

Randal R. Betz, M.D.

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APPOINTMENTS

Shriners Hospitals for Children, Philadelphia

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| Chief of Staff | 2000 - Present |
| Medical Director of Spinal Cord Injury Unit | 1983 - Present |
| Assistant Chief of Staff | 1988 – 1999 |
| Staff Orthopaedic Surgeon | 1983 – 1987 |

Shriners Hospitals for Children, Greenville

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| Consulting Medical Staff | 2007 - Present |
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Shriners Burns Hospital, Boston

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| Consulting Medical Staff | 2008 – Present |
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Massachusetts General Hospital

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| Consultant in Surgery (Surgery Service) | 2008 – Present |
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Temple University School of Medicine, Philadelphia

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| Professor of Orthopaedic Surgery | 1997 – Present |
| Associate Professor of Orthopaedic Surgery | 1991 – 1997 |
| Assistant Professor of Orthopaedic Surgery | 1985 - 1991 |

Temple University Children's Medical Center, Philadelphia, PA

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| Staff Orthopaedic Surgeon | 2000 – Closing |
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Drexel University College of Medicine, Philadelphia, PA

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| Clinical Assistant Professor of Orthopaedic Surgery | 2001 - Present |
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Temple University Hospital, Philadelphia

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| Staff Orthopaedic Surgeon | 1983 - 2000 |
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EDUCATION AND TRAINING

Undergraduate School

Pennsylvania State University
State College, PA
BS, Pre-Med, 1973

Graduate/Professional School

Temple University School of Medicine
Philadelphia, PA
MD, 1977

Graduate Medical Education

Internship, General Surgery
Temple University Hospital
Philadelphia, PA, 1977-1978

Residency, Orthopaedic Surgery
Temple University Hospital
Philadelphia, PA, 1978-1982

Fellowship, Pediatric Orthopaedics
Alfred I. duPont Institute
Wilmington, DE, 1982-1983

Postdoctoral Fellowship Experience

ABC Traveling Fellowship, 1989
North American Traveling Fellowship, 1984
Berg-Sloat Traveling Fellowship, 1983

Licensures

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| Pennsylvania: | MD 020978E |
| New Jersey: | 25MA07977600 |
| South Carolina: | 29608 |
| Puerto Rico: | 15835 |
| Florida: | ME 98616 |
| National Board of Examiners: | 189055 |
| DEA: | AB8263852 |

Board Certification

American Board of Orthopaedic Surgery, July 1985

Recertified June 1998 - December 2008

American Board of Physical Medicine and Rehabilitation: Spinal Cord Injury Medicine,
November 1998 - October 2008

Professional Honors and Awards

American Spinal Injury Association Lifetime Achievement Award, 2009

Top Doc, Philadelphia Magazine, May 2004; May 2005, May 2006, May 2007, May 2008,
May 2009

A. Estin Comarr Memorial Award for Clinical Service, American Paraplegia Society, 2003

Academic Honors and Awards

Alpha Epsilon Delta (International Premedical Honor Society)

Phi Eta Sigma (Freshman Honor Society)

Alpha Omega Alpha 1977 (Honor Medical Society)

Phi Lambda Upsilon (Honor Chemical Society)

PROFESSIONAL ACTIVITIES

Research Grant Support: Shriners Hospitals

Mulcahey MJ (PI), Samdani AF, Hunter L, Mohamed FB, Betz R, Faro S, Smith B. Diffusion tensor imaging and the pediatric spinal cord: validity and reliability testing with establishment of classification for pediatric spinal cord injury. Shriners Hospitals for Children 2009: \$99,000.

Ruggieri M, Betz R, Pontari M, Braverman A, Kozin S, Smith B, Barbe M: Feasibility of somatic nerve transfer for urinary bladder reinnervation: prelude for restoration of bladder emptying with functional electrical stimulation. Shriners Hospitals for Children 2009: \$207,646.

McDonald C, Mulcahey MJ, Betz RR, Vogel L: Progressive spinal deformity in pediatric SCI: effect of treatment on natural history, function and self appraised quality of life (Project #9155). Shriners Hospitals for Children 2008: \$32,475; 2007: \$90,176; 2006: \$100,768; 2005: \$84,800.

Mulcahey MJ, Haley S, Chafetz R, Anderson C, Tucker C, Betz R, Vogel L, McDonald C: development and validation of computer adaptive assessment activity, performance participation, and quality of life in pediatric SCI (Project #9146). Shriners Hospitals for Children 2008: \$182,998; 2007: \$184,267.

Mulcahey MJ, Betz RR, Smith BT, Vogel L: Multi-center project: The international standards for neurological classification of spinal cord injury: reliability testing when applied to children and youth (Project #8956). Shriners Hospitals for Children, 2008: \$49,130; 2007: \$55,414; 2006: \$53,800.

Betz RR (PI): Conference: 12th annual conference of the International Functional Electrical Stimulation Society. Shriners Hospitals for Children 2007: \$26,000.

Betz RR, Mulcahey MJ, Smith B, Gaughan J: Prospective comparison between vertebral body stapling and thoracolumbosacral bracing in treatment of youth with idiopathic scoliosis (Project #8951/9098). Shriners Hospitals for Children 2007: \$21,235; 2006: \$50,000.

Lauer RT, Johnston T, Betz RR, Mulcahey MJ, Smith BT: Lower extremity cycling with electrical stimulation to improve health and fitness of children with spinal cord injuries (Project #9190). Shriners Hospitals for Children, 2006: \$202,125; 2005: \$385,550; 2004: \$430,475.

Mulcahey MJ, Betz RR: The 9th International Conference of Upper Limb Surgery in Tetraplegia (Project #8430). Shriners Hospitals for Children 2006: \$20,000.

Mulcahey MJ, Betz RR: The Howard H. Steel Conference: Injuries and Dysfunction of the Spinal Cord in Children (Project #8431). Shriners Hospitals for Children 2006: \$20,000.

Lee S, Benda B, McCarthy JJ, Betz RR: Strength training using electrical stimulation for children with cerebral palsy. Shriners Hospitals for Children, 2006: \$84,350; 2005: \$42,350; 2004: \$206,977.

McCarthy JJ, Benda B, Betz RR, Smith BT, Shewokis P, Laughton C: Electrical stimulation gait training to effect improvements in walking function and posture for children with cerebral palsy. Shriners Hospitals for Children, 2006: \$191,299; 2005: \$206,371; 2004: \$231,373.

Ruggieri MR, Braverman AS, Barbe M, Betz RR, D'Andrea L, Kozin S, Smith BT, Pontari MA: Feasibility of somatic nerve transfer for urinary bladder reinnervation: prelude for restoration of bladder emptying with functional electrical stimulation (Project #8510). Shriners Hospitals for Children, 2006: \$241,178; 2005: \$230,361; 2004: \$255,806; 2003: \$192,189; 2002: \$183,989; 2001: \$182,681.

Antonacci MD, Betz RR: Transplantation of unmodified human marrow stromal cells after an acute thoracic spinal cord hemi-section injury in a rat model. Shriners Hospitals for Children, 2004: \$10,417.

Betz RR, Mulcahey MJ, McCarthy JJ: Functional neuromuscular stimulation for children with spinal cord injuries and cerebral palsy. Shriners Hospitals for Children 2003: \$600,000; 2002: \$827,634; 2001: \$803,001; 2000: \$775,846; 1999: \$749,610; 1998: \$661,541; 1997: \$500,000; 1996: \$509,876; 1995: \$600,000.

Triolo RJ, Betz RR: Functional neuromuscular stimulation of the lower extremities in children with spinal cord injury. Shriners Hospitals for Children: 1994: \$681,150; 1993: \$695,354; 1992: \$668,610; 1991: \$552,729; 1990: \$541,043; 1989: \$506,020; 1988: \$386,880; 1987: \$316,460; 1986: \$286,000.

Betz RR, Triolo RJ: Development of grasp and upper extremity control with functional neuromuscular stimulation in children. Shriners Hospitals for Children: 1994: \$225,000; 1993: \$286,000; 1992: \$275,000; 1991: \$136,450; 1990: \$115,386; 1989: \$83,470.

Research Grant Support: Industry and Other Organizations

Betz RR: A comparison between the vertebral body wedge system and standard anterior instrumentation for correction of paralytic scoliosis in children and adolescents. Medtronic Sofamor Danek, Memphis, TN

Betz RR (as a member of the Harms Study Group): Prospective testing of the algorithm of treatment based on the Harms Scoliosis Study Group classification system of operative idiopathic scoliosis *and* Anterior instrumentation for correction of idiopathic scoliosis. DePuy-Spine, Inc., Raynham, MA. \$80,800 annually, 2002-Present.

Betz RR (as a member of the Chest Wall and Spine Deformity Study Group): Evaluation of the Synthes vertical expandable prosthetic titanium rib in children with thoracic deformity (IRB #3931). Synthes Spine, Inc., Paoli, PA. \$82,238 annually, 2004-present.

Betz RR and others: Evaluation of the effectiveness of using the PediGuard for pedicle screw insertion (IRB #4727). SpineVision, Inc., Paris, France. \$29,600, 2005-present.

Betz RR and others: A Phase II multi-center, randomized, controlled study to evaluate the safety and efficacy of autologous incubated macrophages for the treatment of patients with a complete spinal cord injury (IRB #4405). Proneuron, Inc., Ness-Ziona, Israel. \$1,108,100, 2004 – 2006.

Kozin SH, Mulcahey MJ, Betz RR: Restoration of elbow extension in children with tetraplegia: a prospective comparison of the deltoid to triceps and biceps to triceps transfer. American Society for Surgery of the Hand, 1999-2001: \$20,000.

Betz RR: Efficacy of video assisted thoracoscopy (VATS) as compared to open lateral thoracotomy (OLT) for spinal visualization and access to perform multi-level discectomies and fusion for the correction of scoliosis. Temple University School of Medicine: June 1995-June 1996: \$3,000; Sofamor Danek USA: \$3,000.

Betz RR, Longenecker S: The role of ischemia in somatosensory evoked potentials. Temple University School of Medicine: 1986: \$2,700.

Patents/Applications

Lauer R, Smith BT, Betz RR: Neural prosthesis with fuzzy logic control system. Submitted July 14, 2004; pending.

Betz RR, Sherman MC, Drewry T: Methods and apparatus for fusionless treatment of spinal deformities (Patent Number: 6,623,484). Date of patent: September 23, 2003.

Smith BT, McGee B, Douglas J, Betz RR, Ignatoski M: Portable functional electrical stimulation (FES) system for upper or lower extremity applications (Patent Number: 6,424,868). Date of patent: July 23, 2002.

Betz R, Sherman MC, Drewry T: Methods and apparatus for fusionless treatment of spinal deformities (Patent Number: 6,287,308). Date of patent: September 11, 2001.

Betz RR, Sherman MC, Drewry T: Methods and apparatus for fusionless treatment of spinal deformities (Patent Number: 5,951,553). Date of patent: September 14, 1999.

Smith BT, McGee B, Douglas J, Betz RR, Ignatoski M: Portable functional electrical stimulation (FES) for upper and lower extremity applications (Patent Number: 5,861,017). Date of patent: January 19, 1999.

PROFESSIONAL ORGANIZATIONS: Local, Regional, National

American Academy for Cerebral Palsy and Developmental Medicine

American Academy of Orthopaedic Surgeons

Program Committee, Pediatrics, 1991-1992

Committee on Evaluations 1986-1992

American Paraplegia Society

Board of Directors 2007-2008

Research Committee 1993-1995

American Spinal Injury Association

Board of Directors 1997-2001

Spine Committee 1997-2000 [Chair], 2007-2008

British Scoliosis Society (honorary member), 2001 & 2005

College of Physicians of Philadelphia

International Functional Electrical Stimulation Society

International Spinal Cord Society

North American Spine Society

Committee on Instructional Courses, 1994-1995

Program Chair, NASS/JSRS Spine Across the Sea, 1994

Instructional Course Committee 1994

Orthopaedic In-Training Examination, Question Writer 1996-2000

Orthopaedic Research and Education Foundation

Member, Shands Circle, 2005-Present

Pediatric Orthopaedic Society of North America

Research Committee, 2001-2005

Chair, Scientific Program Committee for Combined Meeting of EPOS/POSNA, 1990

Philadelphia Orthopaedic Society

Program Chair 1985-1986

Scoliosis Research Society

Past President 2006-Present

President, 2005

President-Elect, 2004

First Vice-President, 2003

Board Member-At-Large, 2002

Fellowship (Membership) Committee 1996-2000 (Chair 2000)

Education Committee Chair, 1988

Program Committee, 1993-1995

Pedicle Fixation of the Lumbar Spine

Chair, 1986-1993

International Meeting of Advanced Spine Techniques

Emeritus Chair, 2003-Present

Chair, 1994-2002

Standing Committee, 2007-2009

Worldwide Course Committee

Chair, 2004-2007

Board Liaison, 2007-Present

Long Range Planning Committee

Chair, 2005-2007

Newsletter Committee

Board Liaison, 2007-Present

Website Committee
Board Liaison, 2007-Present
Spinal Cord Monitoring Committee
Board Liaison, 2007-Present
Spinal Deformity Education Group (formerly GICD-USA)
Chair, Jan. 2003-Dec. 2004
First Vice-Chair, 2001-2003
Board of Directors 2000-2001

COMMITTEES

Professional

Editorial Board, SpineUniverse (2000-present)
Editorial Board, Journal of Pediatric Orthopaedics (1999-present)
Associate Editor, Spinal Frontiers
Reviewer for Journal of Bone and Joint Surgery (through 6/2006), Spine (through 6/2006),
Journal of Pediatric Orthopaedics (through 6/2006), Orthopedics (through 2/2004)

University

Member, ENT Search Committee, Temple University Hospital, 1995
Member, Anesthesia Search Committee, Temple University Hospital, 1987
Member, Radiology Search Committee, Temple University Hospital, 1989
Chair, Committee for the John W. Lachman Endowed Chair for Orthopaedics,
Temple University Hospital, 1987-1989
Co-Chair, Committee for the G. Dean MacEwen Endowed Chair for Orthopaedics,
Louisiana State University Medical Center, 1992-2003

PUBLICATIONS

Books, Monographs, Chapters

Betz RR: Anterior approach to scoliosis, ch. 156. IN Operative Orthopaedics, 3rd ed. (Schafer MF, Butler JP, eds.). Philadelphia: Lippincott-Raven Publishers, in press.

Samdani A, Asghar J, Betz RR: The use of spinal instrumentation in the traumatically injured pediatric spine, ch. 49. IN Spine Trauma: Adult and Pediatric (Kim DH, Ludwig SC, Vaccaro AR, eds.). Philadelphia: WB Saunders, Inc., July 2008.

D'Andrea LP, Asghar J, Guille JT, Betz RR: Intervertebral stapling for spinal deformity, ch. 54. IN Spine Surgery: Tricks of the Trade (Vaccaro AR, Albert T, eds.). New York, NY: Thieme Publishers, December 2007.

Kim DH, Betz RR, Huhn SL, Newton PO, eds.: Surgery of the Pediatric Spine. New York: Thieme, December 2007.

- Simon SL, Betz RR: Ch. 39: Spinal cord injury in children evaluation and early treatment principles
- Mulcahey MJ, Betz RR: Ch. 66: Rehabilitation of children with spinal cord injury

Newton PO, Betz RR, Harms J, O'Brien MF, Shufflebarger HL (eds.): Roundtables in Spine Surgery: Advanced Spinal Deformity. St. Louis, MO: Quality Medical Publishing, Inc., 2007.

D'Andrea LP, Betz RR: Intervertebral stapling for spinal deformity, ch. 19. In: Minimally Invasive Spine Surgery (Vaccaro AM, Bono CM, eds.). New York, NY: Informa Health Care USA, 2007, pp. 179-188.

Betz RR, Newton PO, D'Andrea LP, Clements DH, Grewal H: Anterior surgery for thoracic scoliosis, ch. 15. IN Spinal Deformity: The Essentials (Heary RF, Albert TJ, eds). New York, NY: Thieme Medical Publishers, 2007.

Davis R, Johnston T, Smith B, Betz R: Development of a multi-functional 22-channel functional electrical stimulator for paraplegia. In: Engineering for Neural Enhancement and Replacement (Walker CF and DiLorenzo DJ, eds). CRC Press, Boca Raton, 2005.

Betz RR, Clements DH, Balsara RK, Newton PO, Lenke LG, Crawford AH: Minimally invasive surgery: segmental fixation rod and screw technology. IN Emerging Spine Surgery Technologies: Evidence and Framework for Evaluating New Technology (Corbin TP, Connolly PJ, Yuan HA, Bao Q-B, Boden SD, eds.). St. Louis, MO: Quality Medical Publishing, Inc., 2004.

Betz RR, Mulcahey MJ, Clements DH: Pediatric spinal cord injury and SCIWORA. IN The Cervical Spine, 4th ed. (CR Clark, et al., eds.). Philadelphia: Lippincott Williams & Wilkins, November 2004.

Betz RR: Radiographic and functional outcomes of surgical treatment. IN Adolescent Idiopathic Scoliosis Monograph (PO Newton, ed.). Rosemont, IL: American Academy of Orthopaedic Surgeons, October 2004.

Betz RR: Surgical treatment by thoracoscopic methods. IN Adolescent Idiopathic Scoliosis Monograph (PO Newton, ed.). Rosemont, IL: American Academy of Orthopaedic Surgeons, October 2004.

Betz RR, Newton PO, Clements DH, Balsara RK: Thoracoscopic anterior release and fusion using MOSS-Miami instrumentation, ch. 23. IN Atlas of Minimal Access Spine Surgery (Regan JJ & Lieberman IH, eds.). St. Louis, MO: Quality Medical Publishing, Inc., 2004.

Betz RR: Kyphosis of the thoracic and thoracolumbar spine in the pediatric patient: normal sagittal parameters and scope of the problem, ch. 42. IN AAOS Instructional Course Lectures, Volume 53, 2004, pp. 479-484.

Modern Anterior Scoliosis Surgery (Lenke LG, Betz RR, Harms J, eds.). St. Louis, MO: Quality Medical Publishing, Inc, 2004

- Lenke LG, Betz RR, Harms J: The Lenke treatment-directed classification system for adolescent idiopathic scoliosis, ch. 4
- Betz RR, Lenke LG: Radiographic scoring system for scoliosis, ch. 5
- Balsara R, Clements DH III, Betz RR: Complications in adolescent idiopathic scoliosis, ch. 12
- Balsara R, Betz RR: Double anterior thoracotomy, ch. 16
- Betz RR, Chan DPK, Lenke LG: Overview and indications for anterior instrumentation, ch. 23
- Betz RR: MOSS-Miami single solid rod, ch. 27
- Clements DH III, Betz RR, Balsara R: Thoracoscopic insertion of MOSS instrumentation, ch. 35

Betz RR, Newton PO, Clements DH, Lenke LG: Deformities in childhood. B. Anterior instrumentation for thoracic adolescent idiopathic scoliosis. IN The Adult and Pediatric Spine, 3rd ed. (Frymoyer JW, Wiesel SW, eds.). Philadelphia: Lippincott Williams and Wilkins, 2004, pp. 559-566.

Vaccaro AR, An HS, Betz RR, Cotler JM, Balderston RA: The management of acute spinal trauma: prehospital and in-hospital emergency care, ch. 22. Instructional Course Lectures: Spine (An HS, ed.). Rosemont, IL: American Academy of Orthopaedic Surgeons, 2003, pp. 207-219.

Betz RR, Steel HH: Convex thoracoplasty of the spine, chapter 28. IN Surgical Techniques for the Spine (Haher T, Merola A, eds.). New York: Thieme, 2003, pp. 131-134.

Betz RR, Mulcahey MJ: Pediatric spinal cord injury, ch. 31. IN Principles and Practice of Spine Surgery (Vacarro AR, Betz RR, Zeidman SM, eds.) Philadelphia: Mosby, Inc., 2002, pp. 401-406.

Betz RR, Lenke LG: Adolescent idiopathic scoliosis, ch. 45. IN Principles and Practice of Spine Surgery (Vacarro AR, Betz RR, Zeidman SM, eds.) Philadelphia: Mosby, Inc., 2002, pp. 593-608

Lenke LG, Betz RR: Neuromuscular scoliosis: surgical treatment. IN Principles and Practice of Spine Surgery (Vacarro AR, Betz RR, Zeidman SM, eds.) Philadelphia: Mosby, Inc., 2002, pp. 609-628.

Vogel LC, Betz RR, Mulcahey MJ: Pediatric spinal cord disorders in children and adolescents. IN Spinal Cord Medicine Textbook (Lin V, ed.). New York, NY: Demos, 2002.

Vogel LC, Betz RR, Mulcahey MJ: Pediatric spinal cord disorders, ch. 29. IN Spinal Cord Injury Medicine (Kirshblum S, Campagnolo DI, DeLisa JA, eds.) Philadelphia: Lippincott Williams & Wilkins, 2001, pp. 438-470.

Betz RR, Mulcahey, MJ: Spinal cord injury rehabilitation, ch. 33. IN The Pediatric Spine: Principles and Practice, 2nd ed, vol. 1 (Weinstein SL, ed.) New York: Lippincott-Raven Publishers, 2001, pp. 601-616.

Betz RR: Anterior instrumentation: techniques. In The Pediatric Spine: Principles and Practice, 2nd ed, vol. 2 (Weinstein SL, ed.) New York: Lippincott-Raven Publishers, 2001, pp. 535-546.

McCarthy JJ, Finson RL, Betz RR: The use of neuromuscular electrical stimulation (NMES) in the treatment of children with cerebral palsy. IN Pediatric Gait: A New Millennium in Clinical Care and Motion Analysis Technology (Harris GF, Smith PA, eds.). Piscataway, NJ: Institute of Electrical and Electronics Engineers, Inc., 2000, pp. 39-45.

Betz RR: Anterior instrumentation. IN State of the Art Reviews: Problems in the Pediatric Spine (Drummond DS, ed). Philadelphia: Hanley & Belfus, Inc., 2000.

Vaccaro AR, An HS, Betz RR, Cotler JM, Balderston RS: The management of acute spinal trauma: prehospital and in-hospital emergency care. Instructional Course Lectures, Vol. 46 (Springfield DS, ed.). Rosemont, IL: American Academy of Orthopaedic Surgeons, 1997, pp. 113-125

Betz RR and Steel HH: Thoracoplasty for rib deformity, ch. 13. IN Master Techniques in Orthopaedic Surgery: The Spine (Thompson Jr RC, ed). Philadelphia: Lippincott-Raven Publishers, 1996, pp. 451-461.

Triolo RJ, Kobetic R, Betz RR: Standing and walking with functional neuromuscular stimulation: technical and clinical challenges, ch. 17. IN Human Motion Analysis: Current Applications and Future Directions (Harris GF& Smith PA, eds.). New York: IEEE Press, 1996.

Betz, RR: Thoracoplasty: posterior technique, ch. 34. IN Textbook of Spinal Surgery, 2nd ed. (Bridwell KH, ed.). Philadelphia: Lippincott-Raven Publishers, 1996.

Betz RR, Mulcahey MJ, eds.: The Child with a Spinal Cord Injury. Rosemont, IL: The American Academy of Orthopaedic Surgeons, 1996.

- Salzman SK, Betz RR: Experimental treatment of spinal cord injuries, ch. 63.
- Mulcahey MJ, Betz RR, Weiss AA: Overview of upper extremity management, ch. 33.
- Lubicky JP, Betz RR: Spinal deformity in children and adolescents after spinal cord injury, ch. 32.
- Miller F, Betz RR: Hip joint instability, ch. 31.
- Betz RR: Heterotopic ossification, ch. 30.

Freeman BL III, Betz RR: The Pediatric Spine, Ch. 12. IN Operative Pediatric Orthopaedics, 2nd Ed (Canale ST & Beaty JH, eds.). St. Louis: Mosby -Year Book, Inc., 1995, pp. 471-664.

Betz RR, Mulcahey, MJ: Spinal Cord Injury Rehabilitation, Ch. 36. IN The Pediatric Spine: Principles and Practice (Weinstein SL, ed.) New York: Raven Press, 1994, pp. 781-810.

Betz RR: Thoracolumbar spine, pediatric, Ch. 36. IN Orthopaedic Knowledge Update 4: Home Study Syllabus. Rosemont, IL: American Academy of Orthopaedic Surgeons, 1993, pp. 447-459

Peer-Reviewed or Invited Articles

- Ranade A, Samdani AF, Williams R, Barnes K, McGirt MJ, Ramos G, Betz RR: Feasibility and accuracy of pedicle screws in children younger than 8 years of age. *Spine*, in press.
- Flynn J, Betz RR, O'Brien M, Newton PO, Harms Study Group: Radiographic classification of complications of instrumentation in adolescent idiopathic scoliosis. *Clin Orthop Relat Res*, in press.
- Samdani AF, Rutter L, Betz RR, Mulcahey MJ: Vision loss following spine fusion for scoliosis in a child with spinal cord injury. *J Spinal Cord Med*, in press.
- Clements DH, Newton PO, Betz RR: Correlation of scoliosis curve correction with the number and type of fixation anchors. *Spine*, in press.
- Johnston TE, Lauer R, Smith BT, Betz RR, Mulcahey MJ: A randomized controlled trial on the effects of cycling with and without electrical stimulation on cardiorespiratory and vascular health in children with spinal cord injury. *Arch Phys Med Rehabil*, in press.
- Lonner BS, Auerbach JD, Estreicher MB, Betz RR, D'Andrea L, Crawford AH, Lenke LG, Lowe TG, Newton PO. Pulmonary function changes following various anterior

- approaches in the treatment of adolescent idiopathic scoliosis. *J Spinal Disord Tech*, in press.
- Vaccaro AR, Betz RR, Zeidman SM, Batzdorf U: Principles and practice of spine surgery. *World J Surg*, in press.
211. Johnston TE, Betz RR, Lauer RT: Impact of cycling on hip subluxation in children with spinal cord injury. *J Pediatr Orthop* 29(4):402-405, 2009.
210. Smith JR, Samdani AF, Pahys J, Ranade A, Asghar J, Cahill P, Betz RR: The role of bracing, casting, and vertical expandable prosthetic titanium rib for the treatment of infantile scoliosis: a single-institution experience with 31 consecutive patients. *J Neurosurg Spine* 11(1):3-8, 2009.
209. Pahys JM, Guille JT, D'Andrea LP, Samdani AF, Beck J, Betz RR. Neurologic injury in the surgical treatment of idiopathic scoliosis: guidelines for assessment and management. *J Am Acad Orthop Surg* 17(7):426-434, 2009.
208. Samdani AF, Williams RC, Danish S, Betz R. Torticollis manifest after a minor fall with underlying bony anomalies and a hypoplastic vertebral artery. *J Pediatr Orthop B* June 22, 2009; ePub ahead of print.
207. Samdani AF, Ranade A, Dolch HJ, Williams R, St. Hilaire T, Cahill P, Betz RR: Bilateral use of the vertical expandable prosthetic titanium rib attached to the pelvis: a novel treatment for scoliosis in the growing spine. *J Neurosurg Spine* 10(4):287-292, 2009.
206. Pahys JM, Samdani AF, Betz RR: Intraspinal anomalies in infantile idiopathic scoliosis: prevalence and role of magnetic resonance imaging. *Spine* 34(12):E434-438, 2009.
205. Samdani AF, St. Hilaire T, Emans JB, Smith JT, Song K, Campbell RJ, Betz RR: The usefulness of VEPTR in the older child with complex spine and chest deformity. *Clin Orthop Rel Res*, ePub ahead of print.
204. Sponseller PD, Shah SA, Abel MF, Sucato D, Newton PO, Shufflebarger H, Lenke LG, Letko L, Betz R, Marks M, Bastrom T, Harms Study Group: Scoliosis surgery in cerebral palsy. Differences between unit rod and custom rods. *Spine* 34(8):840-844, 2009.
203. Sponseller PD, Betz R, Newton PO, Lenke LG, Lowe T, Crawford A, Sucato D, Lonner B, Marks M, Bastrom T, Harms Study Group: Differences in curve behavior after fusion in adolescent idiopathic scoliosis patients with open triradiate cartilages. *Spine* 34(8):827-831, 2009.

202. Asghar J, Samdani AF, Pahys JM, D'Andrea LP, Guille JT, Clements DH, Betz RR, Harms Study Group: Computed tomography evaluation of rotation correction in adolescent idiopathic scoliosis: a comparison of an all pedicle screw construct versus a hook-rod system. *Spine* 34(8):804-807, 2009.
201. Pierce SR, Lauer RT, Prosser LA, Mohamed FB, Dougherty JB, Faro SH, Betz RR. Incidental findings during functional magnetic resonance imaging: ethical and procedural issues. *Am J Phys Med Rehabil* 88:275-277, 2009.
200. McCarthy JJ, Palma DA, Betz RR: Comparison of autograft and allograft fixation in Pemberton osteotomy. *Orthopedics* 31(2):126, 2008.
199. Allen DD, Mulcahey MJ, Haley SM, Devivo JM, Vogel LC, McDonald C, Duffy T, Betz RR: Motor scores on the functional independence measure after pediatric spinal cord injury. *Spinal Cord* 47(3):213-217, 2009. ePub 2008 Aug 5.
198. Paul C, Samdani AF, Betz RR, Fischer I, Neuhuber B: Grafting of human bone marrow stromal cells into spinal cord injury: a comparison of delivery methods. *Spine* 34(4):328-334, 2009.
197. Mulcahey MJ, Gaughan J, Betz RR: Agreement of repeated motor and sensory scores at individual myotomes and dermatomes in young persons with complete spinal cord injury. *Spinal Cord* 47:56-61, 2009.
196. Samdani AF, Fayssoux RS, Asghar J, McCarthy JJ, Betz RR, Gaughan J, Mulcahey MJ: Chronic spinal cord injury in the pediatric population: does magnetic resonance imaging correlate with the International Standards for Neurological Classification of Spinal Cord Injury (ISCSCI) examination? *Spine* 34(1):74-81. 2009.
195. Chafetz RS, Vogel LC, Betz RR, Gaughan JP, Mulcahey MJ: International standards for neurological classification of spinal cord injury: training effect on accurate classification. *J Spinal Cord Med* 31(5):538-542, 2008.
194. Chen Y, Anderson CJ, Vogel LC, Chlan KM, Betz RR, McDonald: Change in life satisfaction of adults with pediatric-onset spinal cord injury. *Arch Phys Med Rehabil* 89(12):2285-2292, 2008.
193. Betz RR, Mulcahey MJ, Ramirez N, Flynn J, Smith JT, St. Hilaire T, Campbell Jr RM: Mortality and life-threatening events following VEPTR surgery in children with hypoplastic chest wall deformity. *J Pediatr Orthop* 28(8):850-853, 2008.

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National/International Conferences/Meetings:

Program Co-Chair: Spine + Science + Management. New Orleans, every November 1992-Present.

Program Co-Chair: The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children. Shriners Hospitals for Children, Orlando, FL, December 2003

Program Co-Chair: Spine Deformity Study Group Symposium 2003: Emerging Trends & Advanced Surgical Techniques, St. Louis, MO, November 2003

Program Co-Chair: Total Spine: Advanced Concepts and Constructs, Cancun, Mexico, 1995-2003

Program Co-Chair: International Meeting on Advanced Spine Techniques. Montreaux, Switzerland, May 2002; Paradise Island, Bahamas, July 2001; Barcelona, Spain, July 2000; Vancouver, BC, July 1999; Sorrento, Italy, April 1998; Southampton, Bermuda, July 1997; Munich, Germany, June 1996; Willemstad, Curaçao, April 1995; Munich, Germany, July 1994

Coordinator: Annual Shriners Hospital Pediatric Orthopaedic Seminar. Shriners Hospital, Philadelphia, every December 1984-2001 (except for 1997 due to hospital relocation)

Program Co-Chair: The Howard H. Steel Conference on Pediatric Spinal Cord Injury: Contemporary Principles and New Directions. Palm Springs, California, December 1999; Phoenix, Arizona, December 1994.

Program Chair: Scoliosis: What's the Latest? in conjunction with the Scoliosis Association, Philadelphia, November 1997

Program Co-Chair: What Progress Have We Made in Treating Spinal Deformities in the Last Ten Years? in conjunction with the Scoliosis Research Society, St. Louis, Missouri, September 1997

Scientific Program Chair: Shrine Surgeons' annual meeting, Philadelphia, September 1994.

Program Co-Chair: Spine Across the Sea. Sponsored by the North American Spine Society and Japanese Spine Research Society, Maui, Hawaii, April 1994.

Program Co-Chair: Advanced Pedicle Fixation of the Lumbar Spine. Sponsored by SRS/NASS, Orlando, May 1993; Phoenix, April 1992 and May 1991; Dallas, March 1990.

Scientific Program Chair: Combined EPOS-POSNA meeting in Montreal, 1990.

Program Co-Chair: Hands-On Surgical Skills Workshop: Pedicle Fixation of the Lumbar Spine. Sponsored by SRS/NASS. Chicago, September 1988 and Dallas, April 1989.

Moderator: Orthopaedic Trauma and Infections in Children. Sponsored by the American Academy of Orthopaedic Surgeons, Philadelphia, May 1986

Presentations by Dr. Betz or co-authors:

Johnston TE, Watson KE, Engsberg JR, Ross SA, Gates PE, Betz RR: Gait changes following a Supported Speed Treadmill Training Exercise Program (SSTTEP) for marginally ambulatory children with cerebral palsy. APTA Combined Sections Meeting (podium), San Diego, CA, February 17-20, 2010.

Betz RR, Mulcahey MJ, Kozin SH, Samdani AF: Orthopaedic considerations of the child and adolescent with tetraplegia secondary to SCI. H.H. Steel Conference: Pediatric Spinal Cord Injuries and Dysfunction (podium), Lake Buena Vista, FL, December 3-5, 2009; International Spinal Cord Society 48th annual scientific meeting (poster), Florence, Italy, October 21-24, 2009; International Meeting on Upper Limb in Tetraplegia (podium), Philadelphia, PA, Sept. 17-20, 2007.

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Yaszay B, Newton PO, Bastrom T, Petcharaporn M, Harms Study Group: Lenke 5 curves: thresholds for selecting L3 vs. L4 as the distal level of fusion. 24th annual meeting of the North American Spine Society (podium), San Francisco, CA, November 10-14, 2009; 16th International Meeting on Advanced Spine Techniques (ePoster), Vienna, Austria, July 15-18, 2009.

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Newton PO, Perry A, Bastrom T, Lenke LG, Betz RR, Clements D, D'Andrea L, Harms Study Group: Factors that influence two-year pulmonary function testing after surgical treatment of adolescent idiopathic scoliosis. A study of 269 patients. 13th International Meeting on Advanced Spine Techniques, Athens, Greece, July 12-15, 2006.

Clements DH, Marks M, Newton PO, Betz RR, Lenke LG, O'Brien M, Lowe TG, Harms Study Group: Analysis of adherence to Lenke classification treatment algorithm recommendations. 13th International Meeting on Advanced Spine Techniques, Athens, Greece, July 12-15, 2006.

Betz RR, Gaughan J, Shufflebarger HS, Berven S, Boursillon, M: Development of a multicenter, randomized clinical trial for evaluation of the PediGuard device for pedicle screw insertion. 13th International Meeting on Advanced Spine Techniques, Athens, Greece, July 12-15, 2006.

Flynn JM, Gaugler RL, Emans JB, Smith JT, Betz RR, Skaggs DL, Song KM, Moreland MS, Campbell RM: VEPTR to treat non-syndromic congenital scoliosis: a multicenter study. 13th International Meeting on Advanced Spine Techniques, Athens, Greece, July 12-15, 2006.

Mehta S, Betz RR, Mulcahey MJ, McDonald C, Vogel LC, Anderson CA, D'Andrea LP, Antonacci MD: The effect of bracing on paralytic scoliosis secondary to spinal cord injury. American Spinal Injury Association annual meeting (Synthes Award for Resident Research in Spinal Column and Spinal Cord injury), Boston, MA, June 24-28, 2006; American Paraplegia Society annual meeting (Ernest Bors Award for Scientific Development), Las Vegas, NV, September 5-8, 2005; Eastern Orthopaedic Association annual meeting, Rio Grande, Puerto Rico, October 13-16, 2004; 39th Scoliosis Research Society annual meeting, Buenos Aires, Argentina, September 6-9, 2004; 11th International Meeting for Advanced Spine Techniques, Southampton, Bermuda, July 1-3, 2004; the Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Lonner BS, Newton PO, Betz RR, Scharf C, O'Brien M, Sponseller P, Lenke LG, Crawford AH, Lowe TG, Letko L, Harms J, Shufflebarger HL: Operative management of Scheuermann's kyphosis in 78 patients. Radiographic outcomes, complications, and technique. American Academy of Orthopaedic Surgeons annual meeting, Chicago, March 22-26, 2006; Scoliosis

Research Society annual meeting, Miami, FL, Oct. 27-30, 2005; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Crawford A, Babekir N, Lowe TG, Betz R, Lenke L, Haheer T, Merola A, Newton P, Clements D, Sucato DJ, Letko L: Correction of left thoracic curves: a comparison of anterior versus posterior instrumentation. American Academy of Orthopaedic Surgeons annual meeting, Chicago, IL, March 22-26, 2006; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Crawford A, Babekir N, Lowe GT, Betz R, Lenke L, Haheer T, Merola A, Newton P, Clements D, Sucato DJ, Letko L: Comparison between left and right thoracic curves in idiopathic scoliosis. Scoliosis Research Society annual meeting, Miami, Florida, October 28-30, 2005; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Kishan S, Newton PO, Betz RR, Lenke LG, Lowe TG, Clements DH, D'Andrea LP, Sucato DJ: Thoracoscopic anterior instrumentation affects pulmonary function less than open thoracotomy at two years post-op. Scoliosis Research Society annual meeting, Miami, Florida, October 28-30, 2005; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Lowe TG, Chien JT, Betz RR, Lenke LG, Newton PO, Clements DH, Crawford AH, Letko L: The surgical treatment of double thoracic curves in adolescent idiopathic scoliosis: factors involved in the decision to perform a selective fusion of the main thoracic curve versus a posterior fusion. Scoliosis Research Society annual meeting, Miami, FL, Oct. 27-30, 2005; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

McCarthy KP, Betz RR, D'Andrea LP, Frisch RF, Chafetz RS, Mulcahey MJ: Vertebral wedge osteotomies for the fusionless treatment of paralytic scoliosis: two-year follow-up. Scoliosis Research Society annual meeting, Miami, Florida, October 28-30, 2005; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005 .

Merola AA, Newton PO, O'Brien MF, Haheer TR, Lowe TG, Lenke LG, Clements, D, Betz R, Crawford A, Sponseller PD, Sucato DJ, Lonner B, Caruso SA, Kubeck JP, Shanti N, Marks M: Lumbar sagittal plane alignment with respect to instrumentation type and surgical technique. Scoliosis Research Society annual meeting, Miami, FL, October 27-30, 2005; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Newton P, Gaynor T, Marks M, Golligly S, Harms Study Group: Short fusion with residual deformity vs. long fusion with better correction—which is better? Scoliosis Research Society annual meeting, Miami, Florida, October 28-30, 2005; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Newton P, Marks M, Betz R, Lenke L, Lowe T, Clements D, Hafer T, Merola A, D'Andrea L, Crawford A, Harms J: Ten-year trends in the surgical treatment of primary right thoracic adolescent idiopathic scoliosis. Scoliosis Research Society annual meeting, Miami, FL, October 27-30, 2005; 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Sucato DJ, Newton PO, Betz RR, Picetti GG, Lenke LG, Hresko MT, Hu SS, Braun JT, Roye DP, Vitale MG: Defining the learning curve for performing a thoracoscopic anterior spinal fusion and instrumentation for AIS: a multi-center study. Podium presentation at the 20th Annual meeting of the North American Spine Society, Philadelphia, PA, Sept. 27 – Oct. 1, 2005.

Anderson CJ, Vogel, LC, Betz RR, McDonald C: Impact of environmental factors on outcomes of adults with pediatric-onset SCI. American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Orlando, FL, Sept. 14-17, 2005.

Johnston TE, Smith BT, Lauer R, Betz RR: Physiologic responses to arm ergometry and leg FES ergometry in pediatric spinal cord injury. American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Orlando, FL, September 14-17, 2005; American Paraplegia Society annual meeting, Las Vegas, NV, September 5-8, 2005; 10th International Functional Electrical Stimulation Society annual meeting, Montreal, Quebec, July 5-9, 2005.

Calhoun CL, Chafetz R, Johnston T, Lauer R, Mulcahey MJ, Hutchinson D, Smith B, Betz R. Clinical and research activity based rehabilitation for children with spinal cord injury. American Academy of Cerebral Palsy and Developmental Medicine, Orlando, FL, September 14-17, 2005.

Mulcahey MJ (presented by R. Betz): Preliminary reliability of ASIA motor and sensory exam in children. American Paraplegia Society annual meeting, Las Vegas, NV, September 5-8, 2005.

Betz RR, O'Brien M, Porter S, Newton P, Clements D, Lenke L, Lowe T, Harms J, D'Andrea L, Harms Study Group: Open anterior spinal fusion for thoracic adolescent idiopathic scoliosis (AIS): a prospective five-year follow-up. 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Clements DH, Marks M, Porter ST, Betz RR, D'Andrea LP, Newton PO, Harms Study Group: Trunk shape correction and patient satisfaction in adolescent idiopathic scoliosis. 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Marks M, Newton P, Betz R, Clements D, Lowe T, D'Andrea L: Postoperative trunk motion in adolescent idiopathic scoliosis: does the region of fusion affect motion? 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

O'Brien M, Newton P, Lonner B, Betz R, Lowe T, Lenke L, Crawford A, Sponseller P, Marks M, Harms Study Group: Evaluation of pulmonary function in patients with Scheuermann's kyphosis. 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Sucato DJ, Newton PO, Betz RR, Lenke LG, Crawford A, Clements D, Lowe T, D'Andrea L, Letko L, Marks M: Anterior release prior to a posterior spinal fusion and instrumentation: is the thoracoscopic approach as effective as an open thoracotomy? 12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005.

Johnston TE, Smith BT, Stackhouse C, Betz RR: Reciprocal versus swing-through gait using implanted functional electrical stimulation in motor complete SCI. A case report. 10th International Functional Electrical Stimulation Society annual meeting, Montreal, Quebec, July 5-9, 2005.

Mulcahey MJ, Gaughan JR, Betz RR: Reliability of the international standards for neurological classification of spinal cord injury in children and youth. American Spinal Injury Association annual meeting, Dallas, TX, May 12-14, 2005.

Smith BT, Johnston T, Betz RR, Mulcahey MJ: Implanted FES for upright mobility in pediatric spinal cord injury: a follow-up report. 2nd International IEEE EMBS Special Topic Conference on Neural Engineering, Washington, DC, March 16-19, 2005.

Cheung E, Guille J, Betz RR, Mulcahey MJ, D'Andrea LP, Cerrone J, Campbell R, Johnston CE, Lubicky JP, Segal L: The natural history and results of surgical treatment of patients with fused ribs and congenital scoliosis. American Academy of Orthopaedic Surgeons annual meeting, Washington, DC, February 24, 2005; 39th Scoliosis Research Society annual meeting, Buenos Aires, Argentina, September 6-9, 2004; 11th International Meeting for Advanced Spine Techniques, Southampton, Bermuda, July 1-3, 2004.

Newton PO, Faro F, Gollogly S, Betz R, Clements D, Lenke L, Lowe T, Crawford A, Hafer T, Merola A: Pulmonary function in adolescent idiopathic scoliosis. American Academy of Orthopaedic Surgeons annual meeting, Washington, DC, February 25, 2005; 39th Scoliosis Research Society annual meeting, Buenos Aires, Argentina, September 6-9, 2004.

Duff SV, Mulcahey MJ, Betz RR: Temporal and force coordination during grasping in children with spinal cord injury [poster]. The Society for Neuroscience, San Diego, CA, October 24, 2004.

Ruggieri MR, Barbe M, Braverman AS, D'Andrea L, Betz RR: Orthotopic and heterotopic reinnervation of the canine urinary bladder demonstrated by functional electrical stimulation and nerve tracing histochemistry (poster). Contemporary Topics in Pediatric Spinal Cord Injury,

Shriners Hospitals, Philadelphia, October 11-12, 2004; II International Congress on Neuroregeneration, Rio de Janeiro, Brazil, September 20-24, 2004.

Clements DH, Betz RR, D'Andrea LP, Newton PO, Mulcahey MJ, Marks M, Porter S: Rib resection and rib deformity correction: evaluation by scoliometer. 39th Scoliosis Research Society annual meeting, Buenos Aires, Argentina, September 6-9, 2004.

Song K, Redding G, Campbell RM, Moreland M, Skaggs D, Emans J, Betz R, Smith JT: Changes in respiratory failure of children with thoracic insufficiency syndrome. 39th Scoliosis Research Society annual meeting, Buenos Aires, Argentina, September 6-9, 2004; 11th International Meeting for Advanced Spine Techniques, Southampton, Bermuda, July 1-3, 2004.

Jacob P, Betz RR, Mulcahey MJ, Porth S, Vogel LC: Diagnostic dilemma: case report of fibrocartilaginous emboli in an adolescent female (poster). 39th Scoliosis Research Society annual meeting, Buenos Aires, Argentina, September 6-9, 2004; The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Clements DH, Betz RR, D'Andrea LP, Newton PO, Mulcahey MJ, Marks M, Porter S: Rib resection and rib deformity correction: evaluation by scoliometer (eposter). 11th International Meeting for Advanced Spine Techniques, Southampton, Bermuda, July 1-3, 2004.

Song K, Redding G, Campbell RM, Moreland M, Skaggs D, Emans J, Betz R, Smith JT: Expansion thoracoplasty for TIS led to discontinuation of ventilator support in 1/35 children and improvement of hypercapnea in 14/21 children with these abnormalities before expansion. Children with hypoplastic thorax and CO₂ retention can benefit from expansion thoracoplasty. 11th International Meeting for Advanced Spine Techniques, Southampton, Bermuda, July 1-3, 2004.

Flynn JM, Skaggs DL, Betz R, Smith JT, Song K, Emans J, Moreland M, Snyder B, Millman J, Campbell R: VEPTR for early onset scoliosis: a new paradigm for an unsolved problem. 11th International Meeting for Advanced Spine Techniques, Southampton, Bermuda, July 1-3, 2004.

Clements DH, Betz RR, Newton PO, D'Andrea LP, Mulcahey MJ, Porter S: Sagittal contour in patients with adolescent idiopathic scoliosis (eposter). 11th International Meeting for Advanced Spine Techniques, Southampton, Bermuda, July 1-3, 2004.

Skvirski I, Betz R, Koch S, Maddox G, Chandler D, Drum E, D'Andrea L, Szeremeta W: Intraoperative neurophysiologic monitoring performed during prosthetic surgical procedures for congenital spinal and chest wall malformations. IX Spinal Cord Monitoring Meeting, Rome, Italy, May 3-6, 2004.

Newton PO, Faro F, Betz RR, D'Andrea LP, Clements DH, Lenke LG, Lowe TG, Merola AA, Haher TR: Selective vs. nonselective fusion of Lenke I curves in adolescent idiopathic scoliosis (AIS). American Academy of Orthopaedic Surgeons annual meeting, San Francisco, March 2004.

Vogel L, Betz R, DeVivo M, McDonald C: Medical complications in the young child with SCI. The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Chafetz R, McDonald C, Mulcahey MJ, Betz R, Anderson C, Vogel L, Martin S, Flannagan A: The impact of prophylactic TLSO bracing on functional activities and ADLs in the pediatric SCI population. The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

McCarthy J, Chafetz R, Betz R: The incidence and degree of hip subluxation/dislocation in children with spinal cord injury. The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Kozin S, Betz R, Mulcahey MJ, Lutz C: Comparison between biceps to triceps and deltoid to triceps for elbow extension in tetraplegia. The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Mulcahey MJ, Betz R, Kozin S, Smith B, Lutz C, Hutchinson D: Minimal invasive implantation of Freehand during initial rehabilitation. The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Johnston T, Benda B, Smith B, Betz R, Mulcahey MJ, Barriskill A, Davis R: Initial experiences with the Praxis multi-functional functional electrical stimulation system. The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Anderson C, Betz R, Vogel L, Willis KM: Overview of adult outcomes in pediatric-onset spinal cord injuries: implications for transition to adulthood. The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Vogel LC, Betz R, Anderson C: Medical complications in adults with pediatric-onset spinal cord injuries and their impact on long-term outcomes. The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Hutchinson D, Mulcahey MJ, Betz R, Kozin SH, Smith B: Heterotrophic nerve transfer for adolescents with tetraplegia resulting in LMN impairment (poster). The Howard H. Steel

Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Barbe MF, Ruggieri MR, Braverman AS, D'Andrea L, Kozin S, Pontari MA, Betz R: Reinnervation of the canine urinary bladder demonstrated by functional electrical stimulation and nerve tracing histochemistry (poster). The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Chafetz RS, Mulcahey MJ, Betz RR: The relationship between upper extremity reconstruction and ambulation in a child with tetraplegia (poster). The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Chafetz R, Mulcahey MJ, McDonald C, Betz R, Anderson C, Vogel L, Gaughan J, O'Dell MA, Flanagan A: A pilot study evaluating the difference between level of independence and typical performance at home of ADLs in the pediatric spinal cord injury population (poster). The Howard H. Steel Conference on Injuries and Dysfunction of the Spinal Cord in Children, Orlando, FL, December 2003.

Betz RR, Mulcahey MJ, D'Andrea LP, Clements DH: Acute evaluation and management of spinal cord injury. The Howard H. Steel Conference: Injuries and Dysfunction of the Spinal Cord in Children, Orlando, December 2003.

Guille JT, Betz RR, Balsara RK, Mulcahey MJ, D'Andrea LP, Clements DH: The feasibility, safety, and utility of vertebral wedge osteotomies for the fusionless treatment of paralytic scoliosis. The Howard H. Steel Conference: Injuries and Dysfunction of the Spinal Cord in Children, Orlando, December 2003; Scoliosis Research Society annual meeting, Quebec City, September 2003; International Meeting on Advanced Spine Techniques, Rome, Italy, July 2003.

Betz RR, Mulcahey MJ, Leppy E, D'Andrea LP, Antonacci D: Sagittal profile of patients with spinal cord injury: a radiographic analysis and implications on treatment. The Howard H. Steel Conference: Injuries and Dysfunction of the Spinal Cord in Children, Orlando, December 2003; Scoliosis Research Society annual meeting, Quebec City, September 2003; International Meeting on Advanced Spine Techniques, Rome, Italy, July 2003; American Paraplegia Society annual meeting (poster), Las Vegas, NV, September 2002.

McCarthy JJ, Johnston TE, Finson FL, Smith BT, Betz RR, Mulcahey MJ: Functional electrical stimulation (FES) as an alternative or adjunct to traditional orthopaedic strategies in children with CP. Shrine Surgeons annual meeting, Sacramento, CA, November 2003.

Betz RR, Kim J, D'Andrea LP, Mulcahey MJ, Balsara RK, Clements DH: An innovative technique of vertebral body stapling for the treatment of patients with adolescent idiopathic scoliosis. Shrine Surgeons annual meeting, Sacramento, CA, November 2003; Scoliosis Research Society

annual meeting, Quebec City, September 2003; International Meeting on Advanced Spine Techniques, Rome, Italy, July 2003.

Ruggieri M, Barbe, Braverman, D'Andrea L, Kozin S, Pontari M, Betz RR: Functional urinary bladder reinnervation in a canine model. International Continence Society, Florence, Italy, October 2003.

Newton PO, Betz RR, Clements DH, Lenke LG, Crawford AA, Lowe TG, Haher TR, Merola AA, Wenger DR: Anterior thoracoscopic instrumentation: a matched comparison to open anterior instrumentation and posterior open instrumentation. North American Spine Society annual meeting, San Diego, October 2003.

O'Brien MF, Kuklo TR, Richards BS, Lenke LG, Polly DW, Schreiber D, Pinteric R, Schroeder T, Blanke KM, The Spinal Deformity Study Group: AIS Section: A multicenter clinical and radiographic analysis of anterior and posterior surgical techniques for treatment of thoracolumbar/lumbar AIS: the current state of the art. Scoliosis Research Society annual meeting, Quebec City, September 2003.

D'Andrea LP, Betz RR, Newton PO, Lenke LG, Clements DH, Harms J, Haher TR, Lowe TG, Merola AA, Crawford AH, Sucato DJ: Effects of continued posterior spinal growth on sagittal contour after anterior spinal fusion with instrumentation of different sizes for adolescent idiopathic scoliosis. Scoliosis Research Society annual meeting, Quebec City, September 2003.

Lauer R, Smith B, Betz RR, McCarthy JJ: Comparison of electromyographic (EMG) mean frequency during gait between children with and without cerebral palsy. American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Montreal, Quebec, September 2003.

McCarthy JM, Johnston TE, Finson FL, Smith BT, Betz RR, Mulcahey MJ: Functional electrical stimulation (FES) as an alternative or adjunct to traditional orthopaedic strategies in children with cerebral palsy. American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Montreal, Quebec, September 2003.

Faro F, Newton P, Marks M, Wenger D, Betz R, Clements D, D'Andrea L, Lenke L, Lowe T, Merola A, Haher T: Factors involved in the decision to perform a selective vs. non-selective fusion of Lenke IB and IC (King II) curves in adolescent idiopathic scoliosis. International Meeting on Advanced Spine Techniques, Rome, Italy, July 2003.

Tis J, Oswald T, Newton P, Wenger D, Lenke L, Betz R, Marks M: Pelvic influence on lumbar lordosis in thoracolumbar adolescent idiopathic scoliosis. International Meeting on Advanced Spine Techniques, Rome, Italy, July 2003.

Betz RR, Petrizzo AM, Kerner PJ, Falatyn SP, Clements DH III, Huss GK: Allograft versus no graft with a posterior multisegmented hook system for the treatment of idiopathic scoliosis. 10th International Meeting on Advanced Spine Techniques, Rome, Italy, July 2003; North American Spine Society annual meeting, New York City, October 1997; Scoliosis Research Society annual meeting, St. Louis, Missouri, September 1997.

Johnston TE, Smith BT, Betz RR, Benda BJ, Mulcahey MJ, Davis R, Barriskill A: Initial experiences with bladder/bowel management using the Praxis multi-functional implanted FES system. International Functional Electrical Stimulation Society annual conference, Queensland, Australia, July 2003.

Lauer R, Smith B, Betz R, McCarthy JJ: An adaptive neuro-fuzzy control algorithm for electrically stimulated gait in the child with cerebral palsy. International Functional Electrical Stimulation Society annual conference, Queensland, Australia, July 2003.

Betz RR, Clements DH, Lenke LG, Lowe TG, Newton PO, Merola AA, Haheer TR, Wenger DR, Harms J: Correction of thoracic adolescent idiopathic scoliosis with anterior instrumentation: how does preoperative sagittal profile affect the indications? American Academy of Orthopaedic Surgeons annual meeting (poster), New Orleans, February 2003.

Betz RR, Lenke LG, Clements DH, Newton PO, Harms J, Wenger DR, Lowe TG, Haheer T, Merola AA: Limitations of anterior instrumentation for correction of thoracic adolescent idiopathic scoliosis in the immature (Risser 0) patient. American Academy of Orthopaedic Surgeons annual meeting (poster), New Orleans, February 2003; Pediatric Orthopaedic Society annual meeting (poster), Salt Lake City, May 2002.

Smith BT, Betz RR, Johnston T, Benda B, Mulcahey MJ, Davis R, Barriskill A: Initial experiences with the Praxis multi-functional implantable FES system for individuals with spinal cord injury. 1st FESnet Conference, Glasgow, UK, September 2002.

Hutchinson D, Mulcahey MJ, Betz RR, Kozin SH, Smith B: Heterotrophic nerve transfer for adolescents with tetraplegia resulting in LMN impairment. American Paraplegia Society annual meeting, Las Vegas, September 2002.

Johnston TE, Smith BT, Betz RR, Mulcahey MJ: Stability of an implanted FES system for upright mobility. American Paraplegia Society annual meeting, Las Vegas, September 2002.

Clements DH, Betz RR, Newton PO, Lenke LG, Lowe TG, Merola AA, Haheer TR, Marks M: Incidence of vascular complications associated with anterior thoracic instrumentation for adolescent idiopathic scoliosis. Scoliosis Research Society annual meeting, Seattle, WA, September 2002.

Betz RR, MacDonald JH, Lenke LG, Lowe TG, Newton PO, Clements DH, Wenger DR, Haheer T, Merola A, Harms J, Shufflebarger HL: Perioperative complications of spinal fusion for thoracic adolescent idiopathic scoliosis. Scoliosis Research Society annual meeting, Seattle, WA, September 2002; American Academy of Orthopaedic Surgeons annual meeting, Dallas, TX, February 2002.

Eule JM, Lowe TG, Lenke LG, Betz RR, Harms J, Clements DH, Newton PO, Barmada A, Haheer TR, Merola AA: Selective anterior or posterior thoracic fusions in Lenke 1 adolescent idiopathic scoliosis lumbar curves greater than 40 degrees. Scoliosis Research Society annual meeting, Seattle, WA, September 2002.

Betz RR, Smith BT, Benda BJ, Johnston TE, Mulcahey MJ, Middleton J, Davis G, Davis R, Cousins R, Barriskill A: Clinical trial of the Praxis multi-functional implantable FES system for paraplegia. International Functional Electrical Stimulation Society (IFESS) 7th annual conference, Ljubljana, Slovenia, June 2002.

Clements DH, Betz RR, Balsara RK, Porter S: Video-assisted mini-open approach for insertion of anterior thoracic instrumentation in adolescent idiopathic scoliosis. 9th International Meeting on Advanced Spine Techniques (e-poster), Montreux, Switzerland, May 2002.

Clements DH, Betz RR: Comparison of efficacy of the INS-1™ pedicle screw test compared to conventional pedicle screw stimulation in lumbar spinal instrumentation. A preliminary report. 9th International Meeting on Advanced Spine Techniques (e-poster), Montreux, Switzerland, May 2002.

Betz RR, Lenke LG, Clements DH, Newton PO: Thoracoscopic versus open thoracotomy correction by anterior instrumentation for the treatment of thoracic adolescent idiopathic scoliosis. Pediatric Orthopaedic Society annual meeting (poster), Salt Lake City, May 2002; 7th Stryker Spine Invitational Symposium, Sardinia, September 2001; Scoliosis Research Society annual meeting, Cairns, Australia, October 2000.

Betz RR, Mulcahey MJ, Hutchinson D, Smith BT: Scapular stabilization for patients with tetraplegia secondary to spinal cord injury: preliminary experience. Shrine Surgeons annual meeting, Houston, TX, November 2001; American Paraplegia Society, Las Vegas, NV, September 2001; 7th International Conference on Tetraplegia, Bologna, Italy, June 2001.

McCarthy JJ, Palma D, Betz RR: Pemberton osteotomy: use of allograft vs. autograft. Shrine Surgeons annual meeting, Houston, TX, November 2001.

Wilson PL, Newton PO, Wenger DR, Haheer TR, Merola AA, Lenke LG, Lowe TG, Clements DH, Betz RR: A multi-center study analyzing the relationship of standardized radiographic scoring system of adolescent idiopathic scoliosis (AIS) and the Scoliosis Research Society (SRS)

outcomes instrument. Scoliosis Research Society annual meeting, Cleveland, Ohio, September 2001.

Merola AA, Brkaric M, Haher TR, Kohani O, Betz RR, Clements DH, Huss GK, Lenke LG, Lowe TG, Newton PO, Wenger DR, Marks MC: Do outcome parameters correlate with surgical complications utilizing the SRS questionnaire in the treatment of AIS? Scoliosis Research Society annual meeting, Cleveland Ohio, September 2001; 8th International Meeting on Advanced Spine Techniques [ePoster], Paradise Island, Bahamas, July 2001.

Smith BT, Mulcahey MJ, Betz RR: An implantable upper extremity neuroprosthesis in a growing child with a C5 spinal cord injury. 7th International Conference on Tetraplegia, Bologna, Italy, June 2001.

Merenda L, Betz RR: Case report: The effect of urinary tract infection on continence in patients with the Vocare system (poster). International FES Society, Cleveland, Ohio, June 2001.

Betz RR, Johnston TE, Smith BT, Mulcahey MJ, McCarthy JJ: Percutaneous implantable functional electrical stimulation for upright mobility in children with spinal cord injury: description of surgical technique (poster). International FES Society, Cleveland, Ohio, June 2001.

Johnston TE, Betz RR, Smith BT, Mulcahey MJ: An implantable functional electrical stimulation system for upright mobility in children and adolescents with spinal cord injury (poster). International FES Society, Cleveland, Ohio, June 2001.

Smith BT, Betz RR, Mulcahey MJ: Implantable FES system for upper or lower limb function in the growing child with a spinal cord injury. International FES Society, Cleveland, Ohio, June 2001.

Coiro D, Smith BT, Betz RR: Gait event detection using intramuscular electromyography to trigger functional electrical stimulation in the child with cerebral palsy. International FES Society, Cleveland, Ohio, June 2001.

Harding SP, Weiss AA, Mulcahey MJ, Betz RR: Split flexor pollicis longus tendon transfer: a comparison with arthrodesis for stabilization of the thumb IP joint in adolescents with tetraplegia. American Spinal Injury Association annual meeting, Long Beach, CA, May 2001; American Paraplegia Society annual meeting (poster), Las Vegas, September 1998; Sixth International Conference on Surgical Rehabilitation of the Upper Limb in Tetraplegia (Quadriplegia) (poster), Cleveland, May 1998.

Finson R, McCarthy J, Smith B, Betz R, Mulcahey MJ: Effects of intramuscular electrical stimulation on joint excursions during gait in children with cerebral palsy requiring surgical

lengthenings (poster). Pediatric Orthopaedic Society of North America annual meeting, Cancun, May 2001; American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Toronto, September 2000.

Betz RR, Johnston T, Mulcahey MJ, Smith BT: Implantable functional electrical stimulation for upright mobility in children: preliminary experience. Pediatric Orthopaedic Society of North America annual meeting, Cancun, May 2001; Shrine Surgeons annual meeting, Montreal, September 2000.

Betz RR, Lenke LG, Lowe TG, Harms J, Clements DH, Newton PO, Haheer T, Merola A, Wenger D: Proximal screw pull-out during anterior instrumentation for thoracic scoliosis: preventive techniques. Pediatric Orthopaedic Society of North America annual meeting, Cancun, May 2001; Scoliosis Research Society annual meeting, Cairns, Australia, October 2000.

Betz RR, Lenke LG, Lowe TG, Clements DH, Merola A, Haheer T, Newton PO, Wenger DR, Huss GK, Blanke K: Comparison of anterior versus posterior instrumentation for correction of thoracic adolescent idiopathic scoliosis: analysis by an objective radiographic scoring system. American Academy of Orthopaedic Surgeons annual meeting, San Francisco, March 2001. Pediatric Orthopaedic Society of North America annual meeting, Vancouver, May 2000; Scoliosis Research Society, San Diego, September 1999.

LaRocca S, Betz RR: A quantitative measure of latissimus dorsi and serratus anterior strength after a standard posterolateral thoracotomy. Spine + Science + Management, New Orleans, LA, November 2000.

Mulcahey MJ, Betz RR: The satisfaction with totally implanted functional electrical stimulation on patient-directed outcomes. 5th Scientific Congress of the Paralympic Games, Sydney, Australia, October 2000.

Merola A, Brkaric M, Haheer T, Kohani O, Lowe T, Lenke L, Betz R, Huss G, Wenger D, Newton P, Clements D: A multi-center prospective study of 737 questionnaires utilizing the Scoliosis Research Society (SRS) instrument for the surgical treatment of adolescent idiopathic scoliosis. Nominated for the Russell Hibbs Award, Scoliosis Research Society annual meeting, Cairns, Australia, October 2000.

Kuklo T, Lenke LG, Won DS, Graham EJ, Sweet FA, Betz RR, Blanke KM: Spontaneous proximal thoracic curve correction following selective fusion of the main thoracic curve in adolescent idiopathic scoliosis. Scoliosis Research Society annual meeting, Cairns, Australia, October 2000.

Clements DH, Betz RR, Lowe TG, Lenke LG, Newton PO: Adolescent idiopathic scoliosis with excessive thoracic kyphosis: comparison of anterior vs. posterior instrumentation for

maintaining correction. Scoliosis Research Society annual meeting, Cairns, Australia, October 2000.

Wood J, Lowe T, Betz R, Clements D, Lenke L, Newton P, Merola A, Hafer T, Wenger D, Harms J: Large magnitude adolescent idiopathic scoliosis: anterior vs. posterior surgical stabilization. Scoliosis Research Society annual meeting, Cairns, Australia, October 2000.

Lenke L, Betz R, Clements D, Newton P, Merola A, Lowe T, Wenger D, Crawford A: Interobserver and intraobserver reliability of choosing the stable vertebra: comparing the traditional versus a new method. Scoliosis Research Society annual meeting, Cairns, Australia, October 2000.

Betz RR: Scoliosis classification...recent developments. Shrine Surgeons annual meeting, Montreal, September 2000

McCarthy JJ, Weibel B, Betz RR: Results of pelvic osteotomies for hip subluxation in children with spinal cord injury. American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Toronto, September 2000.

Vogel LC, Anderson CJ, Mulcahey MJ, Betz RR: What's new in the basic care of the child with a spinal cord injury? American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Toronto, September 2000.

Anderson CJ, Lubicky JP, Betz RR, Vogel LC: Adult employment of individuals who sustained pediatric-onset spinal cord injuries. American Paraplegia Society annual meeting, Las Vegas, September 2000; American Spinal Injury Association annual meeting, Chicago, April 2000.

Betz RR: Acute evaluation and management, including SCIWORA. American Paraplegia Society annual meeting, Las Vegas, September 2000.

Betz RR: What constitutes good orthopaedic care for the child with spinal cord injury? American Paraplegia Society annual meeting, Las Vegas, September 2000.

Vogel LC, Lubicky JP, Betz RR, Anderson CJ: Medical complications in adults with pediatric-onset SCI: implications on quality of life. American Paraplegia Society annual meeting (poster), Las Vegas, September 2000.

Morales V, Merenda L, Betz R, Mulcahey MJ: Application of the Vocare system in a youngster with traumatic spinal cord injury. American Paraplegia Society annual meeting (poster), Las Vegas, September 2000.

Graham EJ, Lenke LG, Lowe TG, Betz RR, Bridwell KH, Kong Y: Prospective pulmonary function evaluation following open thoracotomy for anterior thoracic spinal fusion in adolescent idiopathic scoliosis. American Orthopaedic Association annual meeting [poster], Hot Springs, VA, June 2000; Scoliosis Research Society, San Diego, September 1999.

Smith BT, Coiro D, Finson R, McGee B, Betz RR: Intramuscular electromyography for gait event detection to trigger functional electrical stimulation in children with cerebral palsy. World Congress on Medical Physics and Biomedical Engineering, Chicago, IL (CD-ROM), July 2000.

Coiro D, Smith BT, Finson R, McGee B, Betz RR: Gait event detection for the application of functional electrical stimulation to improve ambulation for children with cerebral palsy or incomplete spinal cord injury. World Congress on Medical Physics and Biomedical Engineering, Chicago, IL (CD-ROM), July 2000.

McCarthy J, Betz R, Mark A, Davidson R: The treatment of angular deformities of the tibia with gradual correction using a T-type fixator versus acute correction with a monolateral fixator. Pediatric Orthopaedic Society of North America annual meeting, Vancouver, May 2000.

Betz RR, Lenke LG, Clements DH, Lowe TG, Newton PO: Anterior instrumentation for thoracic adolescent idiopathic scoliosis: open and minimally invasive techniques (poster exhibit). American Academy of Orthopaedic Surgeons annual meeting, Orlando, March 2000.

Festa CJ, Sodl J, Feng AK, Lee C, Gaughan J, Clements DH, Bigos D, Betz RR: Preoperative pulmonary function: its correlation with the duration of postoperative mechanical ventilation in spinal fusion patients. Society of Critical Care Medicine, Orlando, February 2000.

Festa CJ, Abramowitz MC, Sodl J, Feng AK, Bigos D, Gaughan JP, Alburger PD, Clements DH, Betz RR: Spinal cord compromise during spinal fusion surgery: a case control analysis of variables. Society of Critical Care Medicine, Orlando, February 2000.

McCarthy JJ, Betz RR: The treatment of hip fractures in children with existing spinal cord injuries. H.H. Steel Conference on Spinal Cord Injury: Contemporary Principles and New Directions, Rancho Mirage, California, December 1999.

McCarthy JJ, Weibel B, Betz RR: Results of pelvic osteotomies for hip subluxation in children with spinal cord injury. H.H. Steel Conference on Spinal Cord Injury: Contemporary Principles and New Directions, Rancho Mirage, California, December 1999.

Pontari MA, Weibel B, Morales V, Dean MD, Gaughan J, Betz R: Improved quality of life after continent urinary diversion in pediatric patients with quadriplegia after spinal cord injury. H.H.

Steel Conference on Spinal Cord Injury: Contemporary Principles and New Directions, Rancho Mirage, California, December 1999.

Kozin SH, Mulcahey MJ, Betz RR: An intraoperative method to evaluate elbow flexion and supination strength during biceps-to-triceps transfer for tetraplegia (poster). H.H. Steel Conference on Spinal Cord Injury: Contemporary Principles and New Directions, Rancho Mirage, California, December 1999.

Betz RR: FES: Status of human trials in pediatrics. H.H. Steel Conference on Spinal Cord Injury: Contemporary Principles and New Directions, Rancho Mirage, California, December 1999.

Smith BT, Mulcahey MJ, Betz RR: Implantation of an upper extremity neuroprosthesis in growing children with a C5 level spinal injury. H.H. Steel Conference on Spinal Cord Injury: Contemporary Principles and New Directions, Rancho Mirage, California, December 1999.

Betz RR, Lenke LG, Clements DH, Lowe TG: Thoracoscopic approach versus open thoracotomy for insertion of anterior instrumentation for the treatment of thoracic adolescent idiopathic scoliosis. Shrine Surgeons annual meeting, Tampa, FL, November 1999.

Lewin JD, Betz RR, Clements DH, Huss GK: Comparison of segmental hook-sublaminar wire hybrid constructs with traditional segmental hook-rod constructs for correction of scoliosis. North American Spine Society, Chicago, October 1999.

Lenke LG, Betz R, Lowe T, Merola A, Haheer T, Clements D, Blanke K, Huss G: Curve prevalence of a new surgical classification of adolescent idiopathic scoliosis. North American Spine Society, Chicago, October 1999.

Betz RR: The future for the patient with a spinal cord injury. SCI Advances, Shriners Hospitals for Children, Philadelphia, October 1999

Bridwell KH, Shufflebarger HL, Lenke LG, Lowe TG, Betz RR, Bassett GS, Iffrig TM, Baldus C, Blanke K, Whorton J: Parent/patient preference in idiopathic adolescent scoliosis: a prospective preoperative analysis. North American Spine Society, Chicago, October 1999; Scoliosis Research Society, San Diego, September 1999.

Lee CH, Feng A, Festa C, Betz R, Bigos D. Correlation between duration of postoperative IV analgesia and PICU stay after spinal fusion surgery. Pediatric Critical Care, Portland, OR, September 1999

Lenke LG, Betz RR, Haheer T, Merola A, Lapp M, Harms J, Shufflebarger HL, Blanke K: Multi-surgeon assessment of a new classification of adolescent idiopathic scoliosis (AIS): can agreement on classification exist? Scoliosis Research Society, San Diego, September 1999.

Johnston TE, Mulcahey MJ, Smith BT, Betz RR: Percutaneous electrical stimulation strengthening in an adolescent with incomplete paraplegia. American Paraplegia Society annual meeting (poster), Las Vegas, September 1999; Physical Therapy '99, Washington, DC, June 1999.

Betz RR, Johnston TE, Mulcahey MJ, Smith BT: Implantable functional electrical stimulation for upright mobility in children: preliminary experience. American Paraplegia Society annual meeting (poster), Las Vegas, September 1999; American Spinal Injury Association annual meeting, Atlanta, April 1999

Mulcahey MJ, Betz RR, Smith BT, Davis SE, Johnston TE: The satisfaction with totally implanted functional electrical stimulation on client-directed outcomes. American Paraplegia Society annual meeting (poster), Las Vegas, September 1999; American Spinal Injury Association annual meeting, Atlanta, April 1999.

Johnston TE, Mulcahey MJ, Betz RR, Smith BT: Totally implanted FES for upright mobility in an adolescent with paraplegia. RESNA '99 annual conference, Long Beach, CA, June 1999; American Physical Therapy Association combined sections meeting, February 1999.

Zourelis HC, Betz RR, Rebeck CA: Custom TLSOs for infantile scoliosis. Association of Children's Prosthetics and Orthotics Clinics, St. Petersburg, Florida, May 1999

Akers JM, Smith BT, Betz RR, Mulcahey MJ: Implantable functional electrical stimulation technology in growing animals. American Spinal Injury Association annual meeting (poster), Atlanta, April 1999; Sixth International Conference on Surgical Rehabilitation of the Upper Limb in Tetraplegia (Quadriplegia), Cleveland, May 1998.

Lenke LG, Betz RR, Harms J, Clements DH, Lowe TG, Bridwell K: A new and comprehensive classification system of adolescent idiopathic scoliosis. American Academy of Orthopaedic Surgeons annual meeting [scientific exhibit], Anaheim, CA, February 1999.

Lenke LG, Betz RR, Harms J, Bridwell KH, Clements DH, Lowe TG: Spontaneous lumbar curve correction following selective anterior or posterior thoracic fusion in adolescent idiopathic scoliosis. American Academy of Orthopaedic Surgeons annual meeting, Anaheim, CA, February 1999.

D'Andrea LP, Betz RR, Lenke LG, Clements DH, Lowe TG, Merola A, Haheer T, Harms J, Huss GK, Blanke K, McGlothlen S: Do radiographic parameters correlate with clinical outcomes in adolescent idiopathic scoliosis? American Academy of Orthopaedic Surgeons annual meeting (poster), Anaheim, CA, February 1999; Scoliosis Research Society annual meeting, New York City, September 1998.

D'Andrea LP, Betz RR, Lenke LG, Harms J, Clements DH, Lowe TG: The effect of continued spinal growth on sagittal contour in patients treated by anterior instrumentation for adolescent idiopathic scoliosis. American Academy of Orthopaedic Surgeons annual meeting (poster), Anaheim, CA, February 1999; Scoliosis Research Society annual meeting, New York City, September 1998.

Huntington CF, Betz RR, Maxy P, Clements DH, Drewry TD, Sherman MC, Pafford J: Biomechanical finite element analysis of spinopelvic fixation in long segment spinal fixation constructs. American Academy of Orthopaedic Surgeons annual meeting (poster), Anaheim, CA, February 1999.

Johnston TE, Mulcahey MJ, Betz RR, Weiss AA: Upper extremity tendon transfers in children with cervical spinal cord injury. American Physical Therapy Association combined sections meeting, February 1999.

Betz RR, Cunningham BW, Selgrath C, Drewry T, Sherman MC: Biomechanical testing of a wedge-rod system for fusionless correction of scoliosis. American College of Osteopathic Surgeons annual meeting, Chicago, IL, 1998.

Clements DH III, Betz RR, Balsara RK: Thoracoscopic anterior thoracic instrumentation and fusion for adolescent idiopathic scoliosis. Scoliosis Research Society annual meeting (poster), New York City, September 1998.

Huntington CF, Betz RR, Clements DH III: Long segment spinopelvic fusion in adult idiopathic scoliosis using a hybrid pelvic fixation construct. Scoliosis Research Society annual meeting, New York City, September 1998; Scoliosis Research Society annual meeting (poster), St. Louis, Missouri, September 1997.

Betz RR, Harms J, Lenke LG, Lowe TG, Clements DH III, Jeszenszky D: Anterior rigid rod instrumentation for thoracic idiopathic scoliosis. Scoliosis Research Society annual meeting, New York City, September 1998 (poster); Combined Meeting, Orthopaedic Associations of the English Speaking World (poster), Auckland, New Zealand, February 1998; North American Spine Society annual meeting (poster), New York City, October 1997; Scoliosis Research Society annual meeting (poster), St. Louis, Missouri, September 1997.

Betz RR: Implantation of sacral nerve stimulators in pediatric SCI subjects. American Paraplegia Society annual meeting, Las Vegas, September 1998

McCarthy JJ, Betz RR: The relationship between tight hamstrings and lumbar hypolordosis in children with CP. Shrine Surgeons annual meeting, Shreveport, Louisiana, September 1998; Spine + Science + Management (poster), New Orleans, November 1997.

Hermantin FU, Betz RR, Clements DH, Bosacco SJ: Postoperative infection in patients with myelodysplasia or spinal cord injury undergoing fusion for scoliosis. Shrine Surgeons annual meeting, Shreveport, Louisiana, September 1998; American Academy of Orthopaedic surgeons annual meeting (poster), New Orleans, March 1998; Pennsylvania Orthopaedic Society annual meeting, Wilmington, Delaware, November 1997; Scoliosis Research Society annual meeting, St. Louis, Missouri, September 1997; Spine + Science + Management meeting, New Orleans, November 1996.

Lyons R, Mulcahey MJ, Betz RR, Spoltore T, Weiss AA: Assessment of functional outcomes of the deltoid-to-triceps transfer in the patient with SCI tetraplegia. Sixth International Conference on Surgical Rehabilitation of the Upper Limb in Tetraplegia (Quadriplegia) (poster), Cleveland, May 1998; American Paraplegia Society annual meeting (poster), Las Vegas, September 1996; American Spinal Injury Association annual meeting, Seattle, April 1996; American Academy of Orthopaedic Surgeons annual meeting (poster), Atlanta, February 1996.

Mulcahey MJ, Betz R, Weiss A, Smith B: The outcomes of tendon transfers in children. Sixth International Conference on Surgical Rehabilitation of the Upper Limb in Tetraplegia (Quadriplegia), Cleveland, May 1998.

Mulcahey MJ, Smith B, Betz R: Lower motor neuron integrity of arm muscles in high tetraplegia. Sixth International Conference on Surgical Rehabilitation of the Upper Limb in Tetraplegia (Quadriplegia) (poster), Cleveland, May 1998.

Mulcahey MJ, Betz RR, Weiss A, Vogel L, Bednar M, James M: A multi-center study of the Freehand system in adolescents. Sixth International Conference on Surgical Rehabilitation of the Upper Limb in Tetraplegia (Quadriplegia) (poster), Cleveland, May 1998.

Smith B, Mulcahey MJ, Davis S, Betz R: Tendon transfers to provide brace-free wrist stability in adolescents with the Freehand system. Sixth International Conference on Surgical Rehabilitation of the Upper Limb in Tetraplegia (Quadriplegia) (poster), Cleveland, May 1998; American Spinal Injury Association annual meeting (poster), Cleveland, April 1998.

Davis S, Mulcahey MJ, Betz RR: Use of the Freehand system in adolescents. Sixth International Conference on Surgical Rehabilitation of the Upper Limb in Tetraplegia (Quadriplegia) (poster), Cleveland, May 1998.

Lieberman GS, Betz RR: Bracing for delaying the progression of scoliosis in the immature patient with spinal cord injury. American Spinal Injury Association annual meeting (poster), Cleveland, Ohio, April 1998; Pennsylvania Orthopaedic Society annual meeting, Wilmington, Delaware, November 1997; American Paraplegia Society (poster), Las Vegas, September 1997.

Ruggiero RA, Mulcahey MJ, Betz RR: The functional outcome of spinal fusion for paralytic scoliosis following spinal cord injury in the pediatric patient. American Spinal Injury Association annual meeting (poster); Cleveland, Ohio, April 1998; American Academy of Orthopaedic surgeons annual meeting (poster), New Orleans, March 1998; American Paraplegia Society annual meeting (poster), Las Vegas, September 1997.

Betz RR, Harms J, Clements DH III, Lenke LG, Lowe TG, Shufflebarger HL, Jeszenszky DJ, Beele B: Comparison of anterior versus posterior instrumentation for correction of thoracic idiopathic scoliosis. Combined Meeting, Orthopaedic Associations of the English Speaking World, Auckland, New Zealand, February 1998; American Academy of Orthopaedic Surgeons annual meeting, San Francisco, February 1997; Scoliosis Research Society annual meeting (considered for Russell Hibbs Award), Ottawa, September 1996; American Orthopaedic Association annual meeting (poster), Colorado Springs, June 1996; Shrine Surgeons annual meeting, Honolulu, August 1995; American Academy of Orthopaedic Surgeons annual meeting [scientific exhibit], Orlando, February 1995.

Betz RR, Mulcahey MJ, Weiss AA, Smith BT: The outcomes of tendon transfers for hand function. Combined Meeting, Orthopaedic Associations of the English Speaking World, Auckland, New Zealand, February 1998.

Peters TW, Betz RR, Clements DH, Bosacco SJ: Prevalence of patients with adolescent idiopathic scoliosis who could benefit from anterior instrumentation. Combined Meeting, Orthopaedic Associations of the English Speaking World (poster), Auckland, New Zealand, February 1998; Pennsylvania Orthopaedic Society annual meeting, Wilmington, Delaware, November 1997; North American Spine Society annual meeting (poster), New York City, October 1997.

Clements DH, Betz RR, Harms J, Lenke LG, Lowe TG, Huss GK: Critical analysis of proximal sagittal contour after correction of thoracic idiopathic scoliosis: anterior versus posterior instrumentation. Combined Meeting, Orthopaedic Associations of the English Speaking World (poster), Auckland, New Zealand, February 1998; Scoliosis Research Society annual meeting, St. Louis, Missouri, September 1997.

Lee GA, Betz RR, Clements DH, Huss GK: Proximal kyphosis above posterior spinal fusions in patients with idiopathic scoliosis. American Orthopaedic Association Residents' Conference, Sacramento, CA, February 1998; Pennsylvania Orthopaedic Society annual meeting, Wilmington, Delaware, November 1997; North American Spine Society annual meeting, New York City, October 1997; Scoliosis Research Society annual meeting, St. Louis, Missouri, September 1997; Spine + Science + Management meeting (poster), New Orleans, November 1996.

D'Andrea LP, Betz RR: Analysis for sagittal crankshaft after correction of idiopathic scoliosis with anterior instrumentation and fusion. *Spine + Science + Management*, New Orleans, November 1997.

Clements DH III, Betz RR, Balsara RK: Technique of video assisted thoracoscopic anterior thoracic instrumentation and fusion for idiopathic scoliosis. *International Symposium on Minimally Invasive Spine Surgery*, Philadelphia, November 1997; *4th International Meeting on Advanced Spine Techniques*, Munich, Germany, July 1997.

Mulcahey MJ, Betz RR, Finson R, Akers JM, Stanger M, Bertoti DB: Percutaneous functional electrical stimulation in the child with spastic diplegia: therapeutic and functional effects. *American Academy of Cerebral Palsy and Developmental Medicine annual meeting (poster)*, Portland, Oregon, September 1997

Martin WH, Clements DH, Betz RR, Young WF: Intraoperative EMG monitoring during spinal surgery. *Seminar on Clinical Neurophysiology*, Jerusalem, February 1997.

Lenke LG, Betz RR, Bridwell KH, Clements DH III, Harms J, King HA, Lowe TG, Shufflebarger HL: Classifying adolescent idiopathic scoliosis by the King method: is it reliable? *American Academy of Orthopaedic Surgeons annual meeting*, San Francisco, January 1997; *Scoliosis Research Society annual meeting*, Ottawa, September 1996.

Huntington C, Murrell W, Betz RR, Cole BA, Clements DH, Balsara RK: Comparison of thoracoscopic and open thoracic discectomy in a live sheep model for anterior spinal fusion. *American Academy of Orthopaedic Surgeons annual meeting (poster)*, San Francisco, February 1997; *3rd International Meeting on Advanced Spine Techniques*, Munich, June 1996.

Weiss AA, Betz RR, Mulcahey MJ, Keith M: Reconstruction of high tetraplegia hand activity with functional electrical stimulation: introduction to emerging neuro-prosthetic technology. *American Association for Hand Surgery*, Boca Raton, January 1997.

Clements DH, Betz RR, Harms J, Lenke LG, Balsara: Analysis of sagittal contour after correction of thoracic idiopathic scoliosis: anterior vs. posterior instrumentation. *Scoliosis Research Society annual meeting*, Ottawa, September 1996.

Lenke LG, Betz RR, Bridwell KH, Lowe T, Clements D, Harms J, Shufflebarger H: Classification of adolescent idiopathic scoliosis (AIS): a new system addressing both coronal and sagittal planes. *Scoliosis Research Society annual meeting*, Ottawa, September 1996.

Mulcahey MJ, Betz RR, Mullin C: The comparison of FES to orthoses in children with spinal cord injuries. *American Paraplegia Society annual meeting (poster)*, Las Vegas, September 1996.

Akers JM, Triolo RJ, Betz RR: Motor responses to implantable electrodes in a growing limb. American Paraplegia Society (poster), Las Vegas, September 1996.

Clements DH III, Martin WH, Hafner H, Betz RR: Efficacy of intraoperative SSEP monitoring of the upper extremities in detecting neuropraxia during positioning for spinal surgery. Scoliosis Research Society annual meeting, Ottawa, September 1996.

Cordover AM, Betz RR, Clements DH, Bosacco SJ: The natural history of adolescent thoracolumbar and lumbar idiopathic scoliosis into adulthood. Scoliosis Research Society annual meeting, Ottawa, September 1996; 3rd International Meeting on Advanced Spine Techniques (poster), Munich, June 1996; American Academy of Orthopaedic Surgeons annual meeting, Atlanta, February 1996; North American Spine Society annual meeting, Washington, DC, October 1995.

Davidson RS, Weitzel P, Stanton RP, Betz RR, Alburger PD, Dormans JP, Drummond DS: Slipped capital femoral epiphysis: a multicenter review of the complications by treatment group in 432 hips. Eastern Orthopaedic Association annual meeting, Hilton Head Island, SC, October 1996; American Academy of Orthopaedic Surgeons annual meeting, Atlanta, February 1996; Pediatric Orthopaedic Society of North America annual meeting, Bal Harbor, FL, 1995

Betz RR: Spine deformity in the child with SCI. IN Pediatric Spinal Cord Injury: Specialty Topics. American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Philadelphia, September 1995.

Betz RR, Mulcahey MJ, Weiss AA, Keith MW, Peckham PH: Surgical aspects of a functional electrical stimulation hand grasp system to augment function in patients with tetraplegia. American Paraplegia Society annual meeting (poster), Las Vegas, September 1995.

deMoura AB, Mulcahey MJ, Betz RR: The effect of triceps surface stimulation on pinch strength in tetraplegia. American Spinal Injury Association annual meeting (poster), Orlando, April 1995; American Academy of Orthopaedic Surgeons annual meeting (poster), Orlando, February 1995; American Paraplegia Society annual meeting (poster), Las Vegas, September 1994.

Talsania J, Thoder J, Betz R, Clancy M: When is the best time for simple syndactyly release? American Orthopaedic Association Residents' conference, Pittsburgh, March 1995

Stollsteimer GT, Kolessar DJ, Betz RR: The value of the measurement from T5 to T12 as a screening tool in detecting abnormal kyphosis. American Orthopaedic Association Residents' Conference, Pittsburgh, March 1995; American Academy of Orthopaedic Surgeons annual meeting (poster), Orlando, February 1995.

Pierre-Jacques H, Betz RR, Berman AT, Clancy M: Hip instability in children with spinal cord injuries. American Orthopaedic Association Residents' Conference, Pittsburgh, March 1995; American Academy of Orthopaedic Surgeons annual meeting (poster), Orlando, February 1995.

O'Brien JT, Betz RR, Berman AT: A comparison of children with spinal cord injury with and without radiographic abnormality. American Orthopaedic Association Residents' Conference, Pittsburgh, March 1995; American Academy of Orthopaedic Surgeons annual meeting [paper, poster], Orlando, February 1995; Pennsylvania Orthopaedic Society Fall meeting, Pittsburgh, September 1994; American Paraplegia Society annual meeting (poster), Las Vegas, September 1994.

Betz RR: Choosing levels of anterior instrumentation in the thoracic spine. Federation of Spine Associations annual meeting, Orlando, February 1995.

Weiss AA, Betz RR, Matityahu A, Keith MW, Zigler S: Interphalangeal joint stabilization without arthrodesis for restoration of lateral pinch in tetraplegia: the split FPL transfer. Shrine Surgeons annual meeting, Philadelphia, September 1994.

Barbieri CA, Moynahan M, Halden EE, Betz RR: The effects of functional neuromuscular stimulation on the gait characteristics of a child with spastic diplegia cerebral palsy. Shrine Surgeons annual meeting, Philadelphia, September 1994.

Mulcahey MJ, Betz RR, Smith BT, Weiss AA: The application of functional neuromuscular stimulation using a totally implanted stimulator and implanted electrodes in adolescents with tetraplegia. Shrine Surgeons annual meeting, Philadelphia, September 1994.

Smith BT, Mulcahey MJ, Betz RR: Functional neuromuscular stimulation for upper extremity function in C4 tetraplegia. Shrine Surgeons annual meeting, Philadelphia, September 1994.

Mulcahey MJ, Betz RR: The activities of adolescents with spinal cord injuries: results of the adolescent role assessment. American Spinal Injury Association annual meeting, Philadelphia, April 1994.

Mulcahey MJ, Smith BT, Betz RR: Spinal cord injury in children: the impact on parents' routines of work, leisure, and rest. American Spinal Injury Association annual meeting, Philadelphia, April 1994.

Betz RR, Boden B, Triolo RJ, Gardner ER, Fife RS: The effects of functional neuromuscular stimulation on the joints of the lower extremity in children with spinal cord injury. American Spinal Injury Association annual meeting (poster), Philadelphia, April 1994; American Academy of Orthopaedic Surgeons annual meeting (poster), New Orleans, February 1994; Orthopaedic Rehabilitation Association annual meeting, New Orleans, February 1994.

Betz RR, Beck T, Huss GK, Hennes J, Clancy M: Hip instability in children with spinal cord injury. American Spinal Injury Association annual meeting (poster), Philadelphia, April 1994; American Paraplegia Society annual meeting (poster), Las Vegas, September 1993.

Cole BA, Betz RR, Davidson RS: The natural history of scoliosis secondary to modest leg length inequality. American Orthopaedic Association Residents' Conference, Atlanta, March 1994; American Academy of Orthopaedic Surgeons [paper and poster], New Orleans, February 1994.

Weis JC, Betz RR, Clements DH, Balsara RK: The prevalence of perioperative complications following anterior spinal fusion for patients with idiopathic scoliosis. North American Spine Society annual meeting, Minneapolis, September 1994; American Academy of Orthopaedic Surgeons annual meeting (poster), New Orleans, February 1994; Scoliosis Research Society annual meeting (poster), Dublin, Ireland, September 1993.

Böhm H, Betz RR, Harms J, Clements DH, Balsara RK: Correction of adolescent idiopathic scoliosis with flexible anterior instrumentation. American Academy of Orthopaedic Surgeons annual meeting, New Orleans, February 1994; Scoliosis Research Society annual meeting (poster), Dublin, Ireland, September 1993.

Hurley JM, Betz RR, Clancy M, Steel HH: The prevalence of late development of contralateral SCFE in patients treated by in situ pinning vs. cast immobilization. American Academy of Orthopaedic Surgeons annual meeting, San Francisco, February 1993; Shrine Surgeons' annual meeting, Spokane, Washington, September 1991.

Harvey CJ Jr, Betz RR, Clements DH, Huss GK, Clancy M: Are there indications for partial rib resection in patients undergoing CD instrumentation for adolescent idiopathic scoliosis? American Academy of Orthopaedic Surgeons annual meeting (poster), San Francisco, February 1993; Federation of Spine Associations annual meeting, San Francisco, February 1993; Scoliosis Research Society annual meeting (considered for Russell Hibbs Award), Kansas City, MO, September 1992; Shrine Surgeons annual meeting, Greenville, SC, September 1992.

Clements DH, Betz RR, Harms J, Balsara RK: Technique of Harms/MOSS anterior thoracic instrumentation and fusion for treatment of thoracic curves in idiopathic scoliosis. Scoliosis Research Society annual meeting [video], Kansas City, MO, September 1992.

Mulcahey MJ, Betz RR, Smith BT, Triolo RJ, Weiss AA, Keith MW, Peckham PH, Mitra A: Bipolar latissimus dorsi transposition and functional neuromuscular stimulation to restore flexion in a C4 quadriplegic with C5 denervation. American Academy of Orthopaedic Surgeons annual meeting (poster), San Francisco, February 1993; American Paraplegia Society annual meeting

(poster), Las Vegas, September 1992; American Spinal Injury Association annual meeting, Toronto, May 1992.

Houdayer T, Freedman W, Triolo RJ, Andrews B, Betz RR: Prolonged standing for children with paraplegia by means of hybrid orthosis: a case study. IEEE-EMBS Conference, Paris, October 1992.

Betz RR, Cole CL, Triolo RJ, Gardner ER, Cohn JC, Fife RS: The effects of functional neuromuscular stimulation on the joints of the lower extremity in spinal cord injured children. American Paraplegia Society annual meeting (poster), Las Vegas, September 1992; American Spinal Injury Association annual meeting, Toronto, May 1992.

Cohn JC, Moynahan M, Triolo RJ, Betz RR: A survey of the pediatric spinal cord injured population on attitude towards standing (poster). American Spinal Injury Association annual meeting, Toronto, May 1992.

Uppal GS, Wood KB, Betz RR, Ogilvie JW, Watkins RG, Sherk HH: Magnetic resonance imaging evaluation of congenital scoliosis [poster exhibit]. American Academy of Orthopaedic Surgeons annual meeting, Washington DC, February 1992; American Orthopaedic Association Residents' Conference, Kansas City, Kansas, April 1991.

Weiss AA, Betz RR: Transfer of paralyzed but not denervated muscles for functional nerve stimulation restoration of prehensile activity in spinal cord injury patients. American Academy of Pediatrics Orthopaedic Section, New Orleans, October 1991.

Siegel MJ, Betz RR, Bridwell KH, Shufflebarger HL, Cummings RJ, Moynahan M, Baldus C, Clements DH: A critical analysis comparing Zielke instrumentation alone, Cotrel-Dubousset instrumentation alone, and a combination of the two for the treatment of adolescent thoracolumbar and lumbar idiopathic scoliosis. Scoliosis Research Society annual meeting, Minneapolis, September 1991.

Lenke LG, Bridwell KH, Bullis D, Betz RR, Baldus C, Schoenecker PL: Results of in-situ fusion for isthmic spondylolisthesis. Recipient of Russell S. Hibbs Award for best clinical presentation. Scoliosis Research Society annual meeting, Minneapolis, September 1991.

Betz RR, Triolo RJ, Hermida VM, Moynahan M, Gardner ER, Maurer A, Cook SD, Bennett JT: The effects of functional neuromuscular stimulation on the bone mineral content in the lower limbs of spinal cord injured children. American Spinal Injury Association annual meeting, Seattle, April 1991.

Triolo RJ, Reilley B, Mulcahey MJ, Betz RR, Cohn J: Development and standardization of an evaluation for standing function in children with spinal cord injuries. American Spinal Injury Association annual meeting (poster), Seattle, April 1991.

Mulcahey MJ, Smith B, Triolo RJ, Betz RR: Restoration of grasp and release in a C7 child (poster). American Spinal Injury Association, Seattle, April 1991 (first-place orthopaedic poster); Applied Neural Control Research Conference, Case Western Reserve University, Cleveland, May 1990.

Decker JE, Weiss AA, Webber JB, Ciocco R, Betz RR, Clancy M, Giattini JF: Treatment options for radioulnar length discrepancy including epiphysiodesis of the distal ulna. American Orthopaedic Association Residents' Conference, Kansas City, Kansas, April 1991.

Iorio R, Betz RR, Clancy M, Steel HH, Berman AT: The prevalence of malignant degeneration in multiple hereditary exostosis. American Academy of Orthopaedic Surgeons, Anaheim, California, March 1991; Shrine Surgeons, Erie, Pennsylvania, September 1989.

Liss FE, Betz RR, Clancy M, Steel HH: Lateral femoral condylar overgrowth and varus knee deformity following distal femoral epiphysiodesis. American Academy of Orthopaedic Surgeons, Anaheim, California, March 1991; American Orthopaedic Association Residents' Conference, Monterey Beach, March 1990.

Kollmer CE, Betz RR, Clancy M: Association of hip dysplasia with pediatric foot abnormalities: A national Shriners Hospital survey. American Academy of Orthopaedic Surgeons, Anaheim, California, March 1991; Pediatric Orthopaedic Society of North America, San Francisco, May 1990; Shrine Surgeons, Erie, Pennsylvania, September 1989; American Orthopaedic Association Residents' Conference, Monterey Beach, March 1990.

Israelite CL, Bashner BC, Betz RR, Clancy M, Steel HH, Berman AT: Reliable early radiographic differentiation of infantile Blount's disease and physiologic bowing: Utilizing the ratio of the femoral and tibial metaphyseal-diaphyseal angles. American Academy of Orthopaedic Surgeons, Anaheim, California, March 1991; Shrine Surgeons, Lexington, Kentucky, October 1990; American Orthopaedic Association Residents' Conference, Monterey Beach, March 1990.

Cole CL, Betz RR, Harrison M, Clancy M, Steel HH: Orthopaedic manifestations of Proteus syndrome. American Academy of Orthopaedic Surgeons annual meeting (poster), Anaheim, March 1991.

Michalski JA, Steel HH, Betz RR, Mesgarzadeh M, Davidson RC, Clancy M: The Blanch sign revisited. American Academy of Orthopaedic Surgeons annual meeting (poster), Anaheim, March 1991.

Milea AC, Steel HH, Betz RR, Clancy M: Epiphysiodesis of the triradiate cartilage for protrusio acetabuli in Marfan's syndrome: a long-term follow-up. American Academy of Orthopaedic Surgeons annual meeting (poster), Anaheim, March 1991.

Piccioni L, Davidson RC, Betz RR, Clancy M, Steel HH: Radiographic assessment of intraoperative club foot correction. Pennsylvania Orthopaedic Society, Pittsburgh, November 1990.

Backe HA, Betz RR, Mesgarzadeh M, Clancy M, Steel HH: Post-traumatic spinal cord syrinx: An evaluation by MRI. American Spinal Injury Association, Orlando, May 1990.

Mulcahey MJ, Triolo RJ, Betz RR: Restoration of hand function: A demonstration of functional neuromuscular stimulation. American Occupational Therapy Association annual meeting (poster), New Orleans, April 1990.

Mclvor OR, Betz RR, Clancy M, Steel HH: Low back pain following PSF for idiopathic scoliosis. American Orthopaedic Association Residents' Conference, Monterey Beach, March 1990.

Kozin SH, Weiss AA, Webber JB, Betz RR, Clancy M, Steel HH: Index finger pollicization for congenital aplasia or hypoplasia of the thumb. American Orthopaedic Association Residents' Conference, Monterey Beach, March 1990; American Society for Surgery of the Hand (poster), Seattle, Washington, September 1989.

Smith RC, Betz RR, Love M, Bonakdarpour A, Mesgarzadeh M, Clancy M, Steel HH, Sherk HH: Cervical spine abnormalities in multiple epiphyseal dysplasia. American Orthopaedic Association Residents' Conference, Monterey Beach, March 1990.

Cavanaugh MF, Betz RR, Alburger PD, Clancy M, Steel HH: Treatment of congenital hip dislocation in black infants. American Orthopaedic Association Residents' Conference, Monterey Beach, March 1990; American Academy of Orthopaedic Surgeons, New Orleans, February 1990.

Mesgarzadeh M, Wiggill S, Schneck CD, Bonakdarpour A, Clancy M, Betz RR: The MRI structural correlates of carpal tunnel syndrome (CTS). American Academy of Orthopaedic Surgeons (poster), New Orleans, February 1990.

Bridwell KH, Betz RR, Harvey C, Capelli A, Franken C, Huss GK: Sagittal plane analysis in idiopathic scoliosis patients treated with Cotrel-Dubousset instrumentation. American Academy of Orthopaedic Surgeons, New Orleans, February 1990; Federation of Spine Associations Annual Meeting, New Orleans, February 1990; 6th Annual C-D International Symposium, Monte Carlo, September 1989; Scoliosis Research Society annual meeting, Amsterdam, September 1989; North American Spine Society, Quebec City, June 1989.

Mesgarzadeh M, Wiggill S, Schneck CD, Bonakdarpour A, Clancy M, Betz RR: The MRI structural correlates of carpal tunnel syndrome (CTS) (poster). American Academy of Orthopaedic Surgeons, New Orleans, February 1990.

Betz RR, Johnson VL, Aiona MD, Davidson RS, Kollmer C: Association of hip dysplasia with pediatric foot abnormalities: a national Shriners Hospital survey. Shrine Surgeons annual meeting, Erie, PA, September 1989.

Gardner ER, Triolo RJ, Betz RR: Repeatability of strength and endurance of the electrically stimulated quadriceps in SCI children. American Physical Therapy Association annual conference in Nashville, Tennessee, June 1989.

Betz RR, Huss GK, Clancy M: Indications for rib resection with Cotrel-Dubousset instrumentation for correction of adolescent idiopathic scoliosis. ABC Traveling Fellowship, United Kingdom and South Africa, April 1989; Shrine Surgeons, Springfield, October 1988.

Emper WD, Betz RR, Clancy M, Steel HH: Spica cast treatment of slipped capital femoral epiphysis. ABC Traveling Fellowship, United Kingdom and South Africa, April 1989; Shrine Surgeons, St. Louis, October 1986; American Academy of Orthopaedic Surgeons, New Orleans, February 1986; American Orthopaedic Association Residents' Conference, New Orleans, May 1985.

Betz RR, Donner EJ, Mesgarzadeh M, Campo RD, Clancy M: Magnetic resonance imaging in slipped capital femoral epiphysis. ABC Traveling Fellowship, United Kingdom and South Africa, April 1989; Pediatric Orthopaedic Society of North America, Colorado Springs, May 1988; American Academy of Orthopaedic Surgeons, Las Vegas, February 1989.

Carey PJ, Alburger PD, Betz RR: Closed treatment of both bone forearm fractures. Orthopaedic Trauma Association, Philadelphia, October 1989; American Academy of Orthopaedic Surgeons, Las Vegas, February 1989.

Wolf SB, Betz RR, Steel HH, Clancy M: Conservatively treated idiopathic clubfoot: Long-term results. American Academy of Orthopaedic Surgeons, Las Vegas, February 1989; American Orthopaedic Association Residents' Conference, Boston, March 1988.

Robinson DE, Triolo RJ, Betz RR: Graded exercise testing in spinal cord injured children (poster). APTA annual meeting, Honolulu, February 1989.

McAllister JW, Bridwell KH, Betz RR, Huss GK, Clancy M, Schoenecker PL: Coronal decompensation produced by Cotrel-Dubousset derotation maneuver for idiopathic right thoracic scoliosis. Mid-America Orthopaedic Association, Hamilton, Bermuda, April 1989; Scoliosis Research Society annual meeting, Baltimore, September 1988.

Mason RJ, Betz RR, Orlowski JP, Bell GR: The syndrome of inappropriate antidiuretic hormone secretion and its effect on blood indices following spinal fusion. Scoliosis Research Society annual meeting (considered for Russell Hibbs Award), Baltimore, September 1988.

Lyons CJ, Betz RR, Mesgarzadeh M, Revesz G, Clancy M: The effect of magnetic resonance imaging on metal spine implants. Scoliosis Research Society annual meeting, Baltimore, September 1988.

Betz RR: Congenital epiphyseal plate disorders. Philadelphia Orthopaedic Review Course [faculty], Philadelphia, May 1988.

Betz RR, Triolo RJ, Gardner EG, Robinson DE, Alm AC: Functional neuromuscular stimulation in children with spinal cord injury: Changes in strength and endurance of the quadriceps (poster). Case Western Reserve University Annual Neural Control Research Day, May 1988.

Betz RR, Rosenfeld ER, Maurer A, Triolo RJ, Robinson DE, Gardner EG: Bone mineral content in children with spinal cord injury (poster). American Spinal Injury Association, San Diego, March 1988.

Elia EA, Clancy M, Betz RR, Steel HH: Long-term follow-up of osteogenesis imperfecta. American Orthopaedic Association Residents' Conference, Boston, March 1988.

MacMahon EB, Irani RN, Betz RR, Hollis S, Schwentker EP: Significance of lateral tibial torsion translation in Blount's disease. American Academy of Orthopaedic Surgeons, Atlanta, February 1988.

Ecker ML, Betz RR, Trent PS, Mahboubi S, Mesgarzadeh M, Bonakdarpour A, Drummond DS, Clancy M: Computed tomographic evaluation of Cotrel-Dubousset instrumentation in idiopathic scoliosis. American Academy of Orthopaedic Surgeons, Atlanta, February 1988; Federation of Spine Associations, Atlanta, February 1988.

Raisis LW, Betz RR, Clancy M, Ostrum RF, Steel HH: Comparison of percutaneous versus open epiphyseodesis for leg-length discrepancy. American Academy of Orthopaedic Surgeons, Atlanta, February 1988; Pennsylvania Orthopaedic Society meeting, Orlando, April 1987.

O'Donnell CS, Bunnell WP, Betz RR, Bowen JR, Tipping CR: Electrical stimulation in the treatment of idiopathic scoliosis. American Academy of Orthopaedic Surgeons annual meeting, Atlanta, February 1988; Scoliosis Research Society annual meeting (winner of Russell Hibbs Award), Vancouver, British Columbia, September 1987.

Griffith M, Mardjetko S, Betz RR, Clancy M, Steel HH, Millar EA: Review of treatment of unicameral bone cysts. American Academy of Orthopaedic Surgeons annual meeting, Atlanta, February 1988; at the American Orthopaedic Association Residents' Conference, Salt Lake City, March 1987; and at the Spring Residents' Conference, Shriners Hospital, Philadelphia, May 1986.

Maurer R, Betz RR, Bonakdarpour A, Mesgarzadeh M, Clancy M, Steel HH: Radiographic review of amyoplasia (arthrogryposis). American Academy of Orthopaedic Surgeons, Atlanta, February 1988 (poster); American Orthopaedic Association Residents' Conference, Salt Lake City, March 1987.

Clements DH, Betz RR, Truex RE: Diastematomyelia: Natural history and surgical indications. American Academy of Orthopaedic Surgeons, Atlanta, February 1988 (poster); American Orthopaedic Association Residents' Conference, Salt Lake City, March 1987.

Betz RR, Clancy M, Huss GK, Alburger PD: Correction of spine deformities with Cotrel-Dubousset instrumentation: Results and problems in a consecutive series. Eastern Orthopaedic Association, Hot Springs, Virginia, October 1987.

Mannherz RE, Betz RR, Clancy M, Steel HH: Juvenile idiopathic scoliosis followed to skeletal maturity. Federation of Spine Associations, Atlanta, February 1988; Scoliosis Research Society, Vancouver, British Columbia, September 1987.

Betz RR, Campo RD: Epiphyseal plate fractures. Philadelphia Review Course [faculty], Philadelphia, June 1987.

Weidner PL, Alburger PD, Betz RR: Treatment of supracondylar fractures of the humerus by delayed manipulative reduction. American Academy of Orthopaedic Surgeons, San Francisco, January 1987; American Orthopaedic Association Residents' Conference, Los Angeles, May 1986; Fall Pennsylvania Orthopaedic Society meeting, Philadelphia, November 1985.

Mesgarzadeh M, Sneck CD, Betz RR, Moyer R, Bonakdarpour A: Optimization of MR imaging of the knee joint (poster). American Academy of Orthopaedic Surgeons, San Francisco, January 1987.

Gelman AJ, Betz RR, DeFilipp GJ, Mesgarzadeh M, Clancy M, Steel HH: Magnetic resonance imaging in evaluation of spinal cord injured children. American Academy of Orthopaedic Surgeons, San Francisco, January 1987; Scoliosis Research Society, Hamilton, Bermuda, September 1986; American Orthopaedic Association Residents' Conference, Los Angeles, May 1986; Pennsylvania Orthopaedic Society, Hershey, Pennsylvania, April 1986; American Spinal Injury Association, San Francisco, March 1986.

Dearolf WW III, Betz RR, Clancy M, Steel HH: Spinal deformity in pediatric spinal cord injured patients. Scoliosis Research Society, Hamilton, Bermuda, September 1986; American Spinal Injury Association, Boston, March 1987; American Orthopaedic Association Residents' Conference, Los Angeles, May 1986.

Lombardi AV, Betz RR, Bonakdarpour A, Clancy M, Steel HH: Neurofibromatous scoliosis: The necessity of an aggressive approach. American Orthopaedic Association Residents' Conference, Los Angeles, May 1986.

Thoder JJ, Betz RR, Clancy M, Steel HH: Gluteus medius and minimus advancement for correction of internal rotation gait in spastic cerebral palsy. American Orthopaedic Association Residents' Conference, Los Angeles, May 1986.

Lin PS, Betz RR, Kalamchi A, Steel HH: The long-term follow-up of iliofemoral fusion in proximal femoral focal deficiency. American Orthopaedic Association Residents' Conference, Los Angeles, May 1986; Fall Pennsylvania Orthopaedic Society meeting, Philadelphia, November 1985.

Scanlon JD, Betz RR, Weaver SA, Rosenfeld ER, Scheuren MA, Bork CE: Stress test values of paraplegics and quadriplegics versus able-bodied children (poster). American Spinal Injury Association, San Francisco, March 1986.

Betz RR, Baran EM, Rosenfeld EM, Steel HH: Somatosensory evoked potentials (SEPs) in chronic spinal cord injury. American Academy of Orthopaedic Surgeons, New Orleans, February 1986 (poster); American Spinal Injury Association, Atlanta, April 1985.

Crossett LS, Betz RR, Steel HH: Congenital pseudarthrosis of the tibia: long-term follow-up. American Academy of Orthopaedic Surgeons, New Orleans, February 1986; American Orthopaedic Association Residents' Conference, New Orleans, May 1985.

Sutherland RD, Betz RR, Steel HH: The sequelae of septic arthritis of the hip. American Academy of Orthopaedic Surgeons, New Orleans, February 1986; American Orthopaedic Association Residents' Conference, New Orleans, May 1985; Pennsylvania Orthopaedic Society, Pittsburgh, November 1984.

Betz RR, Bunnell WP, MacEwen GD: Scoliosis and pregnancy. Federation of Spine Associations, New Orleans, February 1986; Scoliosis Research Society (considered for Russell Hibbs Award), San Diego, September 1985; American Academy of Orthopaedic Surgeons, Atlanta, February 1984.

Betz R, Sachs I, Steel H: Acquired spastic talipes equinovarus and its relationship to dystonia musculorum deformans. Shrine Surgeons annual meeting, Tampa, FL, October 1985.

Betz RR, Moyer RA, Clements DH, Marchetto P, Lachman JW: Traumatic diastasis of the first and second tarsometatarsal joints. American Orthopaedic Society for Sports Medicine, Nashville, June 1985; American Academy of Orthopaedic Surgeons, Las Vegas, February 1985; American Orthopaedic Foot and Ankle Society, Las Vegas, January 1985.

Maddalon R, Betz RR, Steel HH: Effect of preoperative Cotrel traction on posterior spinal fusion in idiopathic scoliosis. American Orthopaedic Association Residents' Conference, New Orleans, May 1985.

Betz RR, Moyer RA, Alburger PD, Clancy M, Murphy J, Iaquinio J: Arthroscopic anterior cruciate reconstruction using autogenous semitendinosus and gracilis tendons. American Academy of Orthopaedic Surgeons, Las Vegas, January 1985.

Ostrum RF, Betz RR, Manzione M, Steel HH: Pitfalls, problems, and long-term results of epiphysiodesis. American Academy of Orthopaedic Surgeons, Las Vegas, January 1985; American Orthopaedic Association Residents' Conference, Ann Arbor, Michigan, May 1984; Spring Pennsylvania Orthopaedic Society meeting, Hershey, April 1984.

Betz RR, Magill JT, Lonergan R: The percutaneous lateral retinacular release: Long-term review. American Orthopaedic Society for Sports Medicine, Las Vegas, January 1985; Pennsylvania Orthopaedic Society, Hershey, April 1984; Eastern Orthopaedic Association, Boca Raton, Florida, October 1981.

Betz RR, Steel HH, Millar EA: Acquired spastic talipes equinovarus and its relationship to dystonia musculorum deformans. Pediatric Orthopaedic Society, Vancouver, British Columbia, May 1984.

Hix S, Betz RR, Steel HH: Effects of endurance training on the rehabilitation of spinal cord injured and spina bifida children (poster). American Spinal Injury Association, Houston, March 1984.

Betz RR, Palmer C, Kumar S, MacEwen GD: Long-term follow-up of Chiari osteotomies. American Academy of Orthopaedic Surgeons, Atlanta, February 1984.

Tipping C, Betz RR, Bunnell WP, Bowen JR, Kumar S, Pizzutillo PD: Electro-spinal orthosis (ESO) in the treatment of scoliosis. Fall Seminar, Alfred I. DuPont Institute, Wilmington, Delaware, October 1983.

Betz RR, Steel HH, Alburger P, Clements D: Ligamentum teres reconstruction. Orthopaedic Research Society annual meeting, Anaheim, CA, March 1983

Invited Lectures:

Management of SCI in Children (Symposium). International Spinal Cord Society 48th annual scientific meeting, Florence, Italy, October 21-24, 2009.

- Orthopaedic considerations in pediatric SCI
- Innovative rehab strategies (activity based rehab, body weight supported ambulation, and FES cycling, ambulation, and UE function)

16th International Meeting on Advanced Spine Techniques, Vienna, Austria, July 15-18, 2009

- ICL: Minimally invasive posterior approaches for AIS
- ICL: Selection of fusion levels for AIS in 2009: anterior vs. posterior approaches
- Roundtable Case Discussion: Pediatric deformity

Pediatric Spinal Deformity Residents' Course (DePuy Spine), Philadelphia, PA, May 9, 2009

- Keynote: The future of pediatric spinal deformity

Adolescent Idiopathic Scoliosis: Understanding the Deformity and Current Treatment. POSNA One-Day Course, April 29, 2009

- Clinical outcomes of Nitinol staples

Pediatric Spinal Deformity: On the Cutting Edge, Coral Gables, FL, April 3-4, 2009

- Growth modulation: staples
- Pediatric thoracolumbar trauma
- Proximal and distal junctional imbalance after surgery for AIS
- Session moderator: Early onset spinal deformity
- Panelist: Neurological change or monitoring change with deformity surgery
- Panelist: Future challenges in pediatric spinal deformity

4th International Congress of Spine Deformity and NonFusion Techniques (SDNT), Shanghai, China, March 15, 2009

- The use of Matrix allograft strips as an alternative to autogenous bone graft in AIS
- Bone grafting options in children

East Coast Peer to Peer Meeting, DePuy Spine, February 20-21, 2009

- Moderator: Cervico-thoracic deformity
- Moderator: Adolescent idiopathic scoliosis
- Moderator: Early onset scoliosis

Controversies in Spine Surgery, Cancun, Mexico, Feb. 6-7, 2009

- Moderator: Surgical technique forums

8th Annual Current Concepts in Spinal Disorders 2009, Las Vegas, NV, January 29-30, 2009

- Frontier technologies
- PediGuard
- Fusionless deformity

5th Annual International Pediatric Orthopaedic Symposium, Orlando, FL, December 2-6, 2009

- Hemivertebra resection: indications and techniques
- Fusionless options for AIS: still an experiment?

Grand Rounds, Johns Hopkins Hospital, Baltimore, MD, December 18, 2008

- Pediatric spine update

Spine + Science + Management, New Orleans, LA, November 20-22, 2008

- Moderator: Case Discussions: Complex spine and MAST techniques

G. Dean MacEwen Basic Concepts in Pediatric Orthopaedic Surgery, New Orleans, LA, October 10, 2008

- Pediatric spine deformity update 2008
- Evaluation and treatment of congenital spine deformities
- Pediatric spinal cord injury: acute treatment and orthopaedic problems

Grand Rounds, Columbia University / New York Orthopaedic Hospital, June 26, 2008

- Pediatric Spine Deformity Update: 2008

Spinal Deformity Summit, Miami, FL, April 11-12, 2008

- Moderator: Panel on pediatric deformity
- Early intervention in idiopathic deformity
- Panelist: Genetics in AIS

Advanced Techniques for Spinal Deformity, Wilmington, DE, April 1-2, 2008
(Co-chaired with Suken Shah)

- Pitfalls of all pedicle screw constructs and vertebral body rotation techniques
- Spinal osteotomies: SPO, PSO, and VCR

- Sawbones lab: Vertebral body derotation and insertion of thoracic pedicle screws

POSNA Specialty Day, San Francisco, CA, March 8, 2008

- Symposium moderator: Surgical correction of severe spine deformities
 - The 14-year-old female with a 95° idiopathic thoracic curve

Grand Rounds, University of Miami, Miami, FL, February 28, 2008

- Pediatric spine update

Pediatric Spine Forum, Salt Lake City, UT, February 22-23, 2008

- Fusionless scoliosis
- Growing rod techniques

Vail Spinal Summit, Vail, Colorado, February 10-13, 2008

- Congenital and early onset scoliosis update

Advanced Deformity Peer-to-Peer Meeting, New York, NY, December 14-15, 2007

- Moderator: Surgical adolescent idiopathic scoliosis in ages 7-10
- Moderator: Tips, tricks, and busted myths

Japanese Scoliosis Society, Kyoto, Japan, October 11-14, 2007

- Fusionless scoliosis
- New thoughts on treatment of neuromuscular scoliosis

Scoliosis Research Society Regional Meeting, Budapest, Hungary, June 14-16, 2007

- Pediatric spine and adolescent idiopathic scoliosis: treatment advances
- Moderator: When is it necessary to use all pedicle screw constructs for deformity correction techniques?
- Panelist: Challenging adult and adolescent scoliosis case presentations

Grand Rounds, SUNY-Stony Brook, Stony Brook, NY, May 9, 2007

- Pediatric spine update

Grand Rounds, University of Toronto, Toronto, Ontario, April 26-27, 2007

- Initial evaluation and early management of the child with a spinal cord injury
- Health maintenance and promotion for children with SCI

Pediatric Spinal Deformity: On the Cutting Edge, Miami, FL, April 13-14, 2007

- Vertebral stapling: status in 2007
- Direct vertebral derotation in AIS

Grand Rounds, Montefiore Medical Center, New York City, March 21, 2007

- Pediatric spine update

DePuy Advanced Deformity Tutorial, Wilmington, DE, March 13, 2007

- Pitfalls and salvage techniques

6th Annual Symposium on Current Concepts in Spinal Disorders (Cedars-Sinai Medical Center Institute for Spinal Disorders), Las Vegas, NV, March 1-3, 2007

- Vertebral stapling: current status

Current Concepts in Emerging Technologies in Spine, Vail, CO, February 18-21, 2007

- Pediatric deformity update: fusionless technologies, stapling, direct vertebral rotation

POSNA Specialty Day at AAOS Annual Meeting, San Diego, February 17, 2007

- Memory shaped staples

OneSpine: Controversies in Spine Surgery, February 3-5, 2007, Cancun, Mexico

- A new approach for the growing spine: bilateral titanium ribs to the pelvis (with John Smith) (video)

19th Annual Ski with the Spine Center: A Contemporary Update on Disorders of the Spine, Whistler, BC, Canada, January 13-19, 2007

- Advanced techniques in spinopelvic fixation

McCullough Lectureship, Shriners Hospitals for Children, Mexico City, Mexico, November 9-10, 2006

- The future of spine deformity treatment
- Diagnostic studies and treatment of young children with severe spine and chest wall impairment
- Pediatric SCI: acute treatment and orthopaedic problems
- SCI: Injury modulation and regeneration strategies (with MJ Mulcahey)
- Clinical and research applications of orthotics and neuroprostheses for health and wellness of children with SCI (with MJ Mulcahey)

2006 Philadelphia Pediatric Spine Symposium, Philadelphia, August 25, 2006

- Vertebral stapling: current status

13th International Meeting on Advanced Spine Techniques, Athens, Greece, July 12-15, 2006.

- Instructional course: Advances in correction mechanics for spinal deformity surgery (with LG Lenke and DS Skaggs)

- Instructional course: Pediatric spine deformity—treatment strategies for complex problems (with JT Smith and R Campbell)
- Instructional course: Advanced deformity techniques (with PO Newton, D Jeszenszky, HL Shufflebarger)
- Instructional course: New technologies for PLIF and TLIF fusion
- Instructional course: Management options in the treatment of early onset scoliosis (with B Akbarnia, M Yazici and PO Newton)

SRS South Africa Spine Society Meeting, Somerset West, Western Cape, South Africa, May 31-June 1, 2006

- Pediatric spine deformity: treatment advances
- Workshop: Deformity correction techniques (with O Boachie & B Akbarnia)
- Congenital spine: patient evaluation and diagnostic imaging
- Workshop: Causes and treatment of fixed sagittal plane deformity, including trauma (with S Berven, M Lukhele, N Fisher-Jeffes)

Grand Rounds, University of Maryland School of Medicine, February 23, 2006

- Congenital, juvenile, and adolescent spine deformity update

Mayo Clinic International Spine Surgery and Tumor Symposium, Kauai, Hawaii, January 16-20, 2006

- Congenital, juvenile, and adolescent spine deformity update
- Pediatric spinal cord injury and treatment

18th Annual Disorders of the Spine, Whistler, Canada, January 14-17, 2006

- Hands-on lab: Advanced techniques in spinal pelvic fixation

Contemporary Topics in Pediatric Spinal Cord Injury, Shriners Hospitals for Children, Philadelphia, Pennsylvania, October 10-11, 2005.

- Injury modulation and regeneration strategies.

American Academy for Cerebral Palsy and Developmental Medicine annual meeting, Orlando, September 14-17, 2005

- Instructional course: Considerations in the management of young children with severe spine and chest wall impairments (with MJ Mulcahey, J Cerrone, S Porth)

Scoliosis Research Society: Asia Pacific Spine Conference, Jeju Island, Korea, August 25-27, 2005

- Advanced deformity correction techniques (with J. Harms & K. Kaneda)

12th International Meeting on Advanced Spine Techniques, Banff, Alberta, Canada, July 7-9, 2005

- Instructional course: Thoracoscopic/mini open approaches to thoracic scoliosis (with P Newton, R Gaines, H Halm)
- Instructional course: Pediatric spine deformity--treatment strategies for complex problems (with R. Campbell and J. Smith)
- Instructional course: Advanced techniques for posterior correction of spinal deformities (moderator) (with M O'Brien, P Wessberg, P Newton)

International Scoliotic Symposium and Combined SRS Traveling Fellows Program, Beijing, China, May 2005

- The future of spine deformity surgery
- Anterior instrumentation for thoracic idiopathic scoliosis, including thoracoscopic techniques
- Advances in posterior deformity treatment: pitfalls and how to avoid them

Grand Rounds, Seattle, OR, May 18, 2005

- Injury modulation and regeneration strategies

Grand Rounds, Shriners Hospital, Chicago, IL, April 14, 2005

- The child with a complex spine deformity: treatment including indications for the use of VEPTR (titanium rib device)
- Injury modulation and regeneration strategies

American Academy of Orthotists and Prosthetists ACPOC annual meeting, Orlando, FL, March 16-19, 2005.

- Presidential Lecture: New thoughts on orthotics for the child with spinal cord injury (with MJ Mulcahey)

An Interdisciplinary Approach to Neurotrauma Care: Spinal Cord Injuries, Washington, DC, April 24, 2005

- Contemporary thoughts on the assessment and management of the upper limb in persons with tetraplegia (with MJ Mulcahey)

Grand Rounds: Lenox Hill Hospital, New York, NY, December 16, 2004.

- Pediatric spine deformity: new strategies

Spinal Deformity Study Group Symposium 2004: Emerging Trends and Advanced Surgical Techniques. Medtronic Sofamor Danek, St. Louis, MO, November 4-6, 2004.

- Moderator: Open dual rod for thoracic AIS with CD Horizon Legacy 4.5
- Anterior instrumentation techniques: single rod technique and clinical results

Contemporary Topics in Pediatric Spinal Cord Injury, Shriners Hospitals for Children, Philadelphia, October 11-12, 2004

- New horizons to pediatric SCI research
- Case presentations

American Academy of Cerebral Palsy and Developmental Medicine, Annual meeting, Los Angeles, CA, Sept. 29-Oct. 4, 2004.

- Prevention and management of scoliosis and hip dysplasia in children and adolescents with SCI. In: Pediatric Spinal Cord Injury: Specialty Topics (Instructional course)

Evaluation and Treatment of Young Children with Complex Spine Disorders, Buenos Aires, Argentina, September 5, 2004

- Titanium rib for the management of young patients with complex spine deformities

11th International Meeting on Advanced Spine Techniques, Southampton, Bermuda, July 1-3, 2004

- Instructional Course Lecture (faculty): Advanced fusion techniques for scoliosis and degenerative disc disease using growth factors
- Instructional Course Lecture (faculty): Advanced techniques for posterior correction of spinal deformities
- Instructional Course Lecture (faculty): Advanced techniques for anterior correction of spinal deformities
- Instructional Course Lecture (faculty): Complex congenital thoracic deformity

Symposium on Spine Deformity and Minimal Invasive Spine Surgery, Department of Orthopaedics, Changhai Hospital, Shanghai, China, June 19, 2004.

- Anterior treatment of adolescent idiopathic scoliosis

Grand Rounds, Peking Union Hospital, Beijing, China, June 17, 2004

- Anterior treatment of adolescent idiopathic scoliosis
- Thoracic screws in deformity

14th annual Leon M. Kruger, MD Guest Lectureship, Shriners Hospitals, Springfield, MA, May 27, 2004

- Pediatric spinal cord injury update
- Pediatric spine—new strategies 2004

American Spinal Injury Association annual meeting, Denver, CO, May 14-16, 2004

- Functional electrical stimulation. In: The upper extremity in tetraplegia (instructional course)
- Background of paralytic spinal deformities

Federation of Spine Associations annual meeting, San Francisco, CA, March 13, 2004

- Background and clinical experience in vertebral body stapling for idiopathic scoliosis

American Academy of Orthopaedic Surgeons annual meeting, San Francisco, March 2004.

- Introduction: Congenital scoliosis. In: Congenital deformity of the pediatric spine (instructional course)
- Normal sagittal parameters and scope of the problem. In: Kyphosis in the thoracic and thoracolumbar spine in the pediatric patient (instructional course)

Chest Wall and Spinal Deformity Study Group Meeting, Los Cabos, Mexico, February 5-8, 2004

- Cheung EV, Betz RR, Mulcahey MJ, D'Andrea LP, Guille JT, Cerrone J, Campbell RM Jr, Johnston C, Lubicky JP, Segal LS: Natural history and results of surgical treatment of patients with fused ribs and congenital scoliosis

University of Pennsylvania Department of Rehabilitation Grand Rounds & Residents Conference, Philadelphia, PA, October 28, 2003

- Acute evaluation, treatment, and follow-up of orthopaedic issues in children with SCI
- FES: Update

Basic Concepts, New Orleans, LA, October 17-18, 2003

- G. Dean MacEwen Lecture: Advances in pediatric spine
- Congenital spine deformity and sagittal plane abnormalities of the spine
- Spinal cord injury: acute evaluation, treatment, and orthopaedic issues

10th International Meeting on Advanced Spine Techniques, Rome, Italy, July 2003.

- Memorial Lecture: Thomas Whitecloud, MD
- Instructional Course Lecture (faculty): Anterior scoliosis treatment, including endoscopic
- Roundtable Discussion (faculty): Pediatric coronal plane deformity
- Session VI (moderator): Pediatric deformity
- Panel Discussion (panelist): Endoscopic treatment of pediatric spinal deformities

The 2003 Spinal Cord Conference, Long Beach, CA, June 2003

- Unique aspects of the pediatric patients with SCI and the effects on upper limb management

American Academy of Orthopaedic Surgeons annual meeting, New Orleans, February 2003.

- Introduction: Congenital scoliosis. In: Congenital deformity of the pediatric spine (instructional course)
- Normal sagittal parameters and scope of the problem. In: Kyphosis in the thoracic and thoracolumbar spine in the pediatric patient (instructional course)

Shriners Hospitals 2002. Presented at Syria Temple, Pittsburgh, PA, September 30, 2002

American Academy for Cerebral Palsy and Developmental Medicine annual meeting, Montreal, Quebec, September 2002

- Implications of scoliosis on functioning of children and adolescents with SCI. In: Pediatric spinal cord injuries: specialty topics (instructional course)

Fundamentals of Spine Deformity II, Seattle, WA, September 2002

- Lenke surgical classification

Surgical Challenges in Spinal Deformity, Montreaux, Switzerland, May 2002

- Debate ('pro'): AIS single thoracic curve: anterior instrumented fusion is superior to conventional posterior instrumentation (hooks, wires, etc.)

Spine Education Summit, Vail, Colorado, March 2002

- New strategies for correction of paralytic spine deformity
- Thoracoscopic anterior instrumentation for AIS
- Perioperative complications of surgery for AIS
- Moderator: Classification of AIS (panel discussion)

Total Spine: Advances in Theory, Techniques, and Technology, Cancun, Mexico, March 2002

- Vertebral body stapling for prevention of curve progression in the immature patient

American Academy of Orthopaedic Surgeons annual meeting, Dallas, TX, February 2002

- Introduction: Congenital scoliosis. In: Congenital deformity of the pediatric spine (instructional course)
- Normal sagittal parameters and scope of the problem. In: Kyphosis of the thoracic and thoracolumbar spine in the pediatric patient (instructional course)

British Scoliosis Society Honorary Guest Lecturer, Edinburgh, Scotland, March 2001

- Idiopathic scoliosis: alternatives to traditional surgery
- New thoughts on the treatment of paralytic scoliosis

American Academy of Orthopaedic Surgeons, San Francisco, March 2001

- Background, including etiology. In: A Comprehensive approach to adolescent idiopathic scoliosis (instructional course)
- Scoliosis and kyphosis. In: The office practice of pediatric orthopaedics (instructional course)

Spine Education Summit, Vail, Colorado, February 2001

- Webcast presentation: Classification of adolescent idiopathic scoliosis: treatment based (with LG Lenke)
- VAT instrumentation for adolescent idiopathic scoliosis
- Update on thoracic anterior instrumentation in adolescent idiopathic scoliosis

New York Spinal Deformity Program, New York City, December 2000

- Adolescent idiopathic scoliosis-anterior open treatment-indications/techniques

The Annual Frank H. Stelling, III Visiting Lectureship, Greenville, SC, November 2000

- Anterior instrumentation for scoliosis, including thoracoscopic
- State of the art and future directions of FES for patients with spinal cord injury

5th Scientific Congress of the Paralympic Games, Sydney, Australia, October 2000

- Keynote address: State of the art and future directions of functional electrical stimulation (FES) for patients with spinal cord injury
- Implications of scoliosis treatment on function in children with spinal cord injury

American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Toronto, September 2000

- Mulcahey MJ, Betz RR, McDonald C, Hutchinson D, Finson R, McCarthy JJ: Functional and therapeutic electrical stimulation for neuromuscular disorders: state of the art and the science (instructional course)

The Surgical Management of Spinal Deformity in the Young Child, Barcelona, Spain, July 2000

- Anterior instrumentation in the thoracic spine: open techniques

Spinal Deformity: Challenges and Solutions, Las Croabas, Puerto Rico, May 2000

- Scoliosis classification: recent developments
- Adolescent idiopathic scoliosis: indications for posterior instrumentation -- new technical strategies

Spine Trauma in the Millennium, Chicago, April 2000

- Pediatric SCI: special considerations

American Spinal Injury Association annual meeting, Chicago, April 2000

- Betz RR (moderator): The aging spine (instructional course)

American Academy of Orthopaedic Surgeons annual meeting, Orlando, March 2000

- A comprehensive approach to adolescent idiopathic scoliosis: background, including etiology (instructional course)

- Office practice of pediatric orthopaedics: scoliosis and kyphosis (instructional course)

Total Spine, Cancun, February 2000

- Adolescent idiopathic scoliosis: indications and posterior instrumentation

Ski with Big Time Spine, Keystone, CO, January-February 2000

- Anterior instrumentation in adolescent scoliosis
- Scoliosis classification...recent developments
- Thoracoscopic versus open approach for anterior instrumentation in scoliosis

American Academy for Cerebral Palsy and Developmental Medicine annual meeting, Washington DC, September 1999

- Ambulation options for functional mobility, and FES options for bladder management. In: Innovative treatment options to increase independence for pediatric spinal cord injury (instructional course)

Janet Stellini Memorial Lecturer, Temple/Shriners Orthopaedic Alumni Day, May 1999

- Spinal Cord Injury: Past, Present, and Future

Total Spine, Cancun, Mexico, March 1999

- Thoracoscopic technique advancements: what can we do today that we couldn't two years ago? Where is the future?

Presidential Guest Speaker, Australian Orthopaedic Association, Cairns, Australia, October 1998

- Slipped capital femoral epiphysis: perspectives on predicting and treating the contralateral slip (instructional course)
- Spinal cord injury: past, present and future (keynote address)
- New classification system for scoliosis (instructional course)
- Anterior surgery including endoscopy for idiopathic scoliosis
- Early evaluation and management of the child with SCI (instructional course)

New Techniques in Scoliosis Surgeries, Frankfurt, Germany, July 1998

- Anterior spinal fusion and instrumentation for adolescent idiopathic scoliosis

Anterior Scoliosis Instrumentation seminar, New Orleans, March 1998

- Concepts of anterior instrumentation
- Indications and surgical technique: thoracic idiopathic scoliosis
- Thoracoscopic application of the anterior instrumentation

American Academy of Orthopaedic Surgeons annual meeting, New Orleans, March 1998

- Treatment perspectives for the adolescent based on untreated patients presenting in adulthood. In: An eclectic approach to adolescent idiopathic scoliosis (instructional course)
- Scoliosis and kyphosis, In: The office practice of pediatric orthopaedics (instructional course)
- Initial evaluation and management of the child with spinal cord injury. In: Initial management of patients with SCI (instructional course)

Spine + Science + Management, New Orleans, November 1997

- Academic medicine

What Progress Have We Made in Treating Spinal Deformities in the Last Ten Years? St. Louis, Missouri, September 1997

- Anterior surgery for scoliosis in the idiopathic adolescent

American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Portland, Oregon, September 1997

- Betz RR, Vogel LC, Mulcahey MJ, James MA: Progressive management of the child with SCI (instructional course)

New Directions in Pediatric Spinal Cord Injury, Sacramento, California, July 1997

- Orthopaedic problems in pediatric spinal cord injury
- Overview of functional electrical stimulation for children with spinal cord injury

XX G.I.S. National Congress, Italian Society of Vertebral Pathology, Genova, Italy, June 1997

- Does bracing adversely affect the compensatory upper thoracic curve in idiopathic scoliosis?
- Thoracoscopic anterior release and fusion for idiopathic scoliosis: focus on technique, morbidity, future applications
- The results of a prospective study comparing anterior instrumentation vs. posterior instrumentation for thoracic idiopathic scoliosis

Spine Deformity in Children and Adolescents, Philadelphia, PA, April 1997

- Idiopathic scoliosis: anterior spinal fusion

New Surgical Perspectives on the Pediatric Elbow and Hip, Rosemont, IL, October 1996

- Chiari osteotomy (hands-on skills laboratory)
- Session moderator: Slipped capital femoral epiphysis and Perthes disease

American Paraplegia Society annual meeting, Las Vegas, September 1996

- Orthopaedic issues in pediatric spinal cord injury patients (instructional course)

- Unique management needs of pediatric spinal cord injury patients: orthopaedic issues (instructional course)

30th Brazilian Orthopaedic and Traumatology Course, Curitiba, Brazil, July 1996

- Management of the adult with spine deformity
- Anterior instrumentation for thoracic scoliosis
- Pediatric spinal cord injury
- Functional neuromuscular stimulation
- Guidelines to differentiating physiologic bowing from Blount's disease

Advanced Techniques in Spinal Surgery, Keystone, CO, March 1996

- Anterior instrumentation for thoracic idiopathic scoliosis
- The place of the King criteria in 1996

Total Spine, Cancun, Mexico, February 1996

- Kyphosis correction: 4-rod technique

American Academy of Orthopaedic Surgeons annual meeting, Atlanta, February 1996

- An HS, Betz RR, Cotler JM, Vaccaro AR, Balderston RA: Initial management of patients with spinal cord injury (instructional course)

Federation of Spine Associations annual meeting, Atlanta, February 1996

- Pediatric spinal trauma (instructional course)

Miami Project, Miami, Florida, October 1995

- Trends in upper extremity management of individuals with SCI

American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Philadelphia, September 1995

- Sorting out the options: orthoses, robotics, FES, tendon transfers. In: Trends in the Upper Extremity Management of Individuals with SCI (instructional course)

Treatment of Scoliosis, Innsbruck, Austria, March 1995

- Surgical treatment for thoracic, thoracolumbar, and lumbar scoliosis: anterior approach

American Academy of Orthopaedic Surgeons annual meeting, Orlando, February 1995

- Initial evaluation and management of the pediatric spinal injury. In: Initial management of patients with spinal cord injury (instructional course)

American Academy of Cerebral Palsy and Developmental Medicine annual meeting; New Orleans, September 1994

- Betz RR, Mulcahey MJ, Vogel LC, James MA: The child with spinal cord injury, part 2: From rehabilitation to habilitation (instructional course)
- Betz RR, Weiss AA, James MA, Mulcahey MJ: Providing a hand towards competency in daily activities: creative solutions for upper extremity dysfunction (instructional course)

Neural Protheses: Motor Systems IV. Mt. Sterling, Ohio, June 1994

- Upper extremity applications in the pediatric SCI and CP populations

American Spinal Injury Association annual meeting, Philadelphia, April 1994

- Betz RR, Vogel LC, Mulcahey MJ, Morales V: Pediatric spinal cord injury: unique characteristics (instructional course)

American Academy of Cerebral Palsy and Developmental Medicine annual meeting, Nashville, September 1993.

- Betz RR, Mulcahey MJ, Vogel LC, James MA: The child with spinal cord injury, part 1: early rehabilitation (instructional course)

MOSS Instrumentation: Biomechanics, Indications and Techniques, June 1993

- Anterior MOSS for Scoliosis

St. Joseph's Health Centre, London, Ontario, Canada, July 1992

- Pelvic osteotomies for treatment of pediatric hip disorders
- Current controversies in the treatment of scoliosis
- Reliable early radiographic differentiation of infantile Blount's disease and physiologic bowing
- The contralateral slipped capital femoral epiphysis. Can you prevent it? Can you detect it early?

American Academy of Orthopaedic Surgeons annual meeting, San Francisco, February 1993

- The role of nonoperative treatment for patients with slipped capital femoral epiphysis (instructional course)

Guy A. Caldwell Visiting Professor, Children's Hospital and Tulane University Medical Center, New Orleans, June 1992

- Reliable early differentiation of infantile Blount's disease and physiologic bowing
- Pelvic osteotomies for treatment of pediatric hip disorders
- Current controversies in the treatment of scoliosis
- Current perspectives on treatment of SCFE: Can MRI predict a contralateral slip?

Future Research in Neurological and Functional Recovery in SCI. Jefferson Medical College, Philadelphia, February 1992

- Upper extremity functional electrical stimulation: potential for future research

American Academy of Orthopaedic Surgeons annual meeting, Washington DC, February 1992

- The role of nonoperative treatment for patients with slipped capital femoral epiphysis (instructional course)

Update Course on Cotrel-Dubousset Instrumentation, Philadelphia, June 1991

- Local host and moderator of Session 1: Deformity

Nemours Children's Clinic and Northeast Florida Orthopaedic Society, April 1991

- Perspectives on slipped capital femoral epiphysis: Is pinning always necessary? Can MRI predict an impending contralateral slip?
- Back pain in children
- Current controversies regarding instrumentation for treatment of spinal deformity

Brooklyn Orthopaedic Society, January 1991

- Perspectives on slipped capital femoral epiphysis: Is pinning always necessary? Can MRI predict an impending contralateral slip?

34th Annual Orthopaedic Rehabilitation Symposium and Ontario Orthopaedic Association, Toronto, Ontario, November 1990

- Post-traumatic spinal cord syrinx: an evaluation by MRI
- Functional neuromuscular stimulation in spinal cord injured patients
- Cast treatment of slipped capital femoral epiphysis

St. Joseph's Hospital, February 1990: Kaneda Anterior Spinal Device Instrumentation Introductory Course

- Zielke anterior instrumentation

St. Joseph's Hospital, December 1989: Cotrel-Dubousset Spinal Instrumentation Introductory Course

- Common scoliosis curvatures and preoperative planning

Cotrel-Dubousset Spinal Instrumentation, New Orleans, LA, November 1989

- Introduction to the components
- Idiopathic scoliosis constructs - thoracic
- C-D in neuromuscular scoliosis
- Use of C-D in kyphosis

Gwynedd-Mercy College, October 1988

- Scoliosis and its treatment: a contemporary approach

Philadelphia Orthopaedic Review Course, May 1988

- Congenital epiphyseal plate disorders

Pennsylvania Academy of Chiropractic Physicians, April 1988

- An allopathic approach to diagnosis and management of scoliosis

Memphis Orthopaedic Association and LeBonheur Children's Medical Center, Memphis, April 1988

- Early diagnosis and treatment of scoliosis
- Evaluation of low back pain in children
- Orthopaedic infections in children
- The current treatment of thoracolumbar spine fractures

Children's Hospital of Buffalo, Buffalo, New York, December 1987

- The Chiari pelvic osteotomy in children and young adults
- Steel (triple) osteotomy of the innominate bone

Medical College of Pennsylvania, Philadelphia, September 1987

- Cotrel fixation in scoliosis

Perspectives in Pediatric Orthopaedics: The Pediatric Hip, Wilmington, DE, May 1987

- Triple innominate osteotomy
- Chiari osteotomy

Pennsylvania Academy of Chiropractic Surgeons, April 1987

- Anatomy to include embryology as it relates to spine deformity
- Biomechanics of the spine as it relates to spine deformity
- Etiology of scoliosis
- Classification of scoliosis
- History taking, physical examination and diagnostic work-up for patients with scoliosis
- Natural history of scoliosis
- Conservative treatment of scoliosis to include exercise, observation, and bracing
- Surgical treatment of scoliosis
- Back pain associated with scoliosis, and treatment and diagnosis
- Psychosocial issues subsequent to scoliosis
- Problems in adulthood for patients with scoliosis

Family Practice Review, Lancaster, PA, March 1986

- Scoliosis in the young adult: therapeutic, rehabilitative and prognostic considerations
- History and treatment of common sports injuries

Shriners Hospitals for Children, Chicago, February 1984

- Orthopaedic management and complications of spinal cord injury
- Complications in spinal cord injury
- Recent research in spinal cord injury