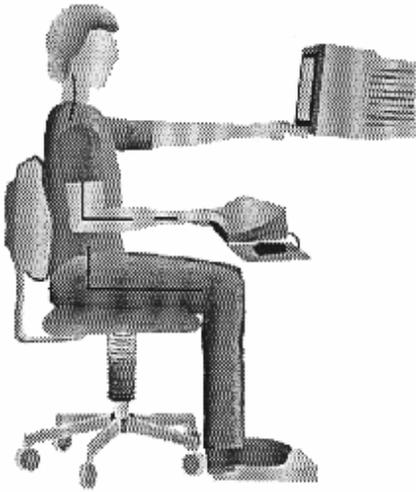# PERSONAL COMPUTER WORKSTATION CHECKLIST
SafetyNet #17

- **Use this checklist to assess your own computer workstation.**

- **Refer to the diagram for an example of proper positioning at the computer.**

- **If you answer "NO" to any items, it may indicate a need for workstation modifications.**

- **To check on videos, or classes about ergonomics, go to the EH&S website at http://ehs.ucdavis.edu/ergo.**

- **If you have questions or need further information, contact Environmental Health & Safety at 530-752-1493.**

Chair Adjustment

- Is your chair height adjustable?

- Does your chair support your lower back?

- Is there room between the front edge of the chair seat and the back of your knees?

- Can you easily reach your work without interference from the arms of your chair?

- When using the keyboard or mouse, are you able to keep your arms in a comfortable position with elbows in at your sides?

- Do your feet rest flat on the floor or footrest?

- Are your knees bent at approximately 90-110 degree angles?

Sitting with your feet flat on the floor (or supported by a footrest) will help support your spine. Having your thighs parallel to the seat with knees bent at approximately a 90-110 degree angle, and having adequate clearance behind your knees, will keep the chair from interfering with the blood circulation to your legs.

If the back of your chair is adjustable, raise or lower it so that the contour of the chair provides maximum lumbar (lower back) support. If possible, adjust the tilt of the backrest to support your body in an upright position. A slight angle, either forward or back, is also acceptable. Adjust the chair according to what is most comfortable for you.

If your chair has arms, they should allow you to get close to your work without getting in the way. If you are typing, they should be at a height where they barely contact your elbows when your arms are resting comfortably at your side. Chair arms should not force you to elevate your shoulders or wing your arms to the side.

Work Surface/Keyboard Adjustment

- With your chair adjusted properly, is your keyboard at approximately elbow level?

- Are your arms in at your sides rather than stretched out in front of you?

- Are your shoulders relaxed and not elevated when you work at your work surface?

- When using the computer, is there approximately a 90-110 degree angle between your forearms and upper arms?

- When using the computer, are your wrists in line with your forearms and not bent upwards, downwards, or to one side or the other?

- Is there at least 2 inches of clearance between the bottom of your work surface and the top of your thighs?

Ideally, with your arms resting comfortably at your sides, the bottom of your elbow should be at the same height as the surface supporting your keyboard. To easily check this, turn sideways to your keyboard. If your work surface is too high and cannot be adjusted, raise the chair to bring your elbows level with the keyboard and support your feet with a footrest if necessary. If your work surface is adjustable, start by adjusting your chair as described in the first section. Once the chair is adjusted, then adjust the work surface.

Monitor Adjustment

- Is your monitor aligned in front of your keyboard rather than off to the side?

- Is the viewing distance to your computer monitor at least 18-30 inches (at arm's length)?

- Is the top of the computer screen at or just below eye level?

- Is your computer monitor protected from excess glare?

- If you wear bifocals or trifocals, are you able to look at the monitor without tilting your head?

Position your monitor so it is aligned in front or nearly in front of your keyboard to allow your neck to remain straight when viewing the monitor. Raise or lower your computer monitor so that the top of the screen is at or just below eye level. You may need to unstack the monitor from the CPU to lower the monitor to the correct height or place a book between the monitor and CPU to raise it to the correct height. People who wear bifocals or trifocals often end up tilting their heads back to read through the lower portion of their glasses. Lowering the computer monitor by placing it directly on the desk surface typically helps. Bifocal users may want to discuss with their eye doctor the possibility of obtaining glasses specifically designed for computer use.

Workstation Accessory Adjustments

- Are your input devices (mouse, trackball, digitizing tablet) at the same level and next to your keyboard?

- Are your primary work materials located in front of you?

- Are your most frequently accessed items (phone, manuals, etc.) easy to reach?

- Do you have a document or copyholder to hold reference material?

- Are you able to keep your arms from resting on any sharp, square edges of your work surface?

- If a large percentage of your time involves using a phone, do you use a phone headset?

Computer input devices such as a mouse or trackball should be located at the same level and next to the keyboard to avoid reaching. This can sometimes be a problem if using a keyboard tray that is not wide enough to accommodate the keyboard and mouse. Modification or replacement of the keyboard tray may be necessary.

As you change tasks, remember to move primary materials in front of you. If you must frequently look at reference materials as you type, you should consider a document holder to allow your head to remain in a more upright position. Position the document holder at the same height and distance as your monitor. If doing a lot of reading or writing on the desk, inclining the material by placing it on a 3-ring binder notebook helps reduce the need to bend the neck forward.

The wrists should remain straight when typing. If you have poor wrist habits, a padded wrist rest can help support your wrists in a straight position. Height of the wrist rest should not exceed the height of the space bar on the keyboard. Avoid wrist rests that are wider than 3 inches since this results in the need to reach further for the keyboard.

When talking on the phone, it is not good for the neck to cradle the phone between your ear and shoulder. For jobs with a high volume of phone calls, headsets are recommended since they allow you to maintain the head in an upright position when talking on the phone.

Work Habits

- When using the computer, do you have a light touch on the keys?

- When using the keyboard or mouse, do your fingers, forearms and shoulders remain relaxed?

- When using the mouse, do you move your arm from your shoulder instead of reaching excessively with your wrist or fingers?

- Do you take short and frequent micro breaks throughout the day to reduce fatigue?

- Do you frequently change body positions while working?

- Do you provide your eyes with vision breaks every hour?

- Do you work fairly regular hours without a lot of overtime?

- Are you able to meet deadlines without excessive stress?

- Are you comfortable and free of pain while working?

When typing, it is important to use a light touch on the computer keys. Sometimes, slowing your typing speed just 5-10% helps you use a lighter touch and reduces tension in the fingers, forearms, and shoulders. During mouse use, hold the mouse lightly. Movement of the mouse should occur from the shoulder instead of only at the wrist. When not actively using the mouse, ease your grip on the mouse to let your hand relax.

Periodic breaks help alleviate fatigue and strain to your eyes and upper body. Taking a break does not mean that you have to stop working. Rather, it allows you to integrate other activities such as making phone calls, making copies or talking with a co-worker. Changing positions periodically helps maintain circulation and prevents putting pressure on any one area of the body for an extended period of time.

Working overtime, or working under stress to meet deadlines can add to tension or discomfort. In addition to taking breaks and frequently changing positions, you should pay attention to how your body responds to discomfort. Discomfort, which goes away overnight, can be a sign of fatigue. Discomfort that is continuous may build to a more serious problem. If you experience lasting discomfort, please discuss this with your supervisor or contact Employee Health Services, 530-752-2330 for medical advice. Aches and pains that are addressed early, typically resolve quickly. Ignoring pain prolongs and may worsen the problem.

Finally, develop good habits away from work. While you may not be able to adjust all of the work surfaces at home, you may be able to make minor adjustments that are significant to your body. Good posture and good work habits are just as important away from work, whether you are using your home computer, doing chores around the house or are involved in special projects or hobbies.

For further information refer to the workbook, "Easy Ergonomics for Desktop Computer Users", and the video, "Ergonomics: Setting Up Your Computer Workstation" available on line at: http://ehs.ucdavis.edu/ftpd/ergo/ComputerErgo.pdf and http://ehs.ucdavis.edu/ergo/ergo_links.cfm.

For additional information, contact your EH&S Safety Advisor, EH&S at 530-752-1493 or ehsdesk@ucdavis.edu.

CONTROLLING LABORATORY ERGONOMIC RISK FACTORS
SafetyNet #27

Many ergonomic risk factors are present in the laboratory, including awkward posture, high repetition, excessive force, contact stresses, and vibration. By learning how to control laboratory ergonomic risk factors, you can improve employee comfort, productivity, and job satisfaction while lowering chances for occupational injuries.

Awkward postures take the body out of neutral positions and can result in increased stress to muscles, tendons, and nerves. For example, the neutral position for the wrist is when the wrist is straight. Working with the wrist in a forward bent position results in compression or crimping of tendons on the palm side of the wrist and tension of tendons on the back of the wrist. This awkward position restricts the normal ability of the tendons to glide during the work activity and may result in injury.

High repetition can result in injury if the repetition exceeds the body's capacity. Typically, given time, employees accommodate to given levels of repetition. Problems arise when there are dramatic increases in repetition, so great that the body cannot accommodate.   While it is important to reduce repetitions whenever possible, it is also important to listen to the body. Symptoms are a signal that you may be exceeding your limits.

Forces vary with equipment type, design, and state of repair. Recognize that when applying force to an object, forces are transferred through your body. For example when activating a pipetter, forces are transferred to your finger or thumb. Forces transferred to your body are affected by not only the amount of force, but also the distance through which a force is applied. Choosing equipment that requires less force to activate and requires a shorter activation distance can reduce forces transferred to your body. Ensuring that equipment is in good working order helps reduce the overall forces to the body.

The amount of force your body can accept without injury varies with the individual. It is also dependent on the size of the joint and the size of ligaments and muscles surrounding the joint. In general, it is best to position yourself and/or use tools which help transfer forces to larger joints, e.g. using the larger shoulder instead of the smaller wrist.

Contact Stresses occur when a force is concentrated to a small area, also known as pressure. Contact stress occurs when resting your forearm against the sharp edge of a hood. In this case, highly concentrated forces can disrupt the ability of the tendons to move within the forearm and cause inflammation of the tendon. If resting on a sharp edge is necessary, pad the edge to distribute forces. When grasping hand-held equipment, contact stress occurs in the hand and this stress can affect structures of the hand. It is important to ensure hand-held equipment fits your hand well. Ensure that hand-held equipment does not result in pressure at the base of the palm of the hand since the pressure can affect the median nerve. If necessary, padding can be added to the equipment or you can wear a padded glove to reduce pressure.

Vibrations can be transferred to the body when holding an object on some types of oscillating equipment. For example, vibration to the hand occurs when holding tubes by hand onto a vortex mixer. In this case, using a vortex mixer rack instead of holding the tubes by hand can eliminate vibration. In other cases

where it is not possible to eliminate vibration, padding the hand can reduce the amount of vibration transferred to the body.

The following information lists ways to reduce ergonomic risk factors for several common laboratory activities: pipetting, handling test tubes, and microscope use.

Pipetting

To Control Awkward Postures:

- Work with wrists in straight, neutral positions - may need to incline sample holder or solution flask.

- Reduce reaching by

    - Using short pipettes.
    - Using low profile waste receptacles for used tips.
    - Using low profile solution containers.

- Keep items as close as possible.

- Work with elbows as close to sides as possible.

- Ensure proper lower back and thigh support from chair and that feet are supported.

- Ensure items are positioned to minimize twisting of the neck and torso.

To Control High Repetition:

- Automate pipetting tasks.

- Use multi-pipetters whenever practical.

- Share workload between right and left sides.

- Vary pipetter types having different activation motions, e.g. thumb-controlled vs. finger-controlled.

- Take adequate breaks from pipetting activity-even short several second "micro-breaks" help.

- Rotate pipetting among several employees.

- Evaluate work processes to spread pipetting throughout the day.

- Add personnel for peak periods.

To Control Excessive Force:

- Choose pipetters that require less finger or thumb motion to activate.

- Choose pipetters that require less force to activate.

- Use only the force necessary to activate.

To Control Contact Stresses:

- Choose pipetters that best fit your hand.

- Do not rest forearms on sharp work surface edges; pad edge or forearm if necessary.

Handling Test Tubes

To Control Awkward Postures:

- If seated, ensure proper lower back and thigh support from chair and ensure feet are supported.

- If standing, ensure the work surface is at the proper height to reduce the need to reach upward or bend forward. Upside down containers can be used to create higher work surfaces.

- Arrange test tube racks to minimize reaching and twisting.

- Work with elbows close to sides.

- Maintain straight wrist positions. This may require inclining test tube racks.

To Control High Repetition:

- Automate processes when possible.

- Share workload between right and left sides.

- Take adequate breaks from handling activity-even short several second "micro-breaks" help.

- Rotate handling among several employees.

- Evaluate work processes to reduce steps requiring manual handling.

- Add personnel for peak periods.

To Control Excessive Forces:

- Automate test tube opening when possible.

- Use pinch (thumb working with index finger) for precision activities that require minimal force.

- Use full hand grip for activities that require greater force.

- Use cap removers that change handling from pinch to full hand grip.

- Request that samples be received in test tubes that allow improved ergonomics.

- Explore other sample mediums.

To Control Contact Stresses:

- Use two hands to open test tube samples.

- Do not rest forearms on a sharp edge of the work surface; pad edge or forearm or create a forearm rest pad.

To Control Vibration:

- Use vortex mixer rack instead of holding tubes by hand on vortex mixer.

Microscope Use

To Control Awkward Postures:

- Ensure proper lower back and thigh support from chair and that feet are supported.

- Ensure adequate thigh clearance under laboratory bench; often low-hanging false fronts need to be removed.

- Raise, incline, and move microscope as close as needed to ensure upright head position.

- Work with elbows close to sides.

- Work with wrists in straight, neutral positions.

- Choose microscope eyepieces that allow improved head and neck posture.

To Control High Repetition:

- Take adequate breaks - even short several second "micro-breaks" help.

- Rotate microscope work between several employees.

- Evaluate work processes to spread microscope work throughout the day.

- Add personnel for peak periods.

To Control Contact Stresses:

- Do not rest forearms on sharp work surface edges; pad edge or forearm or create a forearm rest pad.

To Control Eye Fatigue:

- Keep scopes clean.

- Ensure illuminators are in alignment and light is even, and of proper intensity.

- Ensure optical components are in proper repair.

- Take frequent short breaks to rest your eyes; focus far away or shut eyes to change eye focal length.

For additional information, contact your EH&S Safety Advisor, EH&S at 530-752-1493 or ehsdesk@ucdavis.edu.

SafetyNet #29 - Back Belts

safety net

UC DAVIS ENVIRONMENTAL HEALTH AND SAFETY • 2-1493

What Are They?

Back belts are wide belts that encircle the abdomen and lower back. They are usually made of elastic material and can be cinched tightly around the waist, like a girdle, when one is ready to lift something heavy. They often have suspenders that hold them in place when they are not cinched tightly. They have become popular with workers in jobs that require heavy lifting; for example, warehouse workers or longshoremen, baggage handlers, and stocking clerks.

Claims for Back Belts

Proponents of back belts claim that they prevent back injuries by various means, including reducing internal forces on the spine during lifting, increasing intra-abdominal pressure which counters the forces on the spine, stiffening the spine which decreases forces on the spine, restricting bending range of motion to prevent overextending, and reminding the wearer to lift carefully. They claim that back belts have reduced injuries in the workplace.

Scientific Support

Unfortunately, none of the above claims has been conclusively proven to date, according to the National Institute for Occupational Safety and Health (NIOSH), which has continued to review the scientific literature on the effects of back belts. NIOSH also has concerns that use of back belts can lead workers to lift more than they should because of a sense of security, putting them at greater risk of injury.

Because of the inconsistent and unproven effects of back belts, NIOSH does not recommend the use of back belts to prevent injuries while lifting. Instead, they recommend that employers implement an ergonomics program that reviews the work environment and work tasks to identify the hazards of lifting. Training workers in identifying lifting hazards and using safe lifting techniques and methods is the most effective way to reduce lifting injuries.

UC Davis Position:

EH&S and Occupational Health Services concur with NIOSH and do not support the use of back belts nor consider back belts to be personal protective equipment for the following reasons:

- **Back belts have not** been shown to protect employees from back injuries.
- **They do not** protect people when using improper lifting methods.
- **They cannot** replace the necessary physical conditioning needed for the job.
- **They will not** provide support for lifting loads beyond a person's normal capabilities.

Recommendations for Supervisors:

If an employee feels a back belt is needed to safely perform the job,

- Evaluate the work area and method to see if changes can be made to reduce loads to the back. Consult EH&S, 530-752-1493, if assistance is needed.

- Provide employees training in back injury prevention. EH&S offers training classes, literature, and videos on back injury prevention.
- Have the employee discuss medical reasons for needing a back belt, with an Occupational Health Services Physician (530-752-2330).

If you decide to wear a back belt at work or at home, it is very important that you understand that:

- You should always consult your health care provider before wearing a back belt if you are receiving medical care for back symptoms.
- There is evidence of adverse health effects from wearing a tight back belt for prolonged periods. Tighten the belt only for short periods.
- Long-term use of a back belt may increase your risk of back injury when you stop wearing the belt.
- You should always continue to use safe lifting techniques while wearing a back belt.

For further information about safe lifting techniques, back conditioning or back belts, contact Occupational Health Services (530-752-6051), EH&S at 530-752-1493 or ehsdesk@ucdavis.edu.

Reviewed/Revised. 09/2011
TV

WHAT YOU SHOULD KNOW TO PROTECT YOUR WRISTS AND HANDS FROM REPETITIVE MOTION INJURY
SafetyNet #41

The Potential for Injury

Any combination of the following factors can lead to the over use of some part of your body. Repetitive tasks, awkward or fixed postures and excess stress without adequate recovery time can lead to repetitive motion injury.

Structures of the Wrist

- ▪ Bony Structure: Eight small bones called carpal bones make up the bony structure of the wrist (Figure 1). The bones are aligned in two rows and form the bottom and sides of the carpal tunnel (Figure 2).
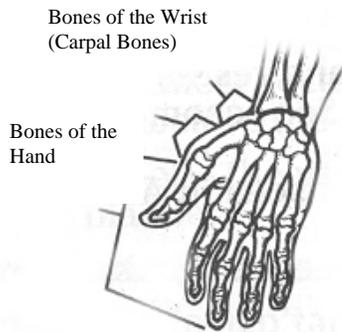
Bones of the Wrist
(Carpal Bones)

Bones of the Hand

Carpal bones

Carpal tunnel

Tendons

Median nerve

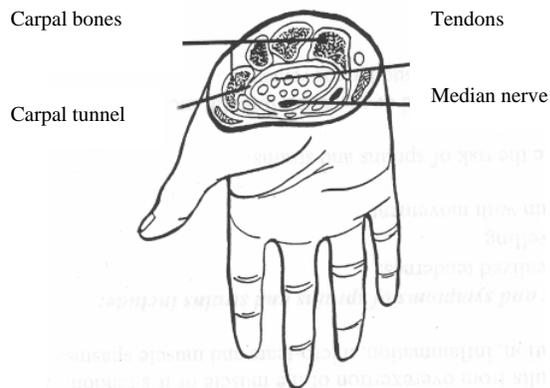Figure 1   Figure 2

- • Ligament: A thin, but very strong band of connective tissue called a ligament covers the top of the carpal tunnel (Figure 2, 3). A complex network of smaller ligaments holds each carpal bone to the next.

- • Carpal Tunnel: A narrow passage between the forearm and hand at the base of the palm through which nerves and tendons pass is called the carpal tunnel.

- • Nerve and Blood Supply: Part of the nerve and blood supply to the hand also passes through the carpal tunnel (Figure 2).

- • Muscles/Tendons: Nine tendons also run through the tunnel connecting the muscles of the forearm to the bones of the wrist and hand (Figure 3). These tendons bend your fingers and thumb.
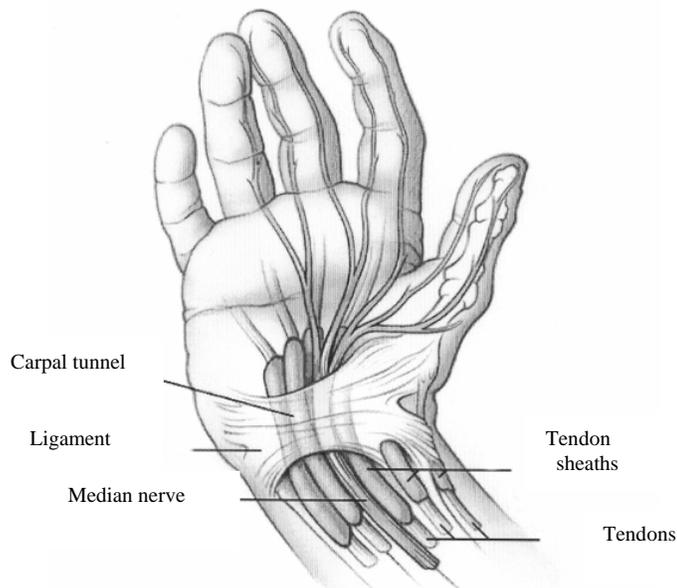
Figure 3

- Lubricating membrane: The tendons are covered with a lubricating membrane called synovium which may enlarge and swell under some circumstances.

Wrist Position

Studies have shown that pressure within the carpal tunnel depends on wrist position (Figure 4). Pressure is relatively minimal when the wrist is straight or in neutral position. Pressure dramatically increases with positions of wrist flexion (bent forward) and extension (bent backwards). Positions of wrist flexion and extension also cause increased stress to the joints between the carpal bones and increased tension to the tendons crossing the wrist.

Figure 4

The Body's Reaction to Stress

Stress is needed to maintain tissue strength (Figure 5). When the body is stressed, tissue damage occurs as a natural process. If adequate recovery time is allowed before the tissues are again stressed, the body tissues rebuild themselves to a stronger level. However, if recovery time is inadequate, symptoms can result. Adequate recovery time will then be needed to again enter the cycle. Any increase in stress to the tissues above the level to which the tissues are accustomed, will begin the cycle. New activities or an increase in the intensity of an activity, to which the body is accustomed, would each result in an increase in stress to the tissues.
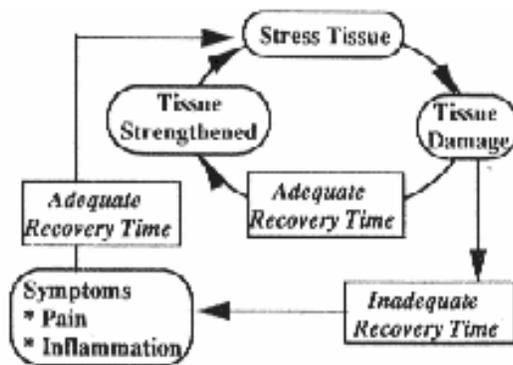
Figure 5

Types of Injury and Methods of Prevention

- Wrist Joint Sprain:

  The wrist joints can be sprained if relatively large forces are applied to the wrist when the wrist is in an awkward position, typically when it is extended. Examples include: 1) lifting a heavy binder with one hand during which the wrist is forced into extension to balance the weight of the book; 2) placing full body weight on the hand with the wrist extended when stapling; 3) pushing against an object with the wrist extended.

  Prevention:

  Avoid large forces to the wrist, especially when the wrist is extended. Whenever possible, try to keep the wrists straight during activity. Use two hands to lift relatively heavy objects such as full binders. Use of two hands helps distribute the load and results in increased control of wrist position.

- Tendonitis/Tenosynovitis:

  Tendonitis is inflammation of a tendon. Tenosynovitis is inflammation of a tendon sheath. Both can occur if the tendon is used excessively, especially when the wrist is in an awkward position. Initially, irritation of a tendon occurs over a localized area. If the irritation continues, inflammation of the tendon can spread along the tendon sheaths, resulting in symptoms into the forearm and/or hand.

  Prevention:

  Avoid excessive wrist flexion or extension during activity. Avoid rapid changes in workload or activity. Remember that the body will adapt to a given workload if it is given adequate time to adapt. When beginning a new activity, limit the amount of new activity for a given session. Try to vary activities as much as possible to alter the type of stresses. Realize that the body can become de-conditioned during an extended leave of absence such as a long vacation, sick leave, or maternity leave. Upon return, increase activity gradually.

- Carpal Tunnel Syndrome:

  Carpal Tunnel Syndrome is diagnosed when compression within the carpal tunnel is sufficient to cause damage to the median nerve. Typical symptoms of Carpal Tunnel Syndrome include pain in the front of the wrist and hand, tingling and numbness in the thumb and first two fingers, and/or loss of strength and coordination of the hand. It is possible to have symptoms that mimic Carpal Tunnel Syndrome if inflammation within the carpal tunnel is sufficient to compromise the space within the carpal tunnel. Typically, carpal tunnel-type symptoms resulting from injury to the wrist (e.g. wrist sprain or tendonitis) resolve with treatment of the injury and do not result in Carpal Tunnel Syndrome.

Prevention:

Take frequent, regular wrist breaks. Avoid resting your wrist on the work surface or wrist when mousing or keying. Reduce the repetition and force of gripping and pinching activities. Resolve wrist sprains, tendonitis or tenosynovitis quickly through proper care. Smoking has been identified as a risk factor for Carpal Tunnel Syndrome. Assess your wrist position and posture during activity. Avoid excessive wrist flexion or extension during activity and avoid wrist flexion at night.

Steps to Take if Symptoms Arise

If symptoms are severe, seek medical advice immediately. Often symptoms come on gradually but even minor symptoms should not be ignored. Early recognition of a problem and following steps 1-6 below can prevent symptoms from getting worse and will dramatically shorten treatment time.

1. Assess your activity level and make adjustments as needed. Have you increased your activity too quickly? Have you added a new activity? Back off on activities that aggravate the symptoms.

2. Assess your wrist position during activity and make adjustments as needed. Look at activities at work and at home since it is important to consider the overall stress to the body.

3. During the initial phase of symptoms, you can apply ice and take an anti-inflammatory such as Motrin or Ibuprofen to control inflammation.

4. If symptoms last more than 3-4 days, inform your supervisor and seek medical attention. Employee Health Services will provide evaluation for work related problems.

5. If you have specific questions regarding your workstation, contact EH&S at 530-752-1493.

6. For problems due to keyboard use, consult SafetyNet #17, "Personal Computer Workstation Checklist", and SafetyNet #96 "Keyboard and Mouse Use" or the workbook "Easy Ergonomics for Desktop Computer Users". For problems due to pipetting, consult SafetyNet #27, "Controlling Laboratory Ergonomic Risk Factors". The SafetyNets and workbook are available on line at http://ehs.ucdavis.edu/ergo/index.cfm.

For additional information, contact your EH&S Safety Advisor, EH&S at 530-752-1493 or ehsdesk@ucdavis.edu.

LIFTING
SafetyNet #46

This document identifies factors that affect your back when lifting and lowering. By controlling the factors, you can reduce stress to your back when lifting and lowering to help prevent injury both at work and at home.

Object Weight

The heavier the weight of the object, the greater the stress will be to your back when lifting. If possible, reduce the weight of heavy loads prior to moving them. This can often be accomplished by splitting the load in half. Sometimes the weight of the load cannot be reduced. If the load is too heavy for you, either get help or use a mechanical lifting device.

Distance

The further the object is from your body, the greater the stress will be to your back when lifting. Position the object as close as possible to your body before you begin the lift. This may require bringing the object to the edge of the shelf or pallet in preparation for the lift. Do not reach over other objects! If other objects are in the way, either move them out of the way or move to a position where you are able to get close to the object you are lifting. Try to store objects that are moved frequently in positions that allow you to get close to the objects when lifting.

Height

Lifting the object from the ground is more stressful than lifting the same object from several inches off the ground. When possible, store objects on platforms (i.e., shelves or pallets) that raise objects off the ground. Starting positions that are at a level between the knee and waist are the least stressful to the back.

Acceleration

The faster you accelerate an object when lifting, the greater the stress will be to your back. Always lift with controlled speed to reduce stress to your back. If the object is so heavy that you have to jerk the object to lift it, it is too heavy and you should either get help or use a mechanical lifting device. Also, the faster you decelerate an object immediately before setting it down, the greater the stress will be to your back. Always lower objects with controlled speed.

Stance

A stance where the feet are too close together can increase stress to the back if something unexpected happens (i.e., the load shifts, someone bumps into you, your foot slips). Your initial reaction to the unexpected is either to prevent dropping the object you are lifting or to prevent yourself from falling. In recovering your balance, you may twist your back or overexert your muscles. This can be prevented by being prepared for the unexpected through use of a wide stable stance. Your feet should be about shoulder width apart to give you side-to-side stability and staggered to give you forward and backward

stability. Also, with this stance, you will be less tempted to twist during the lift.

Torso Stability

The more torso motion you allow during the lift, the greater the stress to your back when lifting. Try to keep your torso a stable unit during the lift. This is accomplished through contraction of your abdominal muscles. The lift should be initiated with your legs. Keep your torso rigid as you come to an upright position using your leg and buttock muscles. Your thigh and buttock muscles are far stronger than your back muscles!

Twisting

Twisting during a lift increases the stress to your back during lifting. Instead of twisting, come to an upright position, then pivot, using your feet. Your feet should face where you lift object from and where you set an object down.

Steps for Manual Lifting

1. **Assess the lifting environment.** This is a mental process that takes just seconds before you begin the lift. Look at the surrounding area to become aware of possible hazards. Is the floor or ground level and dry? If not, you will need to take extra precautions during the lift. Do you know where you will place the object you are about to lift? If not, you may need to clear a place for the object before the lift. Is the pathway needed to perform the lift and/or carry the object clear? If not, you need to either take extra precautions or clear the pathway.

2. **Assess the weight and size of the object.** Nudge the object to assess the approximate weight of the object. This will help you determine whether you can lift the object yourself or whether you need additional help from another person or a mechanical lifting device. Also, assess the size of the object. Often, bulky items are not heavy, but require additional help to maintain proper body mechanics during lifting, carrying, and lowering. Know your limitations and get additional help when necessary.

3. **Get close to the object to be lifted.** Move other objects out of the way or move yourself to a position where you can be close to the object you are about to lift.

4. **Assume a stable stance.** Your feet should be approximately shoulder width apart with feet staggered slightly.

5. **Bend your knees.** Bend your knees as far as you can and still be able to come to an upright position using your thigh muscles. If you have weak thighs, you may only be able to bend your knees slightly.

6. **Grip the object firmly.**

7. **Keep your back a straight, stable unit.**

8. **Initiate the lift with your leg and buttock muscles.**

9. **Lift with controlled speed.**

10. **Continue to keep your back a straight, stable unit.**

11. **Come to an upright position using your leg and buttock muscles.**

12. **Pivot, using your feet; do not twist.**

13. **To lower, use the same precautions noted above.**

For additional information, contact your EH&S Safety Advisor, EH&S at 530-752-1493 or ehsdesk@ucdavis.edu.

KEYBOARD AND MOUSE USE
SafetyNet #96

There appears to be a relationship between typing style and onset of hand and wrist symptoms for some computer users. *Preventing Computer Injury: The Hand Book* by Stephanie Brown is an excellent resource with numerous illustrations of correct and incorrect hand and finger positions as well as down-to-earth tips on how to make corrections in typing style.

This SafetyNet will review some key components of typing style; offer tips on how to achieve improved arm and hand positions when typing; review some important information on mouse use, alternative keyboards and input devices; and the importance of breaks and warm-ups.

Typing Style

When reviewing typing style, the posture of the entire arm becomes important. This includes shoulder, upper arm, lower arm, wrist, and finger positions. A typical position is one in which the arms are reaching forward, the wrists are resting on the desk or wrist rest, and the fingers are reaching up to the keys (Figure 1).

Figure 1.

When the upper arm is reaching forward it is natural to want to rest your wrists on something in order to take stress off the shoulder area. When wrists are in a fixed position, the hand flattens and fingers reach excessively to strike the keys (Figure 2). This awkward position results in marked increased stress to the structures of the hand and fingers and can result in discomfort.

Figure 2.

Instead, the upper arm should remain vertical, forearms horizontal, and wrists floating in a straight position (Figure 3).

Figure 3.

This allows the hands and fingers to maintain a rounded position with the fingers pointing down to the keys (Figure 4).

Figure 4.

Movement to the keys should occur through small movements at the shoulder instead of excessive reaching with the fingers.

There are several common reasons why individuals adopt the position shown in Figure 1 including:

- Inadequate distance between the monitor and individual. A common solution is to pull the computer table out away from the wall and move the monitor back on the table. The monitor will extend slightly off the back of the table.

- Slumping in the chair. As the buttock slides forward in the chair, the upper back leans backward resulting in the need to reach forward for the keyboard. If you prefer not to change your sitting position, place the keyboard in your lap rather than reach forward to a computer table.

- Poor shoulder posture. Many individuals have severely rounded shoulders resulting in constant stress to the shoulder/neck area as a result of postural deviations. Relief comes from any type of support to help reduce the preexisting stress to the shoulder/neck area. These individuals would fare better supporting the weight of their arms through the use of arm rests on the chair rather than through use of a wrist rest.

NOTE: Wrist rests should not be used to rest the wrists when typing. They can serve as a surface to rest the wrist on when not typing.

Another positional problem is excessive side-to-side deviation of the wrist that occurs when the individual tries to keep his/her fingers aligned with the 'home row' of keys (Figure 5). This is a common result of learning to type on a typewriter.

Figure 5.

It is not necessary to stay aligned with the "home row." Let your hands move away from the "home row" to allow the wrists to remain straight (Figure 6). Move to the keys through small movements at the shoulder instead of reaching excessively with the fingers or deviating the wrist.

Figure 6.

Correcting Hand Position:

Correcting poor hand position is difficult and often requires more than simple awareness. For individuals who have never learned the preferred rounded hand position, it is useful to apply a simple taping method to help practice good hand positions. First cup your hand as if holding a tennis ball in your palm. Then use small strips of scotch tape to tape each finger from the middle of the finger to the palm as shown in Figure 7.
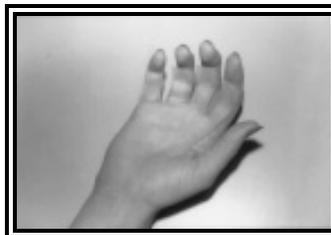

Figure 7.

Practice typing without letting the tape pull off the fingers. One will quickly learn to make small movements at the shoulder instead of excessively reaching with the fingers to strike the keys. At first, typing speed will be significantly slower, but with practice, speed will increase. Notice that striking the keys with a lighter touch is another stress reducer. Practice for just 10 minutes with the tape on, then remove the tape and concentrate on maintaining good hand and finger positions for the next 10 minutes. Use the tape as noted above three to four times/day. Within two weeks you will learn to use the new method. Thereafter, use the tape only if needed as a reminder of the proper position. Periodically, assess hand position when typing to assure that you have not drifted back into old habits.

Mouse Problems

Postural problems resulting from mouse use are not unlike those previously discussed for keyboard use. Figure 8 shows reaching for the mouse can result in increased stress to the shoulder/neck and severe deviation of the wrist.

Figure 8.

When the wrist fixates on the table or mouse pad, movement of the mouse occurs through deviation at the wrist (Figure 9) or excessive reaching with the fingers.

Figure 9.

Position the mouse next to, and at the same level as, the keyboard (Figure 10). This allows more neutral shoulder, upper arm, and wrist positions. Movement of the mouse can then be accomplished through small shoulder movements instead of excessive movements of the wrist or fingers.

Figure 10.

Other mouse solutions include:

- Ease up on your grip and hold the mouse lightly. It is not necessary to hold the mouse tightly. This will markedly reduce stress to the hand.

- Relax your hand and let go of the mouse when it is not being used.

Manufacturers are creating an ever-increasing number of alternative keyboard and input devices (mouse, track ball, input pens) faster than ergonomic impact studies can evaluate them. Therefore, it is advisable to use good judgment as a consumer of any ergonomic product.

The use of alternative keyboards and track balls has met with mixed success on campus. If possible, try the product before ordering it.

A number of individuals have found the track ball to be a more comfortable alternative to a mouse. However, reaching for a track ball creates the same shoulder/neck stresses as reaching for a mouse. A track ball should also be positioned next to and at the same level as the keyboard. Keyboards with built-in trackballs are popular solutions to eliminating the problem of reaching. They are also useful in workstations that are not designed to accommodate a mouse.

Frequent Breaks

The body was not meant to stay in one position for an extended period of time or to perform the same task repeatedly. It is advisable to stand and move about the office for several minutes at least every hour. This is a good time to do some stretching.

If time is a factor, at least standing while continuing to read or think will be helpful. Very often finding an answer or solution to a tough problem will occur outside the office. Using break time to walk outside around the building may be more productive than you would think!!!

Warming Up

Especially during cooler seasons, taking time to warm your hands prior to beginning your computer work is advisable. If your hands get cold when typing, it is probable that you are holding your shoulders tightly. Slightly adjust your height relative to the keyboard to allow your shoulders to relax. You can also do shoulder circles to increase the circulation to your hands.

Other factors related to hand and wrist symptoms and keyboard and mouse use

Computer workstation layout and adjustment can also be important in preventing the appearance of hand and wrist symptoms. Refer to SafetyNet #17, "Personal Computer Workstation Checklist", the workbook, "Easy Ergonomics For Desktop Computer Users", and the video, "Ergonomics: Setting Up Your Computer Workstation" available on line at http://ehs.ucdavis.edu/ergo/index.cfm.

For additional information, contact your EH&S Safety Advisor, EH&S at 530-752-1493 or ehsdesk@ucdavis.edu.

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SafetyNet #121 - Reporting Work-related Fatalities and Serious Injuries or Illnesses

UC DAVIS ENVIRONMENTAL HEALTH AND SAFETY • 2-1493

In addition to normal occupational injury reporting requirements, Cal/OSHA regulations require every employer to report any serious injury/illness or death of an employee occurring in a place of employment or in connection with any employment immediately (by telephone) to the nearest Cal/OSHA office. In order to assist campus departments, Environmental Health and Safety (EH&S) performs this reporting after consulting with the supervisor or department representative of the employee. During normal business hours contact EH&S at **(530)752-1493** to report any serious injury/illness or death of an employee. Outside of normal business hours call the UC Police/Fire Dispatch Center at **(530)752-1230** who will in-turn contact an Environmental Health & Safety representative. The EH&S representative will contact the supervisor or department representative of the employee to collect the reporting information.

Cal/OSHA defines "Immediately" to mean as soon as practically possible but not longer than 8 hours after the employer knows or with diligent inquiry would have known of the death or serious injury or illness. If the employer can demonstrate that exigent circumstances exist, the time frame for the report may be made no longer than 24 hours after the incident. **Cal/OSHA may assess a fine of up to $5000.00 if a qualifying injury is not reported within the stated 8 hour time period.**

Cal/OSHA further defines "Serious injury or illness" to mean any injury or illness occurring in a place of employment or in connection with any employment which requires inpatient hospitalization for a period in excess of 24 hours for other than medical observation or in which an employee suffers a loss of any member of the body or suffers any serious degree of permanent disfigurement, but does not include any injury or illness or death caused by an accident on a public street or highway.

When calling EH&S, you will need the following information, if available:

1. Time and date of accident.
2. Employer's name, address and telephone number.
3. Name and job title, or badge number of person reporting the accident.
4. Address of site of accident or event.
5. Name of person to contact at site of accident.
6. Name and address of injured employee(s).
7. Nature of injury.
8. Location where injured employee(s) was (were) moved to.
9. List and identity of other law enforcement agencies present at the site of accident.
10. Description of accident and whether the accident scene or instrumentality has been altered.

For additional information contact EH&S at 530-752-1493, or ehsdesk@ucdavis.edu.

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Ergonomics Awareness Quiz

Name_____

Date_____

Department_____

E-mail address_____

Phone number_____

<u>Directions</u>:

Read the workbook "Easy Ergonomics for Desktop Computer Users" **and**
Watch the computer disk "Ergonomics: Setting up your Computer Workstation."

Note: This is an open book and computer disk quiz.

Circle the correct answer to the statements below.

Obtain the answer sheet from your department ergonomic representative and score your quiz. Put the total number correct on the top right side and circle it.

1. The 20-20-20 rule means to take a 20 minute break every 40 minutes at your computer workstation, walk 20 feet away from your desk and focus your eyes on something 20 feet away to reduce the risk of musculoskeletal disorders. T or F

2. When organizing your work space, it is accepted practice to reach frequently in the mid work space. T or F

3. The seat pan depth should be adjusted so that there is a 6-8 inch gap between the front of the chair and the back of your knees when you are seated with your back is against the chair. T or F

4. Position the document so that you can easily shift your view between the document and the monitor by moving only your eyes, not your head. T or F

5. Your feet should be able to rest comfortably on the chair legs or dangle slightly while seated at your computer workstation T or F

6. When keying, your wrists should be straight and not bent. T or F

7. If you do not frequently use your number pad, (ten key feature of your keyboard), but use your pointing device (mouse, trackball, etc) constantly or frequently, a mouse platform will likely be a good option to bring the mouse into the near reach zone. T or F

8. If your armrests interfere with your access to the mouse, keyboard, or writing surface, you should adjust them to their lowest position out of the way or consider removing them all together.   T or F

9. A negative tilt to the keyboard is the most desirable position to facilitate your wrists being straight while keying.   T or F

10. It is not important to always identify the specific job tasks or the workstation "handedness" before you try to solve ergonomic problems.   T or F

11. If you are having pain or discomfort in your forearms, it may be related to your chair adjustment or the organization of your work station. T or F

12. Monitor height and distance positioning can be related to discomfort in you neck, upper back, and eye strain. T or F

13. The organization of your work station plays a significant role relative to musculoskeletal injury at the work station.   T or F

14. Software inefficiency impacts the worker in 4 main areas of time, repetitions, posture, and stress. T or F

15. It is encouraged to periodically adjust the tilt or tension of the back support of your chair over the course of the work day to help vary your working position. T or F

16. The combination of prolonged repetitive use of your mouse or keyboard, poor posture and incorrect work habits are not likely to lead to cumulative trauma disorder. T or F

17. Multi-taskers may want to keep their keyboards on the desktop rather than on a keyboard tray to eliminate the potential to reach over the keyboard tray for frequently used items such as the telephone or file folders which may cause shoulder injuries. T or F

18. Place palms on the palm rest at all times for proper support, not just when keying, and allow as much movement as possible at the wrist to avoid keeping them straight. T or F

19. When using the mouse, have a relaxed grip, avoid maintaining fingers in a tense, straight position, and use combined movements of the elbow and shoulder to move the mouse. T or F

20. If you are experiencing neck or shoulder pain, aligning the source document and monitor directly in front of the keyboard may reduce the discomfort. T or F

Ergonomic Awareness Quiz Answer Key

1. F (8:05 on disk)	8. T. (page 15)	15. T (2:30 on disk)
2. F. (9 page 23.Occ. perform reaches in the mid work space)	9. T. (page 16)	16. F (3:45 on disk)
3. F (page 10. 2-4 inch gap)	10. F (page 3)	17.T (4:15 on disk)
4. T (Page 31)	11. F (page 4)	18. F (5:15 on disk)
5. F (page 9)	12. T (page 4)	19. T (6:05 on disk)
6. T (page 16)	13. T (page 4)	20. T (7:25 on disk)
7. T (page 19 & 20)	14. T (page 34)	