Preventing Carpal Tunnel Syndrome and Other Upper-Body Musculoskeletal Injuries

By Kate Montgomery, ND

Surgery to correct carpal tunnel syndrome (CTS) is a success, from the surgical perspective, if the ligament is severed, pressure is removed from the median nerve, and the pain disappears. Once the patient's transverse carpal ligament and hand muscles have healed, the patient goes back to work. But if that patient continues to use the same repetitive movements that caused the injury, the pain will eventually return. In most cases, surgery for CTS is repeated several times until the patient is no longer able to perform normal work duties.

One reason CTS surgery can fail is that it addresses only the symptoms, not the cause. Median nerve compression is the end result of CTS, a postural and musculoskeletal disorder. When it is addressed and treated correctly with noninvasive treatment, surgery is not usually necessary. Current statistics show that only 23% of all CTS patients are able to return to their previous professions following surgery (Figure 1).¹

This article presents a systematic and practical approach to healing the upper body. There are two aspects of maintaining the body's health and well being in relation to workrelated musculoskeletal injuries: 1) ergonomics, and 2) a



Figure 1. The "classic" surgery for carpal tunnel syndrome involves an open technique where a small incision is made over the region of the transverse carpal ligament, which compresses the median nerve. This ligament is surgically released (cut) to decompress the median nerve.¹³

protocol for healing. Many articles focus on ergonomic solutions such as selecting the best computer keyboard, mouse, and office chair for your use. This is a necessary part of the solution; however, many articles don't fully address the body and how to maintain it. This article describes procedures to evaluate the body's health status and then follow up with a selfcare program of prevention and daily maintenance. The Carpal Tunnel Syndrome (CTS) statistics, 1997–2000 from the National Institute for Occupational Safety and Health and the Bureau of Labor and Statistics.¹

- Women are less than half of the workforce, but and are more affected by CTS injury than men.
- CTS is still the number one reported medical problem, accounting for 50% of all workrelated injuries.
- Women are twice as likely to develop CTS as their male counterparts.
- Up to 36% of all CTS patients require medical treatment for the rest of their lives.
- Surgery for CTS is the second most common type of surgery, with well over 230,000 procedures performed annually.

procedures are meant for use with input from professional health care providers. The self-care program takes 15 minutes, twice a day and it can minimize the risk of repetitive strain injury, including CTS.

Ergonomics—The Equipment

The costs for work-related musculoskeletal injuries continue to increase, with CTS remaining at the forefront of repetitive strain injuries. More than \$20 billion dollars a year is spent on workers' compensation and another \$60 billion on accessories and equipment, according to the U.S. Labor Department and the Occupational Safety and Health Administration (OSHA).

In July 2001, OSHA held public hearings to discuss repetitive strain injury and determine if more can be done to curb its rising incidence. OSHA has since redefined these injuries as ergonomic injuries. Even though the term has changed, the etiology and symptoms are the same: it is the body that accumulates the injury, not the equipment. The body can be strained, overworked, and subject to stress. Also,



For practicing dental hygienists or students, now is the time to start learning how to manage muscle pain and prevent it from becoming a career-ending threat.



Figure 3. Muscles and trigger points

muscle/tendon fatigue, nerve impingement, skeletal misalignment, and physical strain increase emotional tension that results when pain accumulates in the body.

Dental hygiene practice can involve non-stop care of back-to-back patients, sometimes five days a week. For dental hygiene students, academic pressure is just as stressful and lays the groundwork for a musculoskeletal injury to develop. For practicing dental hygienists or students, now is the time to start learning how to manage muscle pain and prevent it from becoming a career-ending threat.

The two-part solution to avoid musculoskeletal injury is as follows.

- 1. Ensure the proper setup of the equipment you work with and design of the work area to minimize strain on your body.
- 2. Invest in the health of your body; specifically, the care and maintenance of your skeletal, muscular, and nervous systems. Together, they support your body and hold it upright, and allow you to have 100% tactile sensitivity. These are achievable only with proper alignment and balance.¹⁻⁷ Pain is a signal that something is wrong, and failing to listen to your body is like waiting for a time bomb to explode.

For a dentist, dental hygienist, or dental lab technician, only the pinch grip used to hold instruments is potentially more hazardous than the handpiece itself. The vibration, even at a low frequency, has a cumulative effect on the nerves, especially if the handpiece is used all day long. Monica Skibbe, LDH, president of the Indiana Dental Hygienists' Association, works in a periodontal office and uses an ultrasonic scaler all day. She believes, based on her experience and that of other dental hygienists, that the repetitive motion of scaling, polishing, and using the handpiece increases the risk of a repetitive strain injury. In my clinical experience, symptoms such as loss of sensitivity or touch and grip strength, are the first evidence of a musculoskeletal disorder. Skibbe suggests taking a break after each patient to massage and stretch the arms and hands. Massage is a necessary part of her workday and helps her to maintain a more relaxed body posture and work without pain and muscular strain.

Prevention and Maintenance

A number of common syndromes affect the neck, arms, and hands (Figures 2 and 3).⁸ Overuse of and strain on the muscles can place stress on the joints and create a misalignment of the bones, compromise nerve integrity, and result in a loss of muscular strength in the hand. This, in turn, can lessen your grip strength and sensitivity to touch.

The Importance of a Medical "OK"

Symptoms of repetitive strain injury should prompt a visit to a physician, chiropractor, or osteopath for a thorough examination. Signs and symptoms can be reversed if the per-

access

son experiencing them pays attention and responds to them. Medical confirmation prior to starting a program of structural alignment and muscle therapy is important in order to rule out fractures or other problems that could be causing pain. Once medical clearance is obtained, the health care practitioner can help correct structural misalignment, relieve muscular stress and tension, relieve stress on the joints, restore vital energy and neural sensation, and teach the patient how to rebuild strength in the hands and upper body.

Chiropractors (DC), orthopedic physicians, and osteopaths (DO) are specialists of the spine. An assessment of the spine, which may include an x-ray if one has not been exposed recently, is good to have as a reference so that the health care provider will be able to tell if a change occurs. For a woman, a complete physical examination that takes her chemical balance into account is recommended. Stephen Thompson, claim agent for Zenith Insurance Company in San Diego, California, has found through his investigations that many women undergo systemic changes that can cause and contribute to CTS. Many CTS symptoms can be caused by the malfunction of the thyroid; hormonal fluctuations before, during, and after menopause, PMS, or pregnancy; bloating or swelling for any reason; diabetes; and even minor damage to the tendons from an accident. The quality of a dental hygienist's life and the longevity or her or his career depend on listening to the body. CTS, tendinitis, and other upper-body musculoskeletal disorders can be relieved, decreased, and possibly eliminated with implementation of a daily self-care program.

Everyone's body is different. A person's health depends on the level of investment and amount of time spent making sure your body is mechanically functional. Before undertaking a self-care program such as the one outlined in this article, a medically healthy person must realign the physical structure and release muscle tension in order to regain balance and 100% nerve conductivity. The spine is stable when the vertebrae are aligned, one on top of the other, and the muscles are aligned bilaterally to help support the body in an upright position.^{6,9} A visual analogy would be a crooked house built of bricks that are not placed directly on top of one another, so that eventually the house will topple over. Attempting to stretch and strengthen the body when it is crooked can lead to a less stable posture.

Step 1. Posture

Posture is the most important step in initializing a program to prevent ergonomic injury (Figure 4). Bad posture leads to a life of pain. It may be necessary to consult a chiropractor to make sure the spine is stabilized and the muscles balanced bilaterally for proper structural and neural integrity, especially for those who have experienced traumas to the body, such as a car accident or whiplash, which impede the transmission of the nervous system. Once the body is determined to be structurally sound, a person can get up in the morning, "set" her or his posture, and carry that posture throughout the day.

Setting Your Posture

When correct posture is used and "set" every day, the intrinsic posture muscles that lie close to the spine are used to hold you erect. This gives you bilateral balance. No matter what position you are in—standing, bending, or sitting—the balance remains as long as you adjust yourself to remind the body's muscles of balance. You will know the difference once you start "setting" your posture. Correct posture will feel comfortable and other forms will not. Here is a simple way to set your posture each day.

Disrobe in front of a mirror and stand the way you do every day—the "tired feeling posture." Look in the mirror, stand sideways, and adjust your posture as follows: Stand with your chin in and slightly tipped down. To elongate your spine, place your hands on your ribcage. Take a deep breath and feel your ribcage rise upwards as the spine elongates. Your shoulders will rise upward, so drop them down and back a little. Relax your arms at your sides. Do not push your chest out. Move your pelvis as if you were tucking your tail beneath yourself. Your abdomen will flatten. Bend your

knees slightly. Now, breathe slowly and relax.

This is correct posture, which may seem uncomfortable at first, but that will be because you are not used to using the intrinsic posture muscles to hold you up. As you become accustomed to standing or sitting this way, eventually these muscles will strengthen and support your spine better. You are training them to do what they were designed to do: hold you up. It will be easy to give up and revert to a more comfortable posture, but, in time, the incorrect posture will begin to feel uncomfortable and it will be natural to maintain the correct posture.⁸

Certain symptoms of repetitive strain injury become evident when there is any nerve impingement. They include tingling in the fingers; loss of grip strength; loss of sense of touch; inability to hold onto your instruments firmly, or the need to hold the instrument more tightly each time; numbness and tingling; dropping

objects more often; inability to unscrew a jar lid; and waking up at night because your arm or hand fell asleep.

You can test yourself to determine possible nerve impingement and evaluate your grip strength and finger pad sensitivity.⁵



- 1. Tinel's Test. Hold one hand out, palmside up, and tap the crease of the wrist over the ligament where the median nerve lies (Figure 5). Pain or a tingling sensation indicates a nerve entrapment.
- Phalen's Test. Place the backs of your hands together with the fingertips pointing down (Figure 6) and hold that position for one minute. If your hands start to go numb, a problem may exist.
- 3. Muscle Tests. Applied kinesiology is a system of evaluation to improve the performance of the body.⁷ You can use it to determine the strength of the muscles in the thumbs and little fingers, and the nerve functions responsible for the grip of the hand. You can also find out if there is a misalignment of the elbow, wrist, and hand bones. Physicians and physical education professionals evaluate the function and effectiveness of the body's muscle performance with muscle tests based on the principles of applied kinesiology.^{2,7}

To perform the palm-up muscle test, ask a partner to help you. Place your hand palmside up. Place the pads (not the tips) of your thumb and little finger together and have your partner try to separate them by hooking her or his thumbs or forefingers through the open-

ing, pulling outward at the base of the thumb and little finger joint (Figure 7). Try to hold your thumb and little finger together as hard as you can, but without straining or shaking.

For the palm-down muscle test, with your hand palmside down, place the pads (not the tips) of your thumb and little finger together and have your partner try to separate them by hooking her or his thumbs or forefingers through the opening formed by your pinch and pulling outward (Figure 8). Try and hold your thumb and little finger together as hard as you can, but without straining or shaking.

In either test, if your finger and thumb are easily pulled apart, you may have a misalignment of the bones in your elbow and wrist joints, which lessens muscle strength and nerve integrity. You should be able to effortlessly hold your thumb and little finger together without straining or shaking.^{2,7}

Step 2. Perceived Grip Strength

Over the course of a person's life, the ability to perceive the difference between health and illness becomes ingrained. The awareness of changes that signal the onset of ill health can be heightened and made useful. For example, the sense of touch tells a person when pressure is being applied to, or by, her or his body. Over time, that person will become accustomed to a repeated stimulus (such as holding an instrument ready for work) evoking



Figure 5. Tinel's test



Figure 6. Phalen's test



Figure 7. Palm-up muscle test



Figure 8. Palm-down muscle test



a suspected sensation. The instrument feels the same in the hand

Figure 9. Perceived grip strength test

every time it is ready for use. If the instrument feels different, the person would notice—unless something had diminished her or his ability to perceive the sensation.

As shown by the perceived grip strength and finger pad sensitivity tests, focusing attention on the degree of strength and sensitivity may reveal them to be more diminished than a person has previously been aware.^{3,8,9,10} The perceived grip strength test (Figure 9) can help people evaluate and make decisions about what is needed to maintain or restore hand health.

The perceived grip strength test uses the fists as a pseudodynamometer to help determine whether or not there is need to begin the 12-step program for the arms and hands (see page 32).

• Make fists of both of your hands and squeeze them as hard as you can without shaking. Next, rate your strength on a scale from 1 to 10, where 10 is the strongest. Note any difference between hands. How strong do you think each hand is? Write the numbers down. This is an easy way to keep track of the changes in your grip strength, without visiting a health care professional every day.

Finger Pad Sensitivity Test

To determine your finger pad sensitivity, first close your eyes. Gently rub the tips of the finger pads with your thumb. Assign each of your finger pads a sensitivity rating on a scale from

Tips for the Equipment and Work Areas

- Increase your instrument handle sizes from 2 to 4 or larger to minimize the strain that results from pinching them.
- Use a short, wide handpiece.
- Use a slightly contoured contra-angle and buy 10–12 of them at a time, if possible, so that you'll have enough for a day and can sterilize the bunch at the end of it.
- Use external fulcrums such as the patient's cheek or chin when working in the mouth.
- Replace curly cords on instruments with straight cords that offer less resistance.
- Be aware of the vibration and balance of the handpiece and the size of the instrument. An instrument that requires too tight a grasp can increase the tension in your fingers, hand, and forearm muscles.
- Use a slow-speed handpiece. It can make a difference when you polish.
- Place the tray and handpieces so that they are convenient to you. Move them—and the patient—as necessary.
- Vary your routine. If you typically examine, then scale, then polish the teeth of most patients, alternate by polishing some teeth after the examination and before scaling.
- Ask your patient to help you by turning her or his head to lessen the distance you have to reach.
- Purchase a lumbar support cushion and strap it to the back of the hygiene chair to support your low back and allow you to sit up straighter.
- Sit in a chair that you can adjust to fit your body and adjust it as necessary throughout the day.
- Try to keep your joints in a neutral position, and at 90-degree angles as much as possible to avoid increased musculoskeletal strain. Correct posture includes feet flat on the floor, head and neck relaxed with head erect and eyes forward, shoulders down and relaxed (not raised toward the ears), forearms parallel to the floor, and wrists in a neutral position. Use a mirror for indirect visual assistance. Sit with your pelvis tilted slightly backward with your lower back flat against the lumbar cushion for support.⁸
- Identify the risk factors for ergonomic injury and then make the necessary changes to insure a safer work area. Consider asking an expert in the field of ergonomics and workplace safety to evaluate your work area.

Sources:

Deborah Bailey McFall, RHD, BS; Linda J. Gerwatowski, RDH, BS; Lisa Potter, RDH; Monica Skibbe, LDH. Poindexter SM: All the right meyes: Ergenemics and the dept

Poindexter SM: All the right moves: Ergonomics and the dental hygienist. *Access* 1995;9(1):18-28,33.

1 to 10, with 10 the most sensitive. Once you have performed your self-perceived evaluation and written down your ratings, you will be attuned to notice if your sensitivity changes according to your own antennae of perception.³ The perception tests are used to help you understand when something does not feel correct and when you need to begin your maintenance program. This is where the 12-step program for self-alignment and muscle release comes into play. These 12 steps are

- 1. Postural alignment
- 2. Perceived grip strength
- 3. Neck massage
- 4. Forward arm extension (elbow)
- 5. Lateral arm extension (elbow)
- 6. Wrist press
- 7. Wrist pull
- 8. Wrist squeeze
- 9. Finger pull
- 10. Upper back stretch
- 11. Shoulder, chest and elbow stretch
- 12. Muscle therapy⁸

Whether you do it alone or with the help of a health care practitioner, the use of massage therapy will help reduce or eliminate pain and restore integrity. It also dissolves trigger points, which are hypersensitive areas in a muscle that are tender to touch and become more sensitive when you experience physical or emotional stress or trauma. When a trigger point "fires," it sets off a continuous cycle of spasm and pain. The muscles will become firm to the touch and contract when they are overworked and overstrained, as happens when repetitive hand movements are used.⁸

Self-Administered Muscle Therapy

To determine if there is muscle/tendon pain, press in the belly of the forearm muscle and around the elbow joint where the tendon attaches to the bone. If there is pain, you may have tendinitis or trigger points. The key to recovery or healing the muscles is muscle therapy.

Once you have completed the steps, you can repeat the perception tests to reevaluate your grip strength and finger pad sensitivity. Is there a change or not? Giving yourself a numeric rating helps you keep track of your body's changes in strength and sensitivity and determine when to perform the 12 steps. When you repeat the tests, you should see improvement in sensitivity and grip strength.⁸ This evaluation can be done several times throughout the day. Checking your

grip strength and sensitivity routinely will help you determine when you should do the 12 steps. For example, if you start your day off with a rating of eight, but by lunch you feel like a five, then not only would you perform the 12 steps, but also massage your muscles to help them regain more flexibility and lessen any trigger points that my be beginning to form. This is prevention and maintenance.

Receiving regular treatment of the muscles by a qualified massage therapist will help you maintain muscle health, eliminate pain, and lessen emotional stress. Professional treatment once a week or every two weeks, plus nightly selfcare, is the ideal maintenance program.

How to Self-Massage Your Arms and Hands

Every health food store sells massage oils and lotions, as well as essential oils. Lavender soothes the nerves and helps with sleep, wintergreen and cedar leaf are natural pain relievers, and peppermint increases oxygen to the muscles. Adding a few drops of essential oil to the massage oil or lotion can increase the healing potential.¹¹ Take a small amount of the oil or lotion in the palm of your hand and spread it on your arm. Begin at the elbow and, using your thumb, work across the muscles, spreading the fibers (Figure 10). This opens up the muscle, increasing blood supply and oxygenation and breaking up scar tissue. Repeat this stroke at least three times, or more if you like. Work down into the hand. Turn the arm over and repeat the same stroke on the inner arm muscles. After you have used your thumb to spread the muscle fibers open, press firmly into the muscle on the massaged forearm, and glide it upward as shown. This will flush blood and oxygen back toward your heart. Then use your finger pads to massage around the elbow with small cross-fiber strokes. A cross-fiber stroke is performed by pressing down into the muscle tissue and slowly gliding the finger pads back and forth in a "sawing" motion. This is where you may find old scar tissue and the "ropy" muscles that are produced from a constant isometric contraction such as when holding your instruments in a pinch-grip for a period of time. These strokes can hurt, so go slowly.8 If your arms are really painful to touch, it is best to see a professional to help you get started. Professional massage can accustom you to the sensations of self-massage, plus it relieves stress and feels good.

The Health Care Team

A health care team to support the mechanics of the body consists of a chiropractor or osteopath, a massage therapist, an acupuncturist, a physical therapist, and an athletic trainer. Their job is to keep the body running smoothly and in balance, harmonize the energy, increase flexibility and range of motion, and help the body become stronger. It isn't just about the upper body strength; it is about the body as a whole. A dental hygienist working with such a team and following the daily self-care program can prevent CTS and any



Figure 10. Muscle therapy

access

other upper-body musculoskeletal disorders. There is no cure for musculoskeletal injuries—only body maintenance. A person who invests in her or his body and helps it to stay mechanically sound will have fewer problems with function and mobility.

Professionally Administered Muscle Therapy

Muscle therapy, which encompasses massage and physical therapy, helps minimize structural and muscular strain and can increase the length of time a person is able to work. These noninvasive therapies can help release muscle tension and strengthen the muscles, tendons, and ligaments that bind joints together and create a more bilaterally balanced and supported body. Massage therapy can heal soft tissue. An adept therapist gently manipulates muscles to break down scar tissue, increase blood and lymphatic circulation, flush out toxins that cause pain, and restore physical balance and chemical homeostasis to the soft tissue. When muscle spasms associated with long workdays' are gone, it is easier to hold and to feel instruments without compensating.

Once the soft tissue is healed, the strengthening program can begin. A physical therapist or athletic trainer can design a program to strengthen the upper and lower body that can be performed at home or at a gym. It is not wise to begin a program before the muscles are healed, since pain can reoccur during healing, prompting compensation and possibly impeding compliance with the exercise regimen. The pain from an injury is different from the pain caused by exercise. Strengthening the body is important but the soft tissue needs to heal first.

Acupuncture is another supportive therapy that has been around for thousands of years. Chinese medicine has long identified bioelectric energy, called Qi or Chi, that circulates throughout the body along well-defined pathways called meridians. The meridians traverse the length of the body, weave through the muscles, and lead to organs and glands. If the Qi is disrupted, optimum function is affected and the result is pain or illness. Stimulation of acupuncture points on the surface of the skin rebalances the whole body's energy and supports health. Acupuncture is used for pain,

Fingers and Corresponding Meridians of the Chinese Acupuncture System

- Thumb—lung
- Second finger—large intestine
- Third finger-pericardium
- Fourth finger—triple heater (not an organ, but a system of functions)
- Little finger—heart and small intestine

fatigue, insomnia, migraine headaches, muscle pain, and to bring about homeostasis of the body's energy.¹²

More Self-Care Techniques



Figure 11. Upper back stretch



Shoulder. chest.

and elbow stretch

the day. Never strain when you stretch—go only as far as your body will permit you to. The more you work with your body, the more flexible it will become. Try to hold the stretch for five seconds, breathing evenly and rhythmically. Don't hold your breath, because that stops the flow of energy throughout the body. Instead, take a deep breath and then exhale into the stretch so that the muscles follow the flow of the breath and stretch more easily. Here are some simple stretching movements for the upper body.

An early morn-

ing 30-minute walk with 10 minutes

or more of stretch-

ing gives the body

and mind a boost

and sets a pace for

A stretching exercise for the upper back can be performed standing or seated (Figure 11). Clasp your hands together in front of you and inhale. Then exhale as you extend arms out in front of you at chest level. As you exhale, stretch forward, sinking the chest inward and rounding the shoulders forward (imagine your chest caving in). Hold the stretch for 10 seconds. Breathe slowly and deeply. Inhale, releasing the hands and drawing the shoulders back and down. Repeat two to five times. This feels good when the upper back is tired.

A stretching exercise for the shoulders, chest, and elbows (Figure 12) loosens muscles in the chest and shoulder area. An added benefit is the extension of the elbow joint, which helps realign the skeleton. Stand and interlace your fingers behind your back, with your palms toward your back. Straighten the arms and elbows, stretch the arms backward, and then lift them up and away from your back. Perform this stretch slowly and hold for 10 seconds. Relax and breathe slowly and deeply. Repeat this stretch as often as needed, especially if you find yourself slumping or rolling your shoulders forward.⁸

Begin the day with these warm-up range-of-motion exercises. They can be performed anytime and anywhere.

1. Hand circles: At the wrist, rotate each hand five times each clockwise and counterclockwise.

- 2. Fist clenches: Open and close your fists rapidly five times.
- 3. Wrist bends: Bend your wrists forward and backward. Hold for four seconds in either position. Use one hand to bend the other at the wrist.
- 4. Finger bends: Bend your fingers forward and backward, one at a time. Hold for one or two seconds. Use one hand to bend the fingers of the other back and forth from the knuckle.
- 5. Finger rotations: Rotate the fingers clockwise and counterclockwise on the knuckle. Use the fingers of one hand to rotate the fingers of the other.
- 6. Finger pulls: Pull gently on the fingers, grasping the finger joint closest to the hand.
- 7. Hand shakes: Shake hands gently.
- 8. Finger spread: Spread your fingers wide apart and stretch them outward.
- 9. Finger pinch: Pinch the ends of the fingers, firmly, for one second, to stimulate the energy in six meridians of the Chinese acupuncture system.
- Palm rub: Rub the palms together rapidly, then massage the hands and fingers. This is a good way to increase circulation and it feels great.⁸

Chapman's Reflexes— The Neurolymphatic Reflex points

Here is a quick and easy technique you can do each day, anytime and anywhere, to help strengthen your immune system, detoxify your body, regain muscle strength, flush your lymphatic system, and eliminate pain, all with a quick rub. This technique makes your body "hum."

The lymphatic system acts as the body's drainage system, carrying proteins, hormones, and fats to the cells. It is regulated by the neurolymphatic reflexes—points on the body discovered, named, and charted by Frank Chapman, DO, in the 1930s. Chapman found that rubbing one of these points would stimulate a flushing action in a corresponding organ or gland. In the 1960s, George Goodheart, DC, correlated Chapman's reflexes with the musculature of the body so that this chart can be used by anyone to keep the lymphatic system flushed clean.^{2,7}

The neurolymphatic reflexes are located mainly

on the back, chest, and legs. The reflex points act like circuit breakers that get turned off when the system gets overloaded. The reflex points vary in size from that of a pea to that of a small bean



Figure 13. Chapman's reflexes. Reprinted from Thie J: Touch for Health. Marina del Ray, California, DeVorss Publications, 1998. Used with permission.

What the muscles will feel like when Chapman's Reflexes are massaged

An unhealthy muscle feels fatigued, heavy, weak, and sore. It burns and feels tight and painful to the touch. A healthy muscle feels light, strong, relaxed, energized, flexible, and free of pain.

The system works immediately. By flushing the muscles regularly, you will avoid muscle soreness and prevent injury. Your body knows the map; all it needs is a jump-start to remember it. and occur either alone or in clusters. A reflex point can usually be located by rubbing a specific spot indicated on the chart. If the reflex feels tender to touch, it may signal that the system is clogged up and overloaded. The sorest reflexes are usually those in greatest need of massage;

that is, the corresponding organs are in greatest need of flushing. As Goodheart found and the chart indicates, each point or cluster of points corresponds to a muscle as well as an organ or gland. Find the particular muscle you need to work on and with your finger pads and (or your index finger, if one point is shown instead of a cluster) massage it firmly and deeply for a minimum of 20 seconds and a maximum of five minutes. Don't rub hard enough to hurt, just hard enough to know that you are working the area. The degree of tenderness indicates the extent of the problem. As the tenderness decreases, balance will return, along with a stronger muscle and organ/gland system. As you continue to use this technique daily, it will take less time to feel its effects, and the body will begin responding more efficiently. If you do not rub hard enough, you will not get the results necessary for immediate relief. Light rubbing is indicated only to reduce swelling in the immediate area of an injury, and, in that case, the strokes should always be toward the heart.

Exercise and Nutrition

A good program of exercise and nutrition is necessary to keep the body strong and fueled with energy. Twenty minutes a day of walking increases circulation and oxygen needed for all the organs and muscles to function better and for detoxification to take place. Waste products that cause sore muscles and pain move out of the body, as does illness. Eating too much junk food or drinking soft drinks laden with process sugars creates an unbalanced biochemistry. Muscles respond by becoming weak and losing energy. Plenty of fresh—if possible, organic—vegetables and fruits and pasture-fed meat protein should be consumed daily. Dairy and fats should be consumed sparingly.

Conclusion

The body's well-being begins with learning how to take care of it. A daily program of self-care and regular visits to a health support team can help prevent CTS and other musculoskeletal disorders that can damage dental hygienists' quality of life and shorten their careers.

References

- Carpal Tunnel Syndrome statistics from 1997–2000. Sources from the National Institute for Occupational Safety and Health—NIOSH and the Bureau of Labor Statistics.
- Walther DS: Applied Kinesiology Synopsis. Systems DC, 1988.
 Martini FH: Fundamentals of Anatomy and Physiology.
- Prentice Hall, Inc., Upper Saddle River, New Jersey, 1995. 4. Seig KW, Adams SP: Illustrated Essentials of Musculoskeletal
- Anatomy, 2nd ed. MegaBooks, Gainesville, Florida, 1985.
 5. Hoppenfeld S: Physical Examination of the Spine and Extremities. Appleton-Century Crofts, Norwalk, Connecticut,
- 1987.
 6. Parker Chiropractic Research Foundation: Symptoms of Spinal Misalignment Questionnaire Chart, 1980.
- 7. Thie J: Touch for Health, 3rd ed. DeVorss Publications, Marina Del Ray, California, 1998, pp. 12-13, 15-17, 22, 23.

- Montgomery K: End Your Carpal Tunnel Pain without Surgery. Rutledge Hill Press, Nashville, TN, 1998.
- 9. The Major New Oxford Encyclopedic English Dictionary. Oxford University Press, Oxford, 1991, p. 1077.
- Mironer YE, Somerville JJ: Neuronometer® CPT/C—The current perception threshold evaluation in radiculopathy: Efficacy in diagnosis and assessment of treatment results. *Pain Digest* 1998;8:37-38.
- Leatham P, Higley C: Reference Guide for Essential Oils. Abundant Health, Olathe, Kansas, 1997.
- Beijing College of Traditional Chinese Medicine: Essentials of Chinese Acupuncture. Foreign Languages Press, Beijing, China, 1993.
- Plastic Surgery Information Service: Classic carpal tunnel surgery. Available at www.plasticsurgery.org/faq/carpal.htm. Accessed April 2002.

Kate Montgomery, ND, is the author of *End Your Carpal Tunnel Pain without Surgery*. Unless otherwise indicated, all figures accompanying this article are from that book. Montgomery says that her 12-step corrective program and insightful self-care techniques have helped thousands of people return to functional and productive lives. Her company, SportsTouch can be contacted at www.sportstouch.com. The American Dental Hygienists' Association does not endorse this or any other exercise program.

