

Repetitive Strain and Computer Professionals: A New View

© 1998 Jack Bellis and Suparna Damany All Rights Reserved

Excerpted from their upcoming book, "RSI Theory and Therapy for Computer Professionals."

If, like me, you suffer from a repetitive strain injury (RSI), this article will provide valuable new information that may help you fight this insidious problem. If you're fortunate enough to have survived computer use unscathed by RSI, consider yourself lucky and keep this information carefully stored away where you can recall it—RSI discriminates *only* against new computer users.

As a sufferer of a repetitive strain injury, and unsuccessful surgery to cure my problem, I eventually sought help from a physical therapist, Suparna Damany. She has successfully treated many RSI sufferers and, over the course of time, has identified some important common denominators that are not widely addressed, even by the medical community. Although the "conventional wisdom" of improving your ergonomics, working in the neutral position, and taking breaks has become widely known, such information is not strong enough medicine for chronic sufferers. In this article we will explain a new view, that Suparna and I have composed together, of how RSI specifically attacks computer users, and what therapy is needed to reverse it.

The world of repetitive strain injuries is one of pain and frustration, muddled unfortunately, by a whirlwind of questionable information. Depending on whom you talk to, RSI can be either a form of fraud perpetrated by malingering employees, or a debilitating complex of nerve and muscle disorders. To anyone who has experienced its pain, numbness, and loss of strength, it is quite emphatically the latter. But if you seek out the prevailing literature on the subject, you will come away with your head spinning. You won't know if your problem stems from pregnancy or bad genes.

Distinct from the prior literature, our theory will highlight three factors that are at the heart of many patients' problems, and generally not known by many health practitioners, mainstream or alternative: 1) Thoracic outlet syndrome (constriction of the blood vessels and nerves in the chest wall) is a much more frequent problem than commonly recognized. 2) Muscle inflammation,

although you won't feel it until a therapist presses on the right spots to show you, is present in almost every RSI sufferer. 3) Nerve trigger points, spots where fibrous tissue entraps nerves, have been fairly well documented, but only anecdotally. We will show how these all fit into a larger scheme that can be more properly addressed as a whole.

Before diving in, let's dispel what we believe are the prominent myths surrounding RSI. First, carpal tunnel syndrome is just one subset of RSI, and a fairly rare condition, at that. In our estimation, most individuals who are diagnosed with carpal tunnel syndrome simply have symptoms that overlap with those of true carpal tunnel syndrome. The next misperception is that RSI sufferers are slackers, whereas in our experience, the opposite may be true... many RSI sufferers quite literally work their fingers to the bone. The third issue has to do with prognosis. Contrary to frequent references you may read suggesting that you are condemned to a lifetime of suffering, our experience shows that most RSI cases can improve. We don't have wild stories of one-hour cures where a few simple tricks cure you. By our account, if you have a serious RSI problem, it took several years to develop, so it won't be cured in days. Finally, RSI is not your fault. For instance, it's common to come across statements like this:

"... anyone suffering from chronic pain will have trigger points, due either to their lack of exercise or bad posture."

While exercise and posture are important factors and will be involved in our theory, posture is a result, not a cause. And we frequently see very active people with RSI; they are simply performing a deceptively dangerous job and have overdrawn their body's health bank account with too repetitive a workload.

How Computer Users Get RSI

Let's start with an analogy, albeit an extreme one. Imagine you've been hanging upside-down, eight hours a day for ten years... and you've been holding your arms out straight in front of you while hanging around. How do think your ankles will feel after seven or eight years? What sort of sensation do you think your toes will be capable of? How 'bout if I told you, as your medical professional, that to repair the damage, I prescribe better nutrition and more sleep—you have a horrible lifestyle.

We better have you try braces on your ankle to keep them from stretching too much. Oh yes, and vitamin B6, lots of it. Acupuncture, homeopathic drugs, and electromagnets for the pain, gut-wrenching anti-inflammatories for the swelling, and if all else fails, surgery to separate that heavy torso from those poor feet. As silly as it sounds, these are some of the typical recommendations from the medical community. Get the point? Even if you believe our pathetic analogy is only slightly applicable, it still presents the basis for our case. Here's how we think it works when you're right-side up:

- ☞ Computer-related RSI is caused by working, often compulsively, in a single, hands-suspended posture for a long time.
- ☞ All of the muscles that hold up your head, shoulders, and arms go into a state of constant tension and fatigue, and lose stamina. Your body does so many things to compensate that you don't feel most of these sensations until years have passed and damage starts to occur.
- ☞ As your neck and shoulder muscles fatigue, particularly your shoulder blade muscles, your shoulders slouch forward. All of the literature agrees on this much. What doesn't come out clearly in the literature is the result: your chest collapses on the area where the nerves and blood vessels to your arms pass out between the first rib and collarbone, called the thoracic outlet. Your shoulders also collapse over your armpit, pressing on a concentrated intersection of nerves called the brachial plexus, which gives rise to all the nerves of the arm. Pressure on the nerves causes a variety of symptoms in the arms, including pain, tingling, numbness, etc. Pressure on the blood vessel reduces blood flow to the arm, thus inhibiting the healing process and removal of the waste products of muscle metabolism.
- ☞ Your body begins an elaborate, invisible pattern of compensation that we call the pain cycle. Overworked muscles become inflamed. You avoid these muscles and overload other muscles. All of these muscles may cut off nerves and blood flow because your body was not designed for them to be in constant tension. In several places up and down the arm, the vessels weave their way right between the muscles and other structures.
- ☞ As you lose stamina, you may rest your hands on the work surfaces more. Pressure on the wrist can cause reduced blood flow and further pinch the median nerve going to the fingers.
- ☞ Due to fatigue of the large neck and shoulder girdle muscles, the forearm and hand muscles begin to overwork. The action of typing taxes the small bands of muscles that drive the fingers. These are more prone to the tension/fatigue cycle than bigger muscles. If you're obsessed with working as proficiently as possible, you may also make extreme contortions that stress these small muscles to the utmost: for instance, holding the left Control key with your left thumb while pressing the Esc key with your left middle finger. Actions like this cause the maximum possible irritation in the forearm, wrist, and hand. Some practitioners believe that the tendon sheaths in the carpal tunnel become sticky and resistant to smoothly gliding. If only a localized area is considered during examination, the diagnosis is often tendonitis, tenosynovitis, or even arthritis.
- ☞ The most obvious typing offenses, cited by all RSI theorists, are bending the wrist up (dorsiflexion), and bending it out (ulnar deviation). These motions overuse the small muscles to reach with the fingertips instead of moving the whole arm. If you work to the point of inflammation in the forearm, the resultant swelling can cause fluid buildup in the wrist which in turn could easily be labeled, solely in terms of symptoms, as carpal tunnel syndrome, with no attention to the root cause.
- ☞ In the vast majority of cases, the constant tension results in spasms, knots of muscle in continuous tension. (Note that these are different than muscles that are cramped, which suddenly, quite agonizingly contract.) You will find little clues about spasms sprinkled throughout the literature, but without much hands-on advice. In addition, some practitioners have promoted the idea that the muscles take on the qualities of ligaments, laying down fibrous tissue because they are bearing a static load. If, as an RSI sufferer, you've ever noticed that your arms were feeling very wiry or taut, this is likely what you've felt.
- ☞ The muscle spasms become sore and inflamed, *but rarely do you even feel these tender spots (!)* unless a trained therapist palpates deeply to show you how

different they feel than your other healthy muscles. You will find very little *detailed* information on detecting and resolving these spots, but we'll explain what a successful therapist has learned about them.

- ✦ One particular small muscle action is the pronation of the hands, turning the thumbs down to meet the keyboard. This action alone may account for the most universal, acute symptom noted in the anecdotal literature, called a nerve "trigger point" near the inside of the elbow.
- ✦ Trigger points are deposits of fibrous tissue that frequently accumulate where the nerves of the arm give branches to muscles. They bind the nerve in place, and aggravate, pinch, or tug on the nerves when you move. Like the tender spots of the muscle spasms, you will not feel these spots until or unless someone presses on them. More likely, you will feel what doctors call "referred" numbness or pain, in the fingers that the particular nerve innervates.

Despite the dire tone you will read in many case stories about the supposedly irreversible "curse" if you cross the line into nerve damage, rarely is the nerve actually damaged. It is certainly under trauma, but in most cases, eliminating the trauma is sufficient. Too many people simply never get the right therapy to enable healing. They're still hanging by their ankles. And that's our theory.

Muscular vs. Neurological Trauma Paths

Although we are steadfast in our conviction that this one general scenario explains how the problems occur, we have found that there are two separate paths that the damage can take, which we call trauma paths. In the first, muscular inflammation is the problem, and in other nerve entrapment is the problem. Generally, both will share some portion of the blame, because they will affect one another as you develop the classic pain cycle. But one or the other usually becomes the primary focus of the therapy.

Nerve problems are predominated by trigger points that cause changes in sensation such as numbness, tingling, pins-and-needles, or even electric shock-like spikes. Muscle problems are typified by searing pain, loss of grip strength or stamina, pain with movement, and so on. With

muscular trauma, your nerve is usually in fine condition—it is simply reporting a very painful state.

Will the Real Cause(s) Please Stand Up

Now that we've laid out our theory, you can see there are many intertwined factors. But which ones are causes and which ones are results? Here's a roughly chronological list of the factors:

1. Working in one position for years
2. Millions of repetitions
3. Work intensity
4. Aging and loss of resilience
5. Ergonomics
6. Physiology/anatomy
7. Personality
8. Fatigue
9. Slouching posture
10. Muscle tension
11. Chest compression
12. Compensation and overloading
13. Inflammation and swelling
14. Abrasion and irritation
15. Nerve entrapment

By our analysis, only items one through seven are true root causes, and you can't do much about number six. The others are results, although they do a good job of masquerading as causes once your situation begins to "snowball." We can't reverse every one of the root causes, so a fair amount of our recommendations will address the middle ground, factors seven to eleven.

It's Not an Isolated, Localized "Syndrome"

The temptation in traditional diagnosis is to find one of the individual problems described in our scenario, such as tenosynovitis, and fix it by itself. But there's more than enough evidence in the literature to demonstrate that most sufferers don't have just one of these problems. The "syndromes" that are alluded to earlier are often presented in the medical community as causes, but in our view they are all results. And you almost always have symptoms from several of them. This is confirmed by the

following diagnosis of one particular, very severe RSI patient, by Dr. E. Pascarelli, a pioneer in RSI theory. He diagnosed her with:

*“Neuro-vascular thoracic outlet syndrome,
RSI/myofascial pain, lateral and medial
epicondylitis, postural mis-alignment, finger,
hand, wrist and arm tendonitis.”*

Contrast this with other doctors who diagnosed the patient with lupus and rheumatoid arthritis! She eventually found her way to Suparna for her actual treatment, and is back at work. The multiple factors explain why so many RSI patients report that, after employing what had seemed like a successful remedy, their symptoms recur, perhaps slightly altered. For instance, I had surgery to move my ulnar nerve from my “funny bone” area to the inside of my elbow, and was better for a few months. Then the symptoms came back, just as they were.

RSI, particularly in computer users, is a systemic malady of interdependent structures, more like an engine with wearing parts than a flat tire. When one part is compromised, the others are all overtaxed. If you don’t attend to the real trouble, expect a chain reaction. The factors that predispose one structure to injury are equally dangerous to all of the parts, so you must address the root causes.

Consider an analogy to a suspension bridge. Your shoulder and arms are actually highly analogous to a suspension bridge (actually a cantilever bridge, but this is an article on physiology, not engineering), suspending your hands out over the keyboard for years. If, a few days after a new bridge is built, a couple of rivets pop, the odds are that the rivets are defective. But what if the bridge is 30 years old and this time in addition to some rivets popping, the pavement cracks. You would have to be concerned that the incidents are related... that they have a single cause. Perhaps the stresses on the system, combined with the ravages of time have conspired to weaken the entire suspension system. Perhaps the foundation has settled and the main span must now stretch six inches farther than when the bridge was built. That is our basis for generalizing. Most of what are regarded, by conventional diagnostic wisdom, as localized problems such as carpal tunnel syndrome or tenosynovitis are in fact results, not causes. Any therapy that attempts to simply “repave the road” is destined to fail. Continuing the analogy, imagine if several engineers of aging bridges

were sitting around discussing their popping rivets and cracking asphalt, oblivious to the collapsing superstructures. We would rightfully suspect them of outrageous negligence.

Our Treatment Recommendations

The ideas that follow could easily fill 100 pages, but we’ll do our best to capsule them for you. Keep in mind that this is for serious cases. Some of the techniques really need to be done by a therapist, and note that none are quick fixes.

- ☞ Break the hidden muscle spasms with intensive, deep massage and myofascial (muscle and fascia) release by a trained therapist. The muscle spasms will initially pop under the therapist’s touch. As they resolve they will crunch a little, and eventually roll smoothly when pressed. This can take as long as eight weeks to resolve, and more weeks to rebuild healthy tissue. You may find that ice packs relieve the discomfort from the process itself.
- ☞ Eliminate trigger points that are entrapping nerves with vigorous, localized massage. In normal activity, you won’t even notice these spots, but when pressed, they will feel just like a splinter does—a small but intense irritation. Although a therapist will probably be most effective treating these, you may be able to treat them yourself by pinching the spot, and while holding it, performing the type of movement that the muscle would ordinarily cause. It took a therapist 21 sessions (two a week, 45 minutes each) to zero-in on and break through the fibrous tissue on my ulnar nerve at the elbow. The surgeon who operated on my arm never once probed to look for this spot.
- ☞ For the short-term, reduce your workload as much as necessary to facilitate the healing process.
- ☞ For the long-term, adjust your workstation, your energy level, and your concentration, to maintain a posture in which your shoulders and head are not collapsing into your chest. Emphasize diaphragmatic (abdominal) breathing to reduce pressure on your chest. Remember, this process is not easy and does not occur overnight.
- ☞ Have a therapist perform active stretching to increase mobility where the nerves are most likely to be

pinched or compressed, such as the brachial plexus and the area under the collarbone.

- ✦ Increase muscle vitality and stamina with strengthening exercises. Especially emphasize muscles that hold your shoulders back, and those that hold your arms up, and extend your fingers. These are all likely to be in a state of constant fatigue. I have found the “lat raise” machine in my gym to be very helpful. With it, you raise your folded arms (like a chicken clucking), with weights on top. Use a thick rubber band to do lots of finger exercises.
- ✦ Restore flexibility, resilience, and range of motion with self-stretching exercises.
- ✦ To counteract nerve entrapment, perform motion exercises called “glides,” in which you move your arm from one position to another, without any force or resistance, to put a nerve or tendon through its maximum range of motion.
- ✦ Establish workstation ergonomics that enable you to work in the most neutral (least stressful) positions.
- ✦ Adopt keyboarding techniques that emphasize the use of large muscles, such as the shoulders and upper arms instead of small muscles such as those that drive the fingers. In extreme cases, you may have to resort to typing with three fingers on each hand. Use the same principles during mouse usage.
- ✦ Exploit every possible opportunity to reduce or displace the incessant, repetitive tasks of keyboarding. This can include everything from breaks to productivity techniques such as voice recognition.
- ✦ Address lifestyle and work habits to reduce your level of work-obsessed tension, and create a more favorable balance between the destructive and restorative forces acting on your body. Work on improving your sleep patterns.
- ✦ Do a serious warm-up routine before each work session. One way is to use a hand cream and rub your hands vigorously until your hands get very warm. Try to warm up several times a day.

Questionable Therapies

Now that you know what we recommend, what does this imply about some of the more commonly prescribed remedies? Let’s look at three: wrist braces, surgery, and anti-inflammatory drugs.

Doctors prescribe wrist braces in the belief that the bending of the wrist is the cause of all the problems, aggravating the carpal tunnel. On the contrary, we believe that you must train yourself to work in the neutral position and that any crutch will actually contribute to the conditions that have caused your problems, namely loss of muscle vitality and stamina.

What about surgery? Typical carpal tunnel surgery consists of cutting the ligaments that constrain the tunnel. You may ask, “How can we simply cut the ligaments... don’t we need them?” No, because we don’t run around on all fours, like our four-footed friends, we can get by with less support at the wrist. Surgeons probably have an operation for every part of the anatomy that might be subject to symptoms. The problem, however, is that in the case of computer-related RSI, the surgery almost always treats the symptoms, not the source.

Doctors frequently prescribe anti-inflammatory drugs call NSAIDs, non-steroidal anti-inflammatories, to combat initial RSI symptoms. We’re in favor of anything like aspirin that can eliminate your pain, but NSAIDs are extremely irritating to your stomach, particularly if it’s not made crystal clear to you how much food you must consume along with them. Your muscles are inflamed because of a habit of activity that will very likely continue *even while you are taking the medicine*. The only certainty is that your stomach, which was initially healthy, will now hurt as well.

Prognosis

In our experience, serious RSI problems take about a half a year or longer to heal. The healing process is not the same for chronic RSI as for a broken bone because RSI attacks soft tissue and your nervous system. When your nervous system is attacked, your normal defense mechanisms are, frankly, confused and the road will have lots of ups and downs. Don’t get discouraged.

When you do get on the road to recovery, keep in mind that your body has declared new rules for the game, and you must forever play by its rules. You won’t be able to

abuse your body in the same maniacal but surreptitious way. You'll have to learn new ways to work: to be more careful about taking breaks, working in less stressful positions, warming up much like an athlete does before competition, and reducing the overall extent of the repetition involved in your work. But your body has an incredible capacity for healing and your RSI will heal if you address the true root causes.