

# spinal cord injury

UPDATE

Department of Rehabilitation Medicine

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INSIDE:

- SCI Forum: From Ambien to Zanaflex: Making Your Medications Work for You ..... 4
- Literature review: 11 abstracts on SCI topics ..... 6

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## Taking Charge after SCI

*This is part of a series profiling members of our SCI Consumer Advisory Board.*

Todd Stabelfeldt is the consummate example of someone who has taken charge of his life under the most challenging of circumstances and has done it with humor and style. At the age of eight, Stabelfeldt was shot in the chin while he and his cousin were playing with guns, resulting in C4 tetraplegia (quadriplegia). That was 20 years ago; now he is a full-time professional, living on his own, financially independent and active in the community.

“I’ve had a 20-year course in C4 quadriplegia,” Stabelfeldt said recently to a UW class of occupational therapy (OT) graduate students. “It’s been a difficult course and I wish I could drop out, but I can’t. I am paralyzed, and it’s rough, and I wouldn’t wish it on anybody. But I’ve learned a ton and feel I can share it with you with the hope that it can help others gain quality in life.”

Stabelfeldt has been a regular presenter in this assistive technology class taught by Brian Dudgeon, associate professor of rehabilitation medicine. “I’m a big fan of learning from consumers,” Dudgeon says. “Todd tells his story of injury and emergence with a huge reliance on assistive technology and environmental design to enable his employment, self-managed living status and other

CONTINUED ON PAGE 2



*Todd Stabelfeldt, who has a C4 spinal cord injury, credits assistive technology for his independent lifestyle and full-time working status.*

## Healthy Aging with SCI

*This article summarizes a presentation made at our SCI Forum on May 9, 2006. Read the complete report at <http://sci.washington.edu/info/forums/reports/aging.asp>.*

Many of us have negative stereotypes about aging, said Dr. Steven Stiens, UW associate professor of rehabilitation medicine. “The myth is that getting older means being ill, but this isn’t necessarily the case.” There are steps we can take to maintain a high level of health and function in the advancing years, even with SCI.

A recent study in Great Britain followed 834 people with SCI for more than 25 years.<sup>1,2</sup> The researchers found that, regardless of age, length of time since injury, and injury severity, perceptions of overall health were quite high (over 70%) and actually improved over time, until subjects reached the 40-years-post-injury milestone, at which point people reported

a decline in perceived overall health. “So there is some evidence that when you get to the 40-year mark there are some points of deterioration that you need to watch out for,” Stiens said.

### Cardiovascular Health & Metabolic Syndrome

“We are particularly concerned about the risk of heart disease in people with SCI,” Stiens continued. “Metabolic syndrome—a condition associated with high risk of heart attack, stroke and other complications—is especially common in the SCI population.” It consists of four major characteristics:

1. **Obesity.** “In this country we have an epidemic of obesity,” Stiens observed. “This is also true for the SCI population, mainly because it doesn’t take a lot of energy to push a wheelchair or run a power wheelchair. Not infrequently, we overeat for our size and the amount of energy we expend.”

CONTINUED ON PAGE 3

## Taking Charge

CONTINUED FROM PAGE 1

community engagements. He has been very resourceful in tracking down the technology systems that work for him.”

A self-proclaimed geek with a keen sense of humor about himself and life, Stabelfeldt has gained his hard-won independence through sheer grit and moxie, searching out equipment for assistive technology (AT) in unorthodox places, including the maritime and RV industries, and developing creative solutions to accessibility problems. “We live in a really cool time for technology that’s available for AT,” he says.

Stabelfeldt’s entire home is networked so he can independently access and operate his phone, email, photos, CDs, movies and books. A computer screen is positioned at his bedside. “At night I wear a headset. I can turn the fan on via computer interface. If a client calls me at 4 am, I can answer, bring up a screen, and deal with the problem from bed. So much industry today can be applied to my disability and give me independence.”

It wasn’t always that way. “Growing up in the ‘80s, the AT was awful,” Stabelfeldt recalls. “Childhood for me was not fun, not accessible at all.” For years after the injury, “I felt I wasn’t in charge of my life, like an infant. I decided at some point to work on my brain. If the vessel is broken, what’s inside is not.” He obtained computer training and at age 18 landed a programming job with a medical software company. He worked his way up and is now the director of operations.

Stabelfeldt lives by himself in an apartment, with personal care assistance in the morning and evening. He works at home remotely, and periodically comes into the office, commuting alone by ferry. Paralyzed from the shoulders down, Stabelfeldt operates his motorized wheelchair—tricked out with his own setup of fiber optic buttons and voice-controlled communication system—using a chin-control device.

In addition to functionality, Stabelfeldt strives for a certain elegant simplicity in his AT solutions. He avoids overly

complicated technology when low-tech works fine, such as hooking up a granola bar to a flexible arm attached to his workstation, so he can bite some off “like a gerbil” when he’s hungry.

Stabelfeldt prefers his wheelchair streamlined and aesthetically pleasing, so “when people see me, they focus on the user, not the chair.” He designed a custom denim cover for his urine bag, to achieve a less medical look, and



*Humor for me  
is huge,  
a heal-all.*



because, “I believe you would prefer to see a denim bag than my urine.” The bag is attached to his wheelchair with not one, but two hooks. “Who would have thought that urine bag hooks would matter?” he muses. But it does matter, and it’s one of those many details he learned about the hard way. “Have I dragged my urine bag behind me for half a mile? Have I run over it? Have I done both these things on a first date? The answer is yes.”

He dealt with that awkward moment as he always does, with humor. “Humor for me is huge, a heal-all,” he says. “So I said something funny to dispel the tension. But I never did have a second date with her. So the take-home lesson is: The two-hook style urine bag will get you the second date.”

Stabelfeldt’s sense of style is evident also in his personal appearance. He is usually well turned out in custom-tailored attire; a smart cap, tie and vest; hair and beard impeccably groomed. “I like to smell good and wear nice clothes,” he admits. “It’s important to me.”

He is a fan of Nordstrom, which tailors clothes to work with his body and chair, and where he is always treated

with respect and professionalism. “I’m treated like a regular customer at Nordstrom,” he says. “I wheel in there, and I feel great.”

Relying so heavily on AT to maintain his independence, Stabelfeldt is meticulous about safety and emergency preparedness. A backup system of individual batteries linked together and charged by regular electricity can keep all his equipment running in case of a power outage. “I’m a redundancy guy,” he admits. “I do everything by Internet, and don’t want to lose connectivity if there’s a power outage. I want backup on everything. I have done three-day outages successfully.”

And while batteries are expensive, cumbersome and have an unpredictable lifecycle, “you can’t put a price on independence and security,” he says. “I use Bi-PAP (a ventilator device) at night, so battery back-up is a lifesaver.”

Financially independent, receiving no government support or benefits, Stabelfeldt is unusual for someone with his disability, according to Dudgeon. “I know of no other men with such high level SCI who are as successful as Todd in employment, living status, and community involvement. The independent and resourceful manner in which Todd developed these skills is unique.”

Stabelfeldt is eager to share his experiences and lessons with a wide audience so others can benefit. In addition to his full time job, he is a motivational speaker who delivers compelling and humorous speeches to high school and youth groups. At the UW’s Northwest Regional Spinal Cord Injury System, he is an SCI peer mentor, member of the Consumer Advisory Board, and a frequent SCI Forum participant. He wants to spread the word, not only about the wonders of AT solutions for people with disabilities, but also about the personal rewards of overcoming adversity of all kinds.

“Todd’s desire to influence young people is impressive,” Dudgeon adds. “He uses his heartfelt story and humor to provide a very frank and open presentation of a life that dealt with this enormous challenge, but is nevertheless a life everyone can learn from.”



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## Healthy Aging

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**2. Insulin resistance and diabetes.** “By insulin resistance, I mean the insulin is there, but unsuccessful in bringing glucose to cells. Because of inactivity and other factors such as obesity, cells are less efficient at using insulin. As a result, the fasting blood sugars tend to be a little higher in people with SCI and the ability to manage large glucose loads is worse.”

**3. Poor cholesterol profile.** “Specifically, this means low levels of the ‘good’ cholesterol (high density lipoprotein, or HDL), which goes around mopping up the bad cholesterol off vessel walls,” Stiens explained. “Exercise contributes to a rise in HDL, and people with SCI tend to have lower HDL than others their age because of lack of exercise.” HDL can be improved with exercise, as well as having one or two drinks (especially red wine) per day—“But no more than that, or you blow the whole thing!” Stiens warned.

**4. High blood pressure.** Even though there is a tendency to have lower blood pressure with SCI, obesity tends to bring it up and it becomes a concern.

All of these symptoms tend to increase with age in the general population, and perhaps at a slightly younger age in persons with SCI.

How can you turn this syndrome around and improve your cardiovascular health?

- Keep your weight down.
- Change your diet—decrease sugars and simple carbohydrates, reduce fat and cholesterol.
- Keep moving; increase the total activity in your day.
- Talk with your doctor about whether or not you need medications for cardiovascular health. “We’re finding more and more that some of the medications originally designed to lower heart rate or cholesterol can improve risk for heart disease and directly prevent heart attacks,” Stiens said.

## Bowel and Bladder Changes

Urinary tract infections (UTIs) are more common as people age with SCI, perhaps due to drinking less fluid or to a weakened immune system. There is also an increased risk of bladder stones, which can block the ureters (tubes that carry urine from the kidneys to the bladder) and cause urine to back up into the kidneys, a serious condition. For this reason, Stiens recommends annual medical evaluations that include ultrasound of the kidneys and urinary collection system.

Pay attention to UTI symptoms, Stiens warned, because UTI leading to sepsis is a common cause of death in people with SCI. “If you have UTI associated with fever and chills, you need to get to the hospital and get on antibiotics.”

Bowel care is a very significant quality of life issue. “For some people, their bowel program runs their life,” Stiens observed. “Ideally, you want a bowel program that doesn’t take too much time and that gives you confidence that you won’t have a problem when you’re away from home.”

“But the truth is, when people age, gut transit can slow down,” Stiens continued. If bowel care is very prolonged and doesn’t respond to treatment, a colostomy may be a good choice. (A colostomy involves surgically connecting the colon to the abdominal wall, and collecting stool through an opening called a stoma.)

Stiens noted that, “People who’ve had colostomies after SCI are usually pretty happy because they are free of the bane of bowel care.” Studies show that among people with problems such as incontinence and/or excessively long bowel care times, the amount of time devoted to bowel care can be significantly reduced after colostomy, in some cases down to 1.3 hours per week from a whopping 13.4 hours per week!<sup>3</sup> “Don’t be afraid of a colostomy—it may become the solution later in life.”

While a daily bowel movement is best, every other day is fine if you eat a low fiber diet. “If you are waiting too long between bowel movements, you can overfill and distend (stretch out) the bowel, and as a result the bowel may not perform as well as it should,” Stiens explained. “So the message is: eat a diet with enough fiber to have good stool consistency; drink enough fluids to keep stools soft, but formed; do bowel care on a regular schedule; and empty the bowel adequately. You will probably stay out of trouble.”

## Pulmonary Health

“With age, risk of pneumonia and sleep apnea increase, and lung capacity generally decreases,” Stiens said. People with cervical injuries have a high risk for respiratory infections due to a weakened respiratory system and an inability to cough deeply enough to clear the lungs. “The higher the injury level, the higher the risk for pneumonia.”

Cough assistance devices can help clear the lungs, such as the mechanical insufflator-exsufflator (MIE), which blows air into the lungs and then pulls air and mucous out. “I’m a T-2 and don’t have full use of my chest muscles,” Stiens said. “So as I get older, I may keep an MIE machine around the house to improve my quality of cough during an upper respiratory infection.”

Sleep apnea—pauses in breathing while sleeping—“affects the quality of your sleep and puts you at risk for daytime sleepiness and even sudden death,” Stiens said. If you have symptoms such as loud snoring and excessive daytime sleepiness, you should talk to your physician about being evaluated for sleep apnea.

## Skin Health

“Pressure ulcers are a source of decreased quality of life, and there’s a higher risk of pressure ulcers as time goes on,” Stiens reported. “One study we did on people living with SCI in the community found that 25% have skin breakdown.<sup>4</sup> This is an extreme risk and something you have to watch for very carefully.”

To avoid pressure ulcers, check skin daily (by using a mirror or with the help of a caregiver); review seating once or twice a year with a physical therapist; get a pressure mapping assessment for all seating surfaces; keep your weight down; modify your diet to get adequate protein, vitamin C and zinc; and protect yourself from sun exposure (to avoid skin cancer).

“Many of the risks non-disabled people face (obesity, hypertension, diabetes) are equally if not more important for SCI survivors,” Stiens said. “The lifespan of the SCI individual is continually extending, so that many people with SCI now die of the same things that the average American dies of.”

“Certain conditions are associated more with age (diabetes, cardiovascular), others with time since injury (shoulder and skin problems),” Stiens noted. “Thankfully, life satisfaction does not necessarily correlate with age.”

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# forum report

The SCI Forum is an evening presentation and discussion series on topics of interest to persons with spinal cord injury and their family members, friends, and caregivers, held monthly at the University of Washington Medical Center during the fall, winter and spring. To learn about upcoming SCI Forums or read reports of past forums, consult our Web site at <http://sci.washington.edu/info/forums>. Contact Cynthia Salzman (email: [csalzman@u.washington.edu](mailto:csalzman@u.washington.edu); phone: 206-685-3999) if you wish to be added to the SCI Forum mailing list.

## From Ambien to Zanaflex: Making Your Medications Work for You

*This article summarizes the presentation made at our SCI Forum on October 10, 2006. Read the complete report online at <http://sci.washington.edu/info/forums/reports/medications.asp>.*

"In this country we practice what's called 'evidence-based' medicine," said Debra Page, PharmD, at the SCI Forum on October 10, 2006. Page is Clinical Pharmacist in Neurology and Rehabilitation Medicine at Harborview Medical Center. "This means that we use the best evidence available to make decisions about treating individual patients." The most desirable evidence comes from large randomized controlled trials, in which subjects are randomly assigned to receive either medication or placebo, and effects are compared between the two groups. "This is the gold standard of evidence, and it is what the FDA requires for a drug to be sold in this country."

Once a medication is approved for a condition, physicians can prescribe it for any problem. Because it's so hard to get a sufficient number of study subjects with SCI to participate in a large-scale clinical trials, "In SCI we have to rely more on smaller clinical trials, and a method that's less scientific—'expert opinion'—which is physicians' experience using a medication and seeing how it affects patients," Page explained. "That's why it's important for you to tell your physician about the experiences you're having with a drug. It's our main source of information about whether these drugs are effective or useful in SCI patients."

### Side Effects

A side effect is any unintended consequence—usually undesirable—of a medication or therapy. "Medications aren't as specific as we'd like them to be," Page said. "They act all over the body." When you take morphine for pain, for example, the processes that work to relieve the pain also make you sleepy and can cause constipation.

All medications have side effects, and everyone reacts to medications a little differently. Page recommends telling your doctor if the side effects are intolerable. "Often they can switch you to a slightly different drug."

### Medications That May Cause Drowsiness

Many of the medications used by people with SCI cause drowsiness, including antidepressants (Zoloft, Prozac, etc.); antihistamines (Benadryl, etc.); anxiolytics (Valium, Xanax, etc.); pain medications (Vicodin, Morphine, etc.); and spasmolytics (baclofen, tizanidine, etc.). To manage this common side effect, you can try taking the medication in the evening, when drowsiness will be more beneficial. Again, talk to your doctor, who may decrease the dose or try a different medication.

### If you can't sleep

Practice "good sleep hygiene":

1. Use your bed only for sleeping and sex.
2. Go to bed and wake up at the same time each day.
3. Avoid naps during the day.
4. Make sure your bedroom is dark, quiet, and not too hot or cold.
5. Avoid exercise and alcohol in the evening.
6. Limit caffeine intake, especially in the afternoon and evening.

If sleep problems persist, over-the-counter medications for sleep may help, such as Tylenol PM, Excedrin PM, and Sominex. These usually contain an antihistamine, which can cause urinary retention and constipation, so Page recommends them only for short periods.

Talk to your physician, "both to discuss what might be interfering with sleep, and to get prescription sleep medications, if necessary." Many sleep

### Tips from a Pharmacist:

- Carry a list of your medications, and include a list of allergies and intolerances. Update this regularly.
- Use only one pharmacy. "Computers in different pharmacies are not connected and won't know about medications you received elsewhere," Page said.
- Don't be afraid to ask your physician about the name, purpose and side effects of your medications, "even if he or she seems busy and is rushing out the door," Page added. "Ask questions and be an active part of your health care team to make your medications work for you."

medications—Ambien, Lunesta, Sonata, Rozerem—differ primarily in the way they are released in the body.

### Sleep Apnea

"If you are waking up in the morning and don't feel rested, and if your bed partner is complaining about your snoring," you may have sleep apnea, Page said. In this disorder, the soft tissue of the throat collapses and closes during sleep, resulting in frequent, brief pauses in breathing that deprive your brain of oxygen. When the carbon dioxide gets to a certain level in the bloodstream, the sleeper jolts awake, gasping for air (although he or she may not remember or be aware of this).

"Sleep apnea is a serious condition that leads not only to daytime sleepiness but also to depression and health problems," Page warned. "It needs to be diagnosed and treated." Sleep apnea is diagnosed with a sleep study, and treated

CONTINUED ON PAGE 5

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with continuous positive airway pressure (CPAP)—a mask worn over the mouth and nose at night that keeps the air moving continuously so the airway can't collapse.

Sleep apnea is much more common in SCI than the general population, and many of the medications taken by people with SCI make it worse, as does alcohol.

## Pain

Many people with SCI have pain that interferes with daily life. Pain in SCI—especially neuropathic pain, which is caused by abnormal signals from injured spinal nerves—tends to be complex and difficult to treat. Because SCI pain often has multiple causes and influences, Page recommends that patients “consider non-pharmacological treatments, either instead of or in addition to prescription medications. You may need more than one thing to treat this kind of pain.”

Several types of medications are prescribed for neuropathic pain, including tricyclic antidepressants (such as amitriptyline and nortriptyline); pain medications (narcotics, such as MS Contin and Oxycontin); and anti-epileptic medications (such as gabapentin). Patients may need to try several before finding one that relieves the pain without causing too many side effects.

## Neurogenic Bladder

Most medications for neurogenic bladder are aimed at decreasing hyperactivity (spasticity) in the bladder. Common medications, and their side effects, are:

- Alpha blockers, such as doxazosin and tamsulosin. These drugs can decrease blood pressure, “so you need to be careful if you're already taking blood pressure medications; watch for dizziness, nausea and sweating.”
- Anticholinergics, such as Ditropan (oxybutynin) and Detrol (tolterodine). These medications tend to cause dry mouth, Detrol less so than Ditropan.

## Bowel Management

“Many medications commonly used by people with SCI interact with a person's bowel program, causing either constipation or diarrhea,” Page said.

Constipation may be caused or worsened by anticholinergics and narcotic pain medications, so it is important to use the lowest effective dose, to increase water and fiber intake, and to use a stool softener twice daily.

Diarrhea can occur when antibiotics have killed off all the “good bacteria” in the gut, and while the diarrhea usually goes away after the antibiotic treatment ends, Page warned of “a super infection called *Clostridium difficile* (*C diff*), in which the good bacteria are killed off and the bad bacteria increase aggressively.” This super infection can develop at any time between first starting an antibiotic and two-to-six weeks after ending it. “So if you are having a lot of watery stools and really bad pain, you need to be seen by a physician right away to get another antibiotic to clear it up. This diarrhea won't go away on its own.” Antacids (Rolaids, Mylanta, Milk of Magnesia) may cause diarrhea because of the large quantities of magnesium that they contain.

## Complementary & Alternative Medicine (CAM)

“When conventional medications don't help with pain or other problems, some people turn to complementary or alternative treatments,” Page said. Such treatments have not been thoroughly studied or FDA-approved, so “safety and efficacy are questionable, and you are left alone to decide whether to use them.”

Nonetheless, a large percentage of the American public use CAM therapies anyway, so the National Institutes of Health (NIH) created the National Center for Complementary and Alternative Medicine (NCCAM) to provide information to consumers about differ-

ent therapies, clinical trial information, and important warnings. For example, CAVA, an herbal remedy used for sleep, causes liver damage, Page said. (NCCAM: <http://nccam.nih.gov/>; 888-644-6226.)

## Discontinuing Medications Safely

While patients can always decide for themselves whether to take or continue a drug, “some medications should not be stopped abruptly,” Page warned. In particular, antidepressants, baclofen and benzodiazepines (Valium, etc.) carry a small risk of seizures if discontinued too rapidly. Discuss this with your doctor, who can set up a schedule for tapering off the drug safely.

## Flu

“Last year the Centers for Disease Control (CDC) added people with SCI to the list of high risk individuals eligible (and encouraged) to get the influenza vaccine early,” Page said. As a further precaution, caregivers and family members should also get the vaccine. Page recommends the injection vaccine only; the flu mist is live and carries a small risk of actually causing the flu.

“If you do get a cold or flu, make sure you read the labels of over-the-counter cold medications before taking them,” she continued. “Some of these have three and four products in them that could interact with other medications you are taking.” Ask the pharmacist in the store about drug interactions.

Read the complete report of this forum presentation at <http://sci.washington.edu/info/forums/reports/medications.asp>.

This SCI Forum was also videotaped and can be viewed as streaming video on our Web site at [http://sci.washington.edu/info/forums/forum\\_videos.asp](http://sci.washington.edu/info/forums/forum_videos.asp).



To read past SCI Forum reports or view SCI Forum videos, go to  
<http://sci.washington.edu/info/forums>.

# 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).

## PAIN

### **Pregabalin in central neuropathic pain associated with spinal cord injury: a placebo-controlled trial.**

In a 12-week, multicenter study, 137 patients with SCI were randomized to receive either flexible-dose pregabalin (70 patients) or placebo (67 patients). Patients were allowed to remain on existing stable pain medications. Pain was recorded at baseline and daily throughout the study. The mean baseline pain score was 6.54 in the pregabalin group and 6.73 in the placebo group. The mean endpoint pain score (derived from patients' last 7 days daily pain diary entries) was significantly lower in the pregabalin group (4.62) than the placebo group (6.27), with improvement observed as early as week 1 and maintained for the duration of the study. The average pregabalin dose after the 3-week stabilization phase was 460 mg/day. Pregabalin was also associated with improvements in sleep, anxiety, and overall status. Mild or moderate, typically temporary, sleepiness and dizziness were the most common side effects. Pregabalin, at a dose of 150 to 600 mg/day, was significantly more effective than placebo in relieving moderate to severe neuropathic pain in patients with SCI.

Siddall PJ, Cousins MJ, Otte A, Griesing T, Chambers R, Murphy TK. *Neurology*. 2006 Nov 28;67(10):1792-800.

## BOWEL MANAGEMENT

### **Progressive protocol in the bowel management of spinal cord injuries.**

Although the use of laxatives for neurogenic bowel in SCI is widespread, it is not supported by research evidence and is associated with problems such as dependency and suppression of bowel activity. In this within-subject prospective study of 17 rehabilitation inpatients with SCI, a bowel program that routinely uses laxatives (baseline) was compared to a bowel program that allows the use of physical interventions (abdominal massage, peri-anal digitation, ano-rectal digitation) and rectal stimulants (glycerine suppositories) before resorting to the use of laxatives (the intervention). Although individual responses varied, the number of successful bowel management episodes requiring laxatives, the time required for evacuation, and the use of manual evacuation were significantly less in the intervention phase than baseline. These findings suggest that use of laxatives in bowel management is not essential for all newly spinal cord injured individuals, while the use of physical interventions in this population may be beneficial.

Coggrave M, Burrows D, Durand MA. *Br J Nurs*. 2006 Nov 9-22;15(20):1108-13.

## CARDIOVASCULAR

### **Cardiovascular disease in spinal cord injury: an overview of prevalence, risk, evaluation, and management.**

Cardiovascular disease (CVD) is now the leading cause of death in chronic SCI, ahead of renal and pulmonary conditions, which were the primary causes of mortality in previous decades. Nearly all the risk factors for CVD are more common in SCI subjects than the general population, including a greater occurrence of obesity, lipid (blood fat) disorders, metabolic syndrome (a prediabetic condition),

and diabetes. Daily energy expenditure is significantly lower in SCI individuals, due to lack of motor function and fewer opportunities to engage in physical activity. Autonomic dysfunction caused by SCI is also associated with conditions that contribute to heightened cardiovascular risk, including abnormalities in blood pressure, heart rate variability, arrhythmias, and a blunted cardiovascular response to exercise that can limit the capacity to perform physical activity. Better recognition of the importance of CVD in SCI, which is often asymptomatic and thus undertreated, can reduce illness and death from this disease. This article reviews the cardiovascular consequences of chronic SCI and provides guidelines for screening, recognition and treatment of CVD in SCI, and emphasizes the importance of carefully treating risk factors.

Myers J, Lee M, Kiratli J. *Am J Phys Med Rehabil*. 2007 Feb;86(2):142-52.

## RESPIRATORY FUNCTION

### **Effect of intrathecal baclofen on sleep and respiratory function in patients with spasticity.**

Twenty patients (eight with SCI, 12 with other neurological disorders) admitted for implantation of an intrathecal baclofen (ITB) pump for treatment of severe spasticity were followed prospectively in this study. Spasticity assessments, polysomnography (sleep tests), pulmonary function tests, and resting energy expenditure measurements were done one week before and at least eight days after pump implantation. ITB reduced spasticity, improved total sleep time and sleep efficiency, and reduced periodic leg movements. ITB did not modify sleep-related respiratory events, lung function tests, CO<sub>2</sub> rebreathing response, or resting energy expenditure. Compared with oral baclofen, intrathecal baclofen infusion improved sleep continuity and did not affect respiratory function.

Bensmail D, Quera Salva MA, Roche N, et al. *Neurology*. 2006 Oct 24;67(8):1432-6.

### **Long-term survival of persons ventilator dependent after spinal cord injury.**

The objective of this study was to identify factors related to long-term survival in persons with SCI who are ventilator dependent when discharged from inpatient rehabilitation, to update estimates of life expectancy, and to determine the leading causes of death in this population. Analysis of data from the National SCI Statistical Center on 319 individuals injured from 1973 through 2003 found that age at injury, time since injury, and level and completeness of injury were the key predictors of survival for persons who are ventilator dependent after SCI. The life expectancies were modestly lower than previous estimates. Pneumonia and other respiratory conditions remain the leading cause of death but account for only 31% of deaths of known causes. Whereas previous research has suggested a dramatic improvement in survival over the last few decades in this population, this is only the case during the critical first few years after injury. There was no evidence for such a trend in the subsequent years.

Shavelle RM, DeVivo MJ, Strauss DJ, et al. *Spinal Cord Med*. 2006;29(5):511-9.

CONTINUED ON PAGE 7

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**UROLOGY****Accuracy of predicting bladder stones based on catheter encrustation in individuals with spinal cord injury.**

In this prospective cohort study, the indwelling catheters of 49 individuals with SCI were examined for encrustation at the time of removal in preparation for cystoscopy. During the cystoscopy the presence or absence of bladder stones was noted. Bladder stones were found in 17 (35%) patients. Catheter encrustation was noted in 13 patients, and of these, 11 also had bladder stones. Of the 36 individuals who had no catheter encrustation, only 6 (16%) were found to have bladder stones. In this study, catheter encrustation was associated with bladder stones 85% of the time. Since catheter encrustation is highly predictive of the presence of bladder stones, cystoscopy should be scheduled in a person undergoing a catheter change if catheter encrustation is noted.

Linsenmeyer MA, Linsenmeyer TA.  
*J Spinal Cord Med.* 2006;29(4):402-5.

**Impact of StatLock securing device on symptomatic catheter-related urinary tract infection: a prospective, randomized, multicenter clinical trial.**

In this prospective, randomized, multicenter clinical trial, 118 adult patients with spinal cord injury or multiple sclerosis were randomized to have their indwelling bladder catheters secured in place by using the StatLock device (experimental group; 60 subjects), or to continue using their preexisting methods, such as tape, Velcro strap, CathSecure, or none (control group; 58 subjects). Patients were monitored for the development of symptomatic UTI within a period of 8 weeks following enrollment. The two groups of patients were comparable in terms of clinical characteristics and risk factors for infection. Symptomatic UTI was diagnosed in 8 of 60 (13.3%) patients in the experimental group versus 14 of 58 (24.1%) patients in the control group. Although these results were not statistically significant (due to trial size), the finding of a 45% reduction in the rate of symptomatic UTI in patients who received the StatLock securing device is clinically relevant and prompts further investigations.

Darouiche RO, Goetz L, Kaldis T, et al.  
*Am J Infect Control.* 2006 Nov;34(9):555-60.

**SEXUAL FUNCTION****Spinal cord injury influences psychogenic as well as physical components of female sexual ability.**

A survey on sexual function and activity, administered via secure Web site, was completed by 87 women with SCI over age 18. Bladder and bowel incontinence and autonomic dysreflexia were significant concerns and prevented some participants from seeking sexual activity. Most subjects reported difficulty becoming psychologically aroused (74.7%) and physically aroused (87.4%), which were both correlated with feeling that their SCI had altered their sexual sense of self. The majority of subjects reported having experienced intercourse postinjury. Most participants reported difficulty with positioning during foreplay and intercourse, vaginal lubrication, and spasticity during intercourse. Almost half (46%) reported experiencing orgasm postinjury (compared with 82.3% preinjury) and this was positively associated with the presence of genital sensation. SCI significantly impairs psychological and physical aspects of female sexual arousal.

Anderson KD, Borisoff JF, Johnson RD, Stiens SA, Elliott SL.  
*Spinal Cord.* 2006 Oct 10; [Epub ahead of print]

**The effects of spinal cord injury on psychogenic sexual arousal in males.**

Forty-five men with SCI and 16 able-bodied control subjects underwent a 78-minute laboratory-based protocol in which subjective arousal, penile circumference (PC), blood pressure (BP), and heart rate (HR) were measured in response to separate periods of audiovisual (AV) erotic stimulation and AV erotic combined with manual penile stimulation. Able-bodied subjects generally had significantly greater PC than SCI subjects during the stimulation periods. The degree of preservation of combined pinprick and light touch sensation in the T11-L2 dermatomes distinguished those who did and did not have a significant increase in PC with AV stimulation. BP and HR readings were generally higher in able-bodied than SCI subjects throughout the experimental protocol. However, all readings were within normal limits. The degree of preservation of sensory function in the T11-L2 dermatomes could be used to determine the potential for psychogenic (i.e., due to mental causes) erectile responses in men with spinal cord injury. Results support the hypothesis that psychogenic erection depends on the sympathetic nervous system, and men with sensory function preservation in the T11-L2 dermatomes should be encouraged to maximize the AV aspects of sexual activity to achieve maximum erectile function.

Sipski M, Alexander C, Gomez-Marin O, Spalding J.  
*Neurosurgery.* 2006 Nov;59(5):957-82; discussion 982-7.

**Application of 2 vibrators salvages ejaculatory failures to 1 vibrator during penile vibratory stimulation in men with spinal cord injuries.**

This was a retrospective chart review of 297 men with SCI who, between 1991 and 2006, underwent a total of 965 trials of penile vibratory stimulation with high amplitude vibrators. All men underwent two or more penile vibratory stimulation trials using one vibrator applied to the dorsum or frenulum of the glans penis. Men failing to ejaculate with one vibrator received one or more trials in which the glans penis was then sandwiched between two vibrators. Forty-nine percent of the total, and 57% of those with injuries at T10 or above, responded to penile vibratory stimulation with one vibrator. Of those who did not respond with one vibrator, 22% responded to stimulation with two vibrators. This simple penile vibratory stimulation sandwich method is recommended before referring patients for more the invasive procedures of electroejaculation or surgical sperm retrieval.

Brackett NL, Kafetsoulis A, Ibrahim E, et al.  
*J Urol.* 2007 Feb;177(2):660-3.

**SHOULDER PAIN****Clinical trial of exercise for shoulder pain in chronic spinal injury.**

Forty manual wheelchair users with SCI and one with spina bifida were divided into two groups: Those with shoulder pain (21) consistent with rotator cuff dysfunction received an 8-week exercise intervention focusing on the scapula; those without shoulder pain (20) did not receive the intervention and served as the control group. All subjects completed shoulder pain and patient satisfaction questionnaires before and after the 8-week period. Subjects in the intervention group were instructed in a home exercise program consisting of stretching and strengthening exercises. Subjects in the intervention group showed significant improvements in all measures as a result of the intervention, whereas asymptomatic control group subjects remained stable. A selective 8-week home exercise program is effective in reducing pain and improving function and satisfaction in this population of wheelchair users.

Nawoczinski DA, Ritter-Soronon JM, Wilson CM, et al.  
*Phys Ther.* 2006 Dec;86(12):1604-18.

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## Healthy Aging

CONTINUED FROM PAGE 3

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*Janna Friedly, MD, in the UW Department of Rehabilitation Medicine, contributed to this SCI Forum presentation.*

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