
JOINT SECTION ON DISORDERS OF THE
SPINE AND PERIPHERAL NERVES

SPINE SECTION NEWSLETTER



*The American Association of Neurological Surgeons
and
Congress of Neurological Surgeons*



Gary L. Rea, MD, PhD, and Robert F. Heary, MD

September 1996

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EDITOR'S NOTE

At the AANS meeting in Minneapolis, there were several revisions of the Joint Section rules and regulations. Mark Hadley, MD, the Rules and Regulations Committee Chairman, submitted these changes. All members should review these changes since they will be voted on by the Joint Section membership in Newport Beach, California. The following is a summary regarding these changes.

- There is increased emphasis in the bylaws to clarify that the Joint Section represents both spine and peripheral nerve surgery.
- Senior membership will be available to any active member 60 years of age or older or to any member who retires from active practice. Applications for senior membership must be submitted in writing to the secretary of the Joint Section.
- Annual dues will be recommended by the executive committee and ratified by a majority vote of the active membership of the Joint Section annual meeting. (Note: At the meeting in Orlando, the Executive Committee voted unanimously to increase dues to \$50. This new rate will be voted upon at the next meeting of the Joint Section in Newport Beach, California and if approved, will go into effect in 1997.)
- There has been clarification for the term lengths for members of the Executive Committee: Chairperson, 1 year; Secretary, 3 years; Treasurer, 3 years; Member at Large, 3 years.
- The Joint Section newsletter should be used to update, educate, and inform members of the Joint Section. It will also serve to notify members of all Joint Section business prior to national meetings. **NEUROSURGERY://ON-CALL™** will receive input from the newsletter editor so that this information should be available "on-line" in the near future.
- New revised rules and regulations may be proposed by any active member. The proposal must be sent to the chairman of the Rules and Regulations Committee and then will be reviewed at the next Executive Committee meeting. Final ratification of changes are voted upon by the active membership and a two-thirds majority is required for rules and regulations to occur.
- The complete rules and regulations of the Joint Section of Disorders of the Spine and Peripheral Nerves is available from the secretary upon request.

**Be sure to attend the Joint
Section Program at the
CNS Annual Meeting.
Tuesday, October 1, 1996.**

**Highlights include
presentations on:**

- ◆ **Pediatric Spinal
Column Injuries**
- ◆ **Cervical Spine
Trauma**
- ◆ **Thoracolumbar Spinal
Trauma**

This is a synopsis of the changes proposed. Members having questions or concerns about this may want to contact Dr. Hadley, but it is also important to be at the meeting in Newport Beach, California to have a voice in these changes.

BOOK REVIEWS

Reviewer: John McGregor, MD
Title: *Nerve Injuries - Operative Results for Major Nerve Injuries, Entrapments, and Tumors*
Authors: David G. Kline and Allen R. Hudson
Publisher: W.B. Saunders Company, 1995
ISBN 0-7216-3264-5, Pages 611

Anyone with any interest in the peripheral nervous system or, for that matter, injury to the extremities, whether they be neurosurgeon, neurologist, orthopedist, plastic surgeon, or trauma surgeon, should consider strongly adding *Nerve Injuries* to their library. The information contained within should prove to be the standard to which surgery of the peripheral nervous system will be compared for decades to come. This text compiles a wealth of information on the management of patients with injury and surgical disease of the peripheral nervous system gleaned from years of study by two of the established experts in the field.

NASS Offers Research Grants and Awards

Each year the North American Spine Society (NASS) gives approximately \$100,000 in grants and awards to fund basic and applied clinical research with a goal of improving the quality of spine care for patients and understanding the underlying nature of spine disorders. If you have questions regarding the types of awards, please call Phyllis J. Accardo, Director of Research Grants, North American Spine Society, 847-384-4340.

Joint Section Fellowship Winner

Simcha Weller, MD, from the Brigham and Women's Hospital Program of Harvard Medical School, was awarded the Joint Section Fellowship. He is entering his fellowship under the direction of Edward Benzel, MD, in New Mexico. He was also the Mayfield award winner in 1995.

The Mayfield Basic Science Award was won by Paul Francel, MD, from the University of Virginia, who plans an academic career at the University of Oklahoma. The Mayfield Clinical Award winner was Paul D. Sawin, MD, from the University of Iowa.

David G. Kline brings 30 years of expertise in peripheral nerve injury, nerve physiology, regeneration and nerve tumors, and is recognized internationally as a leader in peripheral nerve research. Allen R. Hudson is a professor at The Division of Neurosurgery, University of Toronto and also brings many years to international expertise and significant contributions in the field of peripheral nerve injury.

The two authors began a long-term collaborative effort in this discipline in 1970. This is their most ambitious product and is a compilation of a 9 year effort in which they set out to present the results of their large personal series of nerve lesions and impart their philosophy regarding clinical evaluation, care, and outcome analysis. The result is a text that combines basic discussions of the anatomy, physiology, and surgical treatments with probably the largest collective experience and outcome measurements of peripheral nerve surgery world wide. Each chapter is filled with important considerations in technique as well as abundant clinical and operative pearls.

The book opens with six chapters of basic nerve physiology, nerve patho-physiology, electrophysiology, and basis of operative care and techniques. One chapter is devoted to the authors' grading system for their results. The next several chapters take each major peripheral nerve in turn and analyze the anatomy, the clinical examination, various surgical exposures, and the authors' own surgical results for each. Special additional emphasis is placed on many of the more common lesions with each nerve, for instance, the carpal tunnel syndrome, the ulnar nerve entrapment, and the tarsal tunnel syndrome. There are several chapters on brachial plexus injury divided by mechanisms of injury. There are chapters on peripheral nerve pain and birth palsies and peripheral nerve tumors. Each chapter is abundantly complimented by well chosen photographs and with clear tables and figures. The photographs are especially worthwhile. Chapters on the median nerve, ulnar nerve, radial nerve, brachial plexus, and lower extremity nerves include photographs demonstrating the proper clinical exam, photographs showing pathologic clinical findings from individual nerve and branch injuries, inter-operative exposures highlighting key nerve pathologies, and tables documenting clinical outcome for surgical repair and non-surgical treatment alike.

The surgeon in training will find this book useful because of how well it teaches, explains, and reinforces the necessary and relevant anatomy and the clinical exam necessary to treat patients with injuries to the peripheral nervous system. Practicing physicians will appreciate the wealth of experience which is so readily shared by the authors. Their comprehensive information contained within this text will prove its importance in making competent recommendations as to clinical management of patients. Finally, those specialists in the field of peripheral nerve injury will find its text valuable for its clinical and surgical pearls as well as its thorough outcome analysis. This compilation of data will be the standard turned to as future surgeons of the peripheral nervous system set out to compare their own results.

BOOK REVIEWS (continued)

Reviewer: Jin Wang, MD
Title: *Office Practice of Neurology*
Authors: Martin A. Samuels and Steven Feske
Publisher: Churchill Livingstone, Inc., 1996

Although this book is not specifically aimed at spine surgeons, it provides a wealth of information for residents and practicing neurosurgeons alike. This is a single volume neurology textbook of 1280 pages. Although this text has more than 230 contributors, it is well organized and covers a broad range of neurological issues in a clear and concise fashion. It is timely published to meet the challenge of current medical care reform. As the editor points out, whether you like it or not, medical cares are undergoing "transportation of medical services from the inpatient to the outpatient setting and from the subspecialist to the generalist." This book is designed to serve as a practical guide not only for neurologist, but also for general practitioners.

Part I, Principles of Ambulatory Neurology and the Approach to Clinical Problems, reviews how to approach a patient with a particular neurologic symptom. Seventeen common complaints including pain, dizziness, gait impairment, sensory loss, dysarthria, and dysphagia are discussed individually. A table of differential diagnosis is usually provided. Section 3 of Part I explicitly discusses the most commonly used neurological special tests. EEG, evoked potentials, neuroimaging, as well as brain and nerve biopsy are all included. General practitioners who do not use these tests on a daily basis will find valuable information about what tests to order when a certain neurological disease is suspected.

Parts II through IX are devoted to the neurological problems edited in traditional categories, included are cerebral vascular disease, immune and infectious disease, spinal cord and peripheral neuromuscular disease, movement disorders, behavioral neurology and epilepsy, neuro-oncology, neurology in general medicine, headache, and pain. The chapters are well written and contain up to date references. Most subjects are covered in sufficient, but not exhaustive, detail. Recent research data are cited only when they affect clinical diagnosis. Some rare neurological diseases, like lysosomal storage disease, are reviewed succinctly with key suggested reading listed at the end of the chapter. It is especially a pleasure to read Part VIII, Neurology in General Medicine, which is a new addition to the standard neurology text. This part addresses endocrinology, organ transplantation, and rheumatology. General practitioners will find many answers for their routine neurology consultations.

The strength of this book is a concise description of clinical manifestations of neurologic diseases. It fills a niche for those physicians interested in a practical guide and single text that encompasses all neurological diseases. If there is a weakness about the text, it lies in the lack of comprehensive discussion about molecular neurobiology in which our knowledge exploded in the last few years. As this text focuses on adult neurology in outpatient settings, it does not cover much pediatric neurology, nor the topics in neuro-intensive care. Nevertheless, this book is easy to read and informative. I recommend this book without reservation for neurology and neurosurgery residents, as well as for neurologists and general practitioners who frequently deal with neurological problems.

JOINT SECTION RESEARCH FUNDING

The Joint Section is currently accepting applications for grants to support research. These grants are primarily for neurosurgeons in order to provide "seed money" to help initiate clinical projects. The application format is the NIH Grant Package. These applications should not exceed five single spaced pages. Specific aims, literature review, a brief summary of the project, and a plan for utilizing the funds produce a fundable grant application should be submitted. A detailed budget must be included. Applications should be submitted to the Chairman of the Research Committee:

Richard G. Fessler, MD, PhD
Box 100265 JHMHC
University of Florida
Gainesville, Florida 32610

Due Date: September 1, 1996.

Awards: One grant of \$30,000 or two grants of \$15,000.
Winners will be notified January 1, 1997.

JOINT SECTION SPINE FELLOWSHIP

The Joint Section of Disorders of the Spine and Peripheral Nerves is currently accepting applications for a Joint Section Spine Fellowship. This award is determined by consensus of the awards committee and is presented to an American or Canadian trained neurosurgical resident. The intent of the award is to provide supplementary funds for advanced education and research in disorders of the spine or peripheral nerves. Applicants should include specific plans for the location of the fellowship which will include the name of the director of the fellowship program, as well as the goals of the fellowship year. Applications should be submitted to the Chairman of the Awards Committee:

Regis W. Haid, Jr., MD
Emory Clinic/Crawford Long Hospital
25 Prescott Street, N.E., #3431
Atlanta, GA 30308

Due Date: September 1, 1996

Awards: One grant of \$30,000. Winners will be notified January 1, 1997. Official announcement of the winners will occur at the 1997 Joint Section Meeting.

SELECTED ABSTRACTS FROM THE AMERICAN ASSOCIATION OF NEUROLOGICAL SURGEONS ANNUAL MEETING Minneapolis, Minnesota—1996

Effects of a Photopolymerized Hydrogel on the Reduction of Postlaminectomy Scar Formation in Rats

Phillip B. Storm, Allen K. Sills, Jr., Alessandro Olivi, Mark Lyman, Amar Sawhney (Boston, MA)

Postlaminectomy epidural fibrosis is believed to contribute to recurrent neurological symptoms and persistent low back pain, and makes reoperation more difficult. A variety of materials have been implanted in the epidural space to inhibit scar formation. FocalGel is a novel hydrogel that photopolymerizes into a solid matrix within seconds after applications of ultraviolet light. We used a rat laminectomy model to study the efficacy of this hydrogel in reducing epidural fibrosis after spinal procedures.

A two-level lumbar laminectomy at L4-5 was performed on 28 Fischer 344 rats, with creation of a 2.5 x 12 mm defect. Each animal was then randomly assigned to receive 0.15 ml of saline or 0.15 ml of aqueous hydrogel into the epidural defect. The hydrogel was photopolymerized with 20 seconds application of long-wave ultraviolet light. The animals were surgically re-explored 3 or 6 weeks later by two investigators blinded by the previous therapy. Scar formation was evaluated using inspection and blunt dissection. The scar in the epidural space was scored on a 0-3 scale (0 = dura clearly visible; 1 = thin scar covering dura; 2 = moderate scar covering dura; 3 = dense vascularized scar covering dura). The animals were then sacrificed and examined histologically.

The hydrogel consistently reduced epidural fibrosis at both 3 weeks (0.5 ± 0.25 , n=8) and 6 weeks (0.75 ± 0.25 , n=8) when compared with controls (2.5 ± 0.5 , n=6; 2.7 ± 0.33 , n=6). Re-exploration revealed a well-healed superficial scar from the dorsal fascia to the level of the lamina in all control and treatment groups. In the region of treatment, the hydrogel was present in half of the animals at 3 weeks but not at 6 weeks. There was no clinical or histological evidence of neurological toxicity from the hydrogel treatment.

Scott T. Dull, MD, has been named an associate editor for the Spine Newsletter to aid in developing ways to expand the Newsletter's capability for teaching and information dissemination through the internet. If you have ideas or information on this, please let him know. His address is:

Scott T. Dull, MD
2213 Cherry Street
Suite 311
Toledo, Ohio 43608

This study suggests that a photopolymerized hydrogel can effectively reduce postlaminectomy epidural scar formation without affecting normal healing in more superficial layers. This effect appears to be mediated by formation of a temporary physical barrier inhibiting migration of fibroblasts and subsequent remodeling of the epidural space.

Enhanced Peripheral Nerve Regeneration Across Silicone Conduits Using Ultrashort-Segment Nerve Grafts

Paul C. Francel, PhD, (Charlottesville, VA) Thomas Francel, Cathy Hertl, Susan MacKinnon (St. Louis, MO)

Discussant: David G. Kline, MD (New Orleans, LA)

In order to facilitate axonal regeneration across a significant nerve gap, some form of conduit must be present to direct nerve growth and trophic factors. In this study, we employed functional, electrical, and histomorphological analysis to determine the ability of a short segment of nerve to facilitate regeneration in a 15 mm silicone conduit. Thirty-six female Lewis rats were divided into three groups. The right sciatic nerve was divided in all rats and a 13 mm gap was created. In Group 1, nerve autograft was used to reconstruct the gap ("control one"). In Group 2, a silicone conduit was placed in the native sciatic nerve ("control two"). In Group 3, a 2 mm segment of the removed nerve was placed in the center of the 15 mm silicone conduit and sutured in place. At 16 weeks, walking track analysis, electrophysiological studies, and histomorphological studies were all obtained.

The conduits that were enhanced with very short "stepping stone" segments showed improved regeneration over groups with empty conduits. Direct observation revealed a tapering nerve regenerated from both the proximal sciatic nerve and the interposed nerve graft. Conduction velocities noted in the conduits enhanced with stepping stone nerve grafts approached those obtained in the autograft group (mean 32.4 vs. 38.4 mm/sec, $p > 0.05$). Qualitative histology and exact quantitative nerve fiber number and size analysis showed similar regeneration between these stepping stone conduits and the autograft nerve group. Likewise, functional walking-track analysis revealed a statistically significant difference between the conduit group alone and the stepping stone conduit group ($p = 0.03$), but not between the stepping stone conduit group and the autograft nerve group ($p = 0.51$).

Nerve regeneration through a silicone conduit is enhanced dramatically when a short 1 mm segment of autologous nerve is placed in the conduit. If either vein or synthetic conduit is used to reconstruct a nerve, the placement of a very short segment of autologous nerve enhances growth across a gap, with results similar to those seen with autografts without creating the associated neural deficit from graft harvesting.

SELECTED ABSTRACTS FROM THE AMERICAN ASSOCIATION OF NEUROLOGICAL SURGEONS ANNUAL MEETING Minneapolis, Minnesota—1996

Thoracoscopic Sympathectomy

*J. Patrick Johnson, Samuel S. Ahn, Antonio A. F. DeSalles, Herbert I. Machleder, Wesley S. Moore (Los Angeles, CA)
Discussant: William Chandler, MD (Ann Arbor, MI)*

Transthoracic videoscopic exposure of the sympathetic chain and adjacent structures provides an alternative treatment method with minimally invasive techniques and may reduce the need for thoracotomy or difficult posterior exposure of the vertebral column. Recent developments in surgical instrumentation specifically designed for thoracoscopic procedures have advanced the technical capabilities for precision surgery in a safe and effective manner with potentially reduced morbidity. We performed 28 thoracoscopic procedures on 25 patients with indications for thoracic sympathectomy or biopsy from 1990 to 1995 and present the results.

There were 16 woman and 9 men with ages that ranged from 17 to 67 years. Eight were treated for hyperhidrosis, 9 for reflex sympathetic dystrophy, 9 for Raynaud's disease/vasculitis, 1 for intractable cardiac arrhythmias, and 1 for biopsy of a vertebral body lesion. Unilateral exposure was performed in 22 patients and bilateral exposure in 3 patients. The operative procedure time ranged from 1.0 to 4.5 hours. One case early in the series was converted to an open thoracotomy due to dense scar from a previous first rib resection. Estimated blood loss ranged from 5 to 300 cc and no patient required transfusion. Histological confirmation was obtained in all sympathectomy and vertebral biopsy cases. All sympathectomy cases had an excellent clinical response with follow up from 1 to 62 months. Hospital stay was 1 to 4 days with a mean of 2 days and a median of 1 day. Postoperative pain was treated with oral analgesics. Complications were encountered in 2 patients who developed a transient Horner's syndrome and 3 patients who had a small residual pneumothorax that resolved spontaneously. One patient developed a pleural effusion and pneumothorax that required replacement of a chest tube, and one patient dies 1 month later from an underlying medical illness.

Thoracoscopic surgery appears to be a safe and effective alternative to standard surgical exposures and may reduce the associated postoperative pain and length of hospitalization in selected patients.

Acute Fractures of the Odontoid Process: A Critical Analysis of Anterior Screw Fixation in 53 Cases

*Robert Veres (Budapest, Hungary), Adrian T. H. Casey, H. Alan Crockard (London, England), Thomas Penteleny
Discussant: Ronald Apfelbaum, MD (Salt Lake City, UT)*

Anterior screw fixation for acute fractures of the odontoid process appears to be a promising technique but to date, apart from a few

enthusiastic early reports on its efficacy, there have been few long-term or large independent studies. The aim of this study, therefore, was to critically analyze our own results in a consecutive series of 53 patients treated over a 5 year period (1986-1991). This ensured a minimum of 2 year period of follow up (mean 3.4 years, range 2-5 years).

There were 40 males and 13 females with a mean age of 46.6 years (range 15-84 years). Fracture type was classified according to Anderson and D'Alonzo (Type II, n = 46; Type III, n = 7), as well as the degree of displacement and direction of the fracture (anterior oblique, n = 8; horizontal, n = 23, posterior oblique, n = 22). A total of 105 screws were inserted in 53 patients. In one patient it was only possible to insert one screw. The overall union rate was 86%, of which 40 fused in an anatomically reduced position (82%) and 2 healed in malposition (malunion). Overall there were 9 unsatisfactory results in terms of fusion (7 nonunions (14%) and 2 malunions). Five of these were associated with an anterior oblique fracture configuration (p = 0.02). Technically unsatisfactory screw insertion occurred in 5 patients. Two of these patients went on to full union in an anatomical position, two developed nonunion, and in the remaining case the fracture became redisplaced resulting in tetraparesis.

We conclude that this technique provides an effective means of fixing acute fractures on the odontoid peg but, based on our experience, would not recommend its use for those fractures with an anterior oblique configuration.

Cannulated Screws for Odontoid Screw Fixation and Atlantoaxial Transarticular Screw Fixation

*Curtis A. Dickman (Phoenix, AZ), Kevin T. Foley (Memphis, TN),
Christopher Paramore, Volker K.H. Sonntag (Phoenix, AZ), Maurice M. Smith (Memphis, TN)*

This project assesses the clinical and biomechanical performance of cannulated bone screws for fixation of the upper cervical spine. Cannulated screws were used in 37 patients requiring odontoid screw fixation (n = 14) or posterior C1-2 transarticular screws (n = 23). A 1.2 mm diameter Kirschner wire (K-wire) was used to precisely guide the trajectory of hollow screws into the bone. Instability occurred from the acute odontoid fractures (n = 14), chronic odontoid fracture nonunions (n = 8), rheumatoid arthritis (n = 10), os odontoideum (n = 2), C1-2 combination fractures (n = 1) or transverse ligament disruption (n = 2).

A total of 59 screws were placed in the 37 patients (16 of 3.5 mm diameter, 43 of 4.0 mm diameter). No major screw-related complications occurred. After a mean follow up of 19 months (range 12-
(continued on page 6)

SPINE MEETING ANNOUNCEMENTS

Joint Section on Disorders of the Spine and Peripheral Nerves 13th Annual Meeting

The Joint Section on Disorders of the Spine and Peripheral Nerves will hold its 13th Annual Meeting in Newport Beach, California, February 19-22, 1997 at the Newport Beach Marriott. Abstract submission deadline is September 4, 1996. Please contact the AANS Meetings Department at 847/692-9500 for more information.

North American Spine Society

The North American Spine Society (NASS) will hold its 11th Annual Meeting in Vancouver, British Columbia, October 23-26, 1996 at the Vancouver Trade and Convention Center and Pan Pacific Hotel. The meeting is open and NASS membership is not required.

The NASS/JSRS announced a second combined spine conference, "Spine Across the Sea 97"

The North American Spine Society (NASS) and the Japanese Spine Research Society (JSRS) announced their second combined conference, "Spine Across the Sea 97" to be held in Kamuela, Hawaii, March 16-20, 1997 at the Hilton Waikoloa Village. To register for the conference or receive preliminary information call Patty Fuller or Maureen McLachlan at 847-698-1630.

For further information on these and other meetings of interest visit the **NEUROSURGERY://ON-CALL™** web site at <http://www.neurosurgery.org>.

Abstracts (continued from page 5)

38 months), no cannulated screws have bent, broken, or failed, and all 37 patients developed an osseous union. Complications were avoided using precise operative techniques, a specialized tool system, and intra-operative fluoroscopic monitoring.

Biomechanical testing was performed to assess several different commercially available types of bone screws. Cannulated bone screws demonstrated 90% to 95% of the bending strength and fatigue strength of comparable solid screws. The narrow, hollow channels in the screws did not weaken the screws significantly. Cannulated screws provided distinct advantages to upper cervical fixation; 1) the thin K-wires could be repositioned if the trajectory was not ideal; 2) the K-wires guided the screw position into the bone; and 3) the K-wires allowed continuous fixation on adjacent unstable bone fragments, and maintained the pilot hole alignment during screw insertion.

The AANS established an ad-hoc task force to investigate the pedicle screw issues and controversies. This task force is chaired by David Cahill, MD and is working to clarify the role of organized neurosurgery with respect to the pedicle screw controversy.

NOMINATING COMMITTEE RECOMMENDS CANDIDATES FOR JOINT SECTION OFFICERS

Chairperson-Elect	Stephen Papadapolous, MD
Secretary	Vincent Traynelis, MD
Treasurer	Curtis Dickman, MD

Elections for these offices will be held at the next annual meeting of the Joint Section.

SPINE is publishing abstracts from the 1996 Annual Joint Section meeting in Orlando in a special issue in December of 1996.

The Young Neurosurgeons Committee has completed its second edition of the Fellowship Manual for neurosurgeons. A comprehensive listing of all neurosurgical spine fellowships has been compiled by Robert Heary, MD, and will be included in the manual which will be available in the fall of 1996.

JAMES D. GUEST, MD, CO-SPONSORED GRANT RECIPIENT RECEIVES AWARD

The Joint Section on Disorders of the Spine and Peripheral Nerves provided funds to the AANS Research Foundation to co-sponsor a spine-related research project. Of the applications received for the 1994 awards, the Scientific Advisory Committee of the Research Foundation recommended James Guest, MD for this funding. The Research Foundation is pleased to have been able to enter this cooperative activity with the Joint Section. After two very intensive years of research, the following is a summary of Dr. Guest's findings.

1994 Research Fellow

James D. Guest, MD, PhD

Miami Project to Cure Paralysis

Sponsor: Richard P. Bunge, MD

Chairman: F.A. Durity, MD

Co-funded with the Joint Section on Spine

Project Title: Demyelination in the Human and Primate

Neuropathological Study—The distribution of peripheral and central myelin in human contusive spinal cord injury epicenters has been studied. Evidence was obtained that human Schwann cells which enter the spinal cord following trauma may contribute to remyelination of CNS axons. Immunohistochemical evidence has also obtained that demyelination at the injury epicenter may persist following human spinal cord contusion for at least two years.

Experimental Study—The ability of purified, expanded human Schwann cells (HSC) to influence neuronal regeneration following lower thoracic spinal cord transection was investigated in the nude

rat. Tissue cable composed of HSC and Matrigel within PAN/PVC guidance channels 10 mm in length were apposed to spinal cord stumps following T8-T11 resection. The survival of transplanted Schwann cells was confirmed for up to 40 days. The cables were able to unite the two ends of the transected spinal cord and provide a highly linear substrate for the regeneration of several thousand axons, some of which were enveloped by immunohistochemically specific human myelin.

Extensive anterograde and retrograde tracing studies were performed to elucidate the response of various neuronal systems to the grafts and were supplemented with immunohistochemical evidence. Unexpectedly, a significant regenerative response from brainstem neurons of the vestibular, raphe and reticulospinal and sensory neurons was found. Identical control experiments employed nude rat Schwann cells instead of human Schwann cells. The response from brainstem neurons was not significantly different in these experiments.

Propriospinal neurons respond strongly to the grafts and were retrogradely labeled as much as 12 segments rostral to the graft. Propriospinal neurons can regenerate throughout the entire length of the graft and then re-enter the host spinal cord for up to 2 mm. The adrenergic and dopaminergic systems regenerate fibers into the graft and such fibers have been detected up to 2 mm distal to the graft. Transected corticospinal characterized by the bulbs between 1 and 1.5 mm above the grafts.

Ongoing investigations involve subarachnoid delivery of tissue culture supernatant containing and antibody know to reduce inhibitory properties of adult white matter in the rat in conjunction with open-ended human Schwann cell grafts. An improved response from the sensory and corticospinal systems has been observed.

Maximize your participation in the 1996 CNS Annual Meeting

Don't miss these educational offerings - just for the spine specialist.

Section Program

Tuesday, October 1, 1996

Current Approaches to Spinal Injury

Moderator: Edward Benzel and Vincent C. Traynelis

After attending this section session, the participant will have an improved understanding of the treatment of spinal injuries and will be able to explain the management of pediatric spinal column injuries, cervical spinal trauma, and thoracolumbar spinal trauma.

General Scientific Session

Tuesday, October 1, 1996

How the Operation is Done

Moderator: Winfield Fisher III

The session will address current issues on degenerative lumbar spine instability and

upper cervical spine trauma, but more specifically, will deal with "how to" aspects of each of the surgical techniques. The participant will be able to evaluate the technical aspects of operative procedures employed in the treatment of various neurosurgical procedures.

Luncheon Seminars

Tuesday, October 1, 1996

Approaches to the Thoracic Spine:

Indications & Techniques for

Anterior vs. Posterior Approaches

Moderator: Richard G. Fessler

After this course, the participant will be able to compare the options available to surgically approach thoracic spine.

Tuesday, October 1, 1996

Techniques of Bone Grafting and biology of Spinal Fusion

Moderator: Mark N. Hadley

Discussion of methods to maximize bone healing and graft incorporation, and choose operative techniques that will enhance surgical success.

Tuesday, October 1, 1996

New Therapeutic Strategies for the Management of Spinal Cord Injuries

Moderator: Charles Tator

After this course, the participant will be able to differentiate specific injury patterns, appropriate treatment and outcomes for spinal cord injuries.

**Joint Section on Disorders of the
Spine and Peripheral Nerves
of the AANS and CNS**
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Park Ridge, Illinois 60068-4287

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