

# spinal cord injury

UPDATE

Department of Rehabilitation Medicine

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## *The Pain Issue*

### Understanding pain and spinal cord injury

As anyone with SCI knows only too well, chronic pain is a frequent problem after SCI and often causes more disability than the paralysis itself. Pain after SCI can be so severe and disabling that some people have said they would give up the possibility of neurological recovery in favor of pain relief. Because chronic SCI pain is such a widespread problem and so difficult to treat, this issue of *SCI Update* is devoted to pain after SCI: understanding it, treating it and living with it.

#### *Types and causes of SCI pain*

People with SCI often experience many different types and locations of pain, and this is one of the things that makes pain after SCI so difficult to treat. Each kind of pain may require a different treatment approach. While acute pain has an identifiable cause and goes away when the cause is treated or eliminated, chronic pain is ongoing, long-standing, persistent and stubborn, and often a specific source cannot be identified.

#### *Neuropathic pain*

This is the most common type of chronic pain in the SCI population and the hardest to treat. Neuropathic pain is usually felt at or below the injury level, but can also occur above the level of injury. It is caused by abnormal signals to the brain from the nerves that were damaged by your SCI. A person can feel neuropathic pain in areas that have no sensation.

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## Pain and the brain

What brain science tells us about why we feel pain and how we can change it.

A conversation with Mark P. Jensen, PhD

### *What is pain?*

“Pain is the brain’s response to physical damage (as from an accident or disease),” says Mark Jensen, UW rehabilitation psychologist and professor in the Department of Rehabilitation Medicine, and an expert in chronic pain in persons with disabilities. “The damage sends signals up to the brain, causing five areas in the brain to become activated. The experience of pain is the interaction between these five areas. Pain is not the end-product of damage but the end-product of activity in the brain.”

In chronic SCI pain, damaged nerves in the spinal cord send abnormal signals to the brain. The brain interprets these signals as pain, and the five areas start “firing up.” This activity in the brain causes pain, and that pain is very real, not imagined or made up. Pain is the biological response to those abnormal inputs.

### *What can a psychologist do?*

“Usually people come to psychologists when medications prescribed by their physician don’t work well enough or work well but have intolerable side-effects,” says Jensen. “Traditionally we psychologists are the second line of treatment after pharmacological treatments (drugs), but that makes no sense. If somebody has pain, they deserve to receive all treatments that have demonstrated efficacy and have minimal or beneficial side-effects.” The only treatments that fill that description are cognitive therapy and self-hypnosis. “Research evidence supports the argument that psychological interventions should be one of the first line treatments, not something to do when everything else has failed.”

Right now there is no effective pain medication that works for everyone or has no adverse side effects. A person may take

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gabapentin or lyrica or an opioid (narcotic) such as oxycontin and be able to tolerate the side effects. But others find the side effects intolerable, and some have tried significant doses and still have severe pain.

Jensen believes people should be referred to psychological treatments sooner. "And there's no reason not to provide both medications and psychological treatments at the same time."

### Psychological treatments for SCI pain

Several psychological therapies focus on decreasing pain by changing brain activity. "Patients can learn to get control of brain activity by changing their thoughts, using hypnosis to change brain states, using relaxation to feel more at ease, and getting absorbed in pleasurable activities," Jensen says. Like pain medications, these methods do not work for everyone, nor do they completely eliminate SCI pain. Unlike medications, however, their side effects can actually be beneficial.

### Cognitive restructuring

This therapy works on the principal that changing your thinking changes brain activity, which in turn changes your experience of pain, Jensen explains. "We ask people to stop and look at the

thoughts they have about their pain and ask themselves if these are comforting and reassuring thoughts (which lead to analgesia or pain reduction) or alarming thoughts (which fire up the brain and lead to more pain)."

Humans are biologically programmed to be alarmed about pain sensations because pain normally means something is wrong. But with chronic pain, alarming thoughts are not useful; rather, they are counter-productive. "So we train patients to identify these automatic alarming thoughts and replace them with automatic calming thoughts," Jensen says. "And when they do that, they experience less pain."

"Changing the meaning of pain, from 'my life is falling apart because of this pain' to 'I have tools to manage this' decreases activity in the part of the brain that tells you how big the pain is so you don't feel it as strongly," he says. "It doesn't mean the pain isn't real, but the experience is buffered, and suffering is reduced. It's a biological process.

We can take advantage of these processes so a person can learn to hurt less."

### Environmental therapies

These methods address the patient's social environment, particularly the family's response to a patient's pain. "When a family member, often a spouse, keeps asking about the patient's pain, they are actually making it worse because they keep the patient focusing on the pain," Jensen explains. "But if you stop focusing on the pain, the pain diminishes. We encourage the patient and spouse to focus less on the pain and more on valued life activities." Again, this does not mean the pain isn't real. Pleasurable activities are actually analgesics because they reduce the brain activity that causes pain.

### Self-hypnosis training

In hypnosis, a specially trained therapist guides the patient into a state of deep relaxation and then makes suggestions for reduced pain and increased comfort. Once patients are trained in self-hypnosis they can use it whenever they wish.

"We have studied self-hypnosis training and found that it produces substantial decreases in pain that stays away for at least three months in 30% of subjects with SCI," Jensen reports. He is now in the process of looking at those data to see if the effects last as long as 12 months. In addition, 70% say they continue

to use hypnosis even if their pain doesn't decrease very much because the "side effects" of hypnosis (increased overall calmness and well being) are all positive. Hypnosis reduces activity in the part of the brain that suffers, so the pain may still be there but it doesn't bother them as much.

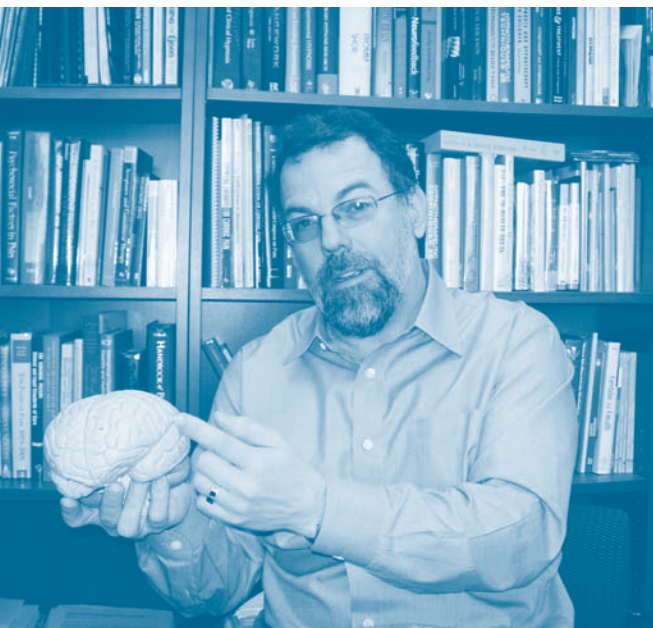
### Biofeedback-assisted relaxation

This method teaches patients how to relax their muscles by giving them feedback about muscle activity as they go through relaxation training. In EMG biofeedback, electrodes placed on the skin over a muscle send signals to a computer, which turns the information about muscle tension into sounds. These sounds change as the person becomes more relaxed. "In our study comparing EMG-assisted biofeedback relaxation to self-hypnosis, we found that both improved pain, but self hypnosis was more effective," Jensen says.

### Neurofeedback

Brain signals picked up from electrodes on the scalp appear on a screen as alpha and beta patterns. Patients watch the screen and learn to increase the alpha waves and decrease the beta waves, "changing their brain from one that looks like it's in pain to one that is relaxed," says Jensen. He has conducted pilot stud-

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*Unlike the side effects of medications, the side effects of psychological treatments are all positive.*  
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Mark P. Jensen, UW rehabilitation psychologist and professor of rehabilitation medicine, studies treatments that teach people techniques for reducing chronic pain by changing their brain activity.

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ies using neurofeedback and hopes to study it further.

### Transcranial direct current stimulation (rTMS)

In rTMS a mild electrical charge (about the strength of a D battery) is applied to the scalp, and this increases motor cortex activity. “Studies have shown that 20 minutes a day decreases pain in people with SCI.” Jensen believes rTMS holds some promise for chronic SCI pain, and research needs to continue.

### Living with chronic SCI pain

While there is currently no widely effective treatment for SCI pain, “there are things you can do now to suffer less. These involve changing the way your brain processes pain information,” Jensen says. “If you are active and absorbed in pleasurable activities, pay attention to your thoughts and tell yourself reassuring

thoughts, and get help to learn relaxation skills, you will hurt less and suffer less.”

Meanwhile, Jensen is encouraged about the future of SCI pain therapies because “people around the world are trying to find treatments that are more effective, ranging from medications to specific psychological practices. As we learn more, there will be more options.”

Finally, Jensen feels that pain research is seriously underfunded. He suggests that “if you are involved in political action, you might consider encouraging your elected representatives to support more NIH pain-related research.”

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Dr. Jensen is expecting to start new studies of chronic pain in SCI soon. If you live in the greater Seattle area and think you might be interested in participating, you may call him directly to find out more (206-543-3185).

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## Understanding pain and SCI

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Your physician may order an X-ray or MRI (magnetic resonance imaging) of your spine to make sure there is no bone or spinal cord abnormality such as a syrinx (a cavity that develops in the spinal cord of about 2% of the SCI population). If tests do not find a specific problem, then your pain probably is caused by the abnormal signals from your SCI.

Many different medications are used for neuropathic pain, including antidepressants at low doses, anticonvulsants such as gabapentin, narcotics (morphine, codeine), nonsteroidal anti-inflammatory drugs (ibuprofen) and others. Sometimes combinations of drugs work better than a single drug. In some cases, treating spasticity helps reduce the pain.

### Musculoskeletal and visceral pain

Musculoskeletal pain comes from problems in the muscles, bones or tendons and is common in the general population as people age. In SCI, chronic musculoskeletal pain can be caused by overuse or strain, arthritic changes, or wear and tear of the joints, often from wheelchair use. Treatment usually includes physical therapy, changes in equipment, medication, or all three.

Visceral or abdominal pain is located in the stomach and digestive area and can be caused by undiagnosed gastrointestinal problems such as ulcers, constipation or appendicitis. Since a person with SCI may not have the usual symptoms associated with these medical conditions, a physician with limited experience caring for SCI patients may have difficulty making the correct diagnosis and prescribing the right treatment. If no abdominal problem or disease can be found, then the pain is considered to be neuropathic pain that is caused by abnormal nerve signals but felt in the abdomen.

### Non-drug treatments

There are many methods of managing pain besides drugs. Massage, acupuncture, aerobic exercise, yoga, stress reduction techniques, hypnosis and other psychological techniques are sometimes helpful in reducing or relieving SCI pain. Discuss these treatments with your physician before trying them. It is important to find reputable practitioners of these therapies who have experience working with individuals who have SCI.

### Prevention and self-care

- Overall health can have a big impact on pain. Good diet, healthy weight and regular exercise improve overall health. Pain can get worse or harder to treat if you are rundown, suffering repeated urinary infections or not getting enough sleep.
- Get prompt treatment for medical problems. Urinary tract infections and spasticity can make pain worse.
- Get a wheelchair seating evaluation. Poor posture and improper wheelchair technique can cause serious pain problems.
- Pay attention to your emotional health. Stress, depression and other emotional upsets often make pain worse. Counseling or other treatments can help.
- Consider trying some of the techniques described in “Pain and the Brain” (page 1).

Adapted from “Pain After Spinal Cord Injury” by Diana Cardenas, MD, in the pamphlet series *Staying Healthy After a Spinal Cord Injury*, published by the Northwest Regional Spinal Cord Injury System (2005).

## In their own words

### Stories—and advice — from people living with chronic SCI pain

I started having pain about six months after injury. The pain feels like burning, pins and needles, and electric shock. A lot of activities trigger it, but nowadays it's constantly there, 24/7. If I had to rate it on a scale from 1–10, it would be 4–5 on a typical day and definitely an 11 on sleepless nights.

I have tried many things over the years (acupuncture, Chinese herbal medications, tai-chi, martial arts (punching bags), breathing techniques) but what seems to work is morphine, neurontin and trileptal, along with constantly keeping my mind busy. Everyone's pain is different, even though we might have similar injuries. Keep exploring all possibilities.

—34-year-old male; T4;  
injured 5 years



I have neuropathic pain all of the time. At one point my pain was much worse than it is now and not managed well at all, to the point of causing personality changes. It made me more agitated and on edge, constantly looking out for potential pain sources.

I think I have tried practically every drug there is for neuropathic pain. The thing that made the greatest change for me was switching to the antidepressant sertraline (Zoloft). This likely had a compounding effect of changing my perception of pain psychologically as well as reducing the physiological pain signals.

My advice: Try different things! Try switching or starting an antidepressant; that made the biggest difference for me. I've been through half a dozen or so, and when I finally arrived at one that worked for me it made a big difference. Also, don't let it get you down or stop you from doing the things you want. It's easy to fall into your own little world and feel alone—after all, pain is a lonely suffering. Watch out for that and seek out positive ways to deal with your pain to a point where it's not controlling who you are.

—25-year-old male; C5;  
injured 6 years



I have neuropathic pain in my back and sometimes it shoots down my legs like electricity. I have learned to block out the pain in my mind and to calm myself, plus I do take pain medication like codeine. The calmer I am, the less pain I have. It can be hard to explain to people and in some instances I believe people have thought I was making it up because they can't understand how I can have pain in my legs when I can't feel my legs.

—32-year-old female; T5/6;  
injured 15 years



I have neuropathic pain pretty much 24/7. On a 1–10 scale the average is 7. What triggers the pain is mostly a mystery, but it is made worse by stress, constipation, having to sit still or in one place for more than 10 minutes, and urinary tract infections.

I try to keep as busy as possible, listen to my favorite music loud. I take neurontin, but it doesn't help that much. I practice relaxation techniques. Sometimes massage helps. My advice: Keep busy. Distract yourself from the pain as much as possible. Seek support from others with the same issue.

It's a good idea to find yourself a good psychologist who has worked with chronic pain patients. Chronic pain



can make you very depressed and can overwhelm your life. Cognitive methods like self hypnosis, breathing and relaxation exercises and the use of imagery can help.

—58-year-old female; T10/11;  
injured 13 years.



I have pain all the time, located in the legs and bladder. Typical pain triggers are stress, dehydration and bladder incontinence. I use baclofen, neurontin, acupuncture, swimming, and even mind games—imagining the pain doesn't exist—to deal with pain. My advice: Learn to accept it; it gets easier. Try acupuncture; relax.

—28-year-old male; T10;  
injured 2 years



I have pain constantly. The intensity varies. Location is in the legs, lower and upper back and neck. It is triggered by temperature, touch, vibration and wrinkled clothing. I have a baclofen pump with a combination of morphine and baclofen.

—44-year-old male; C5; injured 10 years



I've come up with some basic techniques that help to decrease the pain. Many are just distractions or mind over matter, but I think I've trained myself to know (or believe) that they help.

One thing I do when I'm experiencing pain is take deep breaths and then slowly let them out. I imagine breathing into the area on my body where the pain is concentrated. This is both distracting and relaxing. Sometimes I will just rub the area where the pain is, like rub my hands down my thighs. It feels like I'm pushing the pain out.

It's hard sometimes to be rational because pain can affect nearly everything in day-to-day life but this is a situation (battle) where attitude and perspective really can be a useful part of your arsenal. This could be where a therapist might be helpful.

—52-year-old female; T12;  
injured 27 years

# Treating SCI pain: What the research says

By Jeanne Hoffman, PhD, UW rehabilitation psychologist

Treatment for spinal cord injury (SCI) pain continues to be a focus of research. Studies over the last two years have examined the effectiveness of medications, brain stimulation, exercise, acupuncture and psychological approaches such as hypnosis and biofeedback. Most research has focused on neuropathic pain.

## Understanding research studies

There are many different kinds of research studies, and the way they are designed often determines how good the results are. Randomized controlled trials (RCTs) are considered the best or “gold standard” of study designs. In RCTs, participants with the same type of medical problem are randomly (by chance) assigned to one of two or more different treatments, one of which might be a placebo (inactive substance that has no treatment value). The groups are compared at the end of the study to see whether one treatment was better than another.

However, RCTs are often difficult to do and require a large number of participants. For this reason, initial studies, including studies examining just a few people who undergo a treatment (called case studies) are more common. Much of the evidence in pain management after SCI so far comes from initial studies.

## Medications for pain

A recent review of research studies (Baastrup & Finnerup, 2008) found that there have only been 10 RCTs of medication treatments for neuropathic pain. Most found no difference between the study medication compared to a placebo. Those drugs that did show some reduction in pain were gabapentin and pregabalin (originally developed for treating seizures and found to help with pain) and amitriptyline (originally developed as an anti-depressant but found more effective for pain). The review also suggested that opioids (narcotics such as codeine and morphine) can relieve neuropathic pain. Another study (Rintala, 2007) found that amitriptyline may be more effective than gabapentin in treating SCI pain. Botox has also been studied (Naumann et al., 2008) and was found to lessen pain from detrusor sphincter dyssynergia (bladder spasms) after SCI.

## Brain stimulation

In a case study, 12 patients with central pain received repetitive transcranial magnetic stimulation (rTMS), in which electrodes are placed on the scalp to stimulate the motor cortex (Defrin et al., 2007). Results of this study suggest that rTMS may be useful if given over time. A study using cranial electrotherapy with ear clip electrodes produced pain reduction in those with SCI (Tan et al., 2006). Canavero and Bonicalzi (2007) in Italy have suggested that producing a small stereotactic lesion deep in the brain may provide relief of central pain. However, another study done in Germany on deep brain stimulation found no benefit for individuals with SCI (Rasche et al., 2006).

## Acupuncture

A case study of acupuncture on 17 people with shoulder pain found that pain decreased with both acupuncture and sham (fake) acupuncture (Dyson-Hudson et al., 2007).

## Exercise

A case study using virtual walking found some evidence for improved neuropathic pain located at the level of injury (Moseley, 2007). Actual exercise, using circuit resistance training, was found to improve strength and endurance and reduce shoulder pain (Nash et al., 2007). In another study, an eight-week home exercise program reduced pain and improved function in persons with SCI and shoulder pain. (Nawoczenski et al., 2006).

## Psychological factors

Having good social support has been found to lower pain after SCI (Widerstrom-Noga et al., 2007). A review by Jensen and colleagues (2007) reports that neuropathic pain can reduce quality of life and suggests that biopsychological (vs. only medical interventions) approaches may be useful. A case study on 12 individuals with SCI using healing touch and progressive relaxation was found to reduce pain and increase a feeling of well-being (Wardell et al., 2006).

## What treatment might work for you?

Since everyone’s pain is different and no single treatment works for everyone, it is important to work with your physician to manage your pain. Siddall and Middleton (2006) suggested an algorithm (steps to follow) for physicians to use when treating patients with pain after SCI. This involves properly diagnosing the type and potential causes of pain. Treatment is then given based on the problem and on the known literature of pain management techniques.

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# literature review

The articles previewed below were selected from a recent screening of the National Library of Medicine database for articles on spinal cord injury. In the judgment of the editors, they include potentially useful information on the diagnosis or management of spinal cord injury. You may obtain copies of the complete articles through your local medical library or from UW Health Sciences Library Document Delivery Service (call 206-543-3436 for fee schedule).

## ADJUSTMENT

### ■ Coping with spinal cord injury: strategies used by adults who sustained their injuries as children or adolescents.

This study used telephone interviews to examine the coping skills of 259 adults who sustained SCI at age 18 or younger. Sixty-two percent were male and 58% had tetraplegia. The average age at injury was 14 years and average age at interview was 30 years (the range was 24-42 years). The main coping strategies reported were acceptance (99%), positive reframing (94%), active coping (93%), emotional support (89%), humor (89%) and religion (74%). The negative coping skills of behavioral disengagement and substance use were used by 28% and 15%, respectively. Positive coping strategies tend to be used by a majority of adults with pediatric-onset SCI, and several coping styles (seeking emotional support, acceptance and religion) are associated with greater life satisfaction. Substance abuse had a negative effect on life satisfaction.

Anderson CJ, Vogel LC, Chlan KM, Betz RR.  
*J Spinal Cord Med.* 2008;31(3):290-6.

## COMPUTER ACCESS

### ■ Tooth-click control of a hands-free computer interface.

People with severe upper limb paralysis use devices that monitor head movements to control computer cursors. The three most common methods for producing mouse button clicks are dwell-time, sip-and-puff control, and voice-recognition. Here, we tested a new method in which small tooth-clicks were detected by an accelerometer contacting the side of the head. The resulting signals were paired with head tracking technology to provide combined cursor and button control. This system was compared with sip-and-puff control and dwell-time selection. Seventeen people with disabilities and ten people without disabilities tested each system. Tooth-click control was much faster than dwell-time control, and while it was not quite as fast as sip-and-puff control, it was more reliable and less cumbersome.

Simpson T, Broughton C, Gauthier MJ, Prochazka A.  
*IEEE Trans Biomed Eng.* 2008 Aug;55(8):2050-6.

## BRAIN-CONTROLLED FES

### ■ Direct control of paralysed muscles by cortical neurons.

This report describes an animal experiment into brain-controlled functional electrical stimulation (FES) of a muscle. In *Macaca nemestrina* monkeys, control signals from the brain were routed around the injury using artificial connections. The signals could then control electrical stimulation of muscles, thereby restoring voluntary movement to paralysed limbs. The motor cortex in the monkeys was connected to a device that converted neuron activity to FES signals. Monkeys learned to use these artificial connections from the cortical cells in their brains to their muscles to generate muscle movements. The transformation of cortical activity to muscle stimulation could be implemented by autonomous electronic circuitry, creating a relatively natural neuroprosthesis. These results are the first demonstration that direct artificial connections between cortical cells and muscles can compensate for interrupted physiological pathways and restore voluntary control of movement to paralysed limbs.

Moritz CT, Perlmutter SI, Fetz EE.  
*Nature.* 2008 Oct 15.

## EXERCISE AND FITNESS

### ■ Incomplete spinal cord injury, exercise and life satisfaction.

Sixty-nine individuals with incomplete SCI completed a questionnaire measuring life satisfaction, self-rated physical exercise and self-perceptions. Of those, 68% performed physical activity regularly once or more a week. This group scored significantly higher on life satisfaction and perceived fitness, but significantly lower on perceived exercise mastery, than those who did not exercise. Perceived exercise fitness was the psychological variable that contributed meaningfully to life satisfaction in this study.

Lannem AM, Sørensen M, Frøslie KF, Hjeltnes N.  
*Spinal Cord.* 2008 Oct 7.

### ■ Physical activity is related to lower levels of pain, fatigue and depression in individuals with spinal-cord injury: a correlational study.

Forty-nine participants with SCI who used a manual wheelchair for primary mode of mobility completed the physical activity recall assessment for people with SCI (PARA-SCI). Approximately 50% of reported physical activity among individuals with SCI was due to activities of daily living. The amount of physical activity was not related to injury level, age, body mass index or waistline size. Greater amounts of heavy-intensity activity was related to lower levels of pain and fatigue and higher levels of self-efficacy. Higher amounts of mild-intensity activity and total activity were related to less depressive symptoms. Activities of daily living are a large component for physical activity among individuals with SCI. It appears that greater amounts of physical activity are associated with less pain, fatigue and depression in individuals with SCI.

Tawashy AE, Eng JJ, Lin KH, et al.  
*Spinal Cord.* 2008 Oct 21.

### ■ Cardiorespiratory, metabolic, and biomechanical responses during functional electrical stimulation leg exercise: health and fitness benefits.

A review of the medical literature (from the 1960s to 2007) found that functional electrical stimulation (FES)-induced leg exercise in persons with SCI can produce several positive health benefits. Although it was originally intended to produce functional upright mobility, FES-evoked exercise increases the whole-body metabolism of individuals with SCI so that they may gain health and fitness benefits. Some of the advantages of such exercise include increased cardiorespiratory fitness, promotion of leg blood circulation, increased activity of specific metabolic enzymes or hormones, greater muscle volume and fiber size, enhanced functional exercise capacity such as strength and endurance, and altered bone mineral density. There were also psychological improvements.

Davis GM, Hamzaid NA, Fornusek C.  
*Artif Organs.* 2008 Aug;32(8):625-9.

## MALE HORMONES

### ■ Testosterone levels among men with spinal cord injury: relationship between time since injury and laboratory values.

Total serum testosterone level, demographic and injury information, and laboratory values were measured in 102 men with SCI (48% with paraplegia, 52% with tetraplegia; 42% with complete injuries). Sixty percent of men with spinal cord injury had low testosterone levels. Low testosterone was significantly associated with less time since injury, lower hemoglobin, and higher prolactin. Published evidence documents that testosterone replacement produced physical and psychological benefits in men with low testosterone, and this may also be true for

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men with SCI. These findings suggest the need for changes to occur in clinical practice. Future research should address the pathophysiology of low testosterone and the risks and benefits of testosterone treatment in this population.

Clark MJ, Schopp LH, Mazurek MO, et al.  
*Am J Phys Med Rehabil.* 2008 Sep;87(9):758-67.

## NUTRITION

### ■ Evidence of dietary inadequacy in adults with chronic spinal cord injury.

Sixty-three men and 14 women with SCI completed interviews asking them to recall their dietary intake in the prior 24 hours. This dietary information was compared to nationally established guidelines for adequate intake of nutrients. Participants consumed a diet adequate in energy (calories) and macronutrients (protein, carbohydrates and fats), but inadequate in several micronutrients, including vitamin A, magnesium, folate, zinc, vitamin C, thiamine, vitamin B12, riboflavin and vitamin B6. Participants also consumed inadequate amounts of fiber, vitamin D, calcium and potassium. In all, 53% of participants consumed a micronutrient supplement. This is of special concern in the SCI population given the high prevalence of secondary complications that may increase nutrient requirements to levels above the established guidelines.

Walters JL, Buchholz AC, Martin Ginis KA.  
*Spinal Cord.* 2008 Nov 11. [Epub ahead of print]

## PREGNANCY AND CHILDBIRTH

### ■ Autonomic dysreflexia triggered by breastfeeding in a tetraplegic mother.

This is a case report of a 33-year-old woman with C6 incomplete tetraplegia who developed signs and symptoms of autonomic dysreflexia (AD) while breastfeeding. Stopping breastfeeding successfully stopped the AD. AD is a life-threatening problem in persons with tetraplegia (quadriplegia) that requires immediate attention. Identification of the triggering cause is vital in order to prevent further complications. Breastfeeding is an unusual and unexpected cause of autonomic dysreflexia.

Dakhil-Jerew F, Brook S, Derry F.  
*J Rehabil Med.* 2008 Oct;40(9):780-2.

### ■ Pregnancy and women with spinal cord injuries.

Women with chronic SCI in their reproductive years represent a growing population. Approximately 20,000 women with SCI between the ages of 16 and 30 live in the USA today. Each year 2,000 additional women of childbearing age sustain a SCI. Female fertility is usually not affected by SCI. One hundred fourteen women with SCI between ages 18 and 40 completed questionnaires about pregnancy and SCI. Twenty-three (20%) reported they received information about pregnancy during rehabilitation, but only 12 (10%) found it adequate. However, adequacy of information did not affect whether or not the women eventually became pregnant. Preterm (premature) delivery occurred in 33% of women; 22% were unable to feel preterm labor. Thrombosis (8%), urinary complications (59%), dysreflexia (27%), and worsened spasticity (22%) were the most common complications in pregnancy. Post-partum depression (35%) was the most common postpartum complication. Inadequate information about pregnancy is common among young women with SCI. Those who become pregnant should be monitored carefully for complications.

Ghidini A, Healey A, Andreani M, Simonson MR.  
*Acta Obstet Gynecol Scand.* 2008;87(10):1006-10.

## PRESSURE ULCER PREVENTION

### ■ Preventing recurrent pressure ulcers in veterans with spinal cord injury: impact of a structured education and follow-up intervention.

Forty-one veteran men with spinal cord injury or dysfunction who were admitted for pressure ulcer surgery were randomly divided into three study groups. Group 1 (20 subjects) received individualized pressure ulcer education and monthly structured telephone follow-up. Group 2 (11 subjects) received monthly mail or telephone follow-up without educational content. Group 3 (10 subjects) received quarterly mail or telephone follow-up without educational content. Follow-up continued for 24 months. Group 1 went longer before getting another pressure sore (average of 19.6 months) than group 2 (10.1 mo) or 3 (10.3 mo). Group 1 also had a lower rate of new or recurring pressure ulcers (33%, compared to 60% in Group 2 and 90% in Group 3). This study shows that individualized education and structured monthly contacts may help reduce the frequency of or delay pressure ulcer recurrence after surgical repair of an ulcer.

Rintala DH, Garber SL, Friedman JD, Holmes SA.  
*Arch Phys Med Rehabil.* 2008 Aug;89(8):1429-41

### ■ The effect of surface electric stimulation of the gluteal muscles on the interface pressure in seated people with spinal cord injury.

Surface electric stimulation was applied to the gluteal muscles of 13 subjects with SCI. Each participant underwent two different stimulation protocols: in one, the left and right gluteal muscles were stimulated alternately; in the other, the gluteal muscles were stimulated at the same time. Interface pressure, maximum pressure, pressure spread, and pressure gradient were measured during stimulation and rest periods. The stimulation protocol caused a significant decrease in interface pressure and pressure gradient during stimulation periods compared with rest periods. There was no significant difference in effects between the two protocols. The decrease in interface pressure resulting from surface electric stimulation of the gluteal muscles may restore blood flow in compressed tissue and help prevent pressure ulcers in persons with SCI.

van Londen A, Herwegh M, van der Zee CH, et al.  
*Arch Phys Med Rehabil.* 2008 Sep;89(9):1724-32.

## TENDON TRANSFERS

### ■ Acceptable benefits and risks associated with surgically improving arm function in individuals living with cervical spinal cord injury.

A total of 137 participants with cervical SCI completed a survey about how they view tendon transfer surgeries (TTS) and what activities of daily living (ADL) involving arm/hand function are important in improving their quality of life. Over 90% felt that improving their arm/hand function would improve their quality of life. ADLs that were ranked most important to regain were dressing, feeding, transferring in/out of bed. TTS improves elbow extension, key pinch, and hook grip, which are vital for the independent performance of multiple activities of daily living (ADL). Less than half of the participants had ever been told about TTS and only 9% had ever had TTS. Nearly 80% reported that they would be willing to spend 2-3 months being less independent, while recovering from surgery, to ultimately become more independent. Despite the fact that these surgeries have been available and continuously improved upon for over 40 years, relatively few people with cervical SCI have had them, especially in the US, where only 14% of qualified candidates actually received the surgery. It is estimated that approximately 50% of the people with cervical SCI would benefit from some sort of upper limb reconstructive surgery. There is a critical need in the US to improve awareness of TTS as a viable option for improving arm/hand function in some people.

Anderson KD, Fridén J, Lieber RL.  
*Spinal Cord.* 2008 Nov 25.

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## Announcements

### New SCI support group

A monthly SCI support and information group is starting up on Thursday, March 19. Meetings will take place from 11:00 a.m. to 12:30 p.m. at Harborview Medical Center, 4 West Hospital Skybridge conference room (4WH-73). Share stories and experiences, ask questions, get real life answers, talk, share, or just listen to members of the SCI community. This is not a therapy group. Meetings will continue to take place on the 3rd Thursday of each month. Information or questions call 206-616-8568.

### Grant to study aging with disabilities

The National Institute on Disability and Rehabilitation Research has recently funded a Research and Training Center (RRTC) at

the University of Washington's Department of Rehabilitation Medicine. The purpose of this Center is to study the challenges faced by patients aging with spinal cord injury and other physical disabilities. The objectives of the RRTC are to better understand the natural course of aging with a disability, to test the effectiveness of treatments for depression in people with disabilities as they age, to improve employment in those with a physical disability, and to publish findings to people with disabilities, their family members and their health care providers. A longitudinal survey aimed at achieving a better understanding of the scope of aging with spinal cord injury is just one example of upcoming projects. If you have any questions, please contact the Aging RRTC staff at [agerrtc@u.washington.edu](mailto:agerrtc@u.washington.edu), visit our website at <http://agerrtc.washington.edu>, or call our offices at 206-221-5358.



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