



San Diego Spine Foundation

Annual Report

Academic Year

August 2011 – July 2012



fostering excellence in spinal education and research

Research

Below is the list of publications and presentations for 2011-2012 academic year

PEER-REVIEWED PUBLICATIONS: ADULT SPINE

- 1 Dakwar E, Le T, Baaj A, Le A, Smith W, **Akbarnia B**, Uribe J. Abdominal Wall Paresis as a Complication of Minimally Invasive Lateral Transposas Interbody Fusion. Neurosurg Focus. 2011 Oct;31(4):E18.
- 2 Klineberg E, Schwab F, Ames C, Hostin R, Bess S, Smith J, Gupta M, Boachie O, Hart R, **Akbarnia B**, Burton D, Lafage V. Acute Reciprocal Changes Distant from the Site of Spinal Osteotomies Affect Global Post Operative Alignment. Adv Orthop. 2011; 2011:415946. Epub 2011 Oct 4.
- 3 Haghghi S, **Mundis G**, Zhang R, Ramirez B. Correlation Between Transcranial Motor and Somatosensory-Evoked Potential Findings in Cervical Myelopathy or Radiculopathy During Cervical Spine Surgery. Neurol Res. 2011 Nov;33(9):893-8.
- 4 Lafage V, Ames C, Schwab F, Klineberg E, **Akbarnia B**, Smith J, Boachie-Adjei O, Burton D, Hart R, Hostin R, Shaffrey C, Wood K, Bess S. International Spine Study Group. Changes in Thoracic Kyphosis Negatively Impact Sagittal Alignment Following Lumbar Pedicle Subtraction Osteotomy. A Comprehensive Radiographic Analysis. Spine. 2012 Feb 1;37(3):E180-7.
- 5 Fu K, Smith J, Burton D, Shaffrey C, Boachi-Adjei O, Carlson B, Schwab F, Lafage V, Hostin R, Bess S, **Akbarnia B**, **Mundis G**, Klineberg E, Gupta M. International Spine Study Group. Outcomes and Complications of Extension of Previous Long Fusion to the Sacro-Pelvis: Is an Anterior Approach Necessary? World Neurosurg. 2012 Jun 18.
- 6 Schwab, F.J., Patel, A., Shaffrey, C.I., Smith, J.S., Farcy, J.P., Boachie-Adjaei, O., Hostin, R., Hart, R., **Akbarnia, B.A.**, Burton, D.C., Bess, S., Lafage, V. : Sagittal Realignment Failures Following Pedicle Subtraction Osteotomy Surgery: Are We Doing Enough? Journal Of Neurosurgery: Spine. Vol 16, June 2012.
- 7 Lafage, V., Bharucha, N.J., Schwab, F., Hart, R.A., Burton, D., Boachie-Adjei, O., Smith, J.S., Hostin, R., Shaffrey, C., Gupta, M., **Akbarnia, B.A.**, Bess, S.: Multicenter Validation of a Formula Predicting Postoperative Spinopelvic Alignment. j neurosurg spine, Volume 16, Issue 1, January 2012, PP. 15-21 .

PEER-REVIEWED PUBLICATIONS: PEDIATRIC SPINE

- 1 **Akbarnia B.A.**; Campbell RM; Dimeglio A; Flynn JM; Redding GJ; Sponseller PD; Vitale MG; Yazici M: Fusionless Procedures for the Management of Early-Onset Spine Deformities in 2011: What do we Know? J Child Orthop 2011; 5(3):159-72
- 2 Sponseller PD, **Akbarnia B.A.**, Lenke LG, ET AL.: Pediatric Spinal Deformity: What Every Orthopaedic Surgeon Needs to Know; Instr Course Lect (United States), 2012, 61 P481-97
- 3 Yang J, Sponseller P, Thompson G, **Akbarnia B**, Emans J, Yazici M, Skaggs D, Shah S, Salari P, Poe-Kochert C; Growing Spine Study Group. Growing Rod Fractures: Risk Factors and Opportunities For Prevention. Spine. 2011 Sep 15;36(20):1639-44.
- 4 Cheung KM, Cheung JP, Samartzis D, Mak KC, Wong YW, Cheung WY, **Akbarnia B**, Luk KD. Magnetically Controlled Growing Rods for Severe Spinal in Young Children: A Prospective Case Series. Lancet. 2012 May 26;379(9830):1967-74. Epub 2012 Apr 19.
- 5 **Akbarnia B**, **Mundis G**, Salari P, Yaszay B, **Pawelek J**. Innovation in Growing Rod Technique: A Study of Safety and Efficacy of a Magnetically Controlled Growing Rod in a Porcine Model. Spine. 2012 Jun 1;37(13):1109-14.
- 6 Schroerlucke S, **Akbarnia B**, **Pawelek J**, Salari P, **Mundis G**, Yazici M, Emans J, Sponseller P. How Does Thoracic Kyphosis Affect Patient Outcomes in Growing Rod Surgery Spine. 2012 Jul 1;37(15):1303-9.



RESEARCH PRESENTATIONS: ADULT SPINE

A. Podium Presentations:

- 1 Stanton P, Nomoto E, **Kabirian N, Bruffey J, Mundis G, Akbarnia B, Eastlack R**. Analysis of Transposas Lateral Lumbar Interbody Fusion (LLIF) for the Treatment of Adult Lumbar Degenerative Spondylolisthesis (DS): A Radiographic Review. Society of Lateral Access Surgery, San Diego, CA, July 2012.
- 2 Nomoto E, Stanton P, **Kabirian N, Bruffey J, Pawelek J, Mundis G, Akbarnia B, Eastlack R**. Subsidence and Lumbar Sagittal Alignment Following Lateral Lumbar Interbody Fusion. Society of Lateral Access Surgery, San Diego, CA, July 2012.
- 3 **Akbarnia B, Mundis G Jr, Moazzaz P, Kabirian N, Bagheri R, Eastlack R, Pawelek J**. Anterior Column Realignment (ACR) For Focal Kyphotic Spinal Deformity Using a Lateral Transposas Interbody Approach and ALL Release. Society of Lateral Access Surgery, San Diego, CA, July 2012.
- 4 Moazzaz P, **Eastlack R, Bruffey J, Akbarnia B**. Symptomatic Intra-psoas Seroma Formation After Lateral Lumbar Interbody Fusion (LLIF) with Use of Recombinant Bone Morphogenetic Protein-2: A Report of Two Cases. Society of Lateral Access Surgery, San Diego, CA, July 2012.
- 5 Bess S, Line B, Boachie O, Hart R, Lafage V, Schwab F, **Akbarnia B**, Ames C, Burton D, Hostin E, Kebaish K, Klineberg E, Gupta M, **Mundis G**, Deviren V, O'Brien M, Wood, Shaffrey C, Smith J, International Spine Study Group. Does Recombinant Human Bone Morphogenetic Protein-2 (BMP) Use in Adult Spinal Deformity (ASD) Increase Complications and Are Complications Dose Related? A Prospective, Multicenter Study of 257 Consecutive Patients. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012. *Whitecloud Award Nomination for Best Clinical Research Paper.*
- 6 Ames C, Scheer J, Smith J, Gupta M, Klineberg E, Hart R, **Mundis G, Akbarnia B**, Burton D, Hostin E, O'Brien M, Shaffrey C, Bess S, Schwab F, Kebaish K, Deviren V, International Spine Study Group. Reoperation Rates and Impact on Outcome in a Large Prospective Multicenter Adult Spinal Deformity Database. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 7 Schwab, F.J., Bess, S., Blondel, B., Hostin, R., Shaffrey, C.I., Smith, J.S., Boachie-Adjei, O., Burton, D.C., **Akbarnia, B.A., Mundis, G.M.**, Ames, C.P., Kebaish, K., Hart, R.A., International Spine Study Group, Lafage, V.: Combined Assessment of Pelvic Tilt, Pelvic Incidence/Lumbar Lordosis Mismatch and Sagittal Vertical Axis Predicts Disability in Adult Spinal Deformity: A Prospective Analysis. 46th Annual Scoliosis Research Society, Louisville, Kentucky, September 2011.

B. Poster Presentations:

- 1 Stanton P, Nomoto E, **Kabirian N, Bruffey J, Mundis G, Akbarnia B, Eastlack R**. Analysis of Transposas Lateral Lumbar Interbody Fusion (LLIF) for the Treatment of Adult Lumbar Degenerative Spondylolisthesis (DS): A Radiographic Review. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 2 Nomoto E, Stanton P, **Kabirian N, Bruffey J, Pawelek J, Mundis G, Akbarnia B, Eastlack R**. Subsidence and Lumbar Sagittal Alignment Following Lateral Lumbar Interbody Fusion. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 3 **Akbarnia B, Mundis G, Moazzaz P, Kabirian N, Bagheri R, Eastlack R, Pawelek J**. Anterior Column Realignment (ACR) For Focal Kyphotic Spinal Deformity Using a Lateral Transposas Interbody Approach and ALL Release. Society for Minimally Invasive Spine Surgery, Las Vegas, NV, October 2011.
- 4 **Akbarnia B, Mundis G, Bagheri R; Kabirian N, Salari P, Pawelek, J**. Is the less invasive far lateral approach a safe way to reconstruct the anterior spinal column in advanced adult deformity surgery? A minimum 2-year follow-up study. Scoliosis Research Society, Louisville, KY, September 2011.
- 5 Uribe J.S, Smith D, Dakwar E, Baaj A, **Mundis G**, Turner A.W, Cornwall B, Akbarnia, B. Lordosis Restoration After Anterior Longitudinal Ligament Release and Placement of Lateral Hyperlordotic Interbody cages During the MIS Lateral Transposas Approach. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 6 **Mundis G**, Terran J, Deviren V, Ames C., Gupta, Burton D, International Spine Study Group. Risk Factors in Predicting Early Post-Operative Coronal Imbalance in Adult Spinal Deformity Patients: A Multicenter Analysis. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 7 Moal B, Schwab F, Ames C, Smith J, **Mundis G**, Terran, Klineberg, Hart R, Boachie O, Shaffrey C, Lafage V, International Spine Study Group. Radiographic Outcomes of Spinal Deformity Correction in Adult Patients: A Critical Analysis of Variability and Failures Across Deformity Patterns; International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012



- 8 Ames C, Scheer J, Deviren V, Smith J, Bess S, Hostin R, Klineberg E, Hart R, **Mundis G**, O'Brien M, Shaffrey C, Lafage V, Kebaish K, Schwab F, International Spine Study Group. Effect of Upper Instrumented Vertebra (UIV) On Adult Spinal Deformity (ASD) Correction, Maintenance of Correction, and Health Related Quality of Life (HRQOL) Following Lumbar Pedicle Subtraction Osteotomy (PSO). International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 7 McElroy M, Sponseller P, Yazici M, **Akbarnia B**, Thompson G, Skaggs D, Emans J, **Pawelek J**; Growing Spine Study Group. Operative Idiopathic Early Onset Scoliosis and AIS Curves Have Different Characteristics. International Congress on Early Onset Scoliosis, Orlando, FL, November 2011.
- 8 Yaszay B, **Kabirian N**, **Pawelek J**, Emans J, Johnston C, Shah S, **Mundis G**, **Akbarnia B**, Growing Spine Study Group. Beware the Risks of Instrumenting to the Pelvis in Ambulatory Early Onset Scoliosis Patients Treated with Growth Sparing Surgery. Scoliosis Research Society, Louisville, KY, September 2011.

RESEARCH PRESENTATIONS: PEDIATRIC SPINE

A. Podium Presentations:

- 1 **Akbarnia B**, Cheung K, Noordeen H, Elsebaie H, Yazici M, Dannawi Z, **Kabirian N**. Next Generation of Growth-Sparing Techniques: Preliminary Clinical Results of a Magnetically Controlled Growing Rod in 14 Patients. International Congress on Early Onset Scoliosis, Orlando, FL, November 2011; Pediatric Orthopedic Society of North America, Denver, CO, May 2012.
- 2 **Mundis G**, Nomoto E, Hennessey M, **Pawelek J**, **Akbarnia B**. Longitudinal Analysis of Radiation Exposure During the Course of Growing Rod Treatment for Early Onset Scoliosis. International Congress on Early Onset Scoliosis, Orlando, FL, November 2011; International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 3 Cheung, K, Cheung J, Samartzis D, Mak, K, Wong Y, Cheung W; **Akbarnia, B**, Luk K. The Safety and Efficacy of a Remotely Distractible, Magnetic Controlled Growing Rod (MCGR) for the Treatment of Scoliosis in Children: A Prospective Case Series with Minimum 2 year Follow-Up. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 4 McElroy M, Sponseller P, Dattilo J, Thompson G, **Akbarnia B**, Growing Spine Study Group. A Critical Assessment of Growing Rods for the Treatment of Pediatric Scoliosis in Cerebral Palsy. International Congress on Early Onset Scoliosis, Orlando, FL, November 2011; Pediatric Orthopedic Society of North America, Denver, CO, May 2012; International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 5 **Akbarnia B**, **Kabirian N**, **Zhang D**, **Pawelek J**, Redding G, Emans J, Shah S, Johnston C, Growing Spine Study Group. Is There a Significant Increase in Thoracic Height after Growing Rod Surgery for Early Onset Scoliosis? International Congress on Early Onset Scoliosis, Orlando, FL, November 2011.
- 6 **Akbarnia, B**, **Kabirian N**, **Pawelek J**, Alam M, **Mundis G**, Acacio R, Thompson G; Marks D, Gardner A, Skaggs D, Growing Spine Study Group. Deep Surgical Site Infection Following Growing Rod Surgery in Early Onset Scoliosis: How Does It Change the Course of Treatment? International Congress on Early Onset Scoliosis, Orlando, FL, November 2011.
- 9 Yamaguchi K, Skaggs D, Myung K, Mansour S, Yazici M, Johnston C, Thompson G, Sponseller P, **Akbarnia B**, Vitale M; Are Proximal Rib Anchors Protective Against Rod Breakage in Distraction-Based Growing Rods? International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 10 McElroy, M., Sponseller, P.D., Dattilo, J.R., Thompson, G.H., **Akbarnia, B.A.**, Shah, S. A., Snyder, B.D., Growing Spine Study Group; A Critical Assessment of Growing Rods for the Treatment of Pediatric Scoliosis In Cerebral Palsy; International Meeting On Advanced Spine Techniques Istanbul, Turkey, July 2012. *Whitecloud Award Nomination for Best Clinical Research Paper*.
- 11 Brendan A. Williams, **Behrooz A. Akbarnia**, Randal R. Betz, Laurel C. Blakemore, John M. Flynn, Charles E. Johnston, MD; Richard E. McCarthy; John T. Smith, MD; Brian D. Snyder, Paul D. Sponseller, Peter Sturm, George H. Thompson, Muharrem Yazici, Michael Vitale, David P. Roye. Introducing the Early Onset Scoliosis Classification System: International Meeting on Advanced Spine Techniques Istanbul, Turkey, July 2012



Poster Presentations:

- 1 **Akbarnia B**, Cheung K, Noordeen H, Elsebaie H, Yazici M, Dannawi Z, **Kabirian N**. Next Generation of Growth-Sparing Techniques: Preliminary Clinical Results of a Magnetically Controlled Growing Rod in 14 Patients. Scoliosis Research Society, Louisville, KY, September 2011; Society for Minimally Invasive Spine Surgery, Las Vegas, NV, October 2011.
- 2 **Mundis G**, Nomoto E, Hennessey M, **Pawelek J**, **Akbarnia B**. Longitudinal Analysis of Radiation Exposure During the Course of Growing Rod Treatment for Early Onset Scoliosis. Scoliosis Research Society, Louisville, KY, September 2011.
- 3 Altaf, F., Sedra, F., Noordeen, H., **Akbarnia, B.**: Pulmonary Function In Patients With Early Onset Scoliosis Undergoing Treatment With Growing Rods. 5th International Congress on Early Onset Scoliosis and Growing Spine, Orlando, FL, November 2011.
- 4 El sebaie H, Noordeen H, **Akbarnia B**. Incidence, Magnitude and Classification of Pedicle Screw Migration. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 5 **Akbarnia B**, **Kabirian N**, **Zhang D**, **Pawelek J**, Redding G, Emans J, Shah S, Johnston C, Growing Spine Study Group. Is There a Significant Increase in Thoracic Height after Growing Rod Surgery for Early Onset Scoliosis? International Congress on Early Onset Scoliosis, Orlando, FL, November 2011; International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 6 **Akbarnia, B**, **Kabirian N**, **Pawelek J**, Alam M, **Mundis G**, Acacio R, Thompson G; Marks D, Gardner A, Skaggs D, Growing Spine Study Group. Deep Surgical Site Infection Following Growing Rod Surgery in Early Onset Scoliosis: How Does It Change the Course of Treatment? Pediatric Orthopedic Society of North America, Denver, CO, May 2012.
- 7 Myung K, Lee C, Wall E, Jain V, Shah S, Johnston C, **Akbarnia B**, Skaggs D, Growing Spine Study Group. Hemoglobin Levels in Patients with Early Onset Scoliosis Treated with Growing Rods. International Congress on Early Onset Scoliosis, Orlando, FL, November 2011.
- 8 McElroy M, Sponseller P, Yazici M, **Akbarnia B**, Thompson G, Skaggs D, Emans J, **Pawelek J**, Growing Spine Study Group. Operative Idiopathic Early Onset Scoliosis and AIS Curves Have Different Characteristics. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 9 Yaszay B, **Pawelek J**, **Kabirian N**, Bastrom T, Emans J, Thompson G, McCarthy R, **Mundis G**, **Akbarnia B**, Growing Spine Study Group. The Value of Flexibility Radiographs in Predicting Coronal Curve Correction Following Growing Rod Surgery. International Congress on Early Onset Scoliosis, Orlando, FL, November 2011.
- 10 Yaszay B, **Kabirian N**, **Pawelek J**, Emans J, Johnston C, Shah S, **Mundis G**, **Akbarnia B**, Growing Spine Study Group. Beware the Risks of Instrumenting to the Pelvis in Ambulatory Early Onset Scoliosis Patients Treated with Growth Sparing Surgery. International Congress on Early Onset Scoliosis, Orlando, FL, November 2011.
- 11 Yaszay B, **Kabirian N**, **Pawelek J**, Bastrom T, Emans J, Johnston C, Thompson G, **Mundis G**, **Akbarnia B**, Growing Spine Study Group. What Do Coronal Flexibility Films Really Tell Us About the Treatment of Idiopathic Early-onset Scoliosis Patients Using Growing Rods? International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 12 Yamaguchi K, Skaggs D, Myung K, Mansour S, Yazici M, Johnston C, Thompson G, Sponseller P, **Akbarnia B**, Vitale M. Are Rib Anchors Protective Against Rod Breakage in Distraction-Based Growing Rods? International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 13 Schwend R, Blakemore L, **Akbarnia B**, Reigut J, Schmidt J, Complex Spine Study Group. Coupled Symmetry and Proportional Expansion of the Ribs Through Adolescence. International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.
- 14 Lebl, D.R., Boachie-Adjei, O., **Akbarnia, B.A.**, Gogia, J., Krajchich, J.I., Woo, R, Rahm, M.D, King, A.B., Cunningham, M.E.: Anterior Vs Posterior Surgery for Lenke 5 Adolescent Idiopathic Scholiosis: Clinical and Radiographic Outcomes. American Academy of Orthopaedic Surgeons Annual Meeting, San Francisco, California, February 2012.
- 15 Woo, R.W., Blakemore, L.C., Trammell, T.R., Moore, J., Yaszay, B., Ginsburg, G.M., Perez-Grueso, F.J., Kishan, S., Boachie-Adjei, O., **Akbarnia, B.A.**, Strauss, K., Complex Spine Study Group: A Comprehensive Nomenclature for Standardized Radiographic Measurements of Vertebral Morphology. 19th International Meeting on Advanced Spine Technologies, Istanbul, Turkey, July 2012.

posters
 disc disease
 podium
 adult
 cervical
 pelvis
 lumbar
 growing rod
 pediatric
 interbody
 sacro
 fusion
 transcranial
 scoliosis
 presentations

RESEARCH PRESENTATIONS: BASIC SCIENCE

A. Podium Presentations:

- 1 Schroerlucke S, **Eastlack R**, Steklov N, **Akbarnia B**, **Mundis G**, Marino J. Biomechanical Testing of Pedicle Screws: Polyaxial, Monoaxial, and a Novel Uniplanar Design. Society for Minimally Invasive Spine Surgery, Las Vegas, NV, October 2011.

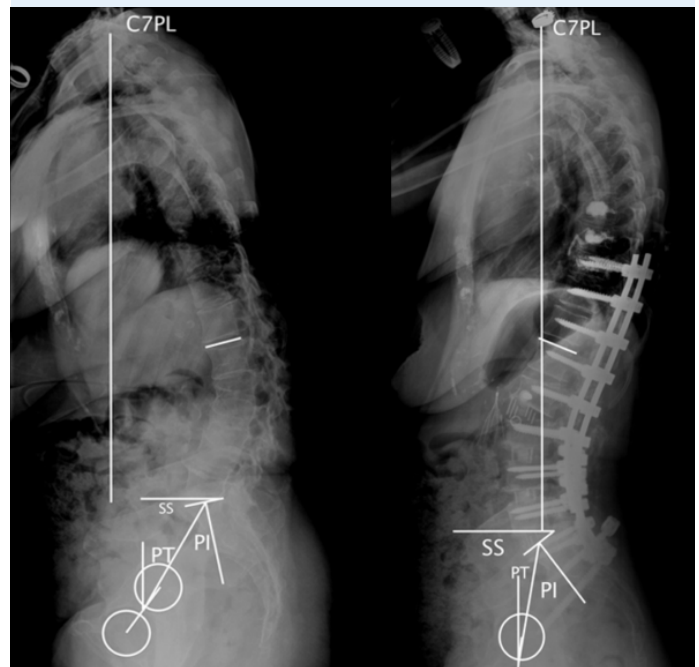
B. Poster Presentations:

- 1 **Mundis G**, **Eastlack R**, Moazzaz P, Turner A, Cornwall B. Contribution of Round vs. Rectangular Expandable Cage Endplates to Spinal Stability in a Cadaveric Corpectomy Model (XCORE). Society for Minimally Invasive Spine Surgery, Las Vegas, NV, October 2011.
- 2 Grogan S, Hennessy M, Chen X, Sovani S, D’Lima D, **Eastlack R**. Isolation of Osteogenic Cell Populations from Bone Fragments Harvested During Lumbar Spine Fusion Procedures. Orthopedic Research Society, San Francisco, CA, February 2012.
- 3 **Akbarnia B**, Yaszay B, Yazici M, **Kabirian N**, Strauss K, Glaser D. Biomechanical Evaluation of 4 Different Foundation Constructs Commonly Used in Growing Spine Surgery: Are Rib Anchors Comparable to Spine Anchors? International Meeting of Advanced Spine Technique, Istanbul, Turkey, July 2012.

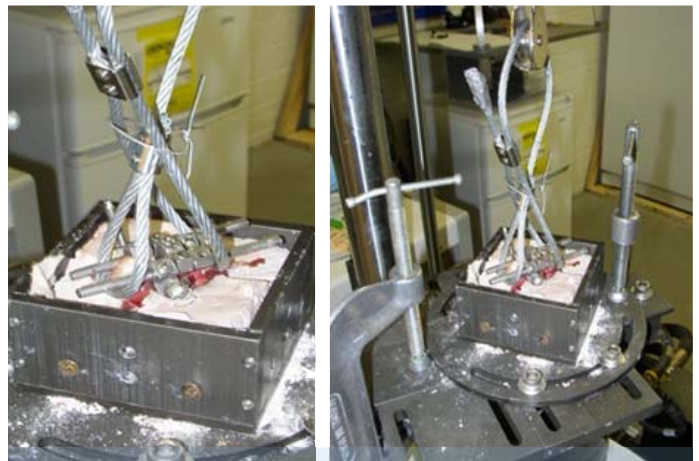
“The Foundation has developed a strong program both in clinical as well as laboratory research.

As you will note in our research report, the results of these projects are presented in many meetings throughout the world.”

Innovation



Anterior Column Realignment (ACR) is a technique to restore stooped forward posture through minimally invasive techniques. It was first described by Akbarnia et al in 2012. The concept is to use mobile disc spaces in the anterior spine to create an angular correction without the need to do a much more invasive posterior-based surgery called osteotomy. The preliminary results are very encouraging and were recently accepted for publication in the Journal of Spinal Disorders and Techniques.



Research in Biomechanical Laboratory

RESEARCH STAFF

Nima Kabirian, M.D.

Research Fellow

Jeff B. Pawelek, B.S.

Research Director

Jayla Kyaw, B.S. / Daniel L. Zhang, B.S.

Research Coordinators