whose duties place them at risk of developing musculoskeletal disorders.
- Staff responsible for purchasing technology and equipment likely to be used in areas where there is a risk of developing musculoskeletal disorders arising from work duties.
- Staff responsible for workplace and environment design.
- New staff or staff newly engaged on a task that presents ergonomic risks.
- Occupational Health & Safety Committee representatives.
- Staff applying to work from home (as per the UNSW Working from Home Policy).

4.10.4 Review and Evaluation

Training should be reviewed regularly to monitor that training objectives are being met.

Training should also be reviewed when there is:

- A change in work practices or restructure of staff’s roles
- A change to workplace layout, task design or organisation
- Introduction of new or modified plant or equipment
- Introduction of mechanical equipment in the workplace

Training should be provided as part of job induction and refresher training should be provided on a regular basis for staff who are:

- Involved in tasks requiring repetitive actions and/or sustained postures
- Returning to work following an extended absence (e.g. from injury, leave)

4.11 Incident Reporting

Should occupational overuse symptoms be experienced (see section 11.2), the following should occur:

- Advise supervisor
- Complete Work Related Illness / Injury Report
- Contact your OHS Coordinator to assist with workstation set-up.
5. Legal & Policy Framework

- Australian Standard 1668.2 -2002: The use of ventilation and airconditioning in buildings - Ventilation design for indoor air contaminant control .
- Australian Standard 1680.2.2 – Interior lighting – Office and screen-based tasks.
- UNSW OHS Policy
- NSW OHS Act 2000

5.1 Associated Documents
- Workstation Checklist
- Working From Home Checklist
- Manual Handling Guidelines

6. Evaluation & History

This guideline will be reviewed in accordance with the OHS Management System Review Procedure.

6.1 Modifications

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<th>Approval</th>
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<td>Senior Manager, Risk Management Unit</td>
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<td>Annette MacManus</td>
<td>Director Human Resources</td>
<td>Entire document</td>
<td>Reformat document, remove reference to RMU, update web links</td>
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<td>2.1</td>
<td>19/11/10</td>
<td>Kate Noble</td>
<td>Director Human Resources</td>
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7. Acknowledgements

- [http://www.cdc.gov/od/ohs/Ergonomics/labergo.htm](http://www.cdc.gov/od/ohs/Ergonomics/labergo.htm)
- [http://www.niehs.nih.gov/about/stewardship/](http://www.niehs.nih.gov/about/stewardship/)