spinal cord injury UPDATE

Department of Rehabilitation Medicine

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INSIDE:

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New Grant Funds Model System

The Northwest Regional Spinal Cord Injury System (NWRSCIS) in the UW Department of Rehabilitation Medicine has been awarded a $2.3 million grant from the National Institute on Disability and Rehabilitation Research (NIDRR) to continue for another five years as one of only 14 designated model spinal cord injury (SCI) systems in the country.

Model System grants are awarded to institutions that are national leaders in SCI research and patient care and serve a high volume of SCI patients, providing multidisciplinary care from the point of injury through rehabilitation and follow-up. Each Model System conducts site-specific and collaborative research and contributes data to a national longitudinal study that tracks the long-term consequences of SCI. The NWRSCIS—a designated Model SCI System for 15 years—also disseminates information about SCI to consumers, heath care providers and the general public through its Web site, educational forums, newsletter, brochures and peer mentoring program.

"Our model system grant helps us maintain and try to enhance the care of people with SCI in this corner of the country," says Charles Bombardier, PhD, principal investigator and director of the NWRSCIS (the only SCI Model System west of Colorado). Bombardier is a clinical psychologist and professor in the UW Department of Rehabilitation Medicine. He co-directed the previous five-year grant with Dr. Diana Cardenas (now chief of rehabilitation medicine at the University of Miami) and has 17 years' experience in SCI clinical care and research. Co-investigators on the grant are UW rehabilitation medicine physicians Barry Goldstein, Stephen Burns and Peter Esselman, and psychologist Jeanne Hoffman.

Research: Improving Outcomes

The grant funds a new research study called, "Scheduled telephone intervention for individuals with SCI and their families: A randomized controlled trial." This project will examine whether a program of scheduled telephone calls to individuals and their families during the vulnerable first year after injury reduces the medical complications and crises that often lead to emergency clinic visits and rehospitalizations. The study will also measure what effect the intervention has on patient adjustment, mood, community involvement, return to work and quality of life.

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Kirk Hennig, who sustained a spinal cord injury 26 years ago, co-chairs the SCI Consumer Advisory Board.

Portrait of a Volunteer

Kirk Hennig was an outgoing, physically fit 26-year-old with a positive outlook, an independent spirit and a passion for living life to the fullest when he was paralyzed in a construction accident 22 years ago. In many ways, he is the same now, only he does it all in a wheelchair.

The day of his injury, he was working with his pile-driving team on Pier 91. He was replacing one of the pilings, when he suddenly found himself on the ground. "I knew I must have been hit. I was lying on the deck thinking, what happened?" he recalls. "It turns out, a 3-pound bolt dropped 50 feet—exerting probably 1000 pounds of force —and hit me directly on top of my head." This caused a C6 spinal cord injury (SCI), resulting in tetraplegia (quadriplegia).

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Grant funding

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"The length of stay (in rehab) following SCI has been getting shorter due to insurance limits, and people are now leaving the hospital sooner than we would wish," Bombardier says. "When they get home, there's lots of adjusting to do." Patients and families are often overwhelmed, dealing with a whole new world of medical care, supplies, equipment, medications, accessibility problems, and a whirlwind of emotions. As one family member recalled, "It's like bringing home a newborn baby—you don't know what to do."

Families are desperate for information, yet previous studies have shown that they rarely initiate calls, even if they are given a 24-hour phone number and told to call anytime. "People don't know what questions to ask," says Jeanne Hoffman, PhD, rehabilitation psychologist and lead investigator on this study. "If they have to make a lot of effort to reach out, it doesn't happen."

Small, unaddressed medical problems can quickly develop into a crisis situation, leading to expensive hospital or emergency visits. "We know that rehospitalizations are higher in the first year (after injury) and so are medical complications," Hoffman adds. Reaching out to families may be one way of averting crises and the costs associated with them.

The study involves randomly assigning newly injured patients (who have agreed to participate) to receive either the telephone intervention program (the treatment group) or the usual follow-up care and services (the control group). Subjects in the treatment group receive regular phone calls from a Research Care Manager who is trained to elicit patient concerns, help people solve problems on their own and connect them with local resources. If needed, the Research Care Manager can access a multidisciplinary team of experts to provide advice and additional referral information. After a year post-discharge, the treatment and control groups will be compared to see how they differ in terms of medical complications, hospitalizations, life satisfaction and other outcomes.

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Ultimately, we'd like to change the standard of care so patients can get more help and have it covered by insurance.

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Both Bombardier and Hoffman have worked on similar studies in traumatic brain injury patients, with positive results. "We found that using the telephone in a proactive way, reaching out to people, is a lot more helpful than merely making ourselves available," Bombardier notes. "This intervention doesn't require a lot of time, and it's low cost. We're not using MDs, we're using a social-work-trained person with a backup team of physicians, psychologists, nurses and others."

Ultimately, Bombardier and Hoffman would like to show that this kind of intervention lowers costs by reducing the need for patients to use other, more expensive medical services, thereby encouraging insurance companies to pay for it. "We'd like to change the standard of care, so patients can get more help and have it covered by insurance," Bombardier says.

Module Project: How patients adapt to spinal cord injury.

In addition to the telephone intervention study (above) and the depression study (page 3), the NWRSCIS was selected to conduct a Module Project called "The natural history of major depression within one year of spinal cord injury" at multiple SCI Model System sites. Renamed "Adapt," this study is designed to address serious gaps in the scientific evidence about depression in persons with SCI. Unlike studies that involve testing a new treatment, the goals of "natural history" type studies such as this are to understand more about the occurrence and current diagnosis and treatment of a disease or medical condition, and to provide a foundation for conducting further research and improving the standard of care.

Depression is common in the SCI population and "significantly adds to the burden of disability associated with SCI," says Bombardier, who is co-leading the study with Jesse Fann, MD, MPH, associate professor of psychiatry and behavioral sciences. "Depression is associated with longer lengths of hospital stay and fewer functional improvements, less functional independence and mobility at discharge, and more pressure sores and urinary tract infections." However, very little research about depression has focused specifically on the SCI patient, resulting in gaps in what is known about the extent and nature of depression in SCI and whether the current treatment strategies are appropriate or even successful.

This study will address several key questions: What are the best ways to screen for and measure depression in this population? How can depression be distinguished from traumatic grief, and how do the two interact? What is the usual course of care currently provided to SCI patients with depression? What proportion of SCI patients recover from depression, either spontaneously or in response to treatment, and what is the course of recovery? What treatment methods are SCI patients likely to accept and use?

The study will be conducted at multiple sites (University of Washington, University of Michigan, and Mt. Sinai School of Medicine in New York) in order to ensure an adequate number of subjects and to learn about regional variations in current treatment of depression in SCI. Study participants will be recruited during inpatient rehabilitation at each research site. Those who agree to participate will be screened for depression periodically and followed at 3, 6, 9 and 12 months after SCI. Persons who are found to have depression will be treated by their respective clinicians.

Landmark study of depression in SCI

The Northwest Regional SCI System (NWRSCIS) was awarded a five-year, $5.8 million grant from NIDRR to lead a multi-site study of the effectiveness and tolerability of the antidepressant venlafaxine XR (Effexor XR) for the treatment of major depressive disorder (MDD) in people with SCI who are one or more years post injury. Chuck Bombardier, PhD, in the Department of Rehabilitation Medicine, and Jesse Fann, MD, MPH, in the Department of Psychiatry and Behavioral Sciences, will co-lead this study, which includes three other sites in addition to the University of Washington: Northwestern University/Rehabilitation Institute of Chicago, University of Michigan, and University of Alabama-Birmingham.

This is the first controlled study of depression in the SCI population, Bombardier says. "Depression is a common disabling problem in SCI. About 22% of this population report significant symptoms of depression, including 15% who report thoughts of death or suicide." Rates of depression in SCI are two-to-six times higher than the general population. People with SCI are generally treated for depression the same as everyone else, even though there is no research indicating whether the treatment works or is well-tolerated in SCI patients.

"We wouldn't be doing this trial if we were sure antidepressants worked among most depressed people with SCI," Bombardier says. "Unfortunately, there is a reasonable chance that the standard antidepressant treatment everyone gets now isn't always very effective. The severity of psychosocial stresses—losing one's independence, source of income, and the activities that brought enjoyment—may make depression harder to treat in this group. If standard treatment doesn't really work for certain people, we need to know that so we can come up with better ways to treat depression in this population."

Furthermore, part of the depression seen in the SCI population may actually be normal feelings of loss or grief, which "doesn't respond well to antidepressants," Bombardier explains. "In this study, we will try to separate grief from depression," in order ensure that the treatment fits the diagnosis.

Since depression is known to increase the risk for pain, pressure sores and other medical complications in the SCI population, Bombardier anticipates that successfully treating depression will result in better overall health and quality of life. Ultimately, he and his colleagues hope this study will lead to more aggressive identification and better treatment of depression in SCI, both regionally and nationally.

The antidepressant venlafaxine XR (Effexor ® extended release) was chosen for this study because it generally has fewer side effects, less tendency to interact with other drugs,

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Portrait

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Kirk was rushed to Harborview, where he began his journey of adjustment to life with SCI. After 2 ½ weeks and two surgeries at Harborview, he transferred to the UW Medical Center (UWMC) for rehab, where over the next seven months he learned about the nuts and bolts of what his body could and couldn't do, about keeping healthy, and about negotiating the world in a manual wheelchair. "The nursing care was outstanding," he recalls, and he developed strong, long-lasting relationships with several rehab staff and physicians, many of which continue to this day.

In spite of what he was told during rehab, "I still didn't accept my paralysis as permanent when I left the hospital," he admits. Even now, he is hopeful about the possibilities of recovery on the horizon. "I know I can live the rest of my life in this physical condition, but I feel we will have regenerative processes that will greatly benefit people with SCI."

In the years since his injury, Kirk has lost neither his optimism nor his vigor. He returned to school for a degree in construction management and worked in the field for many years, most of them in education and training. He lives independently in his own accessible home (which he purchased only three months before his injury and has remodeled several times since), drives his own car, hires his own part-time personal care attendants, maintains a disciplined fitness program and, now that he is retired, keeps up a vigorous schedule of volunteer activities.

Not surprisingly, many of Kirk's volunteer activities are SCI-related. He has been on the Northwest Regional SCI System (NWRSCIS) Consumer Advisory Board (CAB) since its inception in 1995, and currently serves as its co-chair. The CAB provides guidance to the NWRSCIS and helps plan the monthly SCI Forums, a presentation and discussion series on topics about living with SCI. Kirk is also an SCI peer mentor, serving as a resource and role model for newly injured patients. He is a member of the Rehabilitation Services Patient and Family Advisory Council, which works to improve the way UWMC provides care throughout the entire Rehab Medicine Department. Outside the UW, he has been an active member of and fund raiser for the Spinal Cord Society, an international organization for cure research and treatment of chronic spinal cord injury and related neural problems.

Kirk is an assertive, well-informed health care consumer whose experience and insights have become a valuable resource at UWMC. Volunteering allows Kirk to put his expertise to direct use as an advisor to providers and an advocate for persons with disabilities. "I was the first person in a wheelchair to serve on the UWMC ADA Committee," he recalls. This committee, which works to insure that the needs of people with disabilities are considered in the areas of physical environment, communication and service delivery, "was a natural fit for me because of my construction background."

As a can-do, problem-solving type of guy, Kirk enjoys finding ways to "make things better for the next guy." As a CAB member and UWMC volunteer, his dedication and efforts are doing just that.

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://depts.washington.edu/rehab/sci/forum.html. Contact Cynthia Salzman (email: csalzman@u.washington.edu; phone: 206-685-3999) if you wish to be added to the SCI Forum mailing list.

Nutritional Guidelines for Individuals with SCI

This is an excerpt; the complete report and handouts are available online at *http://depts.washington.edu/rehab/sci/nutrition.html.*

June 13, 2006—"People with spinal cord injuries have unique nutrition issues," said Vickeri Barton, RD, CD, associate director of nutrition at Harborview Medical Center. "Partly this is due to changes in body composition and metabolism, partly to changes in activity level, and partly to barriers to preparing meals, shopping, and so on." All these factors make it harder to maintain good nutrition after SCI. Barton has worked with SCI patients in both inpatient and outpatient settings at Harborview for 25 years.

Why are nutrition and weight management so important after SCI?

■ **There is an increased risk for diabetes, elevated cholesterol and obesity**. Less physical activity, lower levels of HDL (high-density lipoproteins, known as the "good" cholesterol), higher fasting glucose and larger abdominal girth all contribute to an increased risk for heart disease and diabetes in the SCI population. Nutrition can play an important role in reversing or minimizing these tendencies, Barton said.

■ **Weight gain affects mobility and independence.** "Weight gain makes it harder to push your wheelchair and puts you at greater risk for skin breakdown because you have more weight on your bottom."

■ **Weight gain can increase expenses**. "You may need to buy a larger wheelchair or hire attendants to help with transfers."

■ **Increased risk for pressure ulcers**. Nutrition is important in maintaining healthy skin and in healing wounds if pressure sores have already occurred.

■ **Increased risk for osteoporosis**. Again, nutrition can help keep bones stronger and prevent fractures.

What is a desirable weight?

Right after injury, people lose a significant amount of weight—40 lbs. is not uncommon, Barton reported. "Much of that is the initial loss of muscle mass due to inactivity. But before going home, weight starts to go up again."

While there are no weight guidelines specifically for people with SCI, weight charts for the general public, such as those from life insurance companies, can be adjusted for use with the SCI population by subtracting 5-10% for paraplegia and 10-15% for tetraplegia (quadriplegia). For example, if the desirable weight for a medium-build, 5-foot 11-inch man is around 160 lbs., the recommendation of a similar-size man with paraplegia would be 5%-10% less, or 144 lbs. to 152 lbs. For a man with tetraplegia, desirable weight would be even lower—136 lbs. to 144 lbs.

Weight is one important factor, but fat is even more so. Body mass index (BMI)—the ratio of weight to height—is often used as an estimate of excess fat, but this is less accurate for people with SCI, who tend to have a higher percentage of fat compared to weight than the general population.

Estimating Calorie Needs

A formula to calculate calorie needs in SCI was developed in a 1985 study* that is still referenced widely today:

■ Persons with paraplegia: 27.9 calories times body weight in kg. (1 kg. = 2.2 lbs).

■ Persons with tetraplegia (quadriplegia): 22.7 calories times body weight in kg.

If you are already overweight, the calculation should be based on your *desirable* weight, not your current weight. For example, a person with tetraplegia whose desirable weight is 165 pounds, or 75 kg, needs 1703 (75 x 22.7) calories per day. A 165-pound person with paraplegia would need 2093 calories per day. Bear in mind, however, that "this formula doesn't take into account your gender, age or activity level," Barton said. "You probably need 200-300 fewer calories per day if you're 50 rather than 20 years old. And you use more calories with activity." Even the amount of air in wheelchair tires can affect energy expenditure (less air makes it harder to push so you burn more calories).

Rather than introducing a whole new eating plan, Barton works with patients to modify what they are already doing. "If I'm working with people who want to lose weight, I start by looking at what they're eating, and then I suggest changes," she said. "A month later, if it's working, we know we're on the right track." If not, further adjustments are made.

Protein needs

Unless a patient has a wound that is still healing, people with SCI have the same protein needs as the general population: 0.8 grams/kg. of body weight (1 kg. = 2.2 lbs.); e.g., someone who is 150 lbs. (68 kg.) should be eating about 55 grams of protein (68 kg. X 0.8 grams) per day. Typically, we all eat a lot more than the minimum.

Weight Control Tips

■ **Stay as active as possible**. Using a manual chair most of the time helps, as does arm aerobic exercise of any kind.

■ **Eat regular meals**. "Do not skip meals! Trying to lose weight by eating one meal a day does not work. Feed your body routinely; it'll help you pace your appetite throughout the day, and you'll end up eating less."

■ **Be aware of portion sizes.** A serving of meat shouldn't be bigger than a deck of cards. A serving of rice is only ½ cup. "What you're usually eating may actually be 3 or 4 servings. If you eat in a restaurant, you should take half of it home. It keeps you from overeating, and you get two meals."

■ **Eat a variety of foods**. Have protein, grains and fruits or vegetables with most of your meals.

■ **Eat low fat, high fiber foods.**

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■ **Watch beverage calories.** One serving of juice is only ½ cup! The 12 oz. bottle you buy in the store is actually 3 servings. "You can very quickly drink a lot of calories. So I often tell people, if you're thirsty, drink water, and save your calories for the meals."

■ **If you drink pop, make sure it's "diet" pop**. Some people drink three or four cans a day—that's 600 calories! "You cannot afford to drink that way!" Barton warned.

■ **Read food labels!** A package that proclaims "Low Fat!" may still be high in calories. Packages that look like one serving may actually contain two or three.

■ **Watch out for fast foods.** Find out what's in those fast-food meals. Do a Web search for "calorie content of fast foods."

Know your lipids (fats in the blood)

Lipids—cholesterol and triglycerides—are important to understand because they can increase risk of heart disease. Unhealthy blood lipids cause plaque to accumulate in the blood vessels, making it hard for blood to get through, and this in turn can cause heart attack or stroke. While you can't control all your blood lipids—much of it is affected by factors like genetics—you can influence them through diet and exercise. Tips from Barton:

■ Limit saturated fats (those that are solid at room temperature), trans fats (read the label!) and cholesterol (animal and dairy fats) in food.

■ Use low-fat cooking methods: bake, broil, grill or poach.

■ Avoid fried foods (French fries, fish and chips).

■ Choose nonfat or low-fat dairy products.

■ Eat lean meat and trim visible fat before cooking.

■ Choose fish more often.

■ Aim for a healthy weight.

■ Stop smoking.

■ Exercise as much as possible.

Osteoporosis

SCI increases the risk of osteoporosis (loss of calcium from the bones) in the lower limbs due to lack of weight-bearing, and this increases the risk for fracture. Try to maintain bone density by eating enough calcium. Barton recommends:

■ Be as active as possible.

■ Limit caffeine and stop smoking—they inhibit absorption of calcium.

■ Discuss medications such as Fosamax (which can limit loss of calcium from bone) with your physician.

■ Practice good fall prevention.

■ Get adequate calcium daily: Adults between age 19 and 50 need 1000mg/day; those older than 51 need 1200-1500 mg/day.

■ Get 400 IU of Vitamin D daily to help absorb calcium.

■ Eat three servings of high calcium food daily (dairy products; soy products; green leafy vegetables; canned sardines and salmon; orange juice with calcium added.)

■ If you need calcium supplements, make sure they contain vitamin D.

Neurogenic bowel

Adequate fiber intake is important for maintaining a good bowel program, but most people don't eat the recommended 20-35 grams of fiber per day. High fiber foods include raw fruits and vegetables, dried fruits, whole grains, nuts, beans and lentils, and popcorn. Watch out for added fats, such as butter on popcorn or oil on nuts. In addition, be sure to drink adequate fluids and space meals throughout the day.

How to find a dietitian:

Dietitians who have passed the American Dietetic Association competency exam are known as Registered Dietitians (RD). Many dietitians are also licensed or certified by individual states. "Your physician may be able to refer you," Barton said. "All hospitals are required to have dietitians on staff."

On the American Dietetic Association Web site (*www.eatright.org*), you can click on the link "Find a Nutrition Professional" to search for dieticians in your area.

* Energy expenditure after spinal cord injury: an evaluation of stable rehabilitating patients. Cox SA, Weiss SM, Posuniak EA, Worthington P, Prioleau M, Heffley G. *J Trauma* 1985;May 25(5):419-23.

Read the complete report of this SCI Forum presentation at:
http://depts.washington.edu/rehab/sci/nutrition.html.

Past SCI Forum reports are archived on our Web site at
http://depts.washington.edu/rehab/sci/forum_reports.html.

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Watch SCI Forum videos online

We are pleased to announce that the NWRSCIS has received federal and private funding to videotape selected SCI Forum presentations and make them available as streaming video on our Web site.

Please go to our home page, *http://depts.washington.edu/rehab/sci*, and click the SCI Forum Videos link. Currently, the following SCI Forum videos are ready for viewing:

■ Nutritional Guidelines for Individuals with SCI. (June 2006)

■ Repairing the spinal cord from within: Regeneration potential of the adult stem cell. (April 2006)

New videos will be added periodically. If you would like to receive email notification when new videos and other materials are added to our Web site, email us at *scirehab@u.washington.edu.*

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).

RESPIRATORY

■ **Outcomes of outpatient visits for acute respiratory illness in veterans with spinal cord injuries and disorders.**
Respiratory complications are a leading cause of death in persons with spinal cord injuries and disorders (SCI&D). This retrospective study examined the rates of hospitalization and death in a national population of veterans with SCI&D. Between October 1997 and September 2002, 4,597 veterans made a total of 8,775 clinic visits due to acute respiratory illness (ARI), which included upper respiratory infections (URI), acute bronchitis, and pneumonia and influenza (P&I). Approximately half (49%) of all ARI visits were for URI, 28% for pneumonia, 21% for acute bronchitis, and 2% for influenza. Over 30% of visits resulted in hospitalization within 60 days, most of them due to respiratory causes, and almost half of all P&I diagnoses resulted in hospitalization on the same day as the visit. Death within 60 days of the clinic visit was 2.9% overall, but 7.9% for pneumonia. Compared to the general population, veterans with SCI&D are at greater risk for hospitalization and death in cases of ARI. Continued vigilance and use of preventive strategies are warranted.
Weaver FM, Smith B, Evans CT, et al.
Am J Phys Med Rehabil. 2006 Sep;85(9):718-26.

■ **New CDC recommendations: annual influenza vaccination recommended for individuals with spinal cord injuries.**
Respiratory complications are common in persons with SCI, and as a result, this population has a higher death rate from influenza than the general population. The Centers for Disease Control (CDC) recommends vaccine for certain high-risk groups, including people with chronic illnesses. Yet influenza vaccination rates are well below national targets for both the general population and high-risk groups. Vaccination rates in persons with SCI are unknown but thought to be low, especially in younger individuals, because persons with SCI often receive care only from specialists, who rarely recommend or give vaccinations, and because generalists who see this population may not know about the risks of respiratory complications in SCI and are less likely to recommend immunization to younger persons with SCI. Given the enormous benefits and relatively small risks of influenza vaccines for the SCI population, new education and information campaigns for providers and consumers are needed.
Goldstein B, Weaver FM, Hammond MC.
J Spinal Cord Med. 2005;28(5):383-4.

BOWEL MANAGEMENT

■ **A comparison of patient outcomes and quality of life in persons with neurogenic bowel: standard bowel care program vs colostomy.**
A national survey that included questions about neurogenic bowel management was sent to 1,503 veterans with SCI; 58.4% responded, and of these 74 had colostomies and 296 used a standard bowel care program. There were no significant differences in satisfaction or quality of life between the veterans with colostomies and those with traditional bowel care programs. Respondents in both groups indicated that they experienced relatively few complications and their quality of life related to bowel care was generally good. Nevertheless, a large number (55.7% with colostomies; 41.7% without) reported dissatisfaction with their bowel care program, indicating that this is a major problem for veterans with SCI.
Luther SL, Nelson AL, Harrow JJ, et al.
J Spinal Cord Med. 2005;28(5):387-93.

SURGERY FOR OBESITY

■ **Gastric bypass surgery in a paraplegic morbidly obese patient.**
Persons with SCI who are also obese have complex medical and socioeconomic problems. While bariatric (gastric bypass) surgery has been successful in reducing the serious medical problems associated with obesity, this option has not been routinely offered to obese patients with SCI. This article describes the first case of a morbidly obese male with a SCI who underwent a successful Roux-en-Y gastric bypass.
Alaedeen DI, Jasper J.
Obes Surg. 2006 Aug;16(8):1107-8.

UROLOGY

■ **Botulinum toxin-type A in the treatment of drug-resistant neurogenic detrusor overactivity secondary to traumatic spinal cord injury.**
Botulinum toxin-type A (BTX-A) was injected into the detrusor (bladder) muscle of 37 patients with SCI and neurogenic detrusor overactivity (NDO, also known as "overactive bladder") that was not controlled adequately with anticholinergic drugs. After BTX-A injection, 25 (86%) of the 29 patients who used anticholinergics were able to stop the drug or reduce their daily dosage. There was also an overall significant increase in bladder capacity and decrease in bladder pressure. Incontinence and NDO were eliminated in 82% and 76% of patients, respectively. Symptoms improved for an average of 9 months.. Scores on Quality of Life questionnaires also improved. BTX-A injection has few side-effects or complications and is an effective treatment for drug-resistant NDO in patients with SCI.
Patki PS, Hamid R, Arumugam K, et al.
BJU Int. 2006 Jul;98(1):77-82.

■ **Intermittent catheterization in the rehabilitation setting: a comparison of clean and sterile technique.**
Thirty-six inpatients with cervical SCI requiring intermittent catheterization were randomized to either clean (16 subjects) or sterile (20 subjects) intermittent catheterization. Of these, six in the clean group and nine in the sterile group developed symptomatic urinary tract infections (UTIs), suggesting that clean intermittent catheterization is safe in the rehabilitation setting, has significant cost and time saving benefits, and enhances transition for the patient from rehabilitation to the community.
Moore KN, Burt J, Voaklander DC.
Clin Rehabil. 2006 Jun;20(6):461-8.

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■ **Evaluation of 3 methods of bladder irrigation to treat bacteriuria in persons with neurogenic bladder.**
Eighty-nine subjects with neurogenic bladder were randomized to irrigate their bladders twice daily for 8 weeks with 30 mL of either (a) sterile saline, (b) acetic acid, or (c) neomycin-polymyxin solution. Urinalysis, cultures, and antimicrobial susceptibility tests were performed at baseline and weeks 2, 4, and 8 to see whether the solutions affected numbers and types of bacteria, urinary pH, urinary leukocytes, and generation of antimicrobial-resistant organisms. None of the 3 irrigants had a detectable effect on the degree of bacteriuria or pyuria in 52 persons who completed the study protocol. Bladder irrigation was generally well tolerated. No advantages were detected for neomycin-polymyxin or acetic acid over saline, and the researchers conclude that bladder irrigation does not reduce bacteriuria in persons with neurogenic bladder.
Waites KB, Canupp KC, Roper JF, et al.
J Spinal Cord Med. 2006;29(3):217-26.

PAIN

■ **A comprehensive pain management programme comprising educational, cognitive and behavioural interventions for neuropathic pain following spinal cord injury.**
Twenty-seven outpatients with SCI and neuropathic pain participated in a 10-week, twice-weekly pain management program consisting of educational sessions, cognitive behavioral therapy, relaxation, stretching, light exercise and body awareness training. A control group of 11 patients with SCI and neuropathic pain was selected for comparison. Participants completed questionnaires measuring pain, sleep quality, mood, quality of life and life satisfaction at baseline, 10 weeks, and 3, 6 and 12 months. In the treatment group, anxiety and depression decreased significantly between baseline and 12 months, and depression improved compared to the control group. This study suggests that a multidimensional pain management program can be a valuable complement in the treatment of SCI patients with neuropathic pain
Norrbrink Budh C, Kowalski J, Lundeberg T.
J Rehabil Med. 2006 May;38(3):172-80.

LOW TESTOSTERONE IN SCI

■ **Testosterone levels among men with spinal cord injury admitted to inpatient rehabilitation.**
Total serum testosterone level, prealbumin, albumin, hematocrit and aspartate aminotransferase were measured in 92 men with SCI who had been injured 15 years or less. Low testosterone levels (<241 ng/dl) were present in 83% of men with acute injuries (<4 months), but only 7% of men with subacute SCI (4-12 months) and 10% of chronic SCI (>12 months). The median testosterone level for men who sustained injuries <4 months earlier was 160 ng/dl. Age, time since injury, and hematocrit levels were significant predictors of low testosterone. Low testosterone is high among men with acute SCI, suggesting a need for routine screening for low testosterone in this group and consideration given to testosterone replacement therapy.
Schopp LH, Clark M, Mazurek MO, et al.
Am J Phys Med Rehabil. 2006 Aug;85(8):678-84; quiz 685-7.

NEURAL REPAIR

■ **Neurological aspects of spinal-cord repair: promises and challenges.**
This review article explains the main challenges of translating spinal repair methods that have been successful in animals into human studies. Artificial transection of the spinal cord in animals does not cause the same damage as the contusion injuries typical in human SCI, which usually affects both central and peripheral nerves and causes large cysts and scar formation. There are significant differences between rats and humans in the mode of locomotion (quadrupedal vs. bipedal) and autonomic system functions, which is more complex and important in humans. The extensive damage of motor neurons and roots associated with spinal-cord contusion is not addressed in current animal studies and has direct implications for rehabilitation strategies and functional outcome. Problems associated with chronic complete SCI, such as degradation of neuronal function below the level of the lesion, further complicate regeneration-inducing treatment.
Dietz V, Curt A.
Lancet Neurol. 2006 Aug;5(8):688-94.

■ **Therapeutic interventions after spinal cord injury.**
The authors review the cellular and molecular strategies for spinal cord repair that are supported by more than one peer-reviewed animal experiment and that result in functional improvements after SCI, including transplantation of cells (peripheral nerve, Schwann, olfactory, embryonic and adult stem/progenitor), tissues (embryonic CNS), and macrophages; use of neuroprotective therapies (growth factors, myelin inhibitors); and locomotive training (treadmill, robotic, FES-assisted). Many of these strategies have reached, or are approaching, clinical trial. The authors emphasize a need for reproducible evidence of safety and efficacy in all trials, and recommend that preclinical studies be reproduced by independent laboratories. Individual therapies are unlikely to emerge as a cure for SCI. Rather, the authors predict that tailored combinations of strategies will lead to cumulative improvements in outcome after different types of SCI.
Thuret S, Moon LD, Gage FH.
Nat Rev Neurosci. 2006 Aug;7(8):628-43.

RECOVERY OF WALKING

■ **Spinal and brain control of human walking: implications for retraining of walking.**
The authors review the evidence for both spinal and brain regulation of walking in humans. They describe the sensory control of walking in young babies and spinal-cord-injured adults, two models with weak descending input from the brain, suggesting that subcortical structures are important in shaping walking behavior. The primitive pattern of walking seen in babies forms the base upon which additional features are added by supraspinal input as independent walking develops. Increasing evidence suggests the motor cortex is important in the control of level-ground walking in adults, in contrast to quadrupedal animals. This brain input seems particularly important for distal flexors in the leg. Recovery of walking after incomplete SCI may depend on the presence of descending input from the motor cortex and our ability to strengthen that input, implying that training methods for improving walking after injury to the nervous system must promote the involvement of both spinal and brain circuits.
Yang JF, Gorassini M.
Neuroscientist. 2006 Oct;12(5):379-89.

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Northwest Regional SCI System Web site: http://depts.washington.edu/rehab/sci

Depression in SCI

CONTINUED FROM PAGE 3

and more pain-relieving properties than other antidepressants—all important considerations for people with SCI, who often take several medications and have complex pain problems related to nerve damage.

Subject recruitment for this study is scheduled to begin in spring 2007. Individuals may be eligible if they are at least one year post injury. Once they enter the study, participants will be randomly assigned to receive a 12-week course of either venlafaxine XR or placebo (an inactive substance, sometimes called a "sugar pill"). Participation will include careful monitoring of symptom changes and any side effects, and participants will be paid for their time. Participants who receive the placebo and remain depressed at the end of the trial will be offered free treatment with venlafaxine XR.

For current information about this study, please check our Web site at *http://depts.washington.edu/rehab/sci/* or call 800-366-5643.

Also published online at http://depts.washington.edu/rehab/sci/update.html

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