Repetitive Stress Injury

Repetitive stress injury (RSI) is a result of repeated movement of a particular part of the body. It is also known as repetitive motion injury, musculoskeletal disorder, cumulative trauma disorder, and by a host of other names. A familiar example of RSI is “tennis elbow.” RSI is the number-one occupational illness, costing employers more than $80 billion a year in health-care fees and lost wages. Of concern to keyboard and mouse users is the form of RSI called carpal tunnel syndrome (CTS). CTS is an inflammatory disease that develops gradually and affects the wrists, hands, and forearms. Blood vessels, tendons, and nerves pass into the hand through the carpal tunnel (see illustration below). If any of these structures enlarge, or the walls of the tunnel narrow, the median nerve is pinched and CTS symptoms may result.

![Diagram of Median Nerve and Carpal Tunnel](image)

**SYMPTOMS OF RSI/CTS**
CTS symptoms include numbness in the hand; tingling or burning in the hand, wrist, or elbow; severe pain in the forearm, elbow, or shoulder; and difficulty in gripping objects. Symptoms usually appear during sleeping hours, probably because many people sleep with their wrists flexed.

If not properly treated, the pressure on the median nerve, which controls the thumb, forefinger, middle finger, and half the ring finger, causes severe pain. The pain can radiate into the forearm, elbow, or shoulder. There are many kinds of treatment, ranging from simply resting to surgery. Left untreated, CTS can result in permanent damage or paralysis.

The good news is that 99 percent of people with carpal tunnel syndrome recover completely. Computer users can avoid reinjuring themselves by taking the precautions discussed later in this article.

**CAUSES OF RSI/CTS**
RSI/CTS often develops in workers whose physical routine is unvaried. Common occupational factors include (1) using awkward posture, (2) using poor techniques, (3) performing tasks with wrists bent (see below), (4) using improper equipment, (5) working at a rapid pace, (6) not taking rest breaks, and (7) not doing exercises that promote graceful motion and good techniques.

RSI/CTS is not limited to workers or adults. Keying school assignments, playing computer or video games, and surfing the Internet are increasing the incidence of RSI/CTS in younger people.

**REDUCING THE RISK OF RSI/CTS**
By taking the following precautions, keyboard and mouse users can reduce the risk of developing RSI/CTS and can keep it from recurring. Experts stress that good computer habits like these are very important in avoiding RSI/CTS. They can also help you avoid back, neck, and shoulder pain, and eyestrain.

**ARRANGE THE WORK AREA**
Arrange your equipment in a way that is natural and comfortable for you. Position the keyboard at elbow height and...
directly in front of the chair. The front edge should be even with the edge of the table or desk. Place the monitor for easy viewing. Some experts maintain that the top of the screen should be at or slightly below eye level. Others recommend placing the monitor even lower. Set it a comfortable distance from your eyes—at least an arm’s length away.

Position the monitor to avoid glare (an antiglare filter can help). Close blinds or pull shades as needed. Adjust the brightness and contrast controls, if necessary, for readability. Keep the screen clean with a soft, lint-free cloth and (unless your instructor tells you otherwise) a nonalcohol, nonabrasive cleaning solution or glass cleaner.

If you cannot adjust your equipment and the desk or table is too high, try adjusting your chair. If that does not work, you can sit on a cushion, a coat, or even a stack of books.

Use a straight-backed chair that will not yield when you lean back. The chair should support your lower back (try putting a rolled-up towel or sweater behind you if it does not). The back of your knees should not be pressed against the chair. Use a seat that allows you to keep your feet flat on the floor, or use a footrest. Even a box or a backpack will do.

Position the mouse next to and at the same height as the keyboard and as close to the body as possible. Research has not shown conclusively that one type of pointing device (mouse, trackball, touch pad, stylus, joystick, etc.) is better than another. Whatever you use, make sure your arms, hands, and fingers are relaxed. If you change to a new device, evaluate it carefully first and work up gradually to using it all the time.

Arrange your work material so you can see it easily and maintain good posture. Some experts recommend positioning whatever you look at most often (the monitor or paper material) directly in front of you so you do not have to turn your head to the side while keying.

**EXERCISE AND TAKE BREAKS**

Exercise your neck, shoulders, arms, wrists, and fingers before beginning to key each day and often during the workday. Finger exercises appear on the next page. Neck, shoulder, wrist, and other exercises appear at the Cornell University ergonomics Web site listed below.

Take a short break at least once an hour. Rest your eyes from time to time as you work by focusing on an object at least 20 feet away. Blink frequently.

**USE GOOD POSTURE AND PROPER TECHNIQUES**

Sit erect and as far back in the seat as possible. Your forearms should be parallel to the slant of the keyboard, your wrists and forearms low, but not touching or resting on any surface. Your arms should be near the side of your body in a relaxed position. Your shoulders should not be raised, but should be in a natural posture.

Keep your fingers curved and upright over the home keys. Strike each key lightly using the fingertip. Grasp the mouse loosely. Make a conscious effort to relax your hands and shoulders while keying.

For more information on mouse and keyboard use and CTS/RSI, visit the following Internet sites:

- [http://kidshealth.org/kid/](http://kidshealth.org/kid/) (search for ergonomics)
- [http://www.tifaq.org](http://www.tifaq.org)
- [http://www.berkeley.edu](http://www.berkeley.edu) (locate the Ergonomics Program and look for Computer Use Tips)
- [http://www.office-ergo.com](http://www.office-ergo.com)
- [http://www.cornell.edu](http://www.cornell.edu) (search for ergonomics)

**Ergonomic Keyboards**

Ergonomic keyboards (see illustration at left) are designed to improve hand posture and make keying more comfortable. Generally they have a split design with left and right banks of keys and the ability to tilt or rotate the keyboard for comfort. More research is needed to determine just how effective ergonomic keyboards are in preventing RSI injuries and carpal tunnel syndrome.
FINGER GYMNASTICS

Brief daily practice of finger gymnastics will strengthen your finger muscles and increase the ease with which you key. Begin each keying period with this conditioning exercise. Choose two or more drills for this practice.

**DRILL 1.** Hands open, fingers wide, muscles tense. Close the fingers into a tight fist, with thumb on top. Relax the fingers as you straighten them. Repeat ten times.

**DRILL 2.** Clench the fingers as shown. Hold the fingers in this position for a brief time; then extend the fingers, relaxing the muscles of fingers and hand. Repeat the movements slowly several times. Exercise both hands at the same time.

**DRILL 3.** Place the fingers and thumb of one hand between two fingers of the other hand, and spread the fingers as much as possible. Spread all fingers of both hands.

**DRILL 4.** Interlace the fingers of the two hands and wring the hands, rubbing the heel of each palm vigorously.

**DRILL 5.** Spread the fingers as much as possible, holding the position for a moment or two; then relax the fingers and lightly fold them into the palm of the hand. Repeat the movements slowly several times. Exercise both hands at the same time.

**DRILL 6.** Rub the hands vigorously. Let the thumb rub the palm of the hand. Rub the fingers, the back of the hand, and the wrist.

**DRILL 7.** Hold both hands in front of you, fingers together. Hold the last three fingers still and move the first finger as far to the side as possible. Return the first finger; then move the first and second fingers together; finally, move the little finger as far to the side as possible.