

Position Statement

Subject: **Ergonomics**
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Pathologists often work long hours and the tasks can be physically and mentally demanding. As a result, pathologists may have an increased risk of strain and musculoskeletal pain. The need for well designed work spaces and equipment is vital.

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

NOTE: The terms 'ergonomics' and 'human factors' are used interchangeably.”

Ergonomic requirements differ between individuals. Factors such as height, body shape, arm length, hand size, and visual acuity will influence the suitability of workstation design and equipment.

Poorly designed systems, workstations and equipment can result in muscle fatigue, pain, eye strain and musculoskeletal injuries due to poor task design.

Poorly designed systems of work can, in turn, result in an increased rate of human error, reduced productivity, heightened stress and impaired job satisfaction.

Duties

Persons with a business undertaking, have a duty of care, as part of their work health and safety obligations to provide all persons working under their control with an ergonomically suitable environment.

Workers have a responsibility to work with the duty holder where they believe the system of work, equipment, task design or work environment is a work, health and safety risk. It is important that Workers raise concerns, as this can assist in the identification and the effective control of potential hazards or injury risks.

Resources

There are numerous resources available to assist with Ergonomics and Work Health and Safety. These resources address general ergonomics and work design including systems of work, manual tasks, overuse injuries, equipment design, use and work posture. Professional Assistance can also be obtained from the Human Factors and Ergonomic Society of Australia (HFESA).

Some of these resources available include:

- Australian Standard AS 4801:2001 Occupational Health and Safety Management Systems Specification with Guidance for Use
- ISO 45001:2018 Occupational Health and Safety Management Systems - Requirements with Guidance for Use
- Australian Standards Handbook HB 59-1994 Ergonomics - The Human Factor - A Practical Approach to Work Systems Design
- AS/NZS 4442:2018 Office desks, office workstation and tables intended to be used as office desks-mechanical, dimensional and general requirements and test methods.
- AS/NZS 4688.1:2000 Australian New Zealand Standard Furniture - Fixed Height Chairs Part 1 Ergonomic and General Requirements
- AS/NZS 4438:1997 *Reconfirmed 2016* - Height Adjustable Swivel Chairs
- The Code of Practice for the Prevention of Occupational Overuse Syndrome - NOHSC:(1996)
- National Occupational Health and Safety Commission - Ergonomic Principles and Checklists for the selection of Office Furniture and Equipment (November 1991)
- WorkSafe Victoria (January 2006) - Office Wise - A Guide to Health and Safety in the Office
- Queensland Government 2012 - Ergonomic Guide to Computer Based Workstations.
- Safe Work Australia - Hazardous Manual Tasks Code of Practice available from December 2011
- Safe Work Australia Code of Practice - Managing the Work Environment and Facilities available from 2011

WORKSTATION DESIGN

Workstation design is addressed in Section 2.5, page 11 of Managing the Work Environment and Facilities Code of Practice (2011), where it states:

“It may be necessary to determine whether the work is best carried out in a seated or standing position (or a combination of the two). Ideally, there should be a mix of seated and standing tasks - neither prolonged sitting nor standing is desirable. Workers should be consulted when carrying out this assessment.

Workstations should be designed so that workers can carry out their work in a comfortable, upright position with shoulders relaxed and upper arms close to the body. Different workers require different working heights so it is best to provide adjustable workstations to make the work height suitable for the person and the task.

Many tasks are best done in a seated position, for example screen-based work, fine component assembly or tasks involving the frequent use of foot controls. For tasks undertaken in a seated position, workers should be provided with seating that:

- *provides good body support, especially for the lower back*
- *provides foot support, preferably with both feet flat on the floor, otherwise a footrest should be provided*
- *allows adequate space for leg clearance and freedom of movement.*

Seating

Chairs should be fully adjustable to accommodate different sized workers (with seat height, back rest height and back rest tilt adjustments) and should not tip or slip - a five-point base is the most stable. Castors should be used on carpet and glides or braked castors on hard surfaces.

Some standing tasks may be carried out using a sit/stand chair, for example some process or inspection work. This means that workers can support themselves on the chair while still carrying out the standing task.

If the job is primarily carried out while standing, but the nature of the work allows workers to sit from time to time, appropriate seating should be provided. This allows workers to vary their position between sitting and standing.”

Lighting

Lighting is addressed in Section 2.6,

“Sufficient lighting must be provided, whether it is from a natural or artificial source, to allow safe movement around the workplace and to allow workers to perform their job without having to adopt awkward postures or strain their eyes to see.

The following factors should be taken into account:

- *the nature of the work activity*
- *the nature of hazards and risks in the workplace*
- *the work environment*
- *illumination levels, including both natural and artificial light*
- *the transition of natural light over the day*
- *glare*
- *contrast*
- *reflections.*

Additional lighting may be needed for some types of work or at places of particular risk (such as crossing points on traffic routes). Table 1 provides guidance on the recommended illumination levels for various types of tasks, activities or interiors.

MICROSCOPE WORKSTATIONS (Kodak 2004)¹

Typical laboratory workstations are not conducive to the prolonged use of microscopes. Several studies of microscope use have reported back, neck, forearm, wrist and visual discomfort or pain among user (Fisher & Wick 1991; Helander, Grossmith & Prabhu 1991; James 1995; Caskey 1999; Greczy, Kofler & Gschwendtner 1999).

“When using a microscope, the position of the eyes and hands are fixed by the location of the eyepiece and the control. The distance between the eyepiece and hand controls of the microscope is usually several inches less than the anthropometric difference at the position of the eyes (with the head flexed at 20-30°) and the hands at a comfortable position level with the eyebrows (James 1995).

Therefore, it should not be surprising that the poor design of the microscope workstation, as well as the microscope themselves, can provoke the following problems:

- *An extremely flexed neck and forward head if the eyepiece is too low or an over-stretched neck if the microscope is high.*
- *The body leaning forward to reach the microscope.*
- *A hunched upper body if the microscope is too low.*
- *The arms held without support or elbows leaning against the sharp edge of the table.*
- *Bent wrist to use the controls.*
- *The legs and thighs being cramped if there is insufficient clearance below the work surface, as is often the case at laboratory benches because of the aprons or a drawer or cupboard in the sitting well.*
- *Visual complaints.*

Suggested controls to improve postures include:

- *Ensuring that the workstation conforms or general seated workstation guidelines.*
- *Modify the bench or table with an optimal extension out towards the user so that the microscope can be brought as close as possible.*
- *Provide a height-adjustable chair with an adjustable back support.*
- *Provide a footrest under the workstation.*
- *Provide a padded forearm ramp or articulating armrests so that the arms are supported as they reach up for the controls.*
- *Modify the microscope by using alternative component parts where available, such as an eyepiece that has an adjustable angle in the range of 0-30°.*
- *A platform that easily adjusts vertically and horizontally.*
- *An expandable piece between the objective and eyepiece (if this is not available, spaces can sometimes be used).*
- *An adjustable interpupillary distance (IPD) of a range of 46-78mm, preferably scaled on the eyepiece in millimetre increments. It should be convenient to lock in the preferred distance. In addition, with such an IPD range, the convergence angle of the microscope should be 3-10°.*

¹ Eastman Kodak Company (2004) *Ergonomic Design for People at Work*. John Wylie & Sons.

GENERAL PRINCIPLES FOR SEATED POSTURES²

Regardless of the tasks being undertaken, individuals should be seated comfortably whilst working.

- *It is recommended that there is variation between sitting and standing every 20 minutes. 20 minutes of seated postures and 10 minutes of dynamic standing, walking tasks is recommended.*
- *The work surface area should be adequate for the tasks being performed and large enough to accommodate the equipment, with enough room for writing and resting of the hands and forearms as required (AS 3590.2-1990).*
- *The workstation should be large enough to permit items used regularly to be within easy reach of the operator from the normal operating position (AS 3590.2-1990).*
- *Sufficient space should be provided under the work surface to allow free leg movement without obstruction.*
- *All seating should be height-adjustable.*
- *The usable seat depth of the chair shall be adjustable.*
- *The backrest shall be adjustable in height and in forward and rearward directions (AS 3590.2-1990).*
- *All chairs should have a five-leg star base.*
- *Feet should be supported on the floor or a footrest provided.*
- *Work surface height should be adjusted where possible according to the task (i.e. sitting, standing or fine motor tasks).*
- *Writing / keyboard tasks should be done with elbows flexed (90 degrees or greater); fine manipulative tasks and those in which visual acuity is important should be between shoulder and elbow height; and tasks requiring force should be between elbow and hip height.*
- *Microscopes should be raised to an appropriate height to minimise the need for neck flexion for extended periods of time.*
- *Microscope adjustment controls should be easy to use so that minimal muscle effort is required when viewing slides and arms should be supported when making fine adjustments to avoid excessive muscle effort to maintain posture.*
- *Staff should avoid awkward and sustained postures – they should sit directly in front of the equipment they are using without twisting or stretching to reach items.*
- *Staff should have a telephone headset or earpiece for frequent or extended telephone calls to prevent “propping” telephone handset between shoulder and ear.*

To ensure that the above recommendations are implemented:

- *Adjustability should be designed and supplied wherever possible*
 - *Height adjustable desks, footrests provided, enough leg room to sit comfortably and change foot and leg position as desired.*
 - *Chairs - adjustment controls for backrest tilt, backrest or lumbar support height and height adjustable seat. Seat pan tilt is optional but should be independent of backrest tilt. Armrests (if present) should not protrude into work area, nor prevent user from bringing chair close to desk.*
 - *Fully adjustable microscopes: height, ocular height, angle, extending supports.*

² Eastman Kodak Company (2004) *Ergonomic Design for People at Work*. John Wylie & Sons

- *Software applications should be fully compatible and integrated with pathology software – this includes speech recognition software to reduce the amount of typing.*
- *Staff should take regular breaks to minimise risk of pain, symptoms and/or injury*
 - *in general, 10 minutes break every half hour or rotation to another task.*
 - *complete stretching exercises regularly throughout the day*
 - *rest eyes by changing the focal distance regularly.*
- *Staff should be consulted in the design and set-up of their work areas (so that individual needs can be considered) and trained in the use of all ergonomic equipment.*

Further information and assistance is available from the HFESA <https://www.ergonomics.org.au>