RSIs are an Enormous Problem

"It's epidemic." This doctor's response was to my question: "What percentage of yours and your collegues' patients have injuries caused by computer usage?" Surprised? Look around at the computer users you know, and ask them if they have experienced pain and weakness in their hands and arms,especially after long hours of days/weeks/months in front of a computer. I believe their answers will bear out the doctor's claim.

But in case you don't believe me, let's look at the U.S. Bureau of Labor Statistics:

Year	# of RSI cases	% of all illnesses
1978	20,200	14%
1979	21,900	15%
1980	23,200	18%
1981	23,000	18%
1982	22,600	21%
1983	26,700	25%
1984	37,700	28%
1985	37,000	30%
1986	45,500	33%
1987	72,900	38%
1988	115,300	48%
1989	146,900	52%
1990	185,400	56%

(Source: Pinsky, Mark A., The Carpal Tunnel Syndrome Book, Warner Books, 1993, pg. 144.)

I will examine this unfortunate side effect, Repetitive Strain Injury (RSI), of the Digital Age in this essay. It has probably affected someone you know. I hope this information will cause you to pause, look at your computer setup and initiate changes that make your computing safer and more comfortable. And if you've already experienced some of RSI's disabling and career-threatening effects, I hope that this article eases some of your anxieties by describing methods, approaches and treatments that have helped others.

Definition and Symptoms

RSI (also known as RMI, repetitive movement injury, OOS, occupational overuse syndrome, and cumulative trauma disorder, CTD) is a a description, and not a diagnosis. It is a grab bag term which has many causes and many manifestations. Carpal tunnel syndrome, CTS, is a specific condition, and therefore a diagnosis. It is this sort sort of semantic confusion which leads to the very misleading "RSI does not exist" tabloid stories.

The many diagnosable disorders that RSI encompasses include carpal tunnel syndrome, ulnar nerve entrapment, deQuervain's syndrome, thoracic outlet syndrome, tennis elbow, and tendonitis (see explanations of many of these disorders in the glossary at the end of the article).

An RSI develops slowly and can affect many parts of the body. Many symptoms may come and go before settling in: aching, tenderness, swelling, pain, cracking, tingling, numbness, loss of strength, loss of joint movement, and diminishing coordination of the injured area. These symptoms can then lead to the disorders listed above. Users should stop whatever is causing any symptoms and see a doctor AS SOON AS POSSIBLE. The difference of a day or two can mean the difference between a short recovery and a long, drawn-out ordeal.

Causes

The causes of RSI are controversial. While every RSI sufferer knows that a stressful day will worsen their symptoms, simply by increasing muscle tension and thereby pain, RSI is definitely not "all in the mind". The spread of RSI within a workplace may even be exacerbated by anxiety once a few people have RSI, but anxiety is not sufficient to cause RSI. Rather, RSI is caused by many shared and individual factors, including physical fitness, muscle tension, individual work habits, stress, long hours, lack of breaks, bad ergonomics, and poor, static posture.

One of the greatest risk factors leading to RSI is the restriction of circulation to muscles, tendons, and nerves during repetitive use. During static contraction (hold your arm out to the side, say), circulation is nearly stopped, which is why you can't do it for very long. The oxygen gets used up. During repeated contractions the effect is just delayed. Under the kind of demands we place on our bodies during computing, these tissues need all of the nutrients and oxygen they can possibly get from our blood. Also, the blood must flow freely to carry off the additional waste products (which cause pain) - lactic acid and carbon dioxide - produced by said use.

Other factors constrict blood flow to your extremities, setting up a vicious cycle. One factor is any existing injury. Injured tissue inflames during repetitive motions. This pressure limits circulation. Then, once one muscle hurts, all its neighbors tense up, perhaps to relieve the load. This makes sense for your normal sort of injury, but it only makes things worse with repetitive motion. More tension means less blood flow, and the cycle continues.

Workstation Ergonomics

RSI and associated poor ergonomics not only affect the health of computer users - they hit the finances of their employers as well. One direct cost is a productivity loss of 20 per cent in keying at an unergonomic workstation, according to one study. A Norwegian company discovered the indirect costs by redesigning assembly workers' workstations, reducing RSI - it made an 840 per cent return on its investment, simply by reducing the cost of sick leave and staff turnover.

Right-angle Rule

The basic principle behind a ergonomically-sound workstation setup involves right angles. Your feet should rest flat on the floor, your calves should be perpendicular to the floor and to your thighs, which should be parallel to the floor, and the angle between your thighs and back should be at least 90 degrees. Your arms should hang relaxed at your sides, and your forearms should project out straight in front of you, forming another 90 degree angle. Your wrists should be straight, not arched upward. You might adjust your keyboard for this, or you might have to adjust your chair and desk height. Standard typing height is supposedly 27 inches, but that will vary with your height.

Armrests

The use of armrests on chairs is a controversial subject in the ergonomics community. Ulnar nerve entrapment can result from resting forearms and elbows against hard surfaces, like some armrests. However, an armrest can provide some support if you are already injured, as long as the armrest is well-padded, and it's not forcing your shoulders up and preventing you from relaxing your upper body. My personal experience with armrests are that, as I healed, I found them to be more of an impediment than a help, and so I rarely use them nowadays.

Monitor Placement

For distance from your monitor, you should be between 18 and 28 inches away from your screen, and the screen should be adjusted so that it is between 15 and 30 degrees below your straight-ahead line of sight. If the screen is much lower than that, you'll probably end up slouching.

Alternative input devices

Look into alternative input methods that will reduce strain on your hands and wrists. Many heavy computer keyboardists have found the split and adjustable keyboards to be more comfortable. The most common alternative input device is the trackball, but the new "trackpad" is generating alot of interest and converts these days too.

More esoteric input devices include chord keyboards and voice recognition systems. Chord keyboards may help reduce CTS problems because you don't have to move your hand at the wrist to reach all the keys. Voice recognition systems are powerful, but both you and the software will

have to train each other. You will need to learn ways of speaking to not strain your voice, and the software will have to be trained to recognize your speaking patterns.

Wrist Pads

Wrist pads/rests are usually the neoprene pads that many people put in front of their keyboards. The wrist pads help in two ways. First, the wrist pad is designed to remind you to lift up your wrist slightly so thtat your hands don't rest on any surface as you type, because that angle can compress the carpal tunnel. Secondly, when you pause in your typing, you probably put your hands down, and it's better to rest them on a soft pad than on the hard corner of a desk, which can cut off circulation and compress the carpal tunnel. However, please keep the following thought in mind with regard to wrist rests: Don't rest your wrist on your wrist pad as you type! Many people are never told how to use wrist rests properly, so they slide their poor injured wrists along the padding, further exacerbating their injury.

The Chair

The chair is probably your most important piece of ergonomic furniture. The following are the basics.

Tilt the seat pan to get your thighs slightly higher than your knees. This straightens the spine and helps support your head and arms. Check that the seat pan is in contact with your thighs but not touching the inside of your knees. (You run the risk of cutting off circulation in your legs.) Check that the seat pan is not so deep that your back doesn't make contact. Check that your chair has a tiltable back. Ergonomic wisdom says that you should not sit bolt-straight, but a little back (no more than 10 degrees). Let the chair take a little bit of your weight. Adjust the height of the seat so that your thighs rest on the seat pan *plus* places your feet firmly on the floor. If you have to be higher to get in the right relationship to the desk or the keyboard, then use a footrest. (If you want armrests.) Check that the armrests are not too wide apart. Too wide leads to more ulnar deviation at the wrist. (If you want armrests.) Check that the armrests are not too close together. Too close together interferes with your arms during typing. (If you want armrests.) Check that the armrests are not too high. You don't want the armrests to force your shoulders up because it leads to Thoracic Outlet problems, and neck and shoulder tightness. (If you want armrests.) Check that the armrests are not too low. Too low leads to a rounding of the spine, contraction of the chest, and restricted breathing. (If you want armrests.) Check that the armrests not too hard. If its too hard, it puts pressure on ulnar nerve at the cubital tunnel at the elbow.

Those are the basics. The most important thing to ask yourself is: Are you comfortable throughout a day's work? If it feels good and you tend not to shift trying to get comfortable, then you are probably less at risk of injury (reinjury).

And remember - we're not robots. Move around. Get up. A good chair lets you have a little room to move so you can stay loose. Leaning and slumping is OK once in a while. Just don't make that your continual working position.