



FAMILY AND SPINAL CORD INJURY

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Friday, March 14, 2003

Spinal cord injury is a life-altering experience not only for the person with injury but for spouses, parents, siblings, and children of the person. Many researchers have analyzed family adjustment to spinal cord injury. Most of the studies have focused on spouses with relatively few studies of children, parents, or siblings. However, a wealth of information is available on effects of spinal cord injury on marital relationships and effects of family on people with spinal cord injury. A review of this literature suggests interesting and surprising patterns, as well as several major gaps in our knowledge.

Effect of Spinal Cord Injury on Family Members

Studies of the effects of spinal cord injury on families usually focus on spouses and have paid little attention to other family members. Little has been published on the effects of spinal cord injury on children, siblings, parents, and other relatives. Family members suffer from stress, grief, and depression when a spinal cord injury occurs in the family.

Spouses. The burden of caregiving most frequently falls on the spouse. Caregiving spouses are often severely stressed, particularly due to health issues that arise after spinal cord injury. Chan (2000) studied this phenomenon in Hong Kong, finding that spouses of persons with spinal cord injury suffer emotional stress that is comparable to or greater than those of the injured partner. Spouses who are caregivers for people with spinal cord injury may be more depressed than their partners with disabilities. Caregivers have a higher incidence of physical stress, emotional stress, burnout, fatigue, anger, and resentment (Weitzenkamp, et al. 1997) than their partners or spouses who are not the caregivers. Chan, et al. (2000) report that the impact of spinal cord injury is more severe on marriages that began before than after the injury. An early study suggested that disabled people in pre-injury marriages receive more daily personal care assistance from their spouses than those in post-injury marriages (Crewe, et al, 1979).

Children. Given the disruptive and impoverishing effects of spinal cord injury on families, most people assume that spinal cord injury of a parent has deleterious effects on children. However, several studies suggest that spinal cord injury does not have as much deleterious long-term effect on the well-being of children. Killen (1990) assessed roles of children in families after spinal cord injury and found that spinal cord injury did not change the roles, i.e. mothers, fathers, husbands, and wives continued to play their traditional roles. Buck & Hohmann (1981) examined the effects of fathers with spinal cord injury and subsequent adjustment of 45 children compared to matched 36 children with able-bodied fathers. They found the children to be well-adjusted and emotionally stable with normal sex role identifies. Buck & Hohmann (1984) also analyzed the effects of financial insecurity and unemployment on child development, comparing children whose fathers were receiving ample income with those who were unemployed. They found no adverse relationship between child adjustment and financial resources of father's financial resources. Alexander, et al. (2002) described the impact of mothers with spinal cord injury on family and children's adjustments. They also found no adverse effects on the children's adjustment, gender role identity, self-esteem, or attitudes towards mother and father. There is a need for more studies on this subject, particularly with long-term follow-up of children whose parents have suffered spinal cord injury. While there is a dearth of information on the effects of parental spinal cord injury on children, much information is available concerning children who have parents with other disabilities. Through the Looking Glass (<http://www.lookingglass.org/>) is a wonderful web site in Berkeley California that has pioneered research, training, and services for families with disability. It is estimated that 2.6 to 4.7 million parents with disabilities are raising teenage children in the United States and nearly 10.9% of all American families with children include at least one parent who has a disability.

Parents. Almost everybody who is spinal injured has a parent. Over half of people in the United States are injured before age 26. When a person is young and not married, the burden of caregiving frequently is taken up by the parents. There is often nobody else. Yet, almost nothing is published in the medical literature concerning parents of people with spinal cord injury. I can say, however, from meeting many parents of injured people that the spinal cord injury of a child is as or more life-altering for them. One other factor may play a role as well. Many parents cannot adjust or forget. Years and even decades after the spinal cord injury, many parents are still grieving. It is not unusual to find tears in the eyes of a parent of a person with spinal cord injury when they talk about the accident and the events that follow. Feelings of helplessness and hopelessness, guilt, and depression often pervade their lives for a long time. There may also be differences between the responses of mother and fathers.

Siblings. Little is known about the effects of spinal cord injury on siblings, except for a few anecdotal stories (Shaddinger, 1995). The effects of injury of course depend on the age and closeness of the siblings. Very little has been published on the potential disruptive effects of spinal cord injury on the life, education, attitudes, and adjustment of siblings. Interestingly, there are several studies of the effect of spinal cord injury on identical twins. Tirch, et al. (1999) assessed depression in 11 monozygotic twins with one spinal-injured member and found no significant differences of depression,

suggesting that depression may have a genetic basis and spinal cord injury does not inevitably lead to depression. An alternative interpretation is that depression in one member of the pair leads to depression in the other. Twin studies, however, have provided a variety of insights into spinal cord injury induced changes in body composition and metabolism (Spungen, et al., 2000; Bauman, et al. 1999). Likewise, Kahn, et al. (2001) examined platelet function in 12 pairs of monozygotic twins and showed significant differences in platelet function related to loss of high-affinity prostanoid receptors, perhaps explaining the greater incidence of coronary disease in people with spinal cord injury. Sibling studies have also been used to assess the insulin resistance and sympathetic functions in high spinal cord injury (Karlsson, 1999; Karlsson, et al., 1995).

Effect of Spinal Cord Injury on Marriages

Spinal cord injury significantly affects marriages. In general, people with spinal cord injury are less likely to be married and more likely to be divorced (DeVivo & Fine, 1985). Given the disruptive effects of spinal cord injury on the family, the burden of caregiving being carried by the spouse, and impairment of sexual function, most people assume that spinal cord injury causes divorces and strongly discourage post-injury marriages. However, the effects of spinal cord injury on marital rates and marital relationships are less deleterious than commonly assumed. While divorces are more common after spinal cord injury, divorce rates are highly variable. Finally, sexual function and children are not only possible but common after spinal cord injury.

Marriages. The marriage rate of people with spinal cord injury is lower than the general population but the factors that influence marriage rate may differ from what is commonly assumed. Disability appears to exert a greater effect on the marital status of females than males (Brown & Giesy, 1986). Although medical complications have an adverse impact on quality of life of adults with pediatric-onset spinal cord injury (Vogel, et al. 2002), the presence of pressure ulcers, severe urinary tract infections, and spasticity have little effect on marriage rate of adults with pediatric onset spinal cord injury. In contrast, the presence of head injury has much more adverse effects on marital status (Florian, et al. 1991).

Marital Relationships. Several studies have reported differences in the quality of marital relationships in pre- and post-injury marriages. Peters, et al. (1992) compared marital relationships between people with spinal cord injury and head injury, finding that the latter causes much greater adjustment difficulties for spouses than the former. Crewe & Krause (1988, 1992) report that individuals who marry after injury have measurably higher life satisfaction than those married before injury. Yim, et al. (1998) assessed the quality of marital life among Korean couples with spinal cord injury. Married couples with spinal cord injury were not more unstable, had similar dyadic adjustment and marital satisfaction, appear to be more cohesive than able-bodied couples, even though husbands with spinal cord injury tend to show less affection and the couples regarded loss of sexual function as a serious problem. Distressed couples with spinal cord injury tend to express more dissatisfaction with sexual relations and more negative communication during conflict resolution (Urey & Henggeler, 1987).

Divorces. Divorce rates are higher after spinal cord injury (DeVivo & Fine, 1985) but reported divorce rates are highly variable from 8-48%. One early study suggested that divorce rates of pre-injury marriages are comparable to divorce rates of the general population (El Ghatit & Hanson, 1976). DeVivo, et al. (1995) examined 622 married persons enrolled in the National Spinal Cord Injury Statistical Center data set since 1973, finding a total of 126 divorces compared to 74 expected divorces based on age-sex-specific divorce rates of the general population. Men had a 2.07 times higher rate of divorce than women with spinal cord injury. DeVivo, et al. (1991) and Kreuter (2000) both point out that divorce rates are high during an initial high-risk period but tend to stabilize. Lapham-Randlov (1994) suggests that while the experience of spinal cord injury is painful, it offers opportunities for personal growth and family coalescence.

Sexual satisfaction. Spinal cord injury obviously impairs sexual function. However, sexual satisfaction does not appear to be related to physical factors such as erectile function, genital sensation, or orgasmic capacity as much as perceived partner satisfaction and relationship quality (Phelps, et al., 2001). Fisher, et al. (2002) assessed sexual function in 40 people (32 men, 8 women) with spinal cord injury. By 6 months after discharge from hospital, most of the participants in the survey had made significant changes in sexual behavior and activity. Most of the respondents had realistic concerns coupled with more requests for sexual health intervention. However, many were engaging in sexual activity. In Iceland, 55.5% of spinal-injured people are married and 71% had an active sexual life after injury (Knuttdottir, 1993). As with able-bodied populations, sexual activity is reduced in elderly people with spinal cord injury (Larsen & Hejgaard, 1984). A survey of 79 men with spinal cord injury in Houston suggest that although sex life was ranked lowest in terms of satisfaction, it was also ranked fifth in terms of importance (White, et al., 1992). In women, sexual dysfunction is inversely related to the perceived importance of sex (Harrison, et al., 1995), i.e. greater sexual dysfunction is associated with less perceived importance of sex and vice versa. Thus, sex is important but is not necessary for sexual satisfaction or sexual activity, and is frequently not the most important factor in life satisfaction.

Menarche and Pregnancy. Most people assume that spinal cord injury impairs ability to have children. Spinal cord injury generally should not prevent fertility in young women (Ohry, et al. 1978) and many women have had normal children after spinal cord injury. Anderson, et al. (1997) examined menstruation after spinal cord injury in 37 people injured between age 10-16. Seven reported no interruption of menses while 8 had interrupted menses for 1-7 months and the rest had normal onset of menarche. Most women have sexual intercourse after spinal cord injury and most are capable of achieving orgasm and are normally fertile (Biering, et al., 2002). Autonomic dysreflexia does complicate pregnancy and delivery (Wanner, et al. 1987) but can be managed with appropriate drugs and delivery approaches. Cross, et al. (1992) described 22 women who had 33 pregnancies after spinal cord injury. The mothers waited on average 5 years to become pregnant and 43% had caesarians. All the newborns were healthy on delivery except for one premature baby and a double footling breach vaginal delivery. Baker, et al., (1992) likewise reviewed 11 spinal-injured women with 13 pregnancy, finding uniformly good infant outcome with no major obstetric complications.

Fertility in Men. While spinal cord injury does impair erectile and ejaculatory function, semen can be obtained from almost all men with spinal cord injury through the use of vibratory or electrical stimulation (Brackett, 1999; Sonksen & Ohl, 2002). Because the bladder sphincter may not be closed during ejaculation, the semen often goes into the bladder. Many techniques are available to manage erectile and ejaculatory dysfunction in men with spinal cord injury (Biering-Sorenson & Sonksen, 2001). Although ejaculates from men with spinal cord injury usually have normal sperm counts, sperm motility may be impaired. Myths abound concerning the roles of elevated scrotal temperature, ejaculation frequency, or bladder management methods as causes of this condition. Recent studies suggest that physiological factors due to the spinal cord injury influences semen quality of men with spinal cord injury (Brackett, et al. 1996; Monga, et al. 2001), due to imbalance of sympathetic and parasympathetic innervation of the prostate. This cause of reduced fertility can be effectively dealt with in several ways. With appropriate rehabilitation and treatments, most men with spinal cord injury can and do have children.

Factors Affecting Family Relationships

Family relationships strongly influence life satisfaction of people with spinal cord injury. Warren, et al. (1996) found that closeness to family, the level of family activities, and blaming oneself for the injury were the three most important variables determining life satisfaction in people with spinal cord injury. Many factors affect family relationships, including the presence of depression, suicidal ideation or attempts, and cultural factors. Some of these factors are ameliorated by development of independence, behavioral changes, and a sense of hope.

Depression. Depression is common in people with spinal cord injury although not as common as in multiple sclerosis (Shnek, et al., 1997). Krause, et al. (2000) suggests that 48% of patients with spinal cord injury in 1997 had clinical symptoms of depression at a year or more after injury. Kemp & Krause (1999) compared depression and life satisfaction amongst people with spinal cord injury, post-polio syndrome, and non-disabled population. The post-polio group tended to score better on both depression and life satisfaction; only 22% of the post-polio group had depressive symptoms compared to 41% of the spinal cord injury group and 15% of the non-disabled group. One study showed that 60% of Portuguese patients with spinal cord injury have depressive symptoms (de Carvalho, et al. 1998). Kennedy & Evans (2001) report high levels of emotional distress in 14% of patients at 6-24 weeks after injury, significantly higher in females. Kennedy & Rogers (2000) examined 104 patients (19 women, 85 men) for anxiety and depression, finding consistent patterns of depression that were highest during the acute phase and during the months leading up to discharge. Pain exacerbates depression (Cairns, et al., 1996; Nagumo, 2000; Ravenscroft, et al. 2000). Holicky & Charlifue (1999) report that married individuals have less depression, greater life satisfaction, superior psychological well-being, and better perceived quality of life. Depression may be seasonal (Joerres, et al., 1992). Coping effectiveness training can significantly reduce depression scores (King & Kennedy, 1999).

Suicide. In the U.S., suicide rates of Vietnam veterans with spinal cord injury are nearly 10 times the suicide rate in the general population (Rish, et al., 1997). In the civilian population, suicide accounts for 6.3% of deaths after spinal cord injury (DeVivo, et al., 1991) and ranges from 2-6 times more prevalent than the general population (Charlifue & Gerhart, 1991). In Denmark, suicide rate is 5 times higher than the general population and surprisingly not related to injury severity (Hartkopp, et al., 1998). Kishi, et al. (2001a) reports that 7.3-11.3% of Japanese patients express suicidal ideation during hospital and rehabilitation phases, similar to other patients with acute life-threatening illnesses (Kishi, et al. 2001b). Some spinal cord injuries occur as a result of suicide attempts and nearly a third of such people in an British study appear to have schizophrenia (Kennedy, et al. 1999). Some people may respond with self-destructive behavior, including drug abuse (Krause, et al. 2001). While death due to infection in spinal cord injury has fallen substantially over the past 20 years, the suicide rate has increased over the same period (Soden, et al., 2000; Hartkopp, et al., 1998, 1997).

Blame. Several studies have identified a potential role of self-blame in depression and life satisfaction after spinal cord injury. A large majority of people either totally blame themselves or others for their injury (Brown, et al. 1999). Paradoxically, people who are blameless for the accident tend to be less successful coping (Stensman, 1994). Blaming oneself for the injury is associated with increased life satisfaction (Warren, et al., 1996). Reidy & Caplan (1994) examined the hypothesis that people who accept responsibility for their injury cope better with their spinal cord injury. Attribution of blame (either self or others) did not correlate with depression during the rehabilitation phase but people whose self-blame increased over time did exhibit greater depression. Over the long term, the relationship between self-blame and depression declines (Schulz & Decker, 1985). On the other hand, people who show anxiety and depression at a year after injury do not seem to get better with time (Craig, et al. 1994).

Cultural factors. Cultural differences may affect family life, social interactions, and perception of spinal cord injury (Saravanan, et al., 2001). Ide & Fugl-Meyer (2001) compared life satisfaction of people with spinal cord injury in Japan and Sweden. Even when corrected for injury level and severity, the data suggest that Swedish people are more satisfied than Japanese in terms of general health, economy, social activity, social services, family life, and sexual life. A recent comparison of spinal-injured individuals in Turkey and the United States, however, revealed limited differences in social participation once the data is corrected for age and injury differences (Dijkers, et al., 2002). Ville & Rayaud (2001) surveyed 1668 people with tetraplegia in France, finding that the age of impairment and having a job do not predict self-assessments of well-being although the presence of pain, subjective assessment of independence, and severity of disability strongly predict a sense of well-being; loss of independence only affected well-being in that it imposes limits on social activity. McColl, et al. (2002) compared American, British, and Canadians who are at least 20 years after spinal cord injury. They found that Americans had a better psychological profile with fewer health and disability-related problems, that British participants had less joint pain and less likelihood of perceiving that they are aging quickly, and that Canadians had more health and disability related complications. The reasons for these differences are not clear.

Independence. The independence of individuals with spinal cord injury may affect family relationships. Spinal-injured individuals who are more independent tend to perceive their family environment as more responsive and more open (McGowan & Roth, 1987). Even when corrected for injury severity and disability, the productivity of an individual after spinal cord injury is most influenced by the following variables in order: education, ability to drive a car, other transportation indices, and age (Noreau, et al., 1999). Boekamp, et al. (1996) reviewed the literature for potential causes of depression after spinal cord injury and found that social support and recent stressful events can be used to identify patients at a high risk of depression but that they are less likely to become depressed if they are independent. Adjustment to spinal cord injury and quality of life can be adversely affected by inadequate home facilities that make a person more dependent (Seki, et al., 2002). Expectations of independence decline steadily with increasing age (McColl, et al. 1999).

Adjustment. Spinal cord injury causes personality and behavioral changes as people adjust to life after injury. Buchanan & Elias (1999) assessed personality and behavior changes in people after spinal cord injury, comparing the perceptions of the changes by the person and the spouse. Both partners usually agree that spinal cord injury causes significant personality and behavior changes. It is important to emphasize that not all behavioral changes, however, are due to the spinal cord injury. Many people with spinal cord injury have had head injury. For example, in the above study from Buchanan & Elias, 5 of the 9 participants described post-traumatic amnesia lasting longer than 3 days, suggestive of traumatic brain injury. Perception of adjustment to spinal cord injury by persons and family members appear to be similar. Glass, et al. (1997) compared the views of adjustment by 250 persons with spinal cord injury and by their closest relatives. The injured persons' perceptions of adjustment appear to be at least as reliable as their closest relatives. Adjustment to spinal cord injury also changes with time after injury. Although most studies show increasing adjustment to spinal cord injury over time, this may not be true for the long term Krause (1997) examined 235 people with traumatic spinal cord injury who were more than 23 years after injury and found declines in perceived well-being.

Hope. Hope is a potentially important coping strategy for both the person and family with spinal cord injury. Davies (1993) interviewed people with spinal cord injury and found that goal-directed hope based on realistic perceptions of life, focusing on progress, positive interpretation of events, and goal setting are important in helping people and families cope with spinal cord injury. The process of hope can be a generalized and positive force to reduce depression, the sense of powerlessness, and grief (Lohn, 2001; Sullivan, 1990). Elliot, et al. (1991) assessed whether a sense of hope and a "sense of pathways" (ability to find ways to meet goals) predicted psychosocial interactions, depression, and impairment. They found that a sense of "hope" predicts psychosocial interactions while "sense of pathways" negatively correlates with depression and impairment. Piazza, et al. (1991) report predictive relationships between hope, social support, and self-esteem in 77 patients, finding that the best predictors of hope in people with spinal cord injury are self-esteem, social support, and education.

References cited

- Alexander CJ, Hwang K and Sipski ML (2002). Mothers with spinal cord injuries: impact on marital, family, and children's adjustment. *Arch Phys Med Rehabil* **83**:24-30. Summary: OBJECTIVE: To evaluate how mothers with spinal cord injury (SCI) adjust to parenting, their marriages, and their families, and how their children adjust to their mothers' disability. DESIGN: Randomized control study of mothers with SCI and their children, matched to able-bodied mothers and their children on key demographic variables. SETTING: Subjects were selected from 7 regional Spinal Cord Injury Model Systems from across the United States. PARTICIPANTS: A total of 310 volunteers (experimental: 88 mothers with SCI, 46 partners, 31 children; matched controls: 84 able-bodied mothers, 33 partners, 28 children). INTERVENTIONS: Not applicable. MAIN OUTCOME MEASURES: Children's adjustment, gender role identity; self-esteem; children's attitude toward mother and father; dyadic and family adjustment; parenting stress; and satisfaction. RESULTS: No significant differences were found between mothers with SCI and able-bodied mothers. Moreover, there were no significant differences between children raised in families with mothers with SCI and children raised in families with able-bodied mothers. Also, no significant differences were found in dyadic or family functioning with mothers with SCI or able-bodied mothers. CONCLUSIONS: SCI in mothers does not appear to affect their children adversely in terms of individual adjustment, attitudes toward their parents, self-esteem, gender roles, and family functioning. Our results may challenge health care providers, social policy-makers, and the general public to end negative stereotyping of children, couples, and families with a disabled mother and wife. The Miami Project to Cure Paralysis, Department of Neurological Surgery, University of Miami School of Medicine, Miami, FL, USA. calexander@miamiproject.med.miami.edu
- Anderson CJ, Mulcahey MJ and Vogel LC (1997). Menstruation and pediatric spinal cord injury. *J Spinal Cord Med* **20**:56-9. Summary: Menstrual characteristics were studied in young women who sustained spinal cord injuries (SCI) prior to puberty or in early adolescence. Subjects were 37 females who were injured prior to age 16 years and who were at least 10 years old at the time of interview; 22 were injured prior to menarche and 15 after menarche. Average age of menarche for females injured before puberty was 12.3 years which is similar to their mothers (mean 12.6 years) and to patients injured after menarche (mean 12.0 years). Of 15 females injured after menarche, seven reported no interruption in menses while eight had interruptions ranging from one to seven months. No significant menstrual problems were noted in either group. This information about menstruation should be included in sexuality teaching of parents and patients when an SCI occurs to a child or adolescent. Shriners Hospitals, Chicago Unit, IL 60707, USA.
- Baker ER, Cardenas DD and Benedetti TJ (1992). Risks associated with pregnancy in spinal cord-injured women. *Obstet Gynecol* **80**:425-8. Summary: We reviewed the experience with pregnancy in spinal cord-injured women at the University of Washington over the past 10 years. During that time, 11 women with spinal cord injury had 13 pregnancies. Infant outcome was uniformly good. No major obstetric complication occurred. The mothers experienced medical problems including urinary

tract infection in ten and pyelonephritis in three. Autonomic hyperreflexia occurred in three of five subjects with lesions at or above the sixth thoracic vertebra. Pregnancy in the spinal cord-injured patient involves medical risk for the mother, but with careful management, an excellent outcome for both mother and infant may be anticipated. Department of Obstetrics and Gynecology, University of Washington, Seattle.

- Bauman WA, Spungen AM, Wang J, Pierson RN, Jr. and Schwartz E (1999). Continuous loss of bone during chronic immobilization: a monozygotic twin study. *Osteoporos Int* **10**:123-7. Summary: Acute immobilization is associated with rapid loss of bone. Prevailing opinion, based on population cross-sectional data, assumes that bone mass stabilizes thereafter. In order to address whole-body and regional skeletal mass in long-term immobilization, monozygotic twins were studied, one of each twin pair having chronic spinal cord injury (SCI) of a duration ranging from 3 to 26 years. The research design consisted of the co-twin control method using 8 pairs of identical male twins (mean +/- SD age, 40 +/- 10 years; range 25-58 years), one of each set with SCI. The twins were compared by paired t-tests for total and regional bone mineral content (BMC) and bone mineral density (BMD) measured by dual-energy X-ray absorptiometry. Linear regression analyses were performed to determine the associations of age or duration of injury with the differences between twin pairs for total and regional skeletal bone values. In the SCI twins, total-body BMC was significantly reduced (22% +/- 9%, $p < 0.001$), with the predominant sites of reduction for BMC and BMD being the legs (42% +/- 14% 35% +/- 10%, $p < 0.0001$), and pelvis (50% +/- 10% and 29% +/- 9%, $p < 0.0001$). Duration of SCI, not age, was found to be linearly related to the degree of leg bone loss in SCI twins (BMC: $r(2) = 0.60$, $p < 0.05$; BMD: $r(2) = 0.70$, $p < 0.01$). Our findings suggest that pelvic and leg bone mass continues to decline throughout the chronic phase of immobilization in the individual with SCI, and this bone loss appears to be independent of age. Spinal Cord Damage Research Center, Departments of Medicine and Rehabilitation Medicine, Mount Sinai School of Medicine, New York, NY, USA.

- Biering-Sorensen F and Sonksen J (2001). Sexual function in spinal cord lesioned men. *Spinal Cord* **39**:455-70. Summary: STUDY DESIGN: Review of literature. OBJECTIVE: To review the physical aspects related to penile erection, ejaculatory dysfunction, semen characteristics, and techniques for enhancement of fertility in spinal cord lesioned (SCL) men. SETTING: Worldwide: individuals with traumatic as well as non-traumatic SCL. RESULTS: Recommendations for management of erectile dysfunction in SCL men: If it is possible to obtain a satisfactory erection but of insufficient duration, then try to use a venous constrictor band to find out if this is sufficient to maintain the erection. Otherwise we recommend Sildenafil. If Sildenafil is not satisfactory then use intracavernous injection with prostaglandin E(1) (some SCL men may prefer cutaneous or intraurethral application). We discourage the implantation of penile prosthesis for the sole purpose of erection. Recommendations for management of ejaculatory dysfunction in SCL men: Penile vibratory stimulation (PVS) to induce ejaculation is recommended as first treatment choice. If PVS fails, SCL men should be referred for electroejaculation (EEJ). Semen characteristics: Impaired semen profiles with low motility rates are seen in the majority of SCL men. Recently reported data gives evidence of a decline in spermatogenesis and motility of ejaculated

spermatozoa shortly after (few weeks) an acute SCL. It is suggested that some factors in the seminal plasma and/or disordered storage of spermatozoa in the seminal vesicles are mainly responsible for the impaired semen profiles in men with chronic SCL. Fertility: Home insemination with semen obtained by PVS and introduced intravaginally in order to achieve successful pregnancies may be an option for some SCL men and their partners. The majority of SCL men will further enhance their fertility potential when using either PVS or EEJ combined with assisted reproduction techniques such as intrauterine insemination or in vitro fertilization with or without intracytoplasmic sperm injection. Clinic for Para- and Tetraplegia, Department TH, The Neuroscience Centre, Rigshospitalet, Copenhagen University Hospital, Havnevej 25, DK-3100 Hornbaek, Copenhagen, Denmark.

- Boekamp JR, Overholser JC and Schubert DS (1996). Depression following a spinal cord injury. *Int J Psychiatry Med* **26**:329-49. Summary: OBJECT: Depression is a common problem following a spinal cord injury (SCI) and can greatly interfere with the rehabilitation process because of reduced energy, negative expectations, and social withdrawal. Understanding various factors which influence a vulnerability to depression may improve the diagnosis and treatment of depressive disorders and can improve rehabilitation outcome. METHOD: A thorough literature search was conducted using Medline, PsychLit, Pyschinfo, and Social Science Citation Index to identify relevant articles published between 1967 and 1995. RESULTS: A diathesis-stress model is proposed to explain the increased risk of depressive symptoms after a SCI. Biological changes associated with SCI and pre-existing cognitive biases may influence the individual's vulnerability to stressful life events following the injury. The nature and frequency of stressful life events following the injury can tax the individual's coping resources. Furthermore, the perceived quality of social support and the severity of conflict within the family can influence the individual's adaptation. CONCLUSIONS: Social support and recent stressors should be assessed to identify patients at high risk for depression. Patients are less likely to become depressed if their independence is fostered and they are encouraged to develop new sources of self-esteem. Relatives can be counseled to help maintain supportive relationships within the family. Harvard Medical School.

- Brackett NL (1999). Semen retrieval by penile vibratory stimulation in men with spinal cord injury. *Hum Reprod Update* **5**:216-22. Summary: Traumatic spinal cord injury resulting from car accidents, falls, violence or sport-related activities is a common occurrence throughout the world. Spinal cord injuries occur most often to young men in their parenting years. Among the medical challenges facing many of these men is the inability to ejaculate via sexual intercourse. To achieve biological fatherhood, their semen may be retrieved by methods of assisted ejaculation. This paper discusses the use of penile vibratory stimulation in men with spinal cord injury, and includes the topics: patient selection and management; proper placement and timing of stimulation; appropriate use of low-amplitude, high-amplitude or dual vibrators; and factors influencing ejaculatory success rate. Also summarized are recent data on semen quality in men with spinal cord injury. When performed properly, penile vibratory stimulation is a safe and easy method of obtaining semen from anejaculatory men with spinal cord injury. Semen quality is better when obtained by penile vibratory stimulation compared

with electroejaculation, an alternative method of semen retrieval. For these reasons, and because of the low investment of time and money, it is recommended that penile vibratory stimulation be used as the first line of treatment for anejaculation in men with spinal cord injury. The Miami Project to Cure Paralysis, University of Miami School of Medicine, Florida, USA.

- Brackett NL, Nash MS and Lynne CM (1996). Male fertility following spinal cord injury: facts and fiction. *Phys Ther* **76**:1221-31. Summary: Although most spinal cord injuries (SCIs) occur to males of parenting age, myths abound as to whether men can biologically father children after SCI. Following SCI, most men experience impairments in erectile and ejaculatory function. Semen can be obtained from almost all men with SCI through the use of vibratory or electrical stimulation. Their ejaculates often have normal sperm counts but more immotile sperm than found in men without SCI. This condition does not seem to be caused by lifestyle factors (such as elevated scrotal temperature, ejaculation frequency, and method of bladder management) but may be related to factors within the seminal plasma. Sperm from men with SCI may be used in assisted reproductive techniques to attempt biological fatherhood. Health care providers, including physical therapists, should encourage men with SCI seeking biological fatherhood to be evaluated at a center dedicated to assisting men with SCI in this specialty area. Male Fertility Research Program, Miami Project to Cure Paralysis, University of Miami School of Medicine, FL 33136, USA.
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- Brown JS and Giesy B (1986). Marital status of persons with spinal cord injury. *Soc Sci Med* **23**:313-22. Summary: The proposition that persons are selected into and out of marriage on the basis of their health or disability status has often been advanced, but remains untested. This article presents a theoretical rationale for the proposition; provides an initial test of that proposition by comparing the marital status of a sample of persons with spinal cord injury with the marital status of the general public; and elaborates on the proposition by examining the extent to which other factors account for differences in marital status among members of this disabled group. The selected factors were sex, severity of disability (indicated by need for assistance, perceived health, and extent of paralysis), socio-economic status (indicated by adequacy of income and welfare status), current age, and age at onset of disability. A secondary analysis of existing survey data on 251 Oregon residents with spinal cord injury (182 males, 69 females) yielded the following results. The marital selection proposition was supported in that the marital status of this sample differed markedly from that of the general population. The disability exerted a greater effect on the marital status of females than of males. All the selected variables were significantly associated with marital status for one or for both sexes. Discriminant function analyses, employing these variables, identified correctly the marital status of 67.6% of the males, and 75.4% of the females. Profiles of married, formerly married, and single men and women with spinal cord injury are presented. Suggestions are offered for further testing of the marital selection proposition and for elaborating theory linking disability and health status to marital status.

- Brown K, Bell MH, Maynard C, Richardson W and Wagner GS (1999). Attribution of

responsibility for injury and long-term outcome of patients with paralytic spinal cord trauma. *Spinal Cord* **37**:653-7. Summary: Study Design: Survey. Objective: To assess the association between patients' perceptions of responsibility for the injury and long term outcomes. Setting: Duke University Medical Center Spinal Injury Service. Methods: One hundred and forty patients, who suffered spinal cord injuries between 1985 and 1990, were selected to participate in the study, and 26 (19%), including eight with quadriplegia, completed a telephone interview. The mean age at interview was 39+/-12 years and 12% were women. The mean time from injury to completion of the study was 8.7+/-1.5 years. Attribution of cause of injury, the Craig Handicap Assessment Reporting Technique, and the SF36 mental health depression/vitality surveyed instruments attribution of responsibility for the injury, functional capacity, mental health depression, and vitality. Results: The majority (18/26) of patients either totally blamed themselves or others for their injuries. Overall, there was no statistically significant association between attribution of injury and long-term outcomes. Outcomes were similar in patients who either totally blamed themselves or others for their predicament. Conclusion: In this study, long-term outcomes were not influenced by whether patients perceived themselves as being responsible for their injuries. Spine Injury Service, Duke University Medical Center, Durham, North Carolina 27710, USA.

- Buchanan KM and Elias LJ (1999). Personality & behaviour changes following spinal cord injury: self perceptions--partner's perceptions. *Axone* **21**:36-9. Summary: There has been little specific investigation of personality and behaviour changes following spinal cord injury (SCI) and only limited consideration of the possible impact of concurrent traumatic brain injury (TBI). By mail-out questionnaire, we evaluated personality and behaviour changes in a married group (n = 9) with traumatic SCI, who knew their partners prior to injury, and who had not been identified as having concurrent TBI on referral to the Canadian Paraplegic Association. Both the person with SCI (and the partner) completed the revised Adjective Checklist and by their combined report, there were significant personality and behaviour changes. Unexpectedly, five individuals described post-traumatic amnesia (PTA) > or = 3 days. Subsequently, participants' reports were further divided into two groups--"longer PTA" and "shorter PTA". The "longer PTA" group self-reported less change and more positive change than did their partners. The "longer PTA" partners described changes that are consistent with the profile of TBI. The "shorter PTA" group described themselves more negatively than did their partners. Given the size of the groups (n = 5, n = 4), these findings are presented to illustrate trends and to stimulate further research. Division of Neurosurgery, Royal University Hospital/University of Saskatchewan.

- Buck FM and Hohmann GW (1981). Personality, behavior, values, and family relations of children of fathers with spinal cord injury. *Arch Phys Med Rehabil* **62**:432-8. Summary: Many opinions have been expressed about the adverse effects on children of being raised by a parent who is physically disabled, but little research has been done. The present study examined the relationship between spinal cord injury (SCI) in fathers and the subsequent adjustment patterns of their children. Two groups of adult children were studied: 45 children reared from early age by fathers with SCI and a matched control group of 36 children with able-bodied fathers. The 2 groups were compared on psychologic tests assessing areas speculated in the literature to be influenced by parental

disability. Although children of fathers with SCI differed from children with able-bodied fathers in some behaviors, values, and attitudes, the data failed to confirm any of the hypothesized relations between parental disability and child development. Children whose fathers had SCI were well-adjusted, emotionally stable persons who had attained normal sex role identities. Health patterns, body image, recreational interests, interpersonal relationships, and family relations were not found to be adversely associated with the disability status of the father. Limitations of the study and implications for rehabilitation, adoption, and court custody issues are discussed.

- Buck FM and Hohmann GW (1984). Child adjustment as related to financial security and employment status of fathers with spinal cord injuries. *Arch Phys Med Rehabil* **65**:327-33. Summary: Many rehabilitation professionals have expressed concern about the effects that socioeconomic changes associated with disability in a parent have on children's adjustment. It has been speculated that financial insecurity and unemployment among fathers with disabilities adversely affect child development, because of the presumed consequence of reversal in parental roles. This study tested these notions by comparing children whose fathers with spinal cord injuries (SCI) were: (1) receiving ample, secure income vs low income that was not guaranteed, and (2) employed vs unemployed. All subjects were given seven tests measuring personality, values, and interests, which were completed in a standardized order and time period. On 16 demographic indices and more than 150 measures of children's personality, behavior, and attitudes, only 17 were related to the financial resources of fathers with SCI and 11 to their employment status. Contrary to opinions in previous reports, no adverse relationships were found between child adjustment and the financial security or employment status of fathers with SCI. Limitations and implications of the study are discussed.

- Cairns DM, Adkins RH and Scott MD (1996). Pain and depression in acute traumatic spinal cord injury: origins of chronic problematic pain? *Arch Phys Med Rehabil* **77**:329-35. Summary: OBJECTIVE: To examine the relationship between pain and depression over time during acute phases of traumatic spinal cord injury (SCI). Theoretical models of the pain-depression relationship provided the framework: (1) pain causes depression; (2) depression causes pain; (3) pain and depression are independent sequelae to SCI. Understanding the pain-depression relationship provides treatment implications and hypotheses for origins of chronic pain in SCI. DESIGN: A repeated measures design assessing subjects at admission and discharge from rehabilitation. SETTING: Subjects were admitted to a large public hospital in Southern California which is a member of the Model Spinal Cord Injury System. Rehabilitation occurred on two 30-bed units. PARTICIPANTS: Complete admission and discharge data sets were collected from 68 acute traumatic SCI patients who served as subjects. One hundred twenty-one patients initially agreed to participate in a larger study of adjustments to SCI. Thirty-three did not have pain data at admission, 16 dropped out, and 4 had incomplete discharge data. Subjects volunteered and were paid a fee. INTERVENTION: A standard rehabilitation program for SCI. MEASURES: Pain assessment used a 101-point numerical rating scale. Depression assessment used the Center for Epidemiological Studies-Depression Scale(CESD). RESULTS: Pain and depression were independent at admission. At discharge, they were significantly related. Changes in pain affected depression more

than changes in depression affected pain. **CONCLUSIONS:** Relationships between pain and depression develop over time. Reduced pain will have a greater effect on reducing depression than reduced depression will have on pain. Pain described as "burning" during the acute phase does not represent difficult to treat dysesthetic pain, as it may in chronic SCI pain. Clinical Psychology, Rancho Los Amigos Medical Center, Downey, CA, USA.

- Chan RC (2000). Stress and coping in spouses of persons with spinal cord injuries. *Clin Rehabil* **14**:137-44. Summary: **OBJECTIVE:** To examine the sources of stress and the patterns of coping of spouses of persons with spinal cord injuries (SCI) among Hong Kong Chinese. **DESIGN:** A cross-sectional correlation design. A set of structured questionnaires and semi-structured interviews were administered. **SUBJECTS:** Forty spouses of persons with SCI were recruited and interviewed. **OUTCOME MEASURES:** These included coping strategies, depression, care-giving burden, life satisfaction and marital adjustment. **RESULTS:** The most stressful situations reported by the participants concerned health issues of their injured partners, the family and marital interactions, and the care-giving burden imposed on them. Cluster analysis indicated a potential at-risk group, characterized by high scores in external locus of control, inadequate coping modes and limited social support. They were noted to manifest high levels of depression, care-giving burden, low levels of life satisfaction and marital adjustment. **CONCLUSION:** The identification of the potential at-risk group indicates that spouses of persons with SCI suffer levels of stress comparable to those of their injured partners. Rehabilitation plans should include this potential at-risk group to help them release the stress and to prevent them from developing clinically significant mental disorders. Department of Psychology, The University of Hong Kong, China. ckrchan@hkusua.hku.hk

- Chan RC, Lee PW and Lieh-Mak F (2000). Coping with spinal cord injury: personal and marital adjustment in the Hong Kong Chinese setting. *Spinal Cord* **38**:687-96. Summary: **STUDY DESIGN:** A cross-sectional retrospective study was carried out with structured questionnaires and semi-structured interviews on 66 persons with spinal cord injury (SCI) and 40 spouses. **OBJECTIVES:** The study aimed to explore the psychosocial adjustment of Hong Kong Chinese couples at the post SCI stage. An important study interest was the impact of care-giving in spouses of persons with SCI. **SETTING:** Three major regional rehabilitation centres and one community resource centre in Hong Kong. **METHODS:** A set of psychometric measures tapping different aspects of psychological functioning was included. These were locus of control (Levenson's Internality, Powerful Others, and Chance Scale), perceived social support (Provision of Social Relationship), coping strategies (Ways of Coping Checklist), marital adjustment (Dyadic Adjustment Scale), caregiving burden (Caregiver Burden Inventory), depression (Beck Depression Inventory), life satisfaction (Satisfaction with Life Situation), and social role adjustment (Katz Adjustment Scale - Relative Form). **RESULTS:** Persons with SCI with pre-injury marriage were more depressed ($P < 0.05$) as compared with those with post-injury marriage. However, the two groups did not differ in terms of satisfaction with life situation and social role dissatisfaction. The spouses in the preinjury marriage reported a significantly higher score in time-dependent burden than those in the post-injury marriage ($P < 0.05$). Care-giving burden was associated

with locus of control, social support, and modes of coping ($P < 0.05$). **CONCLUSION:** The impact of SCI is a long-lasting effect not limited to the patients but also extending to their spouses. Findings from the adjustment outcomes and coping styles of persons with SCI and their spouses indicate that they are not passive victims. A similar injury may produce different outcomes in different individuals. Rehabilitation professionals should thus be alert to both the couple's differing needs and idiosyncrasies in their helping process. The Department of Psychology, The University of Hong Kong, Pokfulam, China.

- Charlifue SW and Gerhart KA (1991). Behavioral and demographic predictors of suicide after traumatic spinal cord injury. *Arch Phys Med Rehabil* **72**:488-92. Summary: Among people with spinal cord injuries, death from suicide is two to six times more prevalent than in the general population. To determine if individual characteristics and behaviors present during rehabilitation can identify high-risk individuals, records of 5,200 spinal cord injured patients admitted to the Rocky Mountain Regional Spinal Injury System were reviewed. Of 489 deaths, 9% were due to suicide. They were compared with a control group of equal size, matched on age, gender, and injury level. The two groups differed significantly on postinjury despondency; expressions of shame, apathy, and hopelessness; and preinjury family disruption (p less than .01). They also differed on alcohol abuse, active involvement in the injury, preinjury depression or despondency, destructive behavior, and one aspect of etiology (p less than .05). Discriminant analysis yielded a predictive model that correctly classified 81% of the suicide group and 79% of the control group. Many of the demographic predictors identified in this study are similar to those reported in the scientific literature. However, when combined with specific behavioral characteristics manifested during rehabilitation, they comprise an array of variables that permits development of a clinical model for predicting suicide among persons with spinal cord injuries. Research Department of Craig Hospital, Englewood, CO 80110.

- Craig AR, Hancock KM and Dickson HG (1994). A longitudinal investigation into anxiety and depression in the first 2 years following a spinal cord injury. *Paraplegia* **32**:675-9. Summary: This study is a 1 year extension of a controlled 1 year follow up study of spinal cord injured persons. The study assessed the extent of spinal cord injury (SCI) persons' depression and anxiety in comparison to an able bodied control group matched for age, sex, education and as far as possible, occupation. Psychological adjustment to SCI was assessed in terms of scores on the Trait Anxiety Inventory and the Beck Depression Inventory. Results obtained at the 2 year follow up were not significantly changed from those obtained over the first year. There was no significant improvement in anxiety and depression scores in the SCI group 2 years post injury. Examination of the SCI scores suggest that psychological morbidity was confined to a group of approximately 30% of persons, whilst the remaining persons were not severely anxious or depressed. Traditional stage models of adjustment to SCI which suggest that the passage of time is associated with better adjustment were not supported by the present data. School of Biological and Biomedical Sciences, University of Technology, Sydney, NSW Australia.

- Crewe NM, Athelstan GT and Krumberger J (1979). Spinal cord injury: a comparison of preinjury and postinjury marriages. *Arch Phys Med Rehabil* **60**:252-6. Summary: A

study of the preinjury and postinjury marriages of 55 spinal cord injured persons and their partners revealed several differences between the relationships. Although all patients had comparable levels of spinal cord injury, the disabled persons in preinjury marriages were judged to have less motivation for independence; a larger proportion of them received daily personal care assistance from their spouses. Furthermore, those in postinjury marriages were more likely to be employed and were judged to be better adjusted psychologically. Psychologists' assessment of marriages based on interviews with the spinal cord injured subjects and their spouses revealed that the postinjury marriages were happier than the preinjury marriages. Possible explanations for these findings are discussed, which include age and state of health, the impact of disability on the marital relationship and the personal assets of disabled persons who attract new partners.

- Crewe NM and Krause JS (1988). Marital relationships and spinal cord injury. *Arch Phys Med Rehabil* **69**:435-8. Summary: A questionnaire study of 122 married individuals with spinal cord injury (SCI) revealed a number of differences between the marriages that took place after the onset of disability and those that had occurred earlier. The two groups were equivalent in terms of severity and duration of disability, but those married before SCI were older. ANCOVA was used in most analyses to control for age at the time of injury and at present. Those married after injury reported greater satisfaction with their sex lives, living arrangements, social lives, health, emotional adjustment, and control over their lives, and they indicated that loneliness was less of a problem. They were also far more likely to be working and to be socially active outside their homes. Department of PM&R, University of Minnesota, Minneapolis 55455.
- Cross LL, Meythaler JM, Tuel SM and Cross AL (1992). Pregnancy, labor and delivery post spinal cord injury. *Paraplegia* **30**:890-902. Summary: There are approximately 3,000 women of childbearing age who become spinal cord injured each year in the United States. There are few reports in the literature that address pregnancy, labor and delivery in this patient population. We are reporting on 22 women post spinal cord injury who had 33 pregnancies. There were equal numbers of paraplegic and quadriplegic women. Three pregnancies aborted, one spontaneously. The babies were near normal or normal weight with one exception. The mothers waited 5 years on average to become pregnant. Cesarean section was performed on 43% of pregnancies. Abnormal presentations occurred in over 10% of pregnancies. Indications for cesarean section included 5 that were repeats; the remainder were necessary due to bleeding (1), breech presentation (1), transverse presentation (2), lack of progress (2), onset of labor 1 day post spinal fusion, and a mother's request to have tubal ligation. Epidural anesthesia was selected for 9 deliveries; 6 of these patients had controlled autonomic hyperreflexia. Five general and 4 local anesthetics were used, and 12 patients received no anesthesia. Diagnostic ultrasound and amniocentesis were used selectively. Complications included autonomic hyperreflexia (9), frequent urinary tract infections, infected pressure sores (3, 2 resulting in below-knee amputations), seizures during and after delivery, pneumonia, bladder stones (2), episiotomy dehiscence (1), and breakdown of spinal fusion. The newborns were healthy, although one double footing breech vaginal delivery had an APGAR of 1 at 1 min, 7 at 5 min and 9 at 10 min. One premature baby, who weighed only 1600 g, was a precipitate birth at home unattended.

Implications for the care of pregnant SCI women are discussed. Department of Physical Medicine and Rehabilitation, University of Virginia, Charlottesville 22908.

- Davies H (1993). Hope as a coping strategy for the spinal cord injured individual. *Axone* **15**:40-6. Summary: This case study described how one spinal cord injured individual used hope as a coping strategy. Using observations and unstructured interviews, the indicators of hope were explored, as well as how hope was sustained over time and during crises. Data were gathered while nursing the individual, and his family using the McGill Model of Nursing. Qualitative data analysis revealed four categories which reflected indicators of hope (focusing on progress, positive interpretation, selective attention, goal setting), and seven categories of how hope was sustained (family responsibility, meaning in life, significant others, uncertainty of physiological status, past experience, goal attainment). Analysis of data also revealed that hope was goal directed, and hope was based on the reality perceptions of the individual. Over time, all indicators of hope were gradually displayed more often, and there was a gradual increase in focus on the meaning in life, family responsibility and goal achievement to sustain hope. Implications for nursing and research are suggested.

- de Carvalho SA, Andrade MJ, Tavares MA and de Freitas JL (1998). Spinal cord injury and psychological response. *Gen Hosp Psychiatry* **20**:353-9. Summary: Psychological adjustment and psychopathological morbidity issues during rehabilitation of patients with spinal cord injury, have been documented in international literature. However, most authors are faced with methodological difficulties, and results are contradictory. In this prospective study, the first to be made in the Portuguese population, a sample of 65 patients being treated in a rehabilitation unit during the years of 1993, 1994 and 1995, was obtained. The authors study the type of psychological response, when it does occur, which personality traits point to less suffering, which coping mechanisms are used by the better adjusted patients and the differences between the scores of paraplegic and quadriplegic patients. Two assessments were made. The following assessment instruments were used: an anamnestic data questionnaire, the SCL-90-R (Derogatis, 1983), the EPI (Eysenck & Eysenck, 1984), the Coping Styles Evaluation Scale (Figueira, 1990). The second assessments were carried out with the SCL-90-R only. The findings indicate that psychopathological scores consistent with depression occurred in 60% of patients if we consider any evaluation. Sleep disturbances, suicide ideation and guilt occurred in the same proportion. In 33% of them, we found persistent depressive scores in the two assessments. The authors find a highly significant positive correlation between psychopathology and neuroticism. On the contrary, the extroversion dimensions of EPI seem to be a good prognosis predictive factor as far as the occurrence of psychopathology is concerned. No differences in the psychopathological response were found concerning the paraplegic-quadriplegic situation. Hospital do Conde de Ferreira, Department of C/L Psychiatry, Oporto, Portugal.
serafimcarvalho@mail.telepac.pt

- DeVivo MJ, Black KJ, Richards JS and Stover SL (1991). Suicide following spinal cord injury. *Paraplegia* **29**:620-7. Summary: A study of 9135 persons injured between 1973 and 1984 and treated at any of 13 model regional spinal cord injury (SCI) care systems was conducted. Follow-up ended December 31, 1985, by which time 50 persons had

committed suicide (6.3% of deaths). Based on age-sex-race-specific rates for the general population, 10.2 suicides were expected to occur. Therefore, the standardized mortality ratio (SMR) for suicide was 4.9. The highest SMR occurred 1 to 5 years after injury. The SMR was also elevated for the first post-injury year, but was not significantly elevated after the fifth year. The SMR was significantly elevated for all neurological groups, but was highest for persons with complete paraplegia. The SMR was highest for persons aged 25 to 54 years, but was also elevated for persons aged less than 25 years. Suicide was the leading cause of death for persons with complete paraplegia and the second leading cause of death for persons with incomplete paraplegia. The most common means of committing suicide was by gunshot. These figures demonstrate the need for increased staff, patient and family awareness of this problem, and improved follow-up assessment and psychosocial support programmes. Department of Rehabilitation Medicine, University of Alabama, Birmingham 35294.

- DeVivo MJ and Fine PR (1985). Spinal cord injury: its short-term impact on marital status. *Arch Phys Med Rehabil* **66**:501-4. Summary: We have had the impression that patients with spinal cord injury (SCI) experience fewer marriages and more divorces than their noninjured counterparts. To test this impression statistically, we examined the influence of SCI in association with other select variables on the marital status of 276 patients injured between 1973 and 1980 and treated at the University of Alabama in Birmingham Spinal Cord Injury Care System. The expected numbers of marriages and divorces in the study population were based on comparison with reported marriage and divorce rates for the general US population. Discriminant analysis was employed to identify variables associated significantly with a postinjury change in marital status. Substantially fewer marriages and more divorces occurred than were expected (p less than 0.05). No variables were associated significantly with marrying within three years of injury. However, divorcing patients were significantly more likely to be young black women who had been previously divorced, had no children, and had Barthel scores of less than 80. Using the most effective combination of these variables, 38.7% of the variance was explained, and the postinjury marital status of 81.5% of patients married at injury was predicted correctly. While other determinants of postinjury marital status undoubtedly exist, the likelihood of divorce can be assessed using a comparatively small set of predictor variables.

- DeVivo MJ, Hawkins LN, Richards JS and Go BK (1995). Outcomes of post-spinal cord injury marriages. *Arch Phys Med Rehabil* **76**:130-8. Summary: The purpose of this study was to compare the divorce rate among persons who got married after spinal cord injury with that of the non-spinal cord-injured population of comparable age and gender and to identify factors associated with increased likelihood of divorce. The study included 622 persons enrolled in the National Spinal Cord Injury Statistical Center data set since 1973. These persons were followed between 1 and 15 years after their marriage (mean = 3.5 years). The status of each marriage was determined at the time of their most recent routine annual follow-up examination. Overall, 126 divorces occurred, whereas 74 were expected, based on 2,190 person-years of follow-up and age-sex-specific annual divorce rates for the United States population. Men and remarried persons had divorce rates 2.07 times and 1.80 times higher, respectively, than women and persons married for the first time. The divorce rate was 1.85 times higher among

persons without college educations and was lower for persons with lumbosacral injuries than for persons with higher injury levels. In general, the impact of spinal cord injury appears to be almost as great on postinjury marriages as it is on preexisting marriages. However, this study yields descriptive rather than causal information. Other factors must be identified before a clinically useful model to predict persons at high risk for divorce can be developed. Department of Rehabilitation Medicine, University of Alabama at Birmingham.

- De Vivo MJ, Richards JS, Stover SL and Go BK (1991). Spinal cord injury. Rehabilitation adds life to years. *West J Med* **154**:602-6. Summary: The National Spinal Cord Injury Statistical Center data base contains information collected prospectively on 13,763 persons injured since 1973 and treated at model systems of care throughout the United States. These data clearly demonstrate improved neurologic status and independent function in activities of daily living following acute care and rehabilitation for most persons with spinal cord injuries. Decreased lengths of initial and subsequent hospital stays and increased survival rates are also documented. Most persons are discharged to a private residence in the community and remain there. Many complete their educations and return to gainful employment after injury. Spinal cord injury has only a short-term effect on marriage and divorce rates, which appears to dissipate within a few years after injury. Overall, these figures demonstrate the dramatic improvements in length and quality of life achieved by most persons with spinal cord injuries during the past two decades. Department of Rehabilitation Medicine, Spain Rehabilitation Center, University of Alabama, Birmingham 35233.
- Dijkers MP, Yavuzer G, Ergin S, Weitzenkamp D and Whiteneck GG (2002). A tale of two countries: environmental impacts on social participation after spinal cord injury. *Spinal Cord* **40**:351-62. Summary: STUDY DESIGN: Comparative analysis of survey data produced in two countries. OBJECTIVES: To assess the degree to which environmental barriers impact social participation, and to identify the aspects of participation most affected. SETTING: Community-dwelling individuals with spinal cord injury in the USA and Turkey. METHODS: Subjects completed the Functional Independence Measure (FIM) motor score, the Craig Hospital Inventory of Environmental Factors (CHIEF), and the Craig Handicap Assessment and Reporting Technique (CHART). Analysis of co-variance was used to analyze CHIEF and CHART differences within and between country. RESULTS: US subjects reported higher participation scores (CHART) and lower barriers (CHIEF), however, when controls for age, gender, time since injury and motor ability (FIM) were applied, country differences in reports of barriers were limited. Motor ability was the major predictor of participation, which was minimally affected by barriers. CONCLUSION: Conceptualization and measurement issues may have been the reason for the minimal support for the hypothesis that environment affects participation. Suggestions for future research are made. SPONSORSHIP: National Institute on Disability and Rehabilitation Research, Centers for Disease Control and Prevention. Department of Rehabilitation Medicine, Mount Sinai School of Medicine, New York, NY 10029-6574, USA.
- El Ghatit AZ and Hanson RW (1976). Marriage and divorce after spinal cord injury. *Arch Phys Med Rehabil* **57**:470-2. Summary: The outcome of marriages contracted

after spinal cord injury suffered by males was examined via the questionnaire method. Of those whose first marriage occurred after their injury, the divorce rate was 24.4%. Of those whose were married prior to injury and then remarried following injury, 16.4% were divorced. If all post-injury marriages are considered, the divorce rate is 23.1%. This is close to the divorce rate of the United States as a whole. The outcome of post-injury marriages was also examined with respect to time since injury, level of injury, presence of post-injury children, and post-injury education and employment. Particular attention was given to those males who had never been married prior to their injury.

- Elliott TR, Witty TE, Herrick S and Hoffman JT (1991). Negotiating reality after physical loss: hope, depression, and disability. *J Pers Soc Psychol* **61**:608-13. Summary: The utility of different reality negotiation strategies among 57 persons who had traumatically acquired severe physical disabilities was examined. It was predicted that a sense of goal-directed determination ("agency"; Snyder, 1989) would predict lower depression and psychosocial impairment scores soon after injury. To meet the demands of rehabilitation and social integration, however, it was hypothesized that a sense of ability to find ways to meet goals ("pathways") would predict lower depression and psychosocial impairment among persons who had been disabled for a longer period. The expected interaction was significant in the prediction of psychosocial impairment but not of depression. The sense of pathways was predictive of impairment and depression regardless of the time since injury. Results suggest that in the reality negotiation process the different components of hope as defined by Snyder have salient effects on perceptions of ability to function in social capacities. Department of Psychology, Virginia Commonwealth University, Richmond 23284-2018.

- Fisher TL, Laud PW, Byfield MG, Brown TT, Hayat MJ and Fiedler IG (2002). Sexual health after spinal cord injury: a longitudinal study. *Arch Phys Med Rehabil* **83**:1043-51. Summary: **OBJECTIVES:** To clarify sexuality issues after spinal cord injury (SCI) and to identify the appropriate timing of sexual health interventions. **DESIGN:** Longitudinal analysis of the survey responses of persons with SCI at 4 intervals between initial inpatient rehabilitation and 18 months postdischarge. **SETTING:** Spinal Cord Injury Model Systems inpatient center and home-based setting. **PATIENTS:** A volunteer sample of 40 individuals (32 men, 8 women) from a consecutive population of persons with recent SCI admitted for initial inpatient rehabilitation. **INTERVENTIONS:** Not applicable. **MAIN OUTCOME MEASURE:** Responses to the Sexual Health Needs Survey. **RESULTS:** By 6 months postdischarge, individuals in the study group had made the significant changes in sexual activity and sexual interest that they would achieve during the study period. The respondents' greatest concerns remained their partners' and their own sexual satisfaction. A more realistic recognition of decline in their sexual activity, function, and interest corresponded with more requests for sexual health interventions during the interval from inpatient rehabilitation and 6 months postdischarge. **CONCLUSIONS:** The interval between inpatient rehabilitation to 6 months postdischarge appeared to be the critical period for function and realization about sexuality. Readily accessible sexual health interventions at about 6 months after inpatient rehabilitation and the inclusion of sexual partners in the intervention process appear warranted. Department of Neurosurgery, Medical College of Wisconsin, Milwaukee 53226-3596, USA.

- Florian V, Katz S and Lahav V (1991). Impact of traumatic brain damage on family dynamics and functioning: a review. *Int Disabil Stud* **13**:150-7. Summary: The purpose of this paper is to review the dynamics and functioning of families with a severely head-injured member. In order to stress the unique problems faced by persons with brain damage and their families, a comparison with spinal cord-injured individuals is presented. The review's major conclusion is that a head injury exposes the family to a complex of problems that are unique to this disability and, therefore, necessitates the delivery of special family support services focused on the family, rather than on the head-injured person. Department of Psychology, Bar-Ilan University, Israel, Ramat-Gan.

- Glass CA, Jackson HF, Dutton J, Charlifue S and Orritt C (1997). Estimating social adjustment following spinal trauma--I: Who is more realistic--patient or spouse? A statistical justification. *Spinal Cord* **35**:320-5. Summary: Whilst assessment of functional independence has been accomplished, to a greater extent, following spinal trauma, assessing social adjustment remains an area requiring considerable further investigation. Providing premorbid estimation of adjustment is an area which presents a number of methodological difficulties both in the collection and interpretational of longitudinal data. Such analyses tend to allow overall estimates of adjustment to be made but which lack individual specificity. Analyses are presented of over 250 individuals, and their closest relative's assessment, of social adjustment to their spinal cord injury. Using a modification of an established scale for assessing social adjustment it has been possible to establish the statistical level of agreement and address the hypothesis of differential perception of the extent of adjustment problems by the injured person and their closest relative. The study allows for the conclusion that an injured person's perception of adjustment is at least as reliable as their closest relative, and that there is further evidence to support the essential accuracy of their estimations of premorbid and current levels of adjustment. Both issues are of clinical importance, particularly in relation to any medico-legal compensation aspects. North West Regional Spinal Injuries Centre, District General Hospital, Southport, Merseyside, England, UK.

- Harrison J, Glass CA, Owens RG and Soni BM (1995). Factors associated with sexual functioning in women following spinal cord injury. *Paraplegia* **33**:687-92. Summary: Research into sexuality following spinal cord injury (SCI) has tended to concentrate on male experiences and the physical capabilities for sexual intercourse. The sexuality of women following SCI has only recently been addressed and studies are limited to small numbers and the use of non-standardised measures. The present investigation utilised standard measures of affective state and body satisfaction together with pre and post-injury questionnaire information of sexual dysfunction, feelings about sex and importance of sexual activity in a group of 85 women with SCI. Sexual dysfunction increased significantly post-injury, whilst feelings about sex and its importance were unaffected. Sexual dysfunction and the importance of sex were inversely correlated. General and Head satisfaction estimates were not significantly different to control samples, whilst Body Satisfaction was increased for women with disabilities. None of the body satisfaction measures were related to the sexual functioning measure. General dissatisfaction was associated depression. Both anxiety and depression were

experienced by the same individuals, and anxiety related to current sexual dysfunction. Qualitative data supported previous findings concerning the effects of social and attitudinal barriers on sexual functioning. Department of Clinical Psychology, University of Liverpool, UK.

- Hartkopp A, Bronnum-Hansen H, Seidenschnur AM and Biering-Sorensen F (1998). Suicide in a spinal cord injured population: its relation to functional status. *Arch Phys Med Rehabil* **79**:1356-61. Summary: OBJECTIVE: To determine the relation between functional status and risk of suicide among individuals with spinal cord injury (SCI). DESIGN: A follow-up study of all individuals who survived a traumatic SCI during the period from 1953 through 1990. SETTING: An SCI center in eastern Denmark. SUBJECTS: A total of 888 individuals with SCI, including 236 who died, 23 of whom committed suicide. MAIN OUTCOME MEASURES: Standardized Mortality Ratios (SMRs) of suicides among individuals with SCI. RESULTS: A 100% follow-up was established January 1, 1993. The total suicide rate among individuals with SCI was nearly five times higher than expected in the general population and lower for men than for women. The suicide rate doubled from an early inclusion period (1953-1971) to a later period (1972-1990). An unexpected finding was that the suicide rate in the group of marginally disabled persons was nearly twice as high as the group of functionally complete tetraplegic individuals. CONCLUSION: Given the high frequency of suicide, there is a need for increased awareness by rehabilitation staff and general practitioners regarding depression and psychological adjustment difficulties. Such conditions should be given special attention during rehabilitation and follow-up, especially among women with SCI and the marginally disabled. Center for Spinal Cord Injured, Rigshospitalet, Copenhagen University Hospital, Denmark.

- Hartkopp PA, Bronnum-Hansen H, Seidenschnur AM and Biering-Sorensen F (1998). [Survival and cause of death after traumatic spinal cord injury. A long-term epidemiological study]. *Ugeskr Laeger* **160**:6207-10. Summary: Life expectancy among individuals with spinal cord injuries (SCI) has remained lower than normal, even with optimal medical management. But improvement has been achieved, as shown by this study of an unselected population of survivors of traumatic SCI, dead or still living. There has been complete follow-up over four decades. The survey included a total of 888 individuals who had survived the injury and were rehabilitated at the Centre for the Spinal Cord Injured, East-Denmark between 1.1.1953-31.12.1990. At the end of the follow-up, 31st of December 1992, 236 had died. The most common causes of death were lung diseases, ischaemic heart diseases and suicide. The Standardised Mortality Ratios (SMRs) were highest for septicaemia, uraemia and pneumonia. Likewise, except for pneumonia, suicide and ischaemic heart disease, a decrease over time in SMRs was seen for all causes of death. The patterns of causes of death in the study group begin to approximate those of the general population. Rigshospitalet, Neurocenteret, Kobenhavn.

- Hartkopp A, Bronnum-Hansen H, Seidenschnur AM and Biering-Sorensen F (1997). Survival and cause of death after traumatic spinal cord injury. A long-term epidemiological survey from Denmark. *Spinal Cord* **35**:76-85. Summary: Life expectancy among individuals with spinal cord injuries (SCI) has remained lower than

in the normal population, even with optimal medical management. But significant improvement has been achieved, as will be illustrated in this retrospective study of an unselected group of traumatic survivors of SCI, dead or still living. There has been a complete follow-up over 4 decades, information being obtained from available medical records, death certificates, and post mortem records. The survey included a total of 888 individuals (713 men and 175 women) who had survived the injury and primary treatment and were rehabilitated at the centre for Spinal Cord Injured in Hornbaek, Denmark. At the end of the follow-up, 31st December 1992, 236 (197 men and 39 women) had died. The commonest causes of death were lung diseases, particularly pneumonia; suicide; and ischaemic heart disease. Among functionally complete tetraplegic individuals there was a recognizably high percentage of deaths from pneumonia, and among the least disabled individuals (Frankel class E) we found a high frequency of suicides. The Standardised Mortality Ratios (SMRs) were highest for septicaemia, followed by uraemia and pneumonia. A significant decrease in the overall mortality was observed from the first (1953-1973) to the second half of the observation period (1972-1992). Similarly the survival curves for both men and women demonstrate that the gap in survival probability between the normal population and the SCI has diminished considerably from the early to the later period. Likewise, except for suicide and ischaemic heart disease, a decrease in SMRs was seen for all causes of death. In particular there were large decreases related to lung embolus, septicaemia, pneumonia, and uraemia. The patterns of causes of death in the study group begin to approximate those of the general population, though many cause-specific deaths for SCI remain substantially above the normal population. Continuous improvement in preventive measures as well as treatment procedures is still necessary. Centre for Spinal Cord Injured, Rigshospitalet, Copenhagen University Hospital, Denmark.

- Holicky R and Charlifue S (1999). Ageing with spinal cord injury: the impact of spousal support. *Disabil Rehabil* **21**:250-7. Summary: PURPOSE: Research has offered ample evidence that spousal support can be seen as an important contributing factor to the ongoing health and well-being of ageing individuals, whether or not they have a spinal cord injury (SCI) or disability. In fact, spouses may be the most important element in successful rehabilitation and long-term home care for people with spinal cord injuries. This longitudinal study, which describes 225 British SCI long-term survivors, offers insight into marital status and its impact on general quality of life, depression, stress and community integration for individuals with SCI. RESULTS: The results demonstrate married individuals having less depression, greater life satisfaction and psychological well-being, and having better perceived quality of life. When controlling for age, duration of injury, and gender, marital status was a significant predictor of better perceived life satisfaction and quality of life. Craig Hospital, Research Department, Englewood, Colorado 80110, USA.
- Ide M and Fugl-Meyer AR (2001). Life satisfaction in persons with spinal cord injury: a comparative investigation between Sweden and Japan. *Spinal Cord* **39**:387-93. Summary: STUDY DESIGN: A cross-sectional and comparative investigation using the unified questionnaire. OBJECTIVES: To investigate the cultural (East Asian versus North European) differences in life satisfaction between long-term survivors of spinal cord injuries (SCI). SETTING: Uppsala county in Sweden and Fukuoka prefecture in

Japan. **METHODS:** A questionnaire dealing with life satisfaction was prepared by the authors. It focused mainly on sexual life and accompanied a self-rating Barthel Index Score. The questionnaire was mailed to male SCI persons in the two communities, Uppsala county (Sweden) and Fukuoka prefecture (Japan). Forty (77%) Swedish and 85 (71%) Japanese SCI replied. **RESULTS:** (1) Swedish SCI appeared to be more satisfied than Japanese SCI in general health, economy, social activity, social service, family life and sexual life. (2) Several life domains indicated significant difference in life satisfaction between with- and without-partner group in Japanese SCI. No life domains indicated significant difference in Swedish SCI. (3) No statistically significant difference was indicated in all of life domains between the degree of life satisfaction and interval since spinal cord damage. **CONCLUSION:** The more expanded cross-cultural study is expected to be helpful for discussing the QOL of SCI. Rehabilitation Medicine, University of Occupational and Environmental Health, Iseigaoka 1-1, Yahatanishi ku, Kitakyushu, 807-8555, Japan.

- Joerres SG, Bonifay RE, Hastings JE, Saltzstein RJ and Hayes TJ (1992). Seasonal affective disorder in a spinal cord injury population. *J Am Paraplegia Soc* **15**:66-70. Summary: Seasonal Affective Disorder (SAD) has received formal research attention only within the last eight years. Diagnostic criteria for SAD include many characteristics typical of depression: sadness, low self-esteem, lack of energy, social withdrawal, and suicide ideation, and features of atypical depression: carbohydrate craving, overeating, weight gain, and hypersomnia. Differential diagnosis of the disorder depends on an onset in fall/winter and remission in spring/summer. It was hypothesized that spinal cord injury (SCI) patients would have a higher incidence of the disorder in the northern latitudes because of decreased outdoor activities in winter and because of such light-depriving winter survival tactics as installing opaque plastic for storm windows. SCI patient responded to a postal survey which included Rosenthal's Seasonal Pattern Assessment Questionnaire (SPAQ) and the Beck Depression Inventory (BDI). Results showed a substantially higher rate of SAD among SCI patients than in the normative sample. Spinal Cord Injury Service, Zablocki Department of Veterans Affairs Medical Center, Milwaukee, Wisconsin 53295.

- Kahn N, Sinha A and Bauman W (2001). Impaired platelet prostacyclin receptor activity: a monozygotic twin study discordant for spinal cord injury. *Clin Physiol* **21**:60-6. Summary: Coronary artery disease (CAD) has been reported to occur prematurely in individuals with spinal cord injury (SCI). Although persons with SCI have metabolic abnormalities that may predispose them to CAD, other potential aetiologies may also be operative. Increased platelet aggregation, among other factors, initiates thrombus formation at the site of the vessel injury, which may acutely obstruct arterial blood flow. Prostacyclin is known to have a beneficial effect to inhibit platelet aggregation and prevent thrombus formation. Platelets were studied from 12 pairs of monozygotic twins, one co-twin with SCI. Each twin pair had similar patterns of platelet aggregation with adenosine diphosphate (ADP), thrombin or collagen, as well as inhibition of platelet aggregation by prostacyclin (PGE₁/I₂) and synthesis of cyclic adenosine mono phosphate (AMP) by the prostanoid. However, the twin pairs differed in their response to PGE₁/I₂ inhibition of platelet-stimulated thrombin generation that was completely inhibited in non-SCI platelets but not in SCI platelets. Scatchard analysis of the binding

of ^3H -prostaglandin E₁, a stable prostacyclin receptor probe, showed the presence of one high-affinity ($K_{d1}=8.1 \pm 2.8 \text{ nM}$; $n_1=168 \pm 35$ sites per platelet) and one low-affinity ($K_{d2}=1.1 \pm 0.22 \text{ }\mu\text{M}$; $n_2=1772 \pm 220$ sites per cell) prostacyclin receptor in normal platelets, whereas in SCI platelets there was a significant loss ($P<0.001$) of high-affinity receptor sites ($K_{d1}=6.34 \pm 1.80 \text{ nM}$; $n_1=42 \pm 11$ sites per platelet) with no significant change in the low-affinity receptor sites ($K_{d2}=1.2 \pm 0.23 \text{ }\mu\text{M}$; $n_2=1860 \pm 412$ sites per cell). These discordant platelet findings in identical twin pairs raises the possibility of an environmental aetiology for accelerated CAD in those with SCI. The loss of inhibitory effect of PGI₂ on thrombin generation in the twin with SCI appears to be because of loss of platelet high-affinity prostanoid receptors, which may contribute to atherogenesis in individuals with SCI. Mount Sinai School of Medicine, New York, NY 10029, USA, and Veterans Affairs Medical Center, Bronx, NY 10468, USA.

- Karlsson AK (1999). Insulin resistance and sympathetic function in high spinal cord injury. *Spinal Cord* **37**:494-500. Summary: OBJECTIVE: Cardiovascular disease (CVD) is today one of the main causes of death and affects spinal cord injured (SCI) earlier than able-bodied. Risk factors for CVD, such as decreased glucose tolerance, insulin resistance and increased fat mass, are all reported among SCI subjects and may be related to changes in sympathetic nervous system (SNS) function. METHODS: In order to test our hypothesis of a relationship between metabolic disturbances and alterations in SNS function, glucose and adipose tissue metabolism was investigated by the hyperinsulinaemic normoglycaemic clamp and microdialysis. Body composition was determined by DEXA-scanning. The SNS function was evaluated in total body as well as above and below lesion level by radiolabelled noradrenaline (NA) isotope dilution technique. A 24 h continuous plasma-NA monitoring was performed in seven SCI subjects. RESULTS: Following an oral glucose load the SCI group demonstrated normal glucose tolerance but impaired insulin sensitivity with a maximum insulin value of $83 \text{ mU} \times \text{l}(-1)$ in SCI compared to 50 in siblings, while adipose tissue metabolism was normal compared to siblings. Fat tissue mass constituted 34% of body mass in SCI group compared to 21% in weight-matched controls. Peripheral afferent activation resulted in increased blood pressure, decreased heart rate and reduction in muscle and skin blood flow. Furthermore, lipolysis below lesion level was activated by peripheral stimulation ($89\text{-}135 \text{ }\mu\text{mol} \times \text{l}(-1)$). The 24 h continuous monitoring revealed p-NA levels $> 1.40 \text{ nmol} \times \text{l}(-1)$ sufficient to induce lipolysis in 20% of the registrations. NA spillover below lesion level increased substantially following peripheral afferent stimulation ($0.06\text{-}0.90 \text{ pmol} \times \text{min} \times (-1) \times 100 \text{ g}(-1)$), whereas spillover above lesion level increased during central activation. CONCLUSIONS: We found signs of decreased insulin sensitivity and increased fat tissue mass. Peripheral activation of SNS was visualised in the SCI group by increased transmitter spillover as well as increased lipolysis and vasoconstriction. The diurnal registration of NA levels indicated frequent episodes of peripheral sympathetic activation in the group. This may compensate for the inability of central activation of SNS and may contribute to maintain lipolysis activity as well as to generate insulin resistance in the group. Institute of Clinical Neuroscience, University of Goteborg, Sweden.

- Karlsson AK, Attvall S, Jansson PA, Sullivan L and Lonnroth P (1995). Influence of the

sympathetic nervous system on insulin sensitivity and adipose tissue metabolism: a study in spinal cord-injured subjects. *Metabolism* **44**:52-8. Summary: To evaluate insulin sensitivity and adipose tissue metabolism, seven spinal cord-injured (SCI) subjects (age, 43 +/- 6 years; body mass index, 22.8 +/- 1.4; mean +/- SE) and their seven siblings (age, 45 +/- 6 years; body mass index, 24.8 +/- 0.8) were studied using oral glucose (100-g) tolerance tests (OGTTs), euglycemic insulin clamps (insulin infusion, 1 mU/kg.min), and microdialysis of the subcutaneous tissue. Blood glucose and insulin after oral glucose were significantly increased in SCI subjects as compared with their siblings. During insulin clamping, plasma adrenaline increased significantly in controls, but not in SCI subjects. However, the rates of glucose production (2.02 +/- 0.36 v 1.59 +/- 0.09 mg/kg.min) and utilization (5.13 +/- 0.71 v 5.78 +/- 0.34) were similar in the two groups. Furthermore, interstitial subcutaneous glycerol and lactate concentrations before and after oral glucose were similar in the two groups, even in neurally decentralized tissue with broken connection between the central nervous system and peripheral sympathetic nerves. The data suggest that (1) well-mobilized SCI subjects show minor insulin resistance, and (2) sympathetic nervous activity has a minor influence on adipose tissue metabolism in the postabsorptive state, but may affect insulin sensitivity during euglycemic clamping. Department of Neurosurgery, University of Gothenburg, Sahlgrenska Hospital, Sweden.

- Kennedy P and Evans MJ (2001). Evaluation of post traumatic distress in the first 6 months following SCI. *Spinal Cord* **39**:381-6. Summary: **STUDY DESIGN:** Cross-sectional questionnaire. **OBJECTIVES:** To assess the degree of post traumatic stress symptomatology and its correlates amongst a group of new spinal cord injured patients. **SETTING:** The National Spinal Injuries Centre, Stoke Mandeville Hospital NHS Trust. **METHOD:** Eighty-five participants with an average age of 32.6 years were assessed between 6 and 24 weeks post injury. Seventeen participants were female. Seventy per cent had complete lesions. Forty per cent had paraplegia and 60% had tetraplegia. Road traffic accidents were the most common cause of injury followed by falls and then sporting accidents. The Impact of Event Scale was used to measure the experience of intrusive thoughts about the trauma and avoidance of trauma related stimuli. Anxiety (SAI), depression (BDI) and dependency (FIM) were also measured. **RESULTS:** High levels of distress were evident in 14% of the sample. Trauma-related distress was significantly higher in female patients or patients with high levels of anxiety or depression. **CONCLUSION:** In this sample, the rates of trauma-related distress following spinal cord injury were comparable to those found following other traumas and are of clinical significance. Department of Clinical Psychology, National Spinal Injuries Centre, Stoke Mandeville Hospital, Bucks, UK.

- Kennedy P and Rogers BA (2000). Anxiety and depression after spinal cord injury: a longitudinal analysis. *Arch Phys Med Rehabil* **81**:932-7. Summary: **OBJECTIVE:** To examine the prevalence of anxiety and depression longitudinally in a sample of patients with a spinal cord injury (SCI). **DESIGN:** A prospective, longitudinal, multiple wave panel design with measures taken on 14 observational periods ranging from initial contact in the acute stages of hospitalization to 2 years' postdischarge to the community. **SETTING:** The National Spinal Injuries Centre, Stoke Mandeville Hospital, Aylesbury, UK, and the general community. **PARTICIPANTS:** The cohort consisted of 104 patients

with traumatic SCI (19 women, 85 men), although the numbers assessed at each interval ranged from 5 to 85. **MAIN OUTCOME MEASURES:** Measures included the Beck Depression Inventory, the Beck Hopelessness scale, the State Anxiety Inventory, the functional independence measure, and the Social Support Questionnaire. **RESULTS:** When examined longitudinally, the data illustrate a consistent pattern of results across measures, with scores highest in the acute phase of the injury and during the months leading up to discharge. **CONCLUSION:** The numbers of persons scoring above clinical cut-off scores for anxiety and depression highlight the need to continue to ensure that appropriate psychological care is available within SCI rehabilitation settings. Moreover, the nature of the longitudinal results provides an indicator of subtle changes in anxiety and depression over time. National Spinal Injuries Centre, Stoke Mandeville Hospital, Aylesbury, Bucks, UK.

- Kennedy P, Rogers B, Speer S and Frankel H (1999). Spinal cord injuries and attempted suicide: a retrospective review. *Spinal Cord* **37**:847-52. **Summary:** **STUDY DESIGN:** A retrospective review examining the cases of 137 individuals with spinal cord injury (SCI) as a result of a suicide attempt between 1951 - 1992. **OBJECTIVE:** To ascertain demographic details of this participant sample, explore and identify the type of psychiatric condition evident around the time of injury, and to review outcome information of this sample with specific focus on mortality, especially further evidence of deliberate self harm. **SUMMARY OF BACKGROUND DATA:** Research examining suicide rates in SCI populations has found such numbers to be significantly higher than in the general population. However, these studies have typically relied on small samples of individuals and have often failed to distinguish between those individuals who sustained SCI as a result of attempted suicide, and those who first attempted suicide following SCI. **METHODS:** An established database comprising details of 137 people with SCI as a result of attempted suicide was reviewed and updated using patient admission records. The subsequent database comprised: cause, level and completeness of injury; height fallen; psychiatric history; psychiatric diagnosis; date of last contact; further suicide attempts; religious affiliation; previous and present employment; date and cause of death; date and place of discharge; and any other relevant details. From this database the three primary objectives of the study were ascertained: demographic detail; psychiatric condition; and outcome information. **RESULTS:** The ratio of males to females was 1 : 1 with a mean age of 32. Almost half (48.9%) were single, around a third (32.8%) had children and 42.3% were employed. Schizophrenia and depression were evident in 32.8% and 27% of cases respectively. Previous suicide attempts had been made by 23% (n=32). The cause of injury in 85% of cases was 'falls'. Thirty-three people are known to have died, of whom eight (24%) committed suicide. During the period between the first and last spinal cord injury examined within this study (1951 - 1992) 1.6% (n=137) of the total sample of patients treated at the rehabilitation centre (n=8347) sustained a spinal cord injury as a result of a suicide attempt. **CONCLUSION:** Significant findings include; a high proportion of patients with schizophrenia; similar findings concerning age profile and level of injuries with previous research, but different sex ratio; and information on longer-term outcomes. Recommendations for further research include an adaptation of the psychological autopsy approach which would provide information beyond that normally available in actual suicides. National Spinal Injuries Centre, Stoke Mandeville Hospital, Bucks, UK.

- Killen JM (1990). Role stabilization in families after spinal cord injury. *Rehabil Nurs* **15**:19-21. Summary: The purpose of this investigation was to determine how family roles changed after spinal cord injury of a child or spouse. Parental and spousal roles--including provider, child care and socialization, housekeeper, sexual, recreational, therapeutic, and kinship roles--were studied. Results indicated that, overall, families that experienced spinal cord injury did not significantly change in role functioning. In most instances, mothers, fathers, husbands, and wives continued to play roles that traditionally were a part of their family functioning. Spinal cord injury, however, was perceived by family members as a crisis event that lessened over time, but that for the majority of respondents continued indefinitely.

- King C and Kennedy P (1999). Coping effectiveness training for people with spinal cord injury: preliminary results of a controlled trial. *Br J Clin Psychol* **38 (Pt 1)**:5-14. Summary: OBJECTIVES: To develop and evaluate a brief group-based psychological intervention for improving psychological adjustment and enhancing adaptive coping following spinal cord injury. The Coping Effectiveness Training (CET) programme is grounded on the cognitive theory of stress and coping of Lazarus & Folkman (1984), and represents an original adaptation of the theory to the needs of this client group. DESIGN: A controlled trial comparing patients receiving the CET intervention to matched controls in measures of psychological adjustment and coping was used. METHODS: Nineteen intervention group participants and 19 matched controls were selected from in-patients at a hospital-based spinal injury rehabilitation centre. Outcome measures of depression, anxiety and coping were collected before, immediately after and six weeks after the intervention. RESULTS: Intervention group participants showed significantly greater reductions in levels of depression ($p < .01$) and anxiety ($p < .05$) compared to matched controls immediately after the intervention and at six weeks follow-up. There was no evidence of a significantly greater change in the coping strategies used by the intervention group. Participants highlighted their interactions with other group members as the most helpful aspect of the intervention. CONCLUSIONS: This evidence suggests that the CET intervention facilitated a significant improvement, in psychological adjustment to spinal cord injury. It is proposed this may be understood in terms of changes in participants' appraisal of the implications of spinal cord injury and of the coping skills needed to continue living meaningful and satisfying lives. Clinical Psychology Department, Warneford Hospital, Oxford, UK.

- Kishi Y, Robinson RG and Kosier JT (2001a). Suicidal ideation among patients during the rehabilitation period after life-threatening physical illness. *J Nerv Ment Dis* **189**:623-8. Summary: A total of 496 patients were examined for suicidal ideation during the acute hospital period and at 3, 6, 12, and 24 months' follow-up after suffering either stroke, traumatic brain injury, myocardial infarction, or spinal cord injury. A total of 7.3% of patients had suicidal ideation during the in-hospital evaluation (acute-onset suicidal ideation), and 11.3% developed it during the chronic 3 to 24 month rehabilitation period (delayed-onset suicidal ideation). Compared with delayed-onset suicidal patients, acute-onset suicidal patients had more predisposing risk factors (i.e., personal psychiatric history and alcohol abuse/dependence) and less social support (i.e.,

lower frequency of being married). Both acute and delayed-onset suicidal ideation, however, were strongly associated with the existence of major depression and impaired social functioning. These findings suggest that the detection and appropriate treatment of depressive disorders and social isolation may be the most important factor in preventing suicide both during the acute and chronic period following life-threatening physical illnesses. Department of Psychiatry, Nippon Medical School, Chiba Hokusoh Hospital, Chiba, Japan.

- Kishi Y, Robinson RG and Kosier JT (2001b). Suicidal ideation among patients with acute life-threatening physical illness: patients with stroke, traumatic brain injury, myocardial infarction, and spinal cord injury. *Psychosomatics* **42**:382-90. Summary: Suicide is one of the leading causes of death in the community. The risk of suicide is greater among patients with physical illnesses than among the general population. This study was undertaken to evaluate the clinical characteristics and correlates of suicidal ideation in patients with acute life-threatening physical illnesses and to assess the duration of suicidal ideation. The study included a consecutive series of patients admitted with stroke, traumatic brain injury, myocardial infarction, or spinal cord injury (n=496). Study participants were administered a semistructured psychiatric interview as well as a series of standardized quantitative scales of mood, cognitive function, physical impairment, social ties, and social functioning. Follow-up evaluations of up to 24 months were also carried out. This study found that 36 (7.3%) patients with acute medical illness had clinically significant suicidal ideation. The suicidal ideation occurred mostly among patients with major depression and sometimes in those with minor depression. About 25% of patients with major depression and acute physical illnesses developed suicidal ideation. After the improvement of depressive disorders, suicidal ideations were ameliorated. These findings suggest that the detection and treatment of depressive disorders is the most important factor in preventing suicide among this patient population. Department of Psychiatry, Nippon Medical School, Chiba Hokusoh Hospital, Japan.

- Knutsdottir S (1993). Spinal cord injuries in Iceland 1973-1989. A follow up study. *Paraplegia* **31**:68-72. Summary: All traumatic SCI patients in Iceland come to the Neurosurgical Department of Borgarspitalinn, the City Hospital in Reykjavik for their initial treatment. From 1973-1989, 79 (93%) were rehabilitated at Borgarspitalinn. The purpose of this study was to look at the most common complications and the social functions of SCI patients after discharge from the Rehabilitation Department. A questionnaire was sent to 59 of the 79 patients. They represent almost the whole population of the spinal cord injured population in Iceland. Forty-five patients (76.3%) answered the questionnaire, 69% male, 31% female. Sixty-seven percent were under the age of 30 years at the time of injury. Twenty-nine percent had a complete spinal cord injury; 53.3% were wheelchairbound (Frankel grade A, B, C); 55.6% were quadriplegic, and 44.4% paraplegic. The commonest complications were pain (64.4%), urinary tract infections (62.2%) and spasticity (60%); and 58% of the wheelchairbound patients had had pressure sores. Fifty-five point five percent were married; 71% had an active sexual life after the injury; 54% of the wheelchairbound patients were not quite independent and required some assistance with activities of daily living (ADL) tasks; and 29% were not working or studying compared to 11%, who were, before the injury. No significant

changes were seen in social function after the injury. The results show that more emphasis must be placed on the prevention of complications such as urinary tract infections and pressure sores and on the treatment of chronic pain and spasticity. Department of Rehabilitation and Neurology, Borgarspitalinn, Reykjavik, Iceland.

- Krause JS (1997). Adjustment after spinal cord injury: a 9-year longitudinal study. *Arch Phys Med Rehabil* **78**:651-7. Summary: **OBJECTIVE:** To generate longitudinal data on the stability of life adjustment over a 9-year period among a sample of participants with spinal cord injury (SCI). **DESIGN:** A field study was conducted by surveying the adjustment of a sample of participants with SCI in 1985 and again in 1994. **SETTING:** Outpatient files of a large, university hospital in the Midwest. **PARTICIPANTS:** All 235 participants had traumatic onset SCI, were a minimum of 18 years of age at the time of first testing, and were no less than 2 years postinjury. The average age was 46.7 yrs at the time of the 1994 study, with an average of 23.4 yrs having passed since injury. **MAIN OUTCOME MEASURES:** The Life Situation Questionnaire (LSO) was the outcome measure used. It was developed in 1973 to measure mostly objective information on adjustment and quality of life after SCI. It contains 7 scales and 40 individual items that were of interest in the current study. **RESULTS:** Declines were identified over the 9-year period in several aspects of subjective well-being, even though there were no declines in overall activity level and some limited increases in participation in employment related activities. **CONCLUSIONS:** The results of this study were in contrast to previous longitudinal follow-ups that identified positive changes over time in both subjective and objective aspects of quality of life. These changes suggest that participants had a less optimistic outlook in 1994 than they did in 1985. Crawford Research Institute, Shepherd Center, Atlanta, GA 30309, USA.
- Krause JS, Kemp B and Coker J (2000). Depression after spinal cord injury: relation to gender, ethnicity, aging, and socioeconomic indicators. *Arch Phys Med Rehabil* **81**:1099-109. Summary: **OBJECTIVE:** To investigate the relation among aging, gender, ethnicity, socioeconomic indicators, and depressive symptoms after spinal cord injury (SCI). **DESIGN:** Survey was done to collect cross-sectional data. A mediational model was used to analyze the interrelationships between predictors and depressive outcome variables. **SETTING:** A large Southeastern rehabilitation hospital. **PARTICIPANTS:** Participants, identified from outpatient records who met the following inclusion criteria: (1) traumatic SCI; (2) at least 18 years old at the time of study; and (3) injured for at least 1 year. There was an initial pool of 1923 potential participants in 1997, of whom 1391 (72%) participated. **MAIN OUTCOME MEASURES:** The Older Adult Health and Mood Questionnaire, a 22-item measure of depressive symptoms designed following Diagnostic and Statistical Manual of Mental Disorders (DSM III-R) criteria, was used to measure depression. It has been validated against clinical assessments by psychiatrists and psychologists. **RESULTS:** Forty-eight percent of the participants reported clinically significant symptoms. Minority participants, particularly women, were at a substantially higher risk for depressive symptoms. This risk diminished but did not disappear after controlling for years of education and income, both of which were highly negatively correlated with depressive symptoms. Aging factors were modestly positively correlated with depression, although education or income did not mediate these associations.

CONCLUSIONS: Symptoms of depression are highly prevalent after SCI and are related to aging, gender or ethnicity, and socioeconomic status indicators (education and income). Shepherd Center, Atlanta, GA 30309, USA.

- Krause JS, Vines CL, Farley TL, Sniezek J and Coker J (2001). An exploratory study of pressure ulcers after spinal cord injury: relationship to protective behaviors and risk factors. *Arch Phys Med Rehabil* **82**:107-13. Summary: **OBJECTIVES:** To identify protective behaviors and risk factors associated with the development of pressure ulcers (PUs) after spinal cord injury (SCI). **DESIGN:** A cross-sectional study to evaluate the relationship between protective behaviors and risk factors and 3 PU outcomes: a current PU, PUs within the past year, and ever hospitalized for a PU. Logistic regression was then used to identify the variables most strongly associated with PU outcomes. **SETTING:** Data were collected by case managers employed by the Arkansas Spinal Cord Commission, an agency that provides services to persons with SCI. **PARTICIPANTS:** A total of 650 of 991 eligible individuals with SCI from a statewide population-based SCI registry participated. All ambulatory participants were eliminated, leaving 560 patients. Average age of the respondents was 27.2 years at injury (median age, 25yr) and 43.6 years at the time of the survey (median age, 42yr). **MAIN OUTCOME MEASURES:** A 200-item interview was developed to measure a broad range of outcomes associated with SCI (including secondary conditions such as PUs), as well as risk and protective behaviors related to these outcomes. **RESULTS:** Several characteristics and behaviors were related to PU outcomes. Being underweight (odds ratio [OR] = 2.18), having used medications to treat pain (OR = 1.33) or spasticity (OR = 1.31), having smoked at least 100 cigarettes over a lifetime (OR = 1.31), and being a current smoker (OR = 1.21) were associated with having a PU in the past year. Having completed a college degree (OR = 0.23), being married (OR = 0.49), and being currently employed (OR = 0.54) were associated with a lower risk of having a PU in the past year. Being underweight (OR = 1.94), having a history of incarceration (OR = 1.78), having attempted suicide (OR = 1.71), and reporting alcohol or drug treatment (OR = 1.65) were associated with having been hospitalized for a PU since injury. This study was unable to evaluate the efficacy of traditional health maintenance or protective behaviors for PUs, such as weight shifts or skin checks. **CONCLUSIONS:** PUs are least likely to occur among individuals who maintain normal weight, return to a work and family role, and who do not have a history of tobacco use, suicidal behaviors, or self-reported incarcerations, or alcohol or drug abuse. Additional research is needed to identify better the risk factors for the occurrence of PUs. Crawford Research Institute, Shepherd Center, Atlanta, GA 30309, USA. jskrause@mindspring.org

- Kreuter M (2000). Spinal cord injury and partner relationships. *Spinal Cord* **38**:2-6. Summary: **INTRODUCTION:** Among the many issues confronting a newly spinal cord injured (SCI) person are apprehension about the potential impact of the acquired disability on present or future intimate relationships. **OBJECTIVE:** To summarize the research regarding partner relationships and SCI. **METHOD:** Medline, Psychlit and Cinahl database researches were undertaken. **RESULTS:** Several studies have focused on the issue of marital status before and after the onset of the injury. The results of the studies carried out on the prevalence of divorce are conflicting. Divorce rates have been reported to be anywhere from 8% to 48%. It appears that divorce rates tend to decline to

the normal rate for the general population after the initial high risk period. Some studies have shown that marital status is a powerful predictor of independent-living outcome variables. Thus, marital stability is a concern in SCI care. The study investigating why able-bodied women might choose to marry men with a permanent physical disability, such as a SCI, showed a substantial overlap with existing models of courtship. It was also shown that a SCI person who strives to minimise the impact of the disability on a potential partner makes a more attractive candidate for a long-term relationship than an individual who has come to rely on others. **CONCLUSION:** Partner relationships seem to be affected by a SCI, although not as much as is widely believed. There are, however, problems interpreting the varying results of the studies due to culture differences, changes in family life in society in general and the different methodologies used. Systematic research that puts the patients' and partners' problems into perspective is necessary. Uniformity in measurement instruments would facilitate comparisons of studies. Department of Physiotherapy, Sahlgrenska University Hospital, Institute of Clinical Neuroscience, Goteborg, Sweden.

- Lapham-Randlov N (1994). How the family copes with spinal cord injury: a personal perspective. *Rehabil Nurs* **19**:80-3. Summary: Spinal cord injury (SCI) is devastating both to the injured person and the person's family. Physical, social, emotional, and vocational implications have an impact on everyone in the family. Emergence from SCI is slow and painful, but it can also offer opportunities for personal growth and family coalescence.
- Larsen E and Hejgaard N (1984). Sexual dysfunction after spinal cord or cauda equina lesions. *Paraplegia* **22**:66-74. Summary: In the neurological follow-up 68 patients with a history of spinal cord or cauda lesions of different aetiology and in different stages of regression were examined and interviewed concerning pre- and postmorbid sexual function. As to sexual dysfunction there was no difference between men and women. There was little relationship between the patients' motor function and their present sexual activity. On the other hand there was a statistically significant relationship between bladder dysfunction and sexual dysfunction. In elderly patients sexual activity was often reduced and also in cases of complete neurological restitution. Stability of the patients' marriage was as in the population on the whole. It is concluded that not only young patients, but also elderly ones, had a need for sexual rehabilitation after treatment for spinal cord or cauda equina lesion.
- Lohne V (2001). Hope in patients with spinal cord injury: a literature review related to nursing. *J Neurosci Nurs* **33**:317-25. Summary: Few studies have addressed nursing of patients with spinal cord injury (SCI) related to the phenomenon of hope. Therefore, a systematic computer-based literature review to analyze the phenomenon of hope was conducted, focusing on both empirical and theoretical perspectives, to highlight the potential for further empirical studies. The review examined existing definitions of hope, theories on hope in nursing, and methodological and empirical perspectives on studies of hope in the literature. The findings showed that hope has been defined in a theoretical and general way, which has influenced empirical and theoretical research in this developing area of knowledge. These findings show that the phenomenon of hope can be generalized (the process of hoping) and particularized (the substance of hope). In

addition, this analysis demonstrates that hope is a prospective phenomenon because it is future-oriented (according to the process) and has a positive essence (according to the substance). Institute of Nursing Science, University of Oslo, Oslo University College, Faculty of Nursing, Oslo. Vibeke.Lohne@su.hio.no

- McColl MA, Charlifue S, Glass C, Savic G and Meehan M (2002). International differences in ageing and spinal cord injury. *Spinal Cord* **40**:128-36. Summary: DESIGN: The present study is part of a programme of longitudinal research on ageing and spinal cord injury involving three populations - American, British and Canadian. The design was multivariate. OBJECTIVE: To identify international differences in outcomes associated with ageing and spinal cord injury. SETTING: A sample of 352 participants was assembled from five large, well-established databases. The Canadian sample was derived from the member database of the Canadian Paraplegic Association (Ontario and Manitoba divisions). The British sample was recruited from Southport Hospital's Northwest Regional Spinal Injuries Centre and Stoke-Mandeville Hospital's National Spinal Injuries Centre. The American sample has been recruited through Craig Hospital in Denver, Colorado. METHODS: The sample included individuals who had incurred a spinal cord injury at least 20 years previously; were admitted to rehabilitation within 1 year of injury; were between age 15 and 55 at the time of injury. Data were collected using a combination of self-completed questionnaires and interviews. Data included medical information, general health, hospitalisations, and changes in bladder and bowel management, equipment, pain, spasticity, the need for assistance, and other health issues. RESULTS: Clear international differences existed between the three samples in the three different countries. After controlling for sampling differences (ie, differences in age, level of lesion, duration of disability, etc.), the following differences were seen: (1) American participants had a better psychological profile and fewer health and disability-related problems; (2) British participants had less joint pain and less likelihood of perceiving they were ageing more quickly; (3) Canadians had more health and disability-related complications (particularly bowel, pain and fatigue problems). CONCLUSION: These differences are discussed in terms of socio-political, health care system and cultural factors that might be used to explain them, and to generate hypotheses for future research. Queen's University, School of Rehabilitation Therapy, Kingston, Canada.

- McColl MA, Stirling P, Walker J, Corey P and Wilkins R (1999). Expectations of independence and life satisfaction among ageing spinal cord injured adults. *Disabil Rehabil* **21**:231-40. Summary: PURPOSE: The present study offers information about independence and life satisfaction over the lifespan for individuals with traumatic spinal cord injuries. METHODS: The study uses the health expectancy methodology to estimate expectations of the remaining years of life that may be spent in states of independence and satisfaction with life. SUBJECTS: The cohort studied had all incurred a spinal cord injury between the ages of 25 and 34, between the years 1945 and 1990 in central and south-eastern Ontario. RESULTS AND CONCLUSIONS: The study found that levels of independence and quality of life in the sample conformed closely to those found in other similar studies with the spinal cord injured population: 22% reported their own functional status as dependent, and 22% reported fair to poor life satisfaction. Expectations of independence appeared to decline steadily over the five decades studied,

while expectations of modified independence increased proportionally. Estimates varied significantly for those with paraplegia vs. quadriplegia, and those with complete vs. incomplete lesions. Expectations of life satisfaction appeared to change after the 30 year mark; at that point, the balance changed so that expectations of dissatisfaction outweighed expectations of satisfaction. Multiple regression showed that independence was related to lesion level, completeness and recency of injury, and both independence and satisfaction were related to marriage and employment. School of Rehabilitation Therapy, Queen's University, Kingston, Ontario, Canada.

- McGowan MB and Roth S (1987). Family functioning and functional independence in spinal cord injury adjustment. *Paraplegia* **25**:357-65. Summary: The relationships among functional independence, perceived family functioning and duration of disability were studied in 41 non-institutionalised post-traumatic spinal cord injury (SCI) families. Correlational analyses revealed that SCI subjects with greater self initiation of activities, increased social involvement and higher overall level of independence perceived their family environment as affectively responsive, open in communication and clear in delineation of role responsibilities. The 'significant other's' (A 'significant other' is designated by the SCI subject as 'the one most involved with you'. The 'significant other' had to be living with or within 25 miles of the SCI subject and in contact at least 3 times a week.) view of the family was unrelated to SCI function. Conversely, for the significant other but not the SCI subject, greater duration of disability predicted more concern for the family's ability to problem solve, delineate roles and maintain standards of behaviour control. Of the functional areas measured, only participation in outside activities increased significantly over time. The results are discussed in terms of the importance of considering the long-term and separate rehabilitation needs of the individual with a SCI and his or her family.

- McKinley WO, Seel RT and Hardman JT (1999). Nontraumatic spinal cord injury: incidence, epidemiology, and functional outcome. *Arch Phys Med Rehabil* **80**:619-23. Summary: OBJECTIVES: To identify and compare the incidence, demographics, neurologic presentation, and functional outcome of individuals with nontraumatic spinal cord injury (SCI) to individuals with traumatic SCI. DESIGN: A 5-year prospective study. SETTING: Level I trauma center of a Regional SCI Model System. PATIENTS: Two hundred twenty adult SCI admissions. MAIN OUTCOME MEASURES: Demographics, etiology, level and completeness of injury, Functional Independent Measure (FIM) scores. RESULTS: Of SCI admissions, 39% were nontraumatic in etiology (spinal stenosis, 54%; tumor, 26%). Compared to subjects with traumatic SCI, those individuals with nontraumatic SCI were significantly ($p < .01$) older and were more likely married, female, and retired. Injury characteristics revealed significantly more paraplegia and incomplete SCI within the nontraumatic SCI group ($p < .01$). Both nontraumatic and traumatic SCI individuals had significant FIM changes from rehabilitation admission to discharge ($p < .01$). Those with tetraplegia-incomplete nontraumatic SCI had significantly higher admission motor FIM scores and shorter rehabilitation length of stay than in the traumatic group ($p < .05$). Paraplegic-complete and paraplegic-incomplete nontraumatic SCI subjects had lower discharge motor FIM scores, FIM change, and FIM efficiency than those with traumatic SCI. Similar discharge-to-home rates were noted in both nontraumatic and traumatic SCI groups.

CONCLUSIONS: These data suggest that individuals with nontraumatic SCI represent a significant proportion of SCI rehabilitation admissions and, although differing from those with traumatic SCI in demographic and injury patterns, can achieve similar functional outcomes. Department of Physical Medicine and Rehabilitation, Medical College of Virginia/Virginia Commonwealth University, Richmond 23298, USA.

- Monga M, Dunn K and Rajasekaran M (2001). Characterization of ultrastructural and metabolic abnormalities in semen from men with spinal cord injury. *J Spinal Cord Med* **24**:41-6. Summary: **BACKGROUND:** In men with spinal cord injury (SCI), fertility is impaired because of a combination of ejaculatory dysfunction and poor semen quality. We hypothesized that ultrastructural and metabolic abnormalities of sperm could be an underlying factor in infertility in these men. **METHODS:** To investigate mechanisms contributing to the abnormal sperm parameters, we analyzed seminal constituents and sperm ultrastructure in ejaculates from 7 men with SCI and compared them with 5 control subjects. Sperm adenosine triphosphate (ATP) content was measured using a firefly luciferase bioluminescent assay kit, and ultrastructure was evaluated by electron microscopy. Seminal oxidative stress (8-iso-prostaglandin F-2alpha [8-iso-PGF2alpha]) and transforming growth factor-beta1 (TGF-beta1) levels were measured by specific enzyme-linked immunoabsorbent assay kits. **RESULTS:** Semen samples from men with SCI showed azoospermia (3) and severe asthenospermia (2; motility 0-5%). A majority (65%) of sperm from asthenospermic samples showed degenerative changes and significant axonemal defects. Incubation of normal sperm with SCI seminal plasma induced a concentration-dependent decrease in sperm motility (43%) accompanied by a significant drop in intracellular ATP content (33%). Semen samples from men with SCI exhibited levels of 8-iso-PGF2alpha 3.5-fold higher than those from controls and levels of TGF-beta1 that were 10% higher than those from controls. **CONCLUSION:** Our results suggest that seminal constituents of men with SCI are detrimental to sperm movement and that ultrastructural degenerative changes may contribute to the impaired sperm motility and viability seen in these patients. These preliminary results must be confirmed in larger patient populations and longitudinal studies. Division of Urology, University of California San Diego Medical Center, 92103-8897, USA. mmonga@ucsd.edu

- Nagumo N (2000). [Relationships between low-grade chronic depression, pain and personality traits among community-dwelling persons with traumatic spinal cord injury]. *Shinrigaku Kenkyu* **71**:205-10. Summary: To examine the relationships between low-grade chronic depression, pain and personality traits among community-dwelling persons with traumatic spinal cord injury (TSCI), 111 male and 11 female TSCI persons were administered questionnaires including Self-rating Depression Scale (SDS) and measures of pain and other mental health items, and were followed-up two years later. Nineteen persons (15%) meeting the criteria for low-grade chronic depression (both SDS scores > or = 48) were identified, while 30% of the sample population consistently showed normal mood (both SDS scores < or = 41). Both disabling pain and B type (emotionally labile, socially maladjusted, and extraverted personality characteristic) associated with lower IQ (90 and less) were significantly related to high SDS scores. However, age, sex, time-since-injury, levels of injury and marital status had no relationship with depression. Research Institute, National Rehabilitation Center for the

Disabled, Tokorozawa.

- Noreau L, Dion SA, Vachon J, Gervais M and Laramee MT (1999). Productivity outcomes of individuals with spinal cord injury. *Spinal Cord* **37**:730-6. Summary: STUDY DESIGN: Cross-sectional study by mail survey of participation in productive activities of individuals who sustained a spinal cord injury (SCI) in Quebec from 1970 to 1993. OBJECTIVES: To determine the level of productivity outcomes of a representative sample and to determine the relationship between the productivity outcomes and some personal and environmental variables. SETTINGS: Quebec, Canada. METHODS: Four hundred and eighteen subjects (mean of age=42.1+/-11. 8) were included in this study. Overall productivity was assessed by the participation into five categories of activities (gainful employment, studies, homemaking and family activities, community organizations and leisure activities). RESULTS: Depending on the severity of injury, 30% to 51% of the variance in productivity outcomes can be explained by a set of ten variables: education, ability to drive a car vehicle, other transportation indices, age related variables and type of locomotion. A discriminant analysis was undertaken to classify the subjects into three levels of productivity (low, moderate and high). The percentage of subjects correctly classified was moderate (54% to 71%) to high (72% to 81%) depending on the productivity levels. CONCLUSION: The results confirm the significant contribution of education and transportation to explain the productivity outcomes. SPONSORSHIP: This project was funded by the 'Societe d'Assurance Automobile du Quebec', the 'Commission de la Sante et de la Securite du Travail' and the 'Fondation Andre Senecal'. Rehabilitation Institute of Quebec City, Canada.

- Ohry A, Peleg D, Goldman J, David A and Rozin R (1978). Sexual function, pregnancy and delivery in spinal cord injured women. *Gynecol Obstet Invest* **9**:281-91. Summary: Complete spinal cord injury results in abolition of motor, sensory and autonomic functions. Among the autonomic functions, the sexual system is seriously disturbed. The spinal cord injury with its many complications offers a challenge to the rehabilitation team, and the sexual problem is one of its most important aspects. For the female paraplegic, rehabilitation of sexual functions is an essential part in the building of a positive new self-image. In this review, we try to summarize the gynecological and obstetrical aspects of spinal cord injured women. Although the innervation of the reproductive system is damaged, this system continues to function and the menstrual cycle resumes its normal course after a while. Ovulation takes place regularly and pregnancy is possible. Today the general opinion is that the pregnant paralyzed woman can deliver vaginally and not by cesarean section as was believed before. We emphasize the importance of special medical care before, during and after delivery. The cooperation between physiatrist and gynecologist is mandatory.

- Peters LC, Stambrook M, Moore AD, Zubek E, Dubo H and Blumenschein S (1992). Differential effects of spinal cord injury and head injury on marital adjustment. *Brain Inj* **6**:461-7. Summary: Central nervous system (CNS) trauma can produce a multitude of physical and psychological sequelae, depending on the neurological level of injury. Clinicians have long recognized the adjustment difficulties posed in marriages of CNS trauma victims, yet there is little research documentation for this observation. The marital relationships of moderate (n = 31) and severe (n = 17) head injury (HI) groups

and a spinal cord injury (SCI) group (n = 24) were assessed through spouses' self-reports in interview and through standardized questionnaires. Analyses indicated that the three groups were not statistically different in age, number of months post-injury, pre- and post-injury occupational status, and level of income. In the post-injury marital relationship, the severe HI group was significantly lower than the moderate HI and SCI groups on standardized and validated scales assessing affectional expression (p less than 0.002), dyadic satisfaction (p less than 0.001), dyadic cohesion (p less than 0.01), and total dyadic adjustment (p less than 0.001). On a scale of social role functioning, the severe HI group's performance was significantly lower than the moderate HI and SCI groups (p less than 0.005). These results empirically substantiate the clinical observation that adjustment difficulties may be more intense for wives of the severely head injured than the moderately injured or the SCI, as they must deal with neuropsychological as well as physical fall-out from the injury. Department of Psychiatry, University of Manitoba, Canada.

- Phelps J, Albo M, Dunn K and Joseph A (2001). Spinal cord injury and sexuality in married or partnered men: activities, function, needs, and predictors of sexual adjustment. *Arch Sex Behav* **30**:591-602. Summary: The sexual behaviors, functioning, needs, and sexual satisfaction levels of men with spinal cord injuries (SCI) were studied. A sample of 50 men with SCI (median age = 50; median age at injury = 25.0), either married or in a committed relationship, responded to an anonymous survey of a large southern California regional spinal injury rehabilitation center. Multiple regression analyses indicated that perceived partner satisfaction, relationship quality, and sexual desire were significant predictors of sexual satisfaction and behavior. Erectile function, level of genital sensation, and orgasmic capacity all varied widely in the sample, as well. However, none of these variables were significantly related to sexual satisfaction. A varied sexual repertoire was independently related to sexual satisfaction and behavior, but did not offer additional predictive power. Results suggest that for married or partnered men with SCI, relationship factors including partner satisfaction and relationship quality are significantly and positively related to sexual satisfaction. Married or partnered men with SCI who report low relationship satisfaction, have difficulty satisfying their partner, and/or report low sexual desire may benefit from assessments and interventions that address these issues. Psychological and Counseling Services, Department of Psychiatry, School of Medicine, University of California, San Diego, Veterans Affairs San Diego Healthcare System, La Jolla, California, USA. jsphelps@usc.edu

- Piazza D, Holcombe J, Foote A, Paul P, Love S and Daffin P (1991). Hope, social support and self-esteem of patients with spinal cord injuries. *J Neurosci Nurs* **23**:224-30. Summary: A descriptive study was conducted to determine if a relationship among the variables of hope, social support and self-esteem existed in persons with spinal cord injuries. A demographic data sheet and three instruments were used: Miller Hope Scale (MHS), Personal Resource Questionnaire Part II (PRQ) and Rosenberg Self-Esteem Scale (RSES). Of the 83 inpatients and outpatients who agreed to participate, 77 sets of questionnaires were usable. Ages of subjects ranged from 18-73 (mean 34.8) years and levels of injury ranged from C4-L3. The mean scores on the tools were: MHS-153.51 (40-200 possible range), PRQ-137.42 (25-175 possible range) and RSES-29.59 (10-40

possible range). There was a statistically significant relationship between hope and social support, hope and self-esteem and social support and self-esteem. By multiple regression analysis, the best predictors of hope in the subjects were self-esteem, social support and education. University of Alabama, School of Nursing, Birmingham.

- Ravenscroft A, Ahmed YS and Burnside IG (2000). Chronic pain after SCI. A patient survey. *Spinal Cord* **38**:611-4. Summary: STUDY DESIGN: A survey of chronic pain experience after spinal cord injury. OBJECTIVE: To investigate the prevalence, severity and impact of chronic pain amongst spinal cord injury (SCI) patients in our region, and assess the need for additional resources to address the problem. METHODS: A postal questionnaire was sent to 216 spinal cord injury patients (10% of the Yorkshire regional spinal injury database). Setting: Yorkshire region, UK. RESULTS: A response was received from 67% of the patients. Seventy-nine per cent of patients said they presently suffered with pain, with 39% describing it as severe. Comparison of pain and non-pain groups using chi-squared analysis showed that complete injury was significantly more likely than incomplete injury to result in chronic pain ($P < 0.05$), and increased severity of pain ($P < 0.05$). 43% of patients with pain said they required further treatment for it. Chronic pain had a significant impact on daily activities and was a major factor in causing unemployment (18%) and depression (39%). CONCLUSION: The study confirms that pain is a major problem in SCI patients which is not currently being adequately addressed. A multidisciplinary approach to management and prospective studies of treatments are required in order to reduce the prevalence and severity of pain in these patients. *Spinal Cord* (2000) 38, 611 - 614. Department of Spinal Injuries, Pinderfields General Hospital, Wakefield, Yorkshire, UK.

- Reidy K and Caplan B (1994). Causal factors in spinal cord injury: patients' evolving perceptions and association with depression. *Arch Phys Med Rehabil* **75**:837-42. Summary: Do spinal cord injured patients who accept responsibility for their injury cope better than those who blame others? Previous investigations have yielded conflicting answers to this question. On the assumption that some portion of the disparity in earlier findings derives from the failure of early investigators to conceptualize "blame" as a dynamic phenomenon, the present study approached the question via a longitudinal study. Specifically, we examined: (1) the evolution of patients' perceptions of responsibility for spinal cord injury, and (2) the changing association of this factor with depression over a 2-year period, beginning with inpatient rehabilitation. Eighteen men with traumatic spinal cord injury were evaluated during acute rehabilitation and again at 18 to 24 months following discharge. Patients assigned proportions of blame for their injury to four possible causal factors (self, environment, chance, others). Three indices of depression were derived from the Beck Depression Inventory (BDI). Eighty-nine percent of the subjects displayed shifts in pattern of blame assignment between initial and follow-up evaluations. Individuals whose self-blame score increased over time exhibited increased depression, as did those who came to attribute to "chance" lesser blame for their injury. During inpatient rehabilitation, no aspect of blame correlated significantly with any of the three BDI indices, although "other blame" and the cognitive/affective BDI index just failed to reach conventional levels ($r = .43$, $p = .07$). By contrast, at follow-up evaluation, "self blame" was positively correlated with both the cognitive/affective ($r = .51$, $p = .03$) and Total ($r = .46$, $p = .05$)

BDI scores. All other correlations were not statistically meaningful.(ABSTRACT TRUNCATED AT 250 WORDS). Department of Rehabilitation Medicine, Thomas Jefferson University Hospital, Philadelphia, PA 19107.

- Rish BL, Dilustro JF, Salazar AM, Schwab KA and Brown HR (1997). Spinal cord injury: a 25-year morbidity and mortality study. *Mil Med* **162**:141-8. Summary: The morbidity and mortality occurring during 25 years following spinal cord injury were analyzed. A cohort of 230 patients was selected from the Vietnam Head and Spinal Cord Injury Study Registry meeting the following criteria: (1) survival beyond triage (72 hours); (2) significant myelopathy; and (3) availability of medical records. The military and Veteran's Hospital medical records were compiled and reviewed. Additional death records were obtained from the Department of Veterans Affairs pension office. The major morbidity problems continue to be sepsis related to genitourinary and decubiti sequelae. Psychosocial maladjustment and substance abuse were prevalent and created heavy health care demand. The most frequent cause of death was sepsis. Suicide in the paraplegic group occurred at a rate exceeding by 10 times the frequency reported for uninjured peers. Survival after 5 years approached but never reached the rate established for uninjured peers. Department of Neurosurgery, Eastern Virginia Medical School, Norfolk, VA, USA.
- Saravanan B, Manigandan C, Macaden A, Tharion G and Bhattacharji S (2001). Re-examining the psychology of spinal cord injury: a meaning centered approach from a cultural perspective. *Spinal Cord* **39**:323-6. Summary: OBJECTIVES: To examine the impact of SCI from a non-Western cultural perspective. SETTING: India. METHODS: A philosophical approach. CONCLUSION: Management of the individual with spinal cord injury needs to take in to account the individual's beliefs and cultural context. Department of Psychiatry, Christian Medical College, Vellore 632002 India.
- Scivoletto G, Petrelli A, Di Lucente L and Castellano V (1997). Psychological investigation of spinal cord injury patients. *Spinal Cord* **35**:516-20. Summary: Spinal cord injuries (SCI) often have psychological consequences, primarily anxiety and depression, which may interfere with rehabilitation possibilities, with adjustment to the impairment and therefore with the possibility of returning to previous familiar social life and work. To assess the degree of anxiety and depression in SCI patients, and to study the factors contributing to their genesis, 100 SCI in- and out-patients were administered questionnaires for self-rating anxiety and depression. A group of newly injured patients was followed up for a year after their discharge to study the evolution of the two psychological syndromes. These two psychological pathologies in SCI patients were respectively 13% (anxiety) and 16% (depression). Some characteristics were significantly associated with a higher risk of developing psychological distress: the presence of severe complications, the lack of autonomy, and low educational level. We did not observe any modification of the psychological picture over time. The lack of reduction in anxiety and depression over time could mean that the two pathologies are maintained by the obstacles SCI patients meet every day resulting from their neurological deficit. Our data justify the provision of psychological services for SCI patients in the rehabilitation centres; these services should still be available to the patients even after discharge. IRCCS Ospedale di Riabilitazione S. Lucia, Roma, Italy.

- Shnek ZM, Foley FW, LaRocca NG, Gordon WA, DeLuca J, Schwartzman HG, Halper J, Lennox S and Irvine J (1997). Helplessness, self-efficacy, cognitive distortions, and depression in multiple sclerosis and spinal cord injury. *Ann Behav Med* **19**:287-94. Summary: The aim of this study was to determine if learned helplessness, self-efficacy, and cognitive distortions would predict depression in a sample of 80 individuals with multiple sclerosis (MS) and 80 individuals with a spinal cord injury (SCI). As MS and SCI usually present with disparate disease courses and etiologies, a secondary objective was to determine if individuals with MS would exhibit greater levels of helplessness, cognitive distortions, and depression and lower levels of self-efficacy than those with SCI. Results indicated that helplessness and self-efficacy significantly predicted depression for both the MS and SCI groups after controlling for confounding variables. Cognitive distortions had no independent effect, indicating that cognitive distortions may have caused feelings of helplessness and low self-efficacy and, in this way, had indirect effects on depression. The MS group exhibited significantly greater levels of depression and helplessness and significantly lower levels of self-efficacy than the SCI group. It was hypothesized that it may have been the combination of an unpredictable course of disease activity and the possibility of being affected by MS in many different ways that produced greater feelings of depression, helplessness, and low self-efficacy in the MS group. Rehabilitation Institute of Toronto, Canada.
- Schulz R and Decker S (1985). Long-term adjustment to physical disability: the role of social support, perceived control, and self-blame. *J Pers Soc Psychol* **48**:1162-72. Summary: One hundred middle-aged and elderly spinal-cord-injured persons were interviewed an average of 20 years after the disability occurred. Respondents answered questions concerning perceived control, attributions of blame, and the nature of the social comparisons they made. Three existing standardized instruments were used to measure adjustment: Index of Psychological Well-Being, Life Satisfaction Index, and the Center for Epidemiologic Studies Depression Scale. For all three outcome measures, respondents reported levels of well-being only slightly lower than population means of nondisabled persons of similar age. Controlling for health status and current income, we found that persons who have high levels of social support, who are satisfied with their social contacts, and who feel they have high levels of perceived control report high levels of well-being. Self-blame and the perceived avoidability of the cause of the disability correlated only moderately with the three measures of adjustment, suggesting that there are important differences between coping successfully immediately after a traumatic event has occurred and coping successfully many years later.
- Seki M, Takenaka A, Nakazawa M, Takahashi H and Chino N (2002). [Examination of living environment upon return to home for patients with cervical spinal cord injury--report of a case]. *Gan To Kagaku Ryoho* **29 Suppl 3**:522-5. Summary: Living environment is a problem for spinal cord injury patients upon their return to the society. There are also many instances of home care problems after hospital discharge. For cervical spinal cord injury patients in particular, appropriate intervention/assistance provided by the authorities in accordance with the level of residual function is essential, but there have been few reports on this issue. Here we report on a municipal facility for cervical spinal cord injury patients where a patient moved into upon hospital discharge

that did not provide a suitable environment, and the burden posed on his family increased. The patient was a 55-year-old man with traumatic cervical spinal cord injury who was commuting to our rehabilitation center after hospital discharge. We investigated the environment in the municipal housing facility he had moved into, and examined the relationship between the level of cervical spinal cord injury function and ADL assessment before and after hospital discharge. The main problems were an increase in care provided by his wife due to unsuitable toilet facilities and insufficient public facilities concerning the living environment. In terms of ADL by FIM (functional independence measure), namely, toilet transfer, toilet motion and defecation control which he had performed independently at the time of hospital discharge, all had decreased to a level requiring assistance after he moved into the present apartment. Therefore, approach via welfare equipment compensation were undertaken. As a result, the burden for his wife diminished, but the ADL and FIM scores obtained were low. Thus, the living environment facilities for patients with cervical spinal cord injuries should be in accordance with the level of function and ADL, suggesting the necessity for the authorities to establish a cooperative system for running home facilities. Dept. of Rehabilitation Medicine, Shizuoka City Hospital.

- Shaddinger DE (1995). An acute spinal cord injury: my family's story. *J Neurosci Nurs* **27**:236-9. Summary: An acute spinal cord injury has been described as one of the most devastating traumatic types of neurological impairment. Twelve years ago I had the misfortune of experiencing this first hand. From the day of my brother's initial injury I began keeping a diary of what this experience was like. The concept of entitlement and indebtedness has been applied to my family's experience.
- Soden RJ, Walsh J, Middleton JW, Craven ML, Rutkowski SB and Yeo JD (2000). Causes of death after spinal cord injury. *Spinal Cord* **38**:604-10. Summary: STUDY DESIGN: Mortality review was undertaken of patients who suffered traumatic spinal cord injury (SCI) between 1955 and 1994 inclusive. OBJECTIVES: The study objective was to provide evidence of reasons for the observed reduction in long-term life expectancy for the SCI population. SETTING: Patients were those who had most, if not all, of their inpatient and outpatient care at Royal North Shore Hospital, Spinal Injuries Unit, Sydney, New South Wales, Australia. METHODS: Data on causes of death for 195 patients fitting the inclusion criteria were analysed by actuarial methods using ICD9CM classifications. RESULTS: The incidence of death in the spinal cord injured, from septicaemia, pneumonia and influenza, diseases of the urinary system and suicide, are significantly higher than in the general population. The findings confirm variations in potentially treatable causes of death depending on neurological impairment, attained age and duration since injury. Unlike septicaemia and pneumonia, which have shown a significant reduction since 1980, the death rate for suicide alone has risen. CONCLUSION: This analysis identified complications which affect mortality and morbidity in patients suffering from the effects of SCI. Spinal Cord Injuries Unit, Royal North Shore Hospital, Sydney, Australia.
- Sonksen J and Ohl DA (2002). Penile vibratory stimulation and electroejaculation in the treatment of ejaculatory dysfunction. *Int J Androl* **25**:324-32. Summary: The purpose of this review is to present the current understanding of penile vibratory

stimulation (PVS) and electroejaculation (EEJ) procedures and its clinical use in men with ejaculatory dysfunction. Unfortunately, the record of treating such individuals has been quite poor, but within recent years development and refinement of PVS and EEJ in men with spinal cord injury (SCI) has significantly enhanced the prospects for treatment of ejaculatory dysfunction. The majority of spinal cord injured men are not able to produce antegrade ejaculation by masturbation or sexual stimulation. However, approximately 80% of all spinal cord injured men with an intact ejaculatory reflex arc (above T10) can obtain antegrade ejaculation with PVS. Electroejaculation may be successful in obtaining ejaculate from men with all types of SCI, including men who do not have major components of the ejaculatory reflex arc. Because vibratory stimulation is very simple in use, non-invasive, it does not require anaesthesia and is preferred by the patients when compared with EEJ, PVS is recommended to be the first choice of treatment in spinal cord injured men. Furthermore, EEJ has been successfully used to induce ejaculation in men with multiple sclerosis and diabetic neuropathy. Any other conditions which affect the ejaculatory mechanism of the central and/or peripheral nervous system including surgical nerve injury may be treated successfully with EEJ. Finally, for sperm retrieval and sperm cryopreservation before intensive anticancer therapy in pubertal boys, PVS and EEJ have been successfully performed in patients who failed to obtain ejaculation by masturbation. Nearly all data concerning semen characteristics in men with ejaculatory dysfunction originate from spinal cord injured men. Semen analyses demonstrate low sperm motility rates in the majority of spinal cord injured men. The data give evidence of a decline in spermatogenesis and motility of ejaculated spermatozoa shortly after (few weeks) an acute SCI. Furthermore, it is suggested that some factors in the seminal plasma and/or disordered storage of spermatozoa in the seminal vesicles are mainly responsible for the impaired semen profiles in men with chronic SCI. Home insemination with semen obtained by penile vibratory and introduced intravaginally in order to achieve successful pregnancies may be an option for some spinal cord injured men and their partners. The majority of men will further enhance their fertility potential when using either penile vibratory or EEJ combined with assisted reproduction techniques such as intrauterine insemination or in-vitro fertilization with or without intracytoplasmic sperm injection. Department of Urology, Rigshospitalet, University of Copenhagen, Denmark. sonksen@mail.dk

- Spungen AM, Wang J, Pierson RN, Jr. and Bauman WA (2000). Soft tissue body composition differences in monozygotic twins discordant for spinal cord injury. *J Appl Physiol* **88**:1310-5. Summary: To determine the effect of paralysis on body composition, eight pairs of male monozygotic twins, one twin in each pair with paraplegia, were studied by dual-energy X-ray absorptiometry. Significant loss of total body lean tissue mass was found in the paralyzed twins compared with their able-bodied co-twins: 47.5 +/- 6.7 vs. 60.1 +/- 7.8 (SD) kg ($P < 0.005$). Regionally, arm lean tissue mass was not different between the twin pairs, whereas trunk and leg lean tissue masses were significantly lower in the paralyzed twins: -3.0 +/- 3.3 kg ($P < 0.05$) and -10.1 +/- 4.0 kg ($P < 0.0005$), respectively. Bone mineral content of the total body and legs was significantly related to lean tissue mass in the able-bodied twins ($R = 0.88$ and 0.98 , respectively) but not in the paralyzed twins. However, the intrapair difference scores for bone and lean tissue mass were significantly related ($R = 0.80$ and 0.81 , respectively). The paralyzed twins had significantly more total body fat mass and percent fat per unit

body mass index than the able-bodied twins: 4.8 kg ($P < 0.05$) and 7 +/- 2% ($P < 0.01$). In the paralyzed twins, total body lean tissue was significantly lost (mostly from the trunk and legs), independent of age, at a rate of 3.9 +/- 0.2 kg per 5-yr period of paralysis ($R = 0.87$, $P < 0.005$). Extreme disuse from paralysis appears to contribute to a parallel loss of bone with loss of lean tissue in the legs. The continuous lean tissue loss may represent a form of sarcopenia that is progressive and accelerated compared with that in ambulatory individuals. The Spinal Cord Damage Research Center, Mount Sinai Medical Center, Bronx, NY 10029, USA. AmSpungen@worldnet.att.net

- Stensman R (1994). Adjustment to traumatic spinal cord injury. A longitudinal study of self-reported quality of life. *Paraplegia* **32**:416-22. Summary: In order to meet a long expressed need for a longitudinal study on personal adjustment to traumatic spinal cord injury, 17 consecutively treated persons with complete traumatic spinal cord injury were interviewed 0.5-5 years after the injury on six occasions, with a total of 102 interviews. The variables studied were age at injury, social status, the cause of the accident, spinal level of injury and physical complications. The subjective quality of life (QOL) was reported on a 0-10 scale at all interviews and showed four patterns during the 5 year period. Five subjects reported that they were coping very well, with an almost unchanged QOL after the injury. Six reported good coping after an initially low QOL in the first years. Two subjects reported an unstable QOL, and four persons reported a continually low QOL without improvement. Variables related to unsatisfactory coping were severe pain, age above 35 years at the time of trauma, and being blameless for the accident. Department of Rehabilitation Medicine, Uppsala University, Akademiska sjukhuset, Sweden.
- Sullivan J (1990). Individual and family responses to acute spinal cord injury. *Crit Care Nurs Clin North Am* **2**:407-14. Summary: This article discusses individual and family responses to acute spinal cord injury from both research and clinical practice perspectives. Investigations concerning individuals' physical reactions, psychologic adjustment, and occurrence of depression are reviewed. Research studies on the demographics of and adjustment and role changes within families of patients with spinal cord injuries are critiqued. Suggestions and guidance emerging from these studies are discussed and applied to clinical practice. Clinical practice perspectives are further developed in a discussion of the needs and resources of these patients and their families. Grief, powerlessness, positive manipulation, and quality-of-life issues are also explored.
- Tirch D, Radnitz CL and Bauman WA (1999). Depression and spinal cord injury: a monozygotic twin study. *J Spinal Cord Med* **22**:284-6. Summary: Although, in earlier work, depression in individuals with spinal cord injury (SCI) was attributed to difficulties adjusting to SCI, more recent articles have emphasized the importance of constitutional and environmental factors not specific to SCI, as well as established theoretical models of depression. To further explore this question, 11 pairs of monozygotic twins, where one of each pair was spinal cord injured, were studied. Measures included the Beck Depression Inventory, the depression scale of the SCL-90R, and the Rosenberg Self-Esteem Scale. Using pairwise t tests, the authors did not find any significant differences between SCI and non-SCI co-twins. These findings are

consistent with the idea that the occurrence of SCI does not inevitably lead to increased depression. Psychology Service, Veterans Affairs Medical Center, Bronx, New York 10468, USA.

- Urey JR and Henggeler SW (1987). Marital adjustment following spinal cord injury. *Arch Phys Med Rehabil* **68**:69-74. Summary: The present study examined marital characteristics of couples who are coping successfully with spinal cord injury (SCI) versus those who are not and the relationship of positive marital adjustment in SCI couples as compared with positive adjustment among able-bodied (AB) couples. In a 2 X 2 factorial design the marital relations of 10 nondistressed and 10 distressed SCI couples and 14 nondistressed and 10 distressed AB couples were examined. Assessments were conducted in the couples' homes and included self-report measures of recreational-social activities and sexual relations, and observations of marital communication skills. Multivariate analyses revealed significant interaction effect with posthoc comparisons, indicating that spouses in distressed SCI marriages engaged in significantly fewer activities alone and with their spouse and requested the greatest degree of change in the marital relationship in comparison with the other groups. There was a significant main effect for marital satisfaction, with distressed couples expressing more dissatisfaction in sexual relations and more negative communications during conflict resolution tasks. Although the results do not indicate that substantive differences exist in quantitative and qualitative aspects of marital relations between SCI and AB couples, several trends were observed which suggest the need for further research.

- Ville I and Ravaud JF (2001). Subjective well-being and severe motor impairments: the Tetrafigap survey on the long-term outcome of tetraplegic spinal cord injured persons. *Soc Sci Med* **52**:369-84. Summary: The purpose of the research described in this article is to study the effects of severe motor impairments on a person's well-being, by attempting to throw light upon the inconsistencies found in the previous literature, which are due to problems of a conceptual and methodological nature. The data were gathered during the Tetrafigap survey on the long-term outcome of tetraplegic persons in France. This survey involved 1668 tetraplegic spinal cord injured people. We examine the relationships between the overall assessment of well-being as expressed by the people interviewed, and a range of clinical, social and psycho-social factors. A progressive approach, along with the use of adjustments via linear regressions, has allowed us to identify certain confounding factors, and to analyse the respective effects of the different types of variables studied. Thus current age, the age at which the impairment occurred and having or not having a professional activity do not have any direct links with the assessment of well-being, whereas the existence of pain and the subjective assessment of one's own independence and of the severity of one's disability are predictive factors. The functional independence indicators are only linked to well-being when they relate to situations in which the dependence creates embarrassment due to socio-cultural taboos. The loss of autonomy only affects well-being in as much as it imposes limits to social activity, whether they be relational or occupational. Living as a couple is a negative predictive factor if the couple were together prior to the impairment occurring. The overall results demonstrate the importance of moving beyond any conception of the impact of the impairments on well-being that is too exclusively focused on the individual, and of integrating the socio-cultural meanings of handicap

situations and the dynamics of the interactions which take place therein. CERMES, INSERM U.502, IFRH (Federative Research Institute on Disability), Paris, France. ville@ext.jussieu.fr

- Vogel LC, Krajci KA and Anderson CJ (2002). Adults with pediatric-onset spinal cord injuries: part 3: impact of medical complications. *J Spinal Cord Med* **25**:297-305. Summary: OBJECTIVE: To determine the impact of medical complications on adult outcomes of individuals with pediatric-onset spinal cord injury (SCI). METHOD: Structured interview including standardized measures. PARTICIPANTS: Individuals who sustained SCI at age 18 years or younger and were 24 years of age or older at interview. OUTCOME MEASURES: A structured interview covering employment, independent living and driving, and marriage. Standardized measures include the Craig Handicap Assessment and Reporting Technique (CHART), the Short Form (SF-12), and the Satisfaction with Life Scale (SWLS). RESULTS: Two hundred sixteen individuals were interviewed, with a mean age at injury of 14 years and a mean age at follow-up of 29 years. Of all the complications, pressure ulcers, severe urinary tract infection (UTI), and spasticity had the greatest impact on adult outcomes. Pressure ulcers were statistically related to all main outcomes. Severe UTI was statistically associated with all the outcomes except for marriage. Spasticity was associated with all the measured outcomes, except for marriage and life satisfaction. Life satisfaction was most significantly associated with severe UTI, pressure ulcers, pain, and respiratory complications. CONCLUSION: Medical complications significantly affect adult outcomes of individuals with pediatric-onset SCI. Shriners Hospitals for Children, Chicago, Illinois 60707, USA. lvogel@shrinenet.org

- Wanner MB, Rageth CJ and Zach GA (1987). Pregnancy and autonomic hyperreflexia in patients with spinal cord lesions. *Paraplegia* **25**:482-90. Summary: Symptoms of autonomic hyperreflexia in patients with complete and incomplete paraplegia above D 7 can be caused by almost any stimulus in the abdominal area or in the lower extremities, specifically during parturition by the uterine contractions. The symptoms vary from pilo-erection and outbreaks of sweating to serious blood pressure crises and cerebrovascular accidents. Epidural anaesthesia and general anaesthesia are effective as therapy and also as prophylaxis. Frequent complications are anemia and urinary tract infections. Changes in bladder function as a result of pregnancy and childbirth were observed. Paraplegic expectant mothers experience premature labour pains more frequently than do others, and this implies the necessity for earlier clinical surveillance up to the time of delivery. The secondary uterine inertia frequently requires an operative termination of the birth. The perception of labour pains is clearly possible also with lesions above D 10. Swiss Paraplegic Centre, Basel.

- Warren L, Wrigley JM, Yoels WC and Fine PR (1996). Factors associated with life satisfaction among a sample of persons with neurotrauma. *J Rehabil Res Dev* **33**:404-8. Summary: Factors were examined that are associated with life satisfaction one year post-discharge for persons with a spinal cord (SCI) or traumatic brain injury (TBI). Findings show persons with SCI or TBI should be considered as two distinct groups with regard to factors affecting life satisfaction. Different strategies might be considered to affect either group. Three psychosocial variables significantly increased life satisfaction

for persons with SCI: closeness to family, the level of family activities, and blaming oneself for the injury. For persons with TBI, total family satisfaction, blaming oneself for the injury, being employed, being married, and having memory and bowel independence significantly increased life satisfaction. For persons with TBI, there was a difference in the number of factors affecting life satisfaction dependent on whether the persons blamed themselves or not. Those who do not blame themselves show a greater number of functional activities as indicators for their self-satisfaction. Alabama Department of Environment Management, Montgomery 36130, USA.

- Weitzenkamp DA, Gerhart KA, Charlifue SW, Whiteneck GG and Savic G (1997). Spouses of spinal cord injury survivors: the added impact of caregiving. *Arch Phys Med Rehabil* 78:822-7. Summary: OBJECTIVE: To better understand the needs of spouses who provide care to spinal cord injury (SCI) survivors, by comparing their self-perceptions and complaints with those of their partners with disabilities and with those of spouses who do not provide care. DESIGN: Survey, including demographics, health concerns questionnaire, and administration of the Center for Epidemiologic Studies Depression Scale (CES-D), the Perceived Stress Scale (PSS), the Life Satisfaction Index (LSI-Z), and the Quality of Life and Individual Needs Questionnaire. SETTING: Two British SCI treatment centers, serving a defined population-based catchment area. PARTICIPANTS: One hundred twenty-four spouses of a longitudinally followed sample of SCI survivors, all of whom had been injured 23 or more years when the study was conducted in 1993. OUTCOME MEASURES: Scores on the above standardized tests, and responses to survey questions. RESULTS: Spouses had more depressive affect ($p < .001$) than their partners with disabilities, as measured by the CES-D. On the PSS, they exhibited no significant differences. Compared with spouses who were not caregivers, the caregiving spouses reported more physical stress ($p = .005$), emotional stress ($p = .011$), burnout ($p = .007$), fatigue ($p = .002$), and anger and resentment ($p = .029$). On the CES-D, they had more symptoms of depressive affect ($p = .004$) and somatic depression ($p = .005$). CONCLUSIONS: Spouses of long-term SCI survivors who fulfill a caregiving role report more symptoms of stress and depression than their partners with disabilities and other spouses who are not caregivers. The Rehabilitation Research and Training Center on Aging with Spinal Cord Injury, Craig Hospital, Englewood, CO 80110, USA.

- White MJ, Rintala DH, Hart KA, Young ME and Fuhrer MJ (1992). Sexual activities, concerns and interests of men with spinal cord injury. *Am J Phys Med Rehabil* 71:225-31. Summary: A representative sample of 79 men with spinal cord injury, drawn from a sampling frame of 661 women and men who reside in the community, was studied in terms of sexual activity, concerns and interests. Participants responded to a questionnaire and rating scales and were physically examined to establish their neurologic status. With respect to eleven other areas of life, sex life ranked the lowest in terms of satisfaction and fifth in terms of importance. Of the sample, 67% reported having had a physical relationship (not necessarily including intercourse) in the past 12 months. Areas of sexual activity about which respondents were most concerned were not satisfying a partner, getting or giving a sexual disease, urinary accidents, and not getting enough personal satisfaction. From among seven topics related to sexuality, the three in which there was greatest interest were methods and techniques to achieve

sexual satisfaction, helping a partner cope emotionally with limitations on sexual activity and ability to have children. University of Texas Health Science Center, Houston School of Nursing.

- Yim SY, Lee IY, Yoon SH, Song MS, Rah EW and Moon HW (1998). Quality of marital life in Korean spinal cord injured patients. *Spinal Cord* **36**:826-31. Summary: The purposes of this study were to assess the quality of marital life and to investigate the most serious problem in the marital relationships of Korean spinal cord injured patients. 30 spinal cord injured (SCI) couples (SCI husbands and their non-disabled wives) who were married prior to injury and 30 able-bodied (AB) couples participated in a questionnaire study. The quality of marital life was measured with three parameters: marital stability, marital adjustment, and marital satisfaction. The results were as follows: (1) The marriage of chronic SCI couples was not noticeably unstable when compared with that of AB couples; (2) There was no significant difference in dyadic adjustment and marital satisfaction between SCI couples and AB couples; (3) There was no significant difference in marital stability, marital adjustment, and marital satisfaction between SCI husbands and their wives; (4) SCI couples had more cohesive marital relationships and SCI husbands expressed less affection to their wives than AB husbands and (5) Sex was the most serious problem in marriages of SCI couples. In conclusion: (1) the quality of marital life in chronic SCI couples is not highly different from that of AB couples; (2) There is no significant difference in the quality of marital life between chronic SCI husbands and their non-disabled wives; and (3) It is considered necessary that rehabilitation program for SCI patients should include information on the altered physiology of sexual function of SCI patients and subsequent mutual adaptation to changed sexual function. Department of Physical Medicine and Rehabilitation, Ajou University School of Medicine, Suwon, Korea.