

## **Vikas V. Patel MA, MD**

Professor, Executive Vice Chair, Department of Orthopaedic Surgery  
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### ***EDUCATION***

The Spine Institute at St. John's Hospital, Santa Monica, California  
Spine Surgery Fellowship, Rick Delamarter, Hyun Bae, Ed Dawson Aug. 2003-July 2004  
University of California, San Francisco Department of Orthopaedic Surgery  
Internship, General Surgery 1997-1998  
Residency, Orthopaedic Surgery 1998-2003  
Washington University School of Medicine, St. Louis Missouri  
Masters in Biomedical Sciences 1997  
Doctor of Medicine 1992-1997  
University of Illinois, Champaign-Urbana Illinois  
Bachelor of Science, Mechanical Engineering 1987-1991  
Technical University of Munich, Munich, Germany  
Engineering 1989-1990

### ***ACADEMIC APPOINTMENTS***

Professor, Department of Orthopaedic Surgery,  
July 2014 to Present  
Professor, Chief of Orthopaedic Spine Surgery, Department of Orthopaedic Surgery,  
July 2014 to 2019  
Associate Professor, Chief of Orthopaedic Spine Surgery, Department of Orthopaedic Surgery,  
June 2009 to July 2014  
Assistant Professor, Orthopaedic Spine Surgery, Department of Orthopaedic Surgery,  
September 2004 to May 2009  
Graduate Faculty, University of Colorado Denver, Bioengineering,  
March 2014 to present  
Faculty: AO North America, 2008 to present

### ***HOSPITAL, GOVERNMENT OR OTHER PROFESSIONAL POSITIONS***

University of Colorado Health Sciences, Chief of Orthopaedic Spine Surgery 2014-2019  
Consultant – Synthes: Cervical spine fusion product development.  
Consultant – Biomet Spine: Lumbar spine fusion product development.  
Consultant – Cerapedics: Biologic spine fusion product development.  
Consultant – Aesculap: Pedicle screw system development  
Consultant – Lanx: Spine surgical practice teaching and medical  
Consultant – Allosource: Clinical trial design  
Engineer – Baxter Healthcare Renal Division, Chicago Illinois 1991-1992  
New Product Development  
Robotic Production Equipment Design

### ***HONORS, SPECIAL RECOGNITIONS AND AWARDS***

- Becker's Orthopedics and Spine: Ten Spine Surgeon Leaders of Academic Medicine to Know 2009
- Best Poster Presentations, North American Spine Society Annual Meeting 2010
- WhiteCloud Award for Best Basic Science Paper: SRS International Meeting of Advanced Spine Techniques, 2010

- Russell A. Hibbs Award for Best Basic Science Paper 43rd Annual SRS 2008
- John H. Moe - Best Basic Science Award, Scoliosis Research Society 2004
- Cervical Spine Research Society Top 10 Poster Award, 2008
- AAOS Basic Educator's Course Scholarship 2002
- The Dames Prize for Cell Biology
- Master's in Biomedical Science Scholarship and Stipend, Washington University
- Bone and Joint Decade Young Investigator's Recipient
- University of Colorado Hospital Inspired Kindness Award 2011
- Minor: Strathmore's Who's Who in America 2007, 2008, 2009, 2010
  - America's Top Orthopedists, 2009, 2010, 2011, 2012
  - Best Doctors in America: 2011
  - Marquis Who's Who 2010, 2011, 12
  - Who's Who in Science and Engineering, 2012.
  - Colorado Biz, Best Doctors, 2012
- Nominated: Best Paper SICOT 2010
- Scoliosis Research Society Travelling Fellowship 2013
- University of Colorado Hospital Pioneer Award 2014
- Becker's Spine Review: 28 Spine Leaders at Academic Medical Centers 2014
- SICOT Hull Deformity Award: Patient Specific Spine Rods (PSSR) Decrease Rate of Mechanical Complications (MC) after Correction of Adult Spine Deformity (ASD) Nov 2018

### ***MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS***

American Academy of Orthopaedic Surgery  
 Colorado Medical Society  
 Scoliosis Research Society  
 Western Orthopaedic Association  
 AO North America  
 American Association of Neurologic Surgeons  
 Society International of Orthopaedic Surgery and Traumatology  
 American Orthopaedic Association  
 Sacroiliac Medical Expert Group e.V.

### ***COMMITTEE AND SERVICE RESPONSIBILITIES***

#### **UNIVERSITY/INSTITUTIONAL**

##### **Present:**

Director – Orthopedic Department Governance Committee 2019  
 Member Orthopedic Department Faculty Research Committee  
 Member Orthopedic Department Marketing Committee  
 Member Spine Center Leadership  
 Spine Fellowship Co-Director

##### **Past:**

Resident Spine Surgery Rotation Co-Director  
 Resident Spine Core Curriculum Educational Director  
 Research Advisory Committee  
 Clinical Leadership Committee Task Force for Quality, Safety and Process Improvement  
 Physical Therapy Scholarship Advisory Board Member  
 Development Committee for Office of Clinical Research

#### **NATIONAL/INTERNATIONAL**

American Academy of Orthopedics: Annual Meeting Committee 20? - present

Scoliosis Research Society: Research Grant Committee 2010 – 2021  
Scoliosis Research Society: IMAST Program Committee 2014 - 2021  
AO Biologics Committee 2010-2019  
North American Spine Society: Public Relations Committee 2009 - 2015  
North American Spine Society: Biologics Committee 2010 - 2015  
North American Spine Society: Research Committee 2011 – 2015  
American Pain Association: Board Member 2016 – Present  
The American Board of Orthopaedic Surgery: Oral Examination Examiner, 2017  
The American Board of Orthopaedic Surgery: Oral Examination Examiner, 2018

### **CLINICAL SERVICE**

Spine Center, University of Colorado Hospital  
Orthopedic Call Coverage, University of Colorado Hospital  
Spine Team Surgical Medical Director  
University of Colorado Hospital in-patient Spine Service  
Denver Health Spine Trauma and Spine Clinic  
Denver Veteran's Hospital Call Coverage

### **VOLUNTEER ACTIVITY**

Orthopaedics Overseas: Umtata South Africa, Oct 2001  
Rotary International, India Polio Follow Up and Gujarat Earthquake, Jan 2001  
Operation Rainbow, Huehuetenango, Guatemala, 2003  
University of Colorado Biomedical Engineering Society, Medical Advisor 2011, 2012, 2013  
Indo-American Spine Alliance (IASA) 2014 – present

### **LICENSURE AND BOARD CERTIFICATION**

Medical License, Colorado, active: 2004-Present. California, active: 1998-2004, retired 2004  
Board Certification: American Board of Orthopedic Surgeons 2006-present

### **INVENTIONS, INTELLECTUAL PROPERTY AND PATENTS HELD OR PENDING**

Noshchenko, AG. Burger-(Van Der Walt), E. **Patel, VV**. Kleck, CJ. Mai, J. Pub 10-14-2021. ID- US 2021031506 A1. *Patient -Specific Spinal Implants*. US Patent Application 17/266535; Filed 8-8-2019.

**Patel, VV**. Kleck, C. Bowman, B. John, T. Paganelli, J. Pub 10-22-2020. ID – US 20200330660 A1. *Post-Operative Surgical Site Wound Treatment and Method for Device Removal*. US Patent Application 16/796826; Filed 2-20-2020. Provisional application US 62549357 20170823.

**Patel, V**. Nanninga, J. Pub 2-20-2020. ID – US 20200054373 A1. *System and Methods for Fastening of Two or More Interacting Elements*. US Patent Application 16/654691; Filed October 16, 2019. Provisional application US 62025163 20140716.

Arnold, B. Bowman, B. Pena, K. **Patel, V**. Pub 1-18-2018. ID – US 20180014939 A1. *Implant and Method for Posterior Sacroiliac Fusion*. US Patent Application 15/653284; Filed July 18, 2017. Provisional application US 62363752 20160718 and US 622448848 20170120.

Park, D. Bartot, M. **Patel, V**. Pub 6-19-2018. ID US 9999224 B2. *Antimicrobial Reverse Thermal Gel and Methods of Forming and Using Same*.

**Patel, V.** Nanninga, J. Pub 06-15-2017. ID – US 20170164988 A1. *System and Methods for Positioning of two or more Interacting Elements*. US Patent Application 15/325822; Filed January 1, 2013. Provisional application US 62025163 20140716.

Yakacki, C. Carpenter, D. **Patel, V.** Noshchenko, A. Pub 2014. Porous, *Patient-Specific Interbody Fusion Cages with Enhanced Loading Characteristics to Reduce Subsidence*. US Patent Application 62/026,678; Filed July 31, 2014. Provisional patent filed.

Mauldin, RG. **Patel, VV.** Yerby, SA. Sand, P. Pub 10-10-2013. *Impactor*. US Patent ID 20130267961 A1.

## **EDITOR, REVIEW AND REFEREE WORK**

### **Present:**

Associate Editor: Orthopedics

Reviewer: Spine

Reviewer: Orthopedics

Reviewer: Clinical Orthopedics and Related Research

Reviewer: Medical Engineering and Physics

Reviewer: Current Orthopaedic Practice

Editorial Board: Orthopedics

Editorial Board: Orthopedics Today

Editorial Board: Spine Surgery Today

Editorial Board: Healio

Reviewer: BMC Musculoskeletal Disorders

### **Past:**

Reviewer: Journal of Comparative Effectiveness Research

Grant Reviewer: National Medical Research Council, Singapore 2009-2011, 2014, 2015

Program Reviewer: Medical Education Resources 2011

NASS Abstract Reviewer, Annual Meetings 2010 and 2011, 2012, 2015

SRS Abstract Reviewer, Annual Meeting 2014, 2015

IMAST Abstract Reviewer, Annual Meeting 2014, 2015

Reviewer: Journal of Orthopaedic Research 2017

## **INVITED EXTRAMURAL LECTURES, PRESENTATIONS AND VISITING PROFESSORSHIPS**

### **LOCAL**

Physical Therapy Core Curriculum Lecture Oct 2004

Physical Medicine and Rehabilitation Core Curriculum Lecture Dec. 2004

Neurosurgery Core Curriculum Lecture – Biologics Oct. 2006

University of Colorado Grand Rounds:

Artificial Disc Replacement 2005

Geriatric Medicine Grand Rounds Oct. 2006:

The Aging Spine

Resident Course March 2007

Treating the Aging Spine

Physical Medicine and Rehabilitation Department Core Curriculum May 2008

Spine Surgery Indications and Treatments

Department of Rheumatology Fellow Lecture Series Feb 2007, 2008.

Spine Surgery Review

Resident's Spine Course, Degenerative Lumbar Spine, May 2008  
Lumbar Spine Case Discussion Leader  
University of Colorado OR Personnel 04/2009  
Spine Surgical Approaches  
University of Colorado, Dept. of Mechanical Engineering, Medical Device Design  
Course Lecture 02/23/2010  
Orthopedic Resident Core Curriculum Jan 2011  
Primary and Metastatic Spine Tumors  
Department of Rheumatology, Rheumatology and Spine Surgery  
Lecture 3/29/11.  
Department of Bioengineering Spine Section Course BIOE 5011  
Lectures and Practical Workshop, 3/29-3/31/11  
Low Back Pain's Missing Piece – Diagnosing the Sacroiliac Joint, Jan. 24, 2011  
Orthopaedic Surgery and Regenerative Medicine, Yesterday and Today, Gates Center, March 22,  
2012.  
Bioengineering PhD Program, BIOE 5041 Lecturer, April 2012: Spine Surgery  
Grand Rounds for the Department of Neurosurgery, University of Colorado, August 13, 2013  
Department of Rheumatology, Rheumatology and Spine Surgery Lecture, University of Colorado,  
May 6, 2015  
Rocky Mountain Society for Integrative Medicine's Back Pain panel discussion, Knoebel  
Institute for Healthy Aging, Denver University, June 13, 2017  
Orthopedic Resident Core Curriculum Anatomy Lab, August 9, 2017  
Physician Assistants in Orthopaedic Surgery, Lecture: Motion Preservation in Spine Surgery,  
Denver, CO, July 26, 2022  
Bioengineers class, Lecture: Engineering and Spine Surgery, University of Colorado, SOM,  
Division of Cardiology, February 21, 2023

## **REGIONAL**

Colorado State University, Dept. Mechanical Engineering Nov. 2005:  
Spine Biomechanics  
Colorado Spine Symposium, 16<sup>th</sup> Annual: Biomechanical Evaluation of Floating and Fixed Center of  
Rotation Total Disc Replacements: Facet Joint Loads Nov 2005  
16<sup>th</sup> Annual Colorado Spine Symposium Nov. 4, 2005: Biomechanics of Artificial Disc Replacement  
Radiology Technologist's Review 2005:  
Spinal Disorders Review  
Colorado State University, Dept. Mechanical Engineering Nov 2006, 2007, 2008, 2009  
Spine Biomechanics  
Colorado Spine Symposium, 18<sup>th</sup> Annual: Sept 2007  
Trans-1 Screw Fixation  
Channel 7 Colorado and Company, Denver CO, 2005  
Anterior Spinal Fusion  
Channel 7 News, Denver CO, 2007  
Interspinous Spacer Minimally Invasive Surgery  
Channel 7 News, Denver CO, 2008  
Minimally Invasive Anterior Fusion and Physician Education  
Channel 7 News, Denver CO, 2008  
Lumbar Spinal Disc Replacement  
Rocky Mountain Resident's Forum 05/2009

Hemostasis in Spine Surgery, TLIF/PLIF demonstration, Cases  
Rocky Mountain Resident Forum: Treatments in Thoracolumbar Trauma  
Biomechanics of Thoracolumbar Fixation. Cadaver Demonstration, Lab Instructor  
Colorado State University, Dept. Mechanical Engineering Nov. 2010:  
Spine Biomechanics  
Fox News, January 2012, Intraoperative Computer Assisted Surgical Navigation  
Channel 9 News, Denver CO, July 3, 2013  
Back Pain Procedure Offers Less Pain Shorter Recovery time  
Fox 31 News, Denver, CO, January 17, 2014  
Community Rallies Around Colorado Crossfit Athlete Paralyzed During Competition  
Fox 31 News, Denver, CO, January 18, 2014  
Community Bands Together to be “Ogar Strong” for Paralyzed Crossfit Athlete  
Associated Press, January 28, 2014  
Super Bowl Marks Milestone for Manning  
Channel 7 News, Denver, CO, June 9, 2014  
Colorado’s Olympic Swimmer Amy Van Dyken-Rouen Severed Spine in ATV Crash  
Denver Post, Denver, CO, June 9, 2014  
Amy Van Dyken-Rouen, 6-Time Olympic Gold Medalist, Severs Spinal Cord in ATV Crash  
Fox 31 News, Denver, CO, June 10, 2014  
A Closer Look at Amy Van Dyken’s Spinal Cord Injury  
Vail Symposium, Vail CO, January 28, 2016  
Stem Cells: Exploring the Research Perspective

## **NATIONAL**

AO OR Personnel Course – Spine Surgery May 21-22, 2005: Anterior Lumbar Plating  
Synthes Resident and Fellows Course – Cervical Spine Trauma Oct 15-16, 2005:  
Biomechanics of Cervical Spine Trauma  
Case Discussion Leader  
Table Instructor  
Synthes Resident and Fellows Course – Degenerative Lumbar Spine May 15-16, 2005:  
Biomechanics of Lumbar Spine  
Lumbar Spine Degeneration  
Case Discussion Leader  
Table Instructor  
Colorado Family Medicine Review Course Nov. 4, 2005:  
Minimally Invasive Spine Surgery  
Fall Orthopaedic Summit – Section Director: Minimally Invasive Surgery; September 15-17, 2005:  
Minimally Invasive Spine Surgery  
Colorado Family Practice Review Nov. 2005  
New Spine Technology for Primary Care  
Colorado Family Practice Review May. 2005  
New Spine Technology for Primary Care  
AO North America National Resident’s Spine Course Nov 2007  
Spinal Biomechanics  
History and Physical, Imaging and Diagnostics  
Case Discussion Leader  
Table Instructor  
AAOS Maintenance of Certification Course Nov 2007  
Pain Management

Trauma: Cervical, Thoracic, Lumbar  
 Spinal Cord Injury and Rehabilitation  
 Spinal Infection  
 ProDisc-L National Physician Training, Jan 2008  
   Design Rationale  
   Table Instructor  
 DePuy National Spine Fellows Course  
   Table Instructor  
 ProDisc-L National Physician Training, Jan 2008  
   Design Rationale  
   Complications  
   Table Instructor  
 AAOS Maintenance of Certification Course Nov 2008  
   Pain Management  
   Trauma: Cervical, Thoracic, Lumbar  
   Spinal Cord Injury and Rehabilitation  
   Spinal Infection  
 AO North America National OR Personnel Course 2008  
   Course Co-Chairman, Spine Section  
   Cervical Surgical Anatomy  
   Lumbar Degenerative Disease  
 Society of Air Force Clinical Surgeons 04/2009  
   Hemostasis in Spine Surgery: State of the Art  
   Disc Replacement and Motion Preservation Update  
 1<sup>st</sup> Annual Operating Room Spine Course, Sept. 2009  
   Course Chairman. Course for operating room personnel  
 AAOS Maintenance of Certification Course Nov 2009  
   Trauma: Cervical, Thoracic, Lumbar  
   Spinal Cord Injury and Rehabilitation  
   Spinal Infection  
 Colorado Family Medicine Review Course June 2010  
   Low Back Pain  
 Colorado Family Medicine Review Course October 2010  
   Low Back Pain  
 AAOS Maintenance of Certification Course Nov 2010  
   Trauma: Cervical, Thoracic, Lumbar  
   Spinal Cord Injury and Rehabilitation  
   Spinal Infection  
 John McCulloch Memorial 19<sup>th</sup> annual Winter Spine Conference  
   Visiting Professor. Lecture: Lumbar Pseudarthrosis, Feb 2011  
 Sacroiliac Joint Surgery Society, 1<sup>st</sup> annual meeting, 2/2012: Pre-operative protocol with discussion.  
 Sacroiliac Joint Surgery Intraoperative Navigation, University of Colorado 2/28/2012 and 5/16/2012  
 American Association of Orthopedic Surgery, Maintenance of Certification Course, 2012 Section  
   Director  
 American Association of Orthopedic Surgery, Maintenance of Certification Course, 2012 Lectures:  
   Spine Trauma  
 Cutting Edge MD TV Series, 6<sup>th</sup> Episode – Herniated Disc, Fox Sports Network, 2014  
 SI Bone National Training Course, Minimally-Invasive Sacroiliac Fusion with the iFuse Implant  
   System, lecture and live surgery, February 7, 2014  
 The Winter Clinics for Cranial and Spinal Surgery, Experience with the Minimally Invasive Sacroiliac  
   Fusion from a Lateral Approach, February 25, 2014

Washington Post Blogs, Washington, DC, June 10, 2014  
 Olympic Swimmer Amy Van Dyken Severs Spine in ATV Accident

USA Today, Englewood, CO, October 16, 2014  
 Injury to Nervous System Doesn't Mean End of an NFL Career

AAOS Maintenance of Certification Course December 2014  
 Lumbar Degenerative Diseases  
 Cervical Degenerative Diseases  
 Spinal Cord Trauma and Spinal Cord Injury  
 Spine Deformity and Special Considerations  
 Bacterial Spine Infections

AAOS Maintenance of Certification Course December 2015  
 Lumbar Degenerative Diseases  
 Cervical Degenerative Diseases  
 Spinal Cord Trauma and Spinal Cord Injury  
 Spine Deformity and Special Considerations  
 Bacterial Spine Infections

Stryker Spine MedED Resident and Fellow Cervical and Lumbar Education, March 12, 2016  
 Cervical Surgical Techniques  
 Cervical Case Presentations  
 Lumbar Indications for Surgery  
 Lumbar Case Presentations

Stryker Spine MedED The Great Debate: Advanced Techniques and Training, May 20, 2016  
 Diagnosis and Treatment Options for Juxtafusion Disease in a Patient with Flat Back Syndrome,  
 Presentation 1 & 2

Miller Orthopedic Surgery Board Review Part II, May 30, 2016  
 Spine Surgery Sub-Specialty Highlight Lecture and Mock Presentations

AAOS Maintenance of Certification Preparation and Review Course November 19, 2016  
 Spine Infections  
 Thoracic and Lumbar Trauma

AAOS Maintenance of Certification Preparation and Review Course December 1-3, 2016  
 Degenerative Conditions Lumbo - Spine  
 Degenerative Diseases Cervical Spine  
 Spinal Trauma  
 Spine Deformity, Infections Involving the Spine

Merc Research Annual Musculoskeletal Education and Research Center Symposium August 25-26,  
 2017  
 The Future of Robotics

VuMedi/LSRS Webinar, January 8, 2018  
 Diagnostic Workup/Selecting Patients for SIJ Fusion

3<sup>rd</sup> International Conference on Sacroiliac Joint Surgery, February 21-24, 2-18, A Review of the  
 Literature and Current Treatments

3<sup>rd</sup> International Conference on Sacroiliac Joint Surgery, February 21-24, 2-18, A New SIJ  
 Questionnaire

3<sup>rd</sup> International Conference on Sacroiliac Joint Surgery, February 21-24, 2-18, Technical  
 Considerations and Pitfalls – Lateral Approach

3<sup>rd</sup> International Conference on Sacroiliac Joint Surgery, February 21-24, 2-18, Lateral vs. Posterior  
 Approach

3<sup>rd</sup> International Conference on Sacroiliac Joint Surgery, Review of the Literature and Current  
 Treatments, USF Health CAMLS, Tampa, FL, February 21-24, 2018

3<sup>rd</sup> International Conference on Sacroiliac Joint Surgery, A New SIJ Questionnaire, USF Health  
 CAMLS, Tampa, FL, February 21-24, 2018



AAOS 2018 Annual Meeting, Looking Beyond the Curve: Classification and Treatment of Spinal Deformity in the Orthopaedic Clinic, New Orleans, LA, March 6-10, 2018.

AAOS 2018 Annual Meeting, Pragmatic Learning for New Techniques and Technologies in Spine Surgery, New Orleans, LA, March 6-10, 2018.

AAOS 2018 Annual Meeting, What is the Role of Anterior, Oblique, Posterior, and Laterally Based Surgery: How Can They Help?, New Orleans, LA, March 6-10, 2018.

AAOS 2021 Annual Meeting, Economics of Lumbar Disc Replacement, San Diego, CA August 31 – September 3, 2021.

AAOS 2021 Annual Meeting, Lumbar Disc Replacement Outcomes, San Diego, CA August 31 – September 3, 2021.

AAOS 2021 Annual Meeting, Paper 481 - Minimally Invasive Proximal Screw Stabilization in Long Posterior Instrumented Spinal Fusion for Prevention of Proximal Junctional Kyphosis and Failure, San Diego, CA August 31 – September 3, 2021

AAOS 2021 Annual Meeting, P0376 | Sacroiliac (SI) Joint-Specific Disability Questionnaire: The Denver SI Joint Questionnaire Initial Validation, San Diego, CA August 31 – September 3, 2021.

## **INTERNATIONAL**

North American Spine Society: PreCourse Spine Biologics and Research:  
Biologics for the Treatment of Spinal Disorders, Oct 2007

Tissue Engineering and Regenerative Medicine Annual Meeting: Porto, Portugal, 2008  
Clinical and Basic Science Interactions of Fibrin Glue and Bone Morphogenetic Protein

North American Spine Society: PreCourse Spine Pain Management:  
Discogenic and Psychologic Pain, Oct 2008

Wooridul Hospital Group, Seoul Korea, Feb 2009  
Hemostasis in Spine Surgery

AO Spine TK Users Group Meeting 2009  
Case Presentations

North American Spine Society Annual Meeting, 2009  
Spine and Sports Symposium: Implications for the Senior Athlete, How does competitive sport affect surgical decision making in multilevel cervical disease

American College of Spine Surgeons, Annual Meeting June 2010  
Lumbar Pseudarthrosis

Indian Medical Association, Mehsana, India Oct 12, 2010  
Low Back Pain

Asia Pacific Orthopedic Association: Taipei, Taiwan, Nov 4-6, 2010  
Symposium, Hemostasis in Spine Surgery

Advanced Techniques for Complex Spinal Resection and Reconstruction: A Hands-on Human  
Anatomic Specimen Course: August 3-4, 2012 (AO)

North American Spine Society 2012 Annual Meeting: Biologics Pre-Course Chairman

North American Spine Society 2012 Annual Meeting: Thoracolumbar Complications of rhBMP-2 Use

North American Spine Society 2012 Annual Meeting: Growth Factors in Spine Surgery

North American Spine Society 2012 Annual Meeting: Breaking Developments in Surgical Biology

North American Spine Society 9th Spine Summit, Feb 28-March 2, New Technology Symposium  
Presenter/Chair: SI joint fusion

North American Spine Society Webinar: Potential Risks of rh-BMP-2 Use in Spine Surgery, August 21, 2013

SRS Traveling Fellowship: Pitfalls and Prevention of Complications in Adult Deformity Surgery, Istanbul Turkey, Nizhniy Novgorod, Bristol United Kingdom, Lyon France, August 30 to September 17, 2013

North American Spine Society: Section on Biologics and Basic Research Webinar Series: BMP: Risk Management Strategies, August 21, 2013

SRS Traveling Fellowship: Spinal Fusion: Optimizing the Mechanical Fixation to Meet the Biology of the Patient, Istanbul Turkey, August 30, 2013

SRS Traveling Fellowship: Modern 3-D Imaging and Computer Navigation in Spine Surgery, Zurich Switzerland, September 13, 2013

North American Spine Society 2013 Annual Meeting: Section on Biologics and Research: Stem Cell Procedures, Cell Enhanced Allografts (Osteocell, Trinity) Are as Good as BMP and Cheaper: Con, October 9, 2013

North American Spine Society 2013 Annual Meeting: Section on Biologics and Basic Science: Update on rhBMP-2: Current Usage, YODA Findings and Risk Management, October 11, 2013

AO Spine Latin America Symposium – Bone Biomaterial: BMP the Good and the Bad, Mexico City, Mexico, June 14, 2014

AO Spine Latin America Symposium – Bone Biomaterial: BMP or DBM? A New Step In-between: Cellular Allografts, Mexico City, Mexico, June 14, 2014

Association of Spine Surgeons of India Visiting Professor Bharati Didyapeeth University Medical College, Department of Orthopedic Surgery, January 20 – 21, 2015

Association of Spine Surgeons of India: Cervical, Thoracic and Lumbar Spine Trauma, Bharati Didyapeeth University Medical College, Department of Orthopedic Surgery, January 21, 2015

Pune Spine Society: Lumbar Pseudoarthrosis, Pune India, January 22, 2015

Association of Spine Surgeons of India Annual Meeting (ASSICON): Dynamic Stabilization for Multilevel Degenerative Disc Disease, Pune India, January 24, 2015

The International Society for the Advancement of Spine Surgery 2015 Annual Meeting: TDR vs. Fusion Panel, San Diego, California, April 16, 2015

The International Society for the Advancement of Spine Surgery 2015 Annual Meeting: Spine Talk – Treatment of L4-5 Degenerative Spondylolisthesis (Moderator), San Diego, California, April 16, 2015

Essentials In Spine: Spinal Osteotomies, An Advanced Level BioSkills Experience: Thoracolumbar Osteotomies – Principles of Different Types of Osteotomies with Decision Making, Bangalore, India, September 19, 2015

Essentials In Spine: Spinal Osteotomies, An Advanced Level BioSkills Experience: Cadaveric Demonstration: Thoraco-Lumbar PSO and SPO (Ponte's) – Surgical Technique (Positioning to Closure), Tips and Pearls, Bangalore, India, September 19, 2015

2<sup>nd</sup> International Extreme Sports Medicine Congress, Spine Injuries in the Extreme Sports Athlete: Treating the tingling, June 10, 2016

2<sup>nd</sup> International Conference on Sacroiliac Joint Surgery and annual meeting: Statistical shape modelling of the SIJ, Hamburg, Germany, September 16, 2016

2<sup>nd</sup> International Conference on Sacroiliac Joint Surgery and annual meeting: Different revision techniques after a failed SIJ fusion - How do we accomplish fusion in case of a pseudoarthrosis and when do we switch one method for another? Hamburg, Germany, September 17, 2016

2<sup>nd</sup> International Conference on Sacroiliac Joint Surgery and annual meeting: Lateral based system, iFuse, Hamburg, Germany, September 17, 2016

Annual Meeting of *EUROSPINE*, Quality of life and sagittal alignment after surgical correction of adult spinal deformity with posterior instrumentation, Dublin, Ireland, October 11-13, 2017.

Annual Meeting of the *International Society for the Advancement of Spine Surgery (ISASS)*: Quality of Life and Sagittal Alignment after Surgical Correction of Adult Spinal Deformity with Posterior Instrumentation and Simultaneous Translation on Two Rods technique, Orlando, Florida, October 25-28, 2017.

38<sup>th</sup> Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*: Blockade of Osteoclast-Mediated Bone Resorption with a RANKL Inhibitor Enhances Spinal Fusion, Cape Town, South Africa, November 30-December 2, 2017.

- 38<sup>th</sup> Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*: Spine Fusion and rhBMP in a Vitamin D deficient rat model, Cape Town, South Africa, November 30-December 2, 2017.
- 38<sup>th</sup> Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*: Surgical Planning And Patient-Specific Rods (PSR) Improve Correction Of Sagittal Imbalance In Adult Spinal Deformity (ASD), Cape Town, South Africa, November 30-December 2, 2017.
- 38<sup>th</sup> Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*: Quality of life and sagittal alignment after surgical correction of adult spinal deformity (ASD) with posterior instrumentation, Cape Town, South Africa, November 30-December 2, 2017.
- 39<sup>th</sup> Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*, Cauda Equina Syndrome, Montreal, CA October 10-13, 2018.
- 39<sup>th</sup> Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*, Safety in Spine Surgery and Trauma, Montreal, CA October 10-13, 2018.
- 40<sup>th</sup> Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*: Motion Preservation Successes and Failures, December 4-7, 2019.
- AAOS 2021 Annual Meeting, International Instructional Course Lecture: Current State of Total Disc Replacement: Economics of Lumbar Disc Replacement, San Diego, CA August 31 – September 3, 2021.
- AAOS 2021 Annual Meeting, International Instructional Course Lecture: Lumbar Disc Replacement Outcomes, San Diego, CA August 31 – September 3, 2021.

### **TEACHING RECORD**

- BIOE 5041 - Clinical Experiences for Bioengineers 2017-2022
- Orthopedic Resident Core Curriculum Spine Section Director 2004 - 2016
- Orthopedic Resident Spine Surgery Clinical Education Section Director: 2004-2016: Supervision, bedside teaching, outpatient clinic teaching, and surgical teaching 24 hours/week.
- Fellowship Director for Spine Surgery Fellowship 2008 - 2018. Co-developed the fellowship starting in 2007 and obtained ACGME accreditation in 2010.
- Orthopedic Resident Spine Trauma Course Director and Lecturer for weekly lectures: Aug-Nov 2005
- Monthly Spine Journal Club, co-organizer and frequent moderator/
- Physical Medicine and Rehabilitation Resident Elective Clinical Instructor: 2 week blocks of clinical and surgical teaching twice / year 2006-2012
- Physical Medicine and Rehabilitation Spine Fellow Elective Clinical Instructor: 6 week block 2007
- Rheumatology Fellow Elective Clinical Instructor: 6 week block 2006.
- Primary Care Physician CME Accredited Evening Lecture Series: Developed, directed, and administered monthly lecture series for the 12 months of 2005.
- Primary Care Physician CME Accredited Webcast Lecture Series: Developed, directed, and administered monthly lecture series via interactive web based format allowing access from anywhere in world. Jan 2006 – 2012
- Developed Spine Surgery Resident Rotation Guideline Packet 2006
- Posterior Cervical Fixation, Director, cadaver workshop March 2005
- Compiled and Developed patient education packets for pre-surgery education 2009
- Medical School Orthopedics 6620 class lecturer, 2005, 2006, 2007, 2008, 2009
- Medical Student Clinical Education in Spine Center: Regular students rotating in clinic
- Developed National Teaching Program for physician education for minimally invasive anterior spinal fusion surgery technique, Trans-1 2010
- Mentored Scholarly Activity mentor for medical school students, Engineering Students and residents: Dale Cassidy, Laura Brown, Aris Sophocles, Scott Golembeski, Alex Yaszemski, Blake Sherman, Matt McCullough, Whitney Strom, Liz Robinson, Grant Armour , Sami Jaafar, Brianna Patti, Ryan Farmer, Patrick O'Brien , Doug Kasow, Mike Zimkowski, Morgan Hill, Alireza Hemmati, Yalda

Nazeri, Brett Matoian, Damian Illing, Cameron Barton, Kenneth Milligan, Chris Johnson, Ben Saccamano, Ryan Martyn, Zach Wuthrich, Brandi Krieg  
Mentored Indo-American Spine Alliance Fellow, Shakti Goel, 2017

### ***THESIS COMMITTEES***

Mike Zimkowski: MA and PhD (CU) 2009-2011  
Nina Vollmer: PhD (Mines) 2010-2013  
Lillian Chatham: MA (CU Bioengineering) 2014  
Maria Bortot: MA (CU Bioengineering) 2014  
Anna Laura Nelson: MA (CU Bioengineering) 2014  
Ryan Arce: MA (CU Bioengineering) 2015  
James R. Bardill: MA (CU Bioengineering) 2015  
Madia Stein: MA (CU Bioengineering) 2016  
Songyuan Gu: MA (CU Biomedical Science and Biotechnology) 2017  
Trevor Pier: 2018  
Zach Wuthrich: MA (CU Biomechanical Science and 2019  
Lana Bowers, MS (Bioengineering) 2020  
2023?

### ***ACADEMIC ACTIVITIES***

Judge for University of Colorado, Denver Research and Creative Activities Symposium, 2010  
Developed National Teaching Program for Operating Room Personnel education in spine surgery.  
Presented 11/2009, 6/2010, 7/2010,  
Bioengineering PhD Program, BIOE 5041 Lecturer 2010-2018  
Bioengineering PhD Program, BIOE 5041 Lecturer -Operating room experience facilitator 2010-present  
North American Spine Society 2012 Annual Meeting: Biologics Pre-Course Chairman  
NASS 9th Spine Summit, Feb 28-March 2, 2013, New Technology Symposium Presenter/Chair: SI joint fusion  
Cervical Spine Anatomy, Feb 20, 2013  
Cervical Spine Anatomic Dissection and Surgical Procedure Lab, Feb 20, 2013  
Rocky Mountain Medical Technology Conference, Feb 25, 2012, Medical Advisory Board, University of Colorado, Boulder, School of Engineering  
AAOS Maintenance of Certification Course 2008-2013  
CU Biomedical Engineering Society, medical advisor, 2011-2016  
Co-Chair AAOS Maintenance of Certification Course 2013-2016  
ABOS Board Examiner 2018  
ABOS Board Examiner 2019  
ABOS Board Examiner 2020  
ABOS Board Examiner 2021  
ABOS Board Examiner 2022, August

### ***PEER REVIEWED GRANTS***

1. A PHASE 3, PLACEBO-CONTROLLED, RANDOMIZED, OBSERVER-BLINDED STUDY TO EVALUATE THE EFFICACY, SAFETY, AND TOLERABILITY OF A CLOSTRIDIUM DIFFICILE VACCINE IN ADULTS 50 YEARS OF AGE AND OLDER, \$15, 440 (PI: Dr. Vikas V. Patel)
2. A Multi-Center Post-Market Retrospective Data Collection Protocol to Evaluate the Real

World Performance of Orthofix Spine Stim Devices Compared to Control (RWE Spine Study), \$133, 147 (PI: Dr. Vikas V. Patel)

3. Pfizer, A PHASE 3, PLACEBO-CONTROLLED, RANDOMIZED, OBSERVER-BLINDED STUDY TO EVALUATE THE EFFICACY, SAFETY, AND TOLERABILITY OF A CLOSTRIDIUM DIFFICILE VACCINE IN ADULTS 50 YEARS OF AGE AND OLDER, \$15, 440 (PI: Dr. Vikas V. Patel)
4. SI Bone, Study of bone growth in the Sacroiliac Joint after minimally invasive surgery with titanium implants ceding to Aspire IRB, (PI: Dr. Vikas V. Patel), \$22,451
5. M6-C Artificial Cervical Disc IDE Post-Approval Study, \$19,200 (PI: Dr. Vikas V. Patel)
6. ReActiv8 Stimulation Therapy vs Optimal Medical Management: A Randomized Evaluation (RESTORE), \$355, 756 (PI: Dr. Vikas V. Patel)
7. A Double Blind, Placebo-Controlled Crossover Study Comparing the Analgesic Efficacy of Cannabis versus Oxycodone, PI Emily Lindley, Investigator, Colorado Department of Public Health and Environment (CDPHE) Medical Marijuana Research Grant 2016-2019 \$743,122
8. Bioscience Discovery and Evaluation Grant, PI DaeWon Park, CI, Colorado Office of Economic Development and International Trade, 2014-2015
9. Porous, Patient Specific Interbody Fusion Cages with Enhanced Loading Characteristics, CI, National Institute for Arthritis and Musculoskeletal and Skin Diseases for 2014-2016, 3% effort, \$176,125
10. Revitalization of Bone Allograft with Induced Pluripotent Stem Cells to Enhance Spinal Fusion, CI Musculoskeletal Transplant Foundation, 2/1/2014 to 1/31/2015, 3% effort, \$100,000
11. Fellowship Grant in Spine Care for 2015-2016, PI, Globus Medical, Industry, 8/1/2015 to 7/31/2016, 1% effort, \$67,022
12. Fellowship Grant in Spine Care for 2014-2015, PI, OMeGA, Industry, 8/1/2014 to 7/31/2015, 1% effort, \$15,000
13. Fellowship Grant in Spine Care for 2013-2014, PI, OREF, Industry, 8/1/2013 to 7/31/2014, 1% effort, \$31,290
14. Fellowship Grant in Spine Care for 2012-2013, PI, OREF, Industry, 8/1/2012 to 7/31/2013, 1% effort, \$34,324
15. Fellowship Grant in Spine Care for 2011-2012, PI, OREF, Industry, 8/1/2011 to 7/31/2012, 1% effort, \$54,250
16. Fellowship Grant in Spine Care for 2011-2012, PI, Synthes, Industry, 8/1/2011 to 7/31/2012, 1% effort, \$32,500
17. Fellowship Grant in Spine Care for 2010-2011, PI, OREF, Industry, 8/1/2010 to 7/31/2011, 1% effort, \$69,500

18. American Association of Hip and Knee Surgeons, 2002, Three Dimensional Morphologic and Kinematic MRI Analysis of the Knee. \$25,000  
<http://www.aahks.org/member/research/AAHKSRResearchGrantsandAwardRecipients.asp>

#### ***NON-PEER REVIEWED GRANTS***

1. 3Spine clinical trial titled “An Interventional, Multi-Center Investigation of Single-Level Transforaminal Lumbar Interbody Fusion (TLIF) Stabilized with Pedicle Screws”. PI, Vikas Patel, Grant 2021-2026, \$353,835
2. Patel, Synthes, Biomechanical Evaluation of Anterior Cage-Plate Fixation (ALIF cage and ATB Plate or Synfix) Versus Iliac Screws with TLIF, \$53,063, 5/1/12 – 5/1/15
3. Patel, CU Innovativs/Pilot, Novel Cages Accommodating Individual Endplate Architecture, \$100,000, 7/11/18 – 7/11/20
4. Patel, Lanx, Inc., A Multi-Center Prospective Randomized Study Comparing Supplemental Posterior Instrumentation, ASPEN Spinour Processs System versus Pedicle Screw Fixation, in Lateral Interbody Fusion (LLIF) or Anterior Lumbar Interbody Fusion (ALIF), \$7,370, 9/21/12 – 9/20/15
5. Patel, Medtronic, Prospective Study of Pedicle Screw Placement Using the O-arm and Navigated Instrumentation, \$63,504, 12/29/11 – 1/17/16
6. Patel, Globus Medical, 2015 Fellowship, \$67,022, 3/24/15 – 7/31/16
7. Patel, SI-BONE, INSITE: Investigation of Sacroiliac Fusion Treatment, \$74,003, 12/4/12 – 12/3/16
8. Patel, Aesculap Implant Systems, Clinical Study to Evaluate the Safety and Effectiveness of the Aesculap Activ-L Artificial Disc in the Treatment of Degenerative Disc Disease, \$1,457,517, 11/28/07 – 3/1/17
9. Patel, Stryker, AAOS 2017 Annual Meeting, \$1,000, 3/1/17 – 3/31/17
10. Patel, Vertiflex, A Prospective, Multicenter, Randomized Study Comparing VertiFlex Superior Interspinous Spacer (ISS) to the X-STOP Interspinous Process Decompression (IPD) System in Patients with Moderate Lumbar Spinal Stenosis, \$668,904, 3/2/09 – 7/21/17
11. Patel, Globus, 16-17 Fellowship, \$40,556.96, 8/1/16 – 7/31/17
12. Patel, Orthofix, A Retrospective Study Evaluating the Efficacy of the Orthofix Cervical-Stim Bone Growth Stimulator in Patients that Have Undergone Cervical Fusion Surgery and are at High-risk for Non-fusion, \$58,229, 9/2/14 – 9/1/17
13. Patel, Integra LifeSciences Corporation, DuraSeal Exact Spine Sealant, \$39,012, 9/29/14 – 9/28/17

14. Patel, Orthofix, Safety and Efficacy of Pulsed Electromagnetic Fields (Cervical-Stim) as an Adjunct to Enhance Union in Conservatively Treated Type II Fractures of the Odontoid Process, \$16,307, 3/12/15 – 3/11/18
15. Patel, Globus, 17-18 Fellowship, \$75,000, 8/1/17 – 7/31/18
16. Patel, Orthofix, Retrospective Study evaluating the efficacy of the Orthofix Spinal-Stim bone growth stimulator in patients who have undergone lumbar fusion surgery with adjunctive use of the Spinal-Stim device, \$26,566, 9/15/15 – 9/14/18
17. Patel, Medicea, 17-18 Fellowship, \$81,384, 2/1/18 – 1/31/19
18. Patel, OMeGA, 17-18 Fellowship, \$16,000, 8/1/18 – 7/31/19
19. Patel, Globus, 17-18 Fellowship, \$75,000, 8/1/18 – 7/31/19
20. Patel, Mainstay Medical, ReActiv8 Implantable Neurostimulation System for Chronic Low Back Pain, \$206,202, 3/29/17 – 3/28/20
21. Patel, Colorado Office of Economic Development and International Trade, Cervical Plate Design Finalization, Validation, and Regulatory Approval, \$115,762, 7/2/17 – 4/30/20
22. Patel, Pfizer Pharmaceuticals, A Phase 3, Placebo-controlled, randomized, observer-blinded study to evaluate the efficacy, safety, and tolerability of a Clostridium Difficile Vaccine in adults 50 years or age and older, \$24,974, 5/23/17 – 5/22/20
23. Patel, Spinal Kinetics, Prospective, Concurrently Controlled, Multi-Center Study to Evaluate the Safety and Effectiveness of the Spinal Kinetics M6-C Artificial Cervical Disc Compared to Anterior Cervical Discectomy and Fusion ACDF) for the Treatment of Symptomatic Cervical Radiculopathy, \$163,661, 2/16/15 – 2/15/21
24. Patel, Orthofix, A Multi-Center, Open-Label, Prospective Study of SpinalStim (MOP-SS) as Adjunctive Care following Lumbar Fusion Surgery, \$11,840, 4/9/18 – 4/8/21
25. Patel, Pfizer Pharmaceuticals, A Phase 2b, Randomized, Double-Blind, Placebo-Controlled study to evaluate the safety and efficacy of Staphylococcus aureus 4-antigen vaccine (SA4Ag) in adults undergoing elective posterior instrumented lumbar spinal fusion procedures, \$529,490, 5/5/15 – 5/4/21
26. Patel, Premia, Clinical Study Protocol to Assess the Safety and Effectiveness of the Premia Spine TOPS System, \$7,205, 7/14/17 – 7/14/22
27. Patel, SI-BONE, SALLY, \$19,778, 7/31/17 – 7/30/22
28. Patel, Orthofix, A Multi-Center, Open-Label, Prospective Study of CervicalStim device as Adjunctive Care following Cervical Fusion, \$10,688
29. DuraSeal TM Exact Spine Sealant System Post Approval Study, PI, Integra Life Sciences Corporation, Industry, 9/29/2014 to 9/28/2017, 5% effort, \$36,393
30. Cervical Stim Retrospective (CDA – Orthofix Cervical Stim Retrospective Protocol), PI, Orthofix, Inc., Industry, 9/2/2014 to 9/1/2017, 5% effort, \$83,457

31. Odontoid: Safety and Efficacy of Pulsed Electromagnetic Fields (Cervical Stim) as an Adjunct to Enhanced Union, PI, Orthofix, Inc., Industry, 3/2/2015 to 2/15/2018, 5% effort, \$10,433
32. Retrospective Study Evaluating the Efficacy of the Orthofix Spinal-Stim Bone Growth Stimulator in Patients Who Have Undergone Lumbar Fusion Surgery with Adjunctive Use of the Spinal-Stim Device, PI, Orthofix, Inc., Industry, 9/5/2015 to 9/14/2018, 5% effort, \$18,900
33. A Phase 2b Randomized, Double-blind, Placebo Study to Evaluate the Safety and Efficacy of Staphylococcus, PI, Pfizer, Inc., Industry, 5/5/2015 to 5/1/2018, 5% effort, \$10,099
34. Prospective, Concurrently Controlled, Multi-Center Study to Evaluate the Safety and Effectiveness of the Spinal Kinetics M6-C Artificial Cervical Disc Compared to ACDF for the Treatment of Symptomatic Cervical Radiculopathy, PI, Spine Kinetics, Inc., Industry 2/15/2015 to 2/15/2018, 5% effort, \$16,099
35. Three dimensional accuracy of Stealth Surgical Navigation with O-Arm Imaging, PI, Medtronic Sofamor-Danek, Industry, 12/29/2011 to 1/17/2015, 3% effort, \$63,504
36. Activ-L Artificial Disc. CT, PI, Aesculap, Inc., Industry, 11/28/2007 to 7/31/2015, 5% effort, \$1,180,140
37. Biomechanical Cervical Disc Replacement Facet Force, PI, Synthes, Industry, 6/1/2011 to 9/30/2013, 3% effort, \$47,397
38. Investigation of Sacroiliac Fusion Treatment – INSITE - CT, PI, SI Bone, Industry, 12/4/2012 to 12/3/2016, 3% effort, \$54,904
39. ISSIS Clinical Trial, PI, Vertiflex, Industry, 3/2/2009 to 7/31/2016, 5% effort, \$524,219
40. The Relationship between Sagittal Plane Correction and Quality of Life in Adult Deformity Patients Treated with Posterior Instrumentation-CT, CO-I, Mediecrea, Industry, 7/31/2012 to 7/31/2016, 3% effort, \$49,107
41. Biomechanical Evaluation of Anterior Cage-Plate Fixation (ALIF cage and ATB Plate or Synfix ) Versus Iliac Screws with TLIF., CO-I, Synthes, Industry, 5/1/2012 to 5/01/2015, 3% effort, \$53,063
42. Effects of vitamin D deficiency on lumbar spine fusion and the role of rhBMP-2, CO-PI, Medtronic, Industry, 11/15/2012 to 11/14/2014, 1% effort, \$28,932
43. Validation of a New Sacroiliac-Joint Specific Disability Questionnaire, CO-I, SI Bone, Industry, 3/4/2012 to 3/3/2015, 1% effort, \$48,834
44. Rabbit Study Protocol CR-055: P-15 ABM Formulations in a Rabbit Femur Drill Hole Healing Study, PI, Cerapedics, Industry, 4/1/2009 to 12/31/2009, 3% effort, \$23,048
45. Evaluation of Blood Platelet Concentrate Methodology with ABM/P-15., PI, Snoasis Medical, Industry, 2/1/2010 to 5/31/2010, 3% effort, \$10,240
46. In vitro biomechanical evaluation of adjacent level facet joint forces relative to pedicle screw head size, PI, Aesculap, Industry, 1/1/2005 to 12/31/2005, 3% effort, \$19,841



47. Inflammatory effects of BMP with protective and bone limiting effects of Fibrin Glue, PI, Medtronic, Industry, 2/3/2006 to 4/30/2009, 3% effort, \$21,055
48. Post market Surveillance of Clinical and Functional Outcomes with Post-Operative Adjunctive use of Cervical-Stim or Spinal Stim, PI, Orthofix, Industry, 6/1/2008 to 5/31/2011, 3% effort, \$18,849
49. A Clinical evaluation of cervical STIM and Spinal-STIM, PI, Orthofix, Industry, 1/27/2006 to 1/26/2009, 3% effort, \$2,050
50. BMP Diffusion from a Novel Bone Graft Substitute, PI, Globus Medical Inc., Industry, 7/5/2007 to 7/4/2008, 3% effort, \$9,435
51. EBI'S Lumbar Anterior Plate System, PI, Biomet, Industry, 4/16/2007 to 4/15/2008, 3% effort, \$15,873
52. Facet force relative to disc degeneration and disc replacement, PI, Synthes, Industry, 5/31/2007 to 8/31/2008, 3% effort, \$31,577
53. The effect of auto claving on metal memory, PI, DePuy, Industry, 8/1/2007 to 12/31/2008, 3% effort, \$6,000
54. Fellowship Grant in Spine Care for 2011-2012, PI, OREF, Industry, 8/1/2011 to 7/31/2012, 1% effort, \$54,250
55. Fellowship Grant in Spine Care for 2008-2010, PI, Synthes, Industry, 9/1/2008 to 8/31/2010, 1% effort, \$121,837
56. Fellowship Grant in Spine Care for 2010-2011, PI, Synthes, Industry, 9/1/2010 to 8/31/2011, 1% effort, \$65,000
57. EPhysical Capacity Outcomes Study PD-L and ALIF, PI, Synthes, Industry, 11/20/2009 to 10/31/2011, 3% effort, \$15,407
58. Synthes ED Support, PI, Synthes, Industry, 1/1/2011 to 1/31/2011, 1% effort, \$2,600.
59. Retrospective Multicenter Clinical Evaluation of Fusion and Complications for Single Lvl AxialIF and ALIF Subjects, PI, Trans 1, Industry, 4/27/11 to 12/31/2012, 3% effort, \$31,561
60. Synthes AO Spine, PI, Synthes, Industry, 8/1/2012 to 8/30/2012, 1% effort, \$1,500
61. Lanx Aspen Spinous Process Clamp CT, PI, Lanx, Industry, 09/21/2012 to 9/20/2015, 3% effort, \$7,240
62. Skull to sacrum course, PI, Medtronic, Industry, 4/1/2013 to 4/8/2013, 1% effort, \$2,000
63. Nubac Disc Arthroplasty, CO-I, Pioneer Surgical Company, Industry, 7/1/2009 to 6/30/2012, 3% effort, \$26,678
64. Facet Force Disc Degen/Metal Memory, Co-PI, Showa Ika Kohgyo Co. LTD, Industry, 10/1/2007 to 12/1/2008, 3% effort, \$70,453

## ***CLINICAL TRIALS***

1. Activ-L Artificial Disc. CT, PI, Aesculap, Inc., 11/28/2007 to 7/31/2015
2. Investigation of Sacroiliac Fusion Treatment – INSITE - CT, PI, SI Bone, 12/4/2012 to 12/3/2015
3. ISSIS Clinical Trial, PI, Vertiflex, 3/2/2009 to 7/31/2016
4. Validation of a New Sacroiliac-Joint Specific Disability Questionnaire, CO-I, SI Bone, 3/4/2012 to 3/3/2015
5. Post market Surveillance of Clinical and Functional Outcomes with Post-Operative Adjunctive use of Cervical-Stim or Spinal Stim, PI, Orthofix, 6/1/2008 to 5/31/2011
6. A Clinical evaluation of cervical STIM and Spinal-STIM, PI, Orthofix, 1/27/2006 to 1/26/2009
7. EPhysical Capacity Outcomes Study PD-L and ALIF, PI, Synthes, 11/20/2009 to 10/31/2011
8. Retrospective Multicenter Clinical Evaluation of Fusion and Complications for Single Lvl AxiaLIF and ALIF Subjects, PI, Trans 1, 4/27/11 to 12/31/2012
9. Lanx Aspen Spinous Process Clamp CT, PI, Lanx, 09/21/2012 to 9/20/2015
10. Nubac Disc Arthroplasty, CO-I, Pioneer Surgical Company, 7/1/2009 to 6/30/2012

## ***BIBLIOGRAPHY***

### **Peer Reviewed Journal Articles**

#### **Submitted**

1. Lindley EM, Sherman BP, Ohnmeiss D, Zigler J, Kasow DB, Janssen ME, Burger EL, **Patel VV**. The positive predictive value of provocative discography in artificial disc replacement. Submitted to AO Global
2. Noshchenko A, Lindley EM, Burger EL, Cain CMJ, **Patel VV**. Clinical outcomes after lumbar arthrodesis with BMP: a systematic review with meta analysis.
3. Lindley EM, Barton C, Blount T, Burger EL, Cain CMJ, **Patel VV**. Outcomes of cervical and lumbar fusion in the sheep model: a review of available control data and recommendations for future studies.

#### **Accepted**

1. Gilligan C, Volschenk W, Russo M, Green M, Gilmore C, Mehta V, Deckers K, De Smedt K, Latif U, Sayed D, Georgius P, Gentile J, Mitchell B, Langhorst M, Huygen F, Baranidharan G, **Patel V**, Mironer E, Ross E, Carayannopoulos A, Hayek S, Gulve A, Van Buyten JP, Tohmeh A, Fischgrund J, Lad S, Ahadian F, Deer T, Klemme W, Rauck R, Rathmell J, Schwab F, Maislin G, Heemels JP, Eldabe S. Three-Year Durability of Restorative Neurostimulation Effectiveness in Patients With

Chronic Low Back Pain and Multifidus Muscle Dysfunction. *Neuromodulation*. 2023 Jan;26(1):98-108. PubMed PMID: 36175320

2. Page MI, Easley JT, Bonilla AF, Patel VV and Puttlitz CM. Biomechanical evaluation of a novel repair strategy for intervertebral disc herniation in an ovine lumbar spine model. *Front Bioeng Biotechnol*. 2022;10:1018257. PubMed PMID: 36394049
3. **Patel VV**, Sawyer EE, Mintken PE, Cofer CL, Lindley EM. Initial Validation of a Sacroiliac Joint-Specific Disability Questionnaire. *Orthopedics*. In Press. Accepted 10/22
4. Page MI, Easley JT, Bonilla AF, **Patel VV**, Puttlitz CM. Biomechanical evaluation of a novel repair strategy for intervertebral disc herniation in an ovine lumbar spine model. *Front. Bioeng. Biotechnol., Sec. Tissue Engineering and Regenerative Medicine* 2022 October 25; <https://doi.org/10.3389/fbioe.2022.1018257>
5. Martin CT, Holton KJ, Elder BD, Fogelson JL, Mikula AL, Kleck CJ, Calabrese D, Burger EL, Ou-Yang D, **Patel VV**, Kim HJ, Lovecchio F, Hu SS, Wood KB, Harper R, Yoon ST, Ananthakrishnan D, Michael KW, Schell AJ, Lieberman IH, Kisinde S, DeWald CJ, Nolte MT, Colman MW, Phillips FM, Gelb DE, Bruckner J, Ross LB, Johnson JP, Kim TT, Anand N, Cheng JS, Plummer Z, Park P, Oppenlander ME, Sembrano JN, Jones KE, and Polly DW. Catastrophic acute failure of pelvic fixation in adult spinal deformity requiring revision surgery: a multicenter review of incidence, failure mechanisms, and risk factors. *J Neurosurg Spine*. 2023 Jan 1;38(1):98-106. PubMed PMID: 36057123
6. Kleck CJ, Burger E, Ou-Yang D, **Patel V**, et al. Catastrophic acute failure of pelvic fixation in adult spinal deformity requiring revision surgery: a multicenter review of incidence, failure mechanisms, and risk factors. *J Neurosurg Spine*. 2022;38(1):98-106. Published 2022 Sep 2. doi:10.3171/2022.6.SPINE211559
7. Payne KA, Shaw NM, Erickson CB, Yarger P, Yu Y, Baldini T, Kleck CJ, **Patel VV**, Burger EL. Blockade of Osteoclast-Mediated Bone Resorption With a RANKL-Inhibitor Enhances Bone Formation in a Rat Spinal Fusion Model. *Spine (Phila Pa 1976)*. 2022 Aug 15;47(16):1165-1171. PubMed PMID: 35797625
8. Netsanet R, Look N, Koshak C, **Patel V**. Decompression without Fusion for Lumbar Spinal Stenosis at a Single Mobile Segment in Adults with Ankylosing Spondylitis. *Journal of Bone and Joint Surgery* 2022 July; DOI: [10.2106/JBJS.CC.21.00800](https://doi.org/10.2106/JBJS.CC.21.00800)
9. Le AX, **Patel VV**, Campos JC. Minor Trauma Caused High-Grade Lumbosacral Spondylolisthesis After Short-Segment Lumbar Fusion: A Case Report. *JBJS Case Connect*. 2022 Jul 1;12(3). PubMed PMID: 35852169
10. Delcont MR, Ou-Yang DC, Burger EL, **Patel VV**, Wessell NM, Kleck CJ. Alternative Uses of O-Arm and Stealth Navigation Technology Over 10 Years: The University of Colorado Experience. *Orthopedics*. 2022 Jul 25;1-9. [Epub ahead of print] PubMed PMID: 35876781
11. Wessell NM, Wolverton E, Ross P, Akiyama M, Lindley E, **Patel V**. Opioid Prescription Monitoring in Preoperative and Postoperative Sacroiliac Joint Fusion Patients. *Int J Spine Surg*. 2022 Jun;16(3):498-504. PubMed PMID: 35772975

12. Chakravarthy K, Lee D, Tram J, Sheth S, Heros R, Manion S, **Patel V**, Kiesel K, Ghandour Y, Gilligan C. Restorative Neurostimulation: A Clinical Guide for Therapy Adoption. *J Pain Res*. 2022 Jun 20;15:1759-1774. doi: 10.2147/JPR.S364081. eCollection 2022. PMID: PMC9231548
13. Ayers R, Noschenko A, Ou-Yang D, Burger IE, **Patel V**, Kleck CJ. Laser Marking of Spine Rods Is Strongly Associated With Risk of Clinical Rod Failure. *J Am Academy Orthopedic Surg*. 2022 Jan 15;30(2):e252-e263. PubMed PMID: 34715690
14. Gilligan C, Volschenk W, Russo M, Green M, Gilmore C, Mehta V, Deckers K, De Smedt K, Latif U, Georgius P, Gentile J, Mitchell B, Langhorst M, Huygen F, Baranidhara G, **Patel VV**, Mironer E, Ross E, Carayannopoulos A, Hayek S, Gulve A, Van Buyten JP, Tohmeh A, Fischgrund J, Lad S, Ahadian F, Deer T, Klemme W, Rauck R, Rathmell J, Maislin G, Heemels JP, Eldabe S. Long-Term Outcomes of Restorative Neurostimulation in Patients With Refractory Chronic Low Back Pain Secondary to Multifidus Dysfunction: Two-Year Results of the ReActiv8-B Pivotal Trial. 2022 January. [www.neuromodulationjournal.org](http://www.neuromodulationjournal.org) ISSN 1094-7159, <https://doi.org/10.1016/j.neurom.2021.10.011>. (<https://www.sciencedirect.com/science/article/pii/S1094715921063868>).
15. Wessell NM, Kie-Ok C, Ou-Yang ID, Goldstein CL, Burgler E, **Patel V**. The University of Colorado Virtual Physical Examination for Spine Surgeons: A Preliminary Study. *Orthopedics*. 2021 Dec 2; 1-4. [Epub ahead of print] PubMed PMID: 34846242
16. Gilligan C, Volschenk W, Russo M, Green M, Gilmore C, Mehta V, Deckers K, De Smedt K, Latif U, Georgius P, Gentile J, Mitchell B, Langhorst M, Huygen F, Baranidhara G, **Patel V**, Mironer E, Ross E, Carayannopoulos A, Hayek S, Gulve A, Van Buyten JP, Tohmeh A, Fischgrund J, Lad S, Ahadian IF, Deer T, Klemme W, Rauck R, Rathmell J, Levy R, Heemels JP, Eldabe S. An implantable restorative-neurostimulator for refractory mechanical chronic low back pain: a randomized sham-controlled clinical trial. *Pain*. 162 (10):2486-2498. PubMed PMID: 34534176. 2021 Oct 1
17. Milligan K, Wuthric Z, Carpenter RD, Ayers, R, Jessy M, Kleck C, **PatelVV**. Morphometric analysis of the sacrum using statistical shape modelling. *J Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization* (TCIV). 2021 Sept 26; Article ID: TCIV 1977716 <https://doi.org/10.1080/21681163.2021.1977716>
18. **Patel V**, Kovalsky D, Meyer SC, Chowdhary A, Lacombe J, Lockstadt H, Techy F, Langel C, Limoni R, Yuan P, Kranenburg A, Cher D, Tender G. Prospective Trial of Sacroiliac Joint Fusion Using 3D-Printed Triangular Titanium Implants: 24-Month Follow-Up. *Med Devices (Auckl)*. June 2021; 14:211-216. PubMed PMID: 34234582
19. Kleck, CJ, Noschenko A, Burger EL, Cain CMJ, **Patel VV**. Postoperative pelvic incidence (PI) change may impact sagittal spinopelvic alignment (SSA) after instrumented correction of adult spine deformity (ASD). *Spine Deform*. 2021 Apr 19 online ahead of print. doi: 10.1007/s43390-020-00283-2.
20. **Patel, VV**, Billys, J, Okonkwo D, He, D, Ryaby J, Radcliff K, Three and 4-level lumbar arthrodesis using adjunctive pulsed electromagnetic field stimulation: A Multicenter retrospective evaluation of fusion rates and a review of the literature. *International Journal of Spine Surgery*. March 2021

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65. Lindley EM, Bond A, Razavi-Shearer D, Noshchenko A, Henry SE, Burger EL, Cain CMJ, **Patel VV**. Vitamin D Deficiency in Spine Surgery Patients. 34th Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)* and *Orthopaedic World Congress*. Hyderabad, India, October 17-19 2013.
66. Lindley EM, Razavi-Shearer D, **Patel VV**, Henry SE, McBeth Z, Burger EL, Cain CMJ, Finn MA. Medical marijuana use characteristics in patients with chronic spine pain disorders. 28<sup>th</sup> Annual Meeting of the *North American Spine Society (NASS)*. New Orleans, Louisiana, October 9-12 2013.
67. Lindley EM, Kleck CJ, **Patel VV**. Clinical and Functional Outcomes with Postoperative Adjunctive use of Pulsed Electromagnetic Field Stimulation in Cervical Fusion. Inagrual Summer Spine Meeting of the *North American Spine Society (NASS)*. Naples, Florida, July 31-August 3 2013.
68. Finn MA, Razavi-Shearer D, Henry SE, **Patel VV**, Burger EL, Cain CMJ, Lindley EM. Medical Marijuana use characteristics in the spinal surgery patient. 6<sup>th</sup> Annual meeting of the *Lumbar Spine Research Society (LSRS)*. Chicago, Illinois, April 11-12 2013.
69. Chatham L, **Patel VV**, Carpenter D: “Subject-specific Differences in Strain Levels in the Lumbar Spine Following Interbody Fusion” ORS 2013 Annual Meeting in San Antonio, Texas, January 26-29, 2013
70. Farmer R, Paietta R, Ferguson V, **Patel VV**, Burger-Van Der walt EL: “Histological Characterization of the Cartilaginous Endplate in the Human Spine” ORS 2013 Annual Meeting in San Antonio, Texas, January 26-29, 2013
71. Lindley EM, McBeth ZL, Henry SE, Burger EL, Cain CMJ, **Patel VV**. Retrograde ejaculation following anterior lumbar spine surgery. 33rd annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)* & 17th annual meeting of the *Pan Arab Orthopaedic Association (PAOA) Orthopaedic World Conference*. Dubai, United Arab Emirates, November 28-30 2012.
72. Burger EL, **Patel VV**, Noshchenko A. Modeling of vertebral strength topography by quantitative computed tomography (CT) imaging. 33rd annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)* & 17th annual meeting of the *Pan Arab Orthopaedic Association (PAOA) Orthopaedic World Conference*. Dubai, United Arab Emirates, November 28-30 2012.

73. Lindley EM, McBeth ZL, Henry SE, Burger EL, Cain CMJ, **Patel VV**. Retrograde ejaculation following anterior lumbar spine surgery. 27th Annual Meeting of the *North American Spine Society (NASS)*. Dallas, Texas, October 24-27 2012.
74. Chatham L, **Patel VV**, Carpenter D: "Effects of Age-related Cortical Thinning and Trabecular Bone Loss on the Strain Distribution in the Lumbar Spine Following Interbody Fusion" American Society of Bone and Mineral Research Annual Meeting, Oct 12-15, 2012, Abstract #SU0054
75. Farmer RP, Paietta RC, Ferguson VL, Burger E, **Patel VV**. Histological characterization of the cartilaginous endplate in the infant spine. 19th *International Meeting on Advanced Spine Techniques (IMAST)*. Istanbul, Turkey, Toronto, Canada, July 18-21, 2012.
76. Cain CM, Lafleur M, Rao M, Hollenbeck J, Rullkoetter PJ. Pre-operative anatomical FEA templating for patient selection and optimizing range of motion in TDR. 19th *International Meeting on Advanced Spine Techniques (IMAST)*. Istanbul, Turkey, Toronto Canada, July 18-21, 2012.
77. Noshchenko, A; Burger, EL; Cain, CM; Lindley, EM; Patel, **VV**. Two Year Bone Morphogenetic Protein Clinical Effects after Lumbar Fusion in Degenerative Disc Disease. 19th *International Meeting on Advanced Spine Techniques (IMAST)*. Istanbul, Turkey, Toronto, Canada, July 18-21, 2012.
78. Noshchenko A, Burger EL, **Patel VV**. Clinical Outcomes of Lumbar Arthrodeses in Patients with Spondylosis. 125th *Annual Meeting of the American Orthopaedic Association (AOA)*. Washington, DC, June 27-30, 2012.
79. Lindley EM, Zimkowski M, **Patel VV**, Rentschler M. Pain sensitivity testing using a novel computer-controlled pressure algometer that simultaneously records sympathetic nervous system responses to pain stimuli. Annual Meeting of the *American Pain Society (APS)*. Honolulu, Hawaii, May 16-19, 2012.
80. Cain C, Rao M, Rullkoetter P. Pre-op templating for TDR alignment: Is it clinically relevant? 12th Annual Meeting of *The International Society for the Advancement of Spine Surgery (ISASS)*. Barcelona, Spain, March 20-23, 2012.
81. Noschenko A, Burger EL, Cain CMJ, Lindley EM, **Patel VV**; Two Year Bone Morphogenetic Protein Clinical Effects After Lumbar Fusion in Degenerative Disc Disease. 12th Annual Meeting of *The International Society for the Advancement of Spine Surgery (ISASS)*. Barcelona, Spain March 20-23, 2012.
82. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. Annual Meeting of *The American Academy of Orthopaedic Surgeons (AAOS)*. San Diego, California, February 15-19, 2011.
83. Burger EL, **Patel VV**, Noshchenko A. Two Year Bone Morphogenetic Protein (BMP) Clinical effects after lumbar fusion in degenerative disc disease. Annual Meeting of *The American Academy of Orthopaedic Surgeons (AAOS)*. San Francisco, California, February 7-11, 2012.
84. Rao M, Cain CMJ, Rullkoetter, PJ. The influence of prodisc-I positioning on mechanics of the lumbar spine. Annual meeting of the *Orthopaedic Research Society (ORS)*. February 4-7, 2012.
85. Leahy P, McGilvray K, Sherman J, Traynelis V, Nottmeier E, Singh V, Murrell B, **Patel VV**, Puttlitz C: "Analysis of Anterior Cervical Discectomy and Fusion Kinematics when Supplemented with Facet

Screw Instrumentation” Annual Meeting of the *Orthopaedic Research Society (ORS)*. 2012 Annual Meeting in San Francisco, California, February 4-7, 2012

86. Patil S, Lindley EM, Burger EL, **Patel VV**. O-arm and stealth system navigation for pedicle screw placement in thoracolumbar spine surgery. Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*. Prague, Czech Republic, September 6-9, 2011.
87. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. 124th Annual Meeting of The *American Orthopaedic Association (AOA)*. Boston, Massachusetts, June 22-25, 2011.
88. Patil S, Lindley EM, Burger EL, **Patel VV**. O-arm and stealth system navigation for pedicle screw placement in thoracolumbar spine surgery. 11th Annual Meeting of The *International Society for the Advancement of Spine Surgery (ISASS)*. Las Vegas, Nevada, April 26 - 29, 2011.
89. Golembeski S, Lindley EM, Sophacles A, Burger EL, **Patel VV**. Dynamic translating versus variable angle plates in anterior cervical discectomy and fusion. 11th Annual Meeting of The *International Society for the Advancement of Spine Surgery (ISASS)*. Las Vegas, Nevada, April 26 - 29, 2011.
90. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. Annual Meeting of The *American Academy of Orthopaedic Surgeons (AAOS)*. San Diego, California, February 15-19, 2011.
91. Ayturk U; Schuldt D; **Patel VV**; Puttlitz C: “Orthotropic Continuum Model Development for Healthy and Degenerated Annulus Fibrosus Based on a Biaxial Testing Protocol”: Annual Meeting of the *Orthopaedic Research Society (ORS)*. 2011 Annual Meeting in Long Beach, California, January 13-16, 2011
92. Ayturk U; **Patel VV**; Puttlitz C:” Finite Element Modeling of Degeneration-Related Biomechanical Changes of the Lumbar Spine”: *Orthopaedic Research Society (ORS)*. Annual Meeting in Long Beach, California, January 13-16, 2011
93. Noshchenko A, Burger EL, **Patel VV**. Correlation of vertebral strength topography with 3-dimensional computed tomography structure. 25th Annual Meeting of the *North American Spine Society (NASS)*. Orlando, Florida, October 5-9, 2010.
94. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. 25th Annual Meeting of the *North American Spine Society (NASS)*. Orlando, Florida, October 5-9, 2010.
95. Lindley EM, Sherman BP, Ohnmeiss D, Zigler J, Kasow DB, Janssen ME, Burger EL, **Patel VV**. The positive predictive value of provocative discography in artificial disc replacement. 25th Annual Meeting of the *North American Spine Society (NASS)*. Orlando, Florida, October 5-9, 2010.
96. Lindley, EM, McCullough M, Brown C, Burger EL, **Patel VV**. Complications associated with axial lumbar interbody fusion. 25<sup>th</sup> Annual Meeting of the *North American Spine Society (NASS)*. Orlando, Florida, October 5-9, 2010.
97. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. 7th Annual Meeting of the



*International Society of Orthopaedic Surgery and Traumatology (SICOT)*. Gothenburg, Sweden, August 31-September 3, 2010.

98. Lindley EM, McCullough M, Brown C; Burger EL; **Patel VV**. Complications associated with axial lumbar interbody fusion. 7th Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*. Gothenburg, Sweden, August 31 – September 3, 2010.
99. Lindley EM, Robinson ES, Gonzalez P, Estes S, Cooley R, Burger EL, **Patel VV**. Piriformis syndrome versus radiculopathy following lumbar artificial disc replacement. 7th Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*. Gothenburg, Sweden, August 31 – September 3, 2010.
100. Noshchenko A, Burger EL, **Patel VV**. Correlation of vertebral strength topography with 3-dimensional computed tomography structure. 7th Annual Meeting of the *International Society of Orthopaedic Surgery and Traumatology (SICOT)*. Gothenburg, Sweden, August 31 – September 3, 2010.
101. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. 12th Meeting of the *Combinded Orthopaedic Associations (COMOC)*. Glasgow, Scotland, September 12-17, 2010.
102. Lindley EM, McCullough M, Brown C; Burger EL; **Patel VV**. Complications associated with axial lumbar interbody fusion. 17th *International Meeting on Advanced Spine Techniques (IMAST)*. Toronto, Canada, July 21-24, 2010.
103. Lindley EM, Robinson ES, Gonzalez P, Estes S, Cooley R, Burger EL, **Patel VV**. Piriformis syndrome versus radiculopathy following lumbar artificial disc replacement. 17th *International Meeting on Advanced Spine Techniques (IMAST)*. Toronto, Canada, July 21-24, 2010.
104. Lindley EM, Sherman BP, Ohnmeiss D, Zigler J, Kasow DB, Jansses, ME, Burger EL, **Patel VV**. The positive predictive value of provocative discography in artificial disc replacement. 17th *International Meeting on Advanced Spine Techniques (IMAST)*. Toronto, Canada, July 21-24, 2010.
105. Noshchenko A, Burger EL, **Patel VV**. Correlation of vertebral strength topography with 3-dimensional computed tomography structure. 17th *International Meeting on Advanced Spine Techniques (IMAST)*. Toronto, Canada, July 21-24, 2010.
106. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. 17th *International Meeting on Advanced Spine Techniques (IMAST)*. Toronto, Canada, July 21-24, 2010. **\*\*Winner of the Whitecloud Award for Best Basic Science Paper\*\***
107. Lindley EM, McCullough M, Brown C; Burger EL; **Patel VV**. Complications associated with axial lumbar interbody fusion. *American College of Spine Surgery Annual Meeting (ACSS)*. Newport Beach, CA, June 10-12, 2010.
108. Lindley EM, Robinson ES, Gonzalez P, Estes S, Cooley R, Burger EL, **Patel VV**. Piriformis syndrome versus radiculopathy following lumbar artificial disc replacement. *American College of Spine Surgery Annual Meeting (ACSS)*. Newport Beach, CA, June 10-12, 2010.

109. Lindley EM, Sherman BP, Ohnmeiss D, Zigler J, Kasow DB, Jansses, ME, Burger EL, **Patel VV**. The positive predictive value of provocative discography in artificial disc replacement. *American College of Spine Surgery Annual Meeting (ACSS)*. Newport Beach, CA, June 10-12, 2010
110. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. *American College of Spine Surgery Annual Meeting (ACSS)*. Newport Beach, CA, June 10-12, 2010.
111. Noshchenko A, Burger EL, **Patel VV**. Correlation of vertebral strength topography with 3-dimensional computed tomography structure. *American College of Spine Surgery Annual Meeting (ACSS)*. Newport Beach, CA June 10-12, 2010.
112. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. Facet joint biomechanics at the treated and adjacent levels after total disc replacement. 10th Annual Meeting of the *Spine Arthroplasty Society (SAS)*. New Orleans, LA, April 27-30, 2010.
113. Lindley EM, McCullough M, Brown C; Burger EL; **Patel VV**. Complications Associated with Axial Lumbar Interbody Fusion. 10th Annual Meeting of the *Spine Arthroplasty Society (SAS)*. New Orleans, LA, April 27-30, 2010.
114. Lindley EM, Sherman BP, Ohnmeiss D; Zigler J; Kasow DB; Janssen ME; **Patel VV**. "The Positive Predictive Value of Provocative Discography in Artificial Disc Replacement." 10th Annual Meeting of the *Spine Arthroplasty Society(SAS)*. New Orleans, LA, April 27-30, 2010.
115. McCullough M, Lindley EM, Brown C; Burger EL; **Patel VV**. "Complications Associated with Axial Lumbar Interbody Fusion". 10th Annual Meeting of the *Spine Arthroplasty Society (SAS)*. New Orleans, LA, April 27-30, 2010.
116. Botolin S, Puttlitz C, Petrella A, Baldini T, Burger E, Abjornson C, **Patel VV**. "Facet joint biomechanics at the treated and adjacent levels after total disc replacement." 26th Annual Meeting of the *American Association of Neurological Surgeons/Congress of Neurological Surgeons: Disorders of the Spine and Peripheral Nerves*. Orlando, FL, February 17-20, 2010.
117. Robinson ES, Gonzalez P, Lindley EM, Estes S, Cooley R, Burger EL, **Patel VV**. "Piriformis Syndrome versus Radiculopathy Following Lumbar Artificial Disc Replacement". 26th Annual Meeting of the *American Association of Neurological Surgeons/Congress of Neurological Surgeons: Disorders of the Spine and Peripheral Nerves*. Orlando, FL, February 17-20, 2010.
118. Lindley EM; Sherman BP; Ohnmeiss D; Zigler J; Kasow DB; Janssen ME; **Patel VV**. "The Positive Predictive Value of Provocative Discography in Artificial Disc Replacement". 26th Annual Meeting of the *American Association of Neurological Surgeons/Congress of Neurological Surgeons: Disorders of the Spine and Peripheral Nerves*. Orlando, FL, February 17-20, 2010.
119. McCullough M; Lindley EM; Brown C; Burger EL; **Patel VV**. "Complications Associated with Axial Lumbar Interbody Fusion". 26th Annual Meeting of the *American Association of Neurological Surgeons/Congress of Neurological Surgeons: Disorders of the Spine and Peripheral Nerves*. Orlando, FL, February 17-20, 2010.
120. Botolin S, Baldini T, Burger EL, Puttlitz C, Abjornson C, Petrella A, Noshchenko A, Lindley E, **Patel VV**. "Lumbar Facet Joint Biomechanics after Nucleotomy, Nucleus Replacement, and Total

- Disc Replacement”. 24th Annual Meeting of the *North American Spine Society (NASS)*. San Francisco, California, November 10-14, 2009.
121. Patil S, Zhang J, **Patel VV**, Burger EL. “AxiaLIF Surgical Outcomes.” 24th Annual Meeting of the *North American Spine Society (NASS)*. San Francisco, California, November 10-14, 2009.
  122. Lindley EM, Estes S, Burger E, **Patel VV**. “Evaluation of rh-BMP2/fibrin glue-associated edema in rabbit muscle tissue”. 44th Annual Meeting of the *Scoliosis Research Society (SRS)*. San Antonio, Texas, September 23-26, 2009.
  123. Burger EL, Yao X, **Patel VV**, Brown L, van der Walt C, Suzuki N, Baldini T. “A biomechanical model for evaluating the effects of rib head release on spinal motion”. 44th Annual Meeting of the *Scoliosis Research Society (SRS)*. San Antonio, Texas, September 23-26, 2009.
  124. Lindley EM, Estes S, Burger E, **Patel VV**. “Evaluation of rh-BMP2/fibrin glue-associated edema in rabbit muscle tissue”. 16th Annual *International Meeting on Advanced Spine Techniques (IMAST)*. Vienna, Austria. July 15-18, 2009.
  125. Burger EL, Yao X, **Patel VV**, Brown L, van der Walt C, Suzuki N, Baldini T. “A biomechanical model for evaluating the effects of rib head release on spinal motion”. 16th Annual *International Meeting on Advanced Spine Techniques (IMAST)*. Vienna, Austria. July 15-18, 2009.
  126. **Patel VV**, Abjornson C, Turner S, Seim HB, Lyons A, Puttlitz CM. “Failure Analysis of Absorbable Cervical Plates”. 25th Annual Meeting of the *American Association of Neurological Surgeons/Congress of Neurological Surgeons. Section on Disorders of the Spine and Peripheral Nerves*. Phoenix, Arizona, March 11 - 14, 2009.
  127. Lindley EM, Estes S, Burger EL, **Patel VV**. “Evaluation of rhBMP-2/Fibrin Glue-Associated Edema in Rabbit Muscle Tissue”. 37th Annual Meeting of the *Cervical Spine Research Society*. Austin, Texas, December 4-6, 2008. \*2008 Annual Meeting’s Top 10 scoring Posters\*
  128. **Patel VV**, Abjornson C, Turner S, Seim HB, Lyons A, Puttlitz CM. “Histological Evaluation of Bioresorbable Plates in a Sheep Model”. 37th Annual Meeting of the *Cervical Spine Research Society*. Austin, Texas, December 4-6, 2008.
  129. Lindley EM, Estes S, Burger E, **Patel VV**. “Evaluation of rh-BMP2/fibrin glue-associated edema in rabbit muscle tissue”. 23rd Annual Meeting of the *North American Spine Society (NASS)*. Toronto, Ontario, Canada, October 14-18, 2008.
  130. **Patel VV**, Abjornson C, Turner S, Seim HB, Lyons A, Puttlitz CM. “Failure Analysis of Absorbable Cervical Plates”. 23rd Annual Meeting of the *North American Spine Society(NASS)*. Toronto, Ontario, Canada, October 14-18, 2008.
  131. **Patel VV**, Burger EL, Lindley EM, Zhao L, Wong P, Pradhan BB, Bae HW, Kanim L, Delamarter RB. “Tisseel fibrin glue use in spinal surgery: Effects on bone morphogenetic protein diffusion, bone morphogenetic protein-stimulated bone growth, and soft tissue swelling”. *Tissue Engineering and Regenerative Medicine International Society*. Portugal, June 23, 2008.

132. **Patel VV**, Lyons A, Abjornson C, Turner AS, Puttlitz C: "P69 Histological Evaluation Of Bioresorbable Plates In A Sheep Model"; *SpineWeek International Spinal Conference*, Geneva, Switzerland, June 2008.
133. Puttlitz C, **Patel VV**, Santoni B: "P104 A Biomechanical Investigation Of Two-Level Cervical Disc Replacement And Associated Salvage Procedure"; *SpineWeek International Spinal Conference*, Geneva, Switzerland, June 2008.
134. Solomonow M, Lu Y, Zhou B, **Patel VV**, Solomonow D, Youssef J; "P273 Spine Stability Is Compromised After Cyclic Flexion"; *SpineWeek International Spinal Conference*, Geneva, Switzerland, June 2008.
135. **Patel VV**, Freudenberger C, Burger EL, Beard D, Reckling WC, Williams A: "P398 Clinical Outcomes Of Posterior Lumbar Interbody Fusion Versus Anterior Lumbar Interbody Fusion With Anterior Tension Band Plating"; *SpineWeek International Spinal Conference*, Geneva, Switzerland, June 2008.
136. **Patel VV**, Bae H, Pradhan B, Toth J, Badura J, Seim III, H, Turner AS: "Ab121 Transient Short Term Local Bone Remodeling Effects Of High-Doses Of Rbmp-2 In A Novel Preclinical Interbody Spine Fusion Model"; *SpineWeek International Spinal Conference*, Geneva, Switzerland, June 2008.
137. Puttlitz CM, McGilvray K, Lyons AS, Santoni BG, **Patel VV**, Turner AS: "Kinetic implications of replacement of a cervical intervertebral disc at adjacent levels and associated salvage procedure." 54th Annual Meeting of the *Orthopaedic Research Society (ORS)*, San Francisco, CA, March 2-5, 2008
138. **Patel VV**, Sasso R, Benedict J: "Novel Cell-Binding Peptide As A Bone Graft Substitute" *North American Spine Society(NASS)* Annual Meeting, Oct. 2007
139. **Patel VV**, Benedict J, Turner S, Seim W: "Lumbar Spine Fusion In An Ovine Model Comparing P-15/Bgs To Autogenous Bone" *North American Spine Society Annual Meeting (NASS)*, Oct. 2007
140. **Patel VV**, Estes S, Burger EL: "The Financial Implications of Lumbar Disc Replacement vs. Fusion" *North American Spine Society(NASS)* Annual Meeting Oct. 2007
141. Burger EL, **Patel VV**: "Metal Memory" *North American Spine Society (NASS)* Annual Meeting, Oct. 2007
142. **Patel VV**, Sasso R, Benedict J: "Novel Cell-Binding Peptide As A Bone Graft Substitute" *Scoliosis Research Society (SRS)* International Meeting on Advanced Spinal Techniques Oct. 2007
143. Puttlitz CM, McGilvray K, Lyons A, Ayturk U, Turner AS, **Patel VV**. "Biomechanical implications of adjacent level cervical disc replacement and associated salvage procedures." 14th *International Meeting on Advanced Spine Techniques (IMAST)*, July 11-14, 2007.
144. **Patel VV**, Benedict J, Turner S, Seim W: "Lumbar Spine Fusion In An Ovine Model Comparing P-15/Bgs To Autogenous Bone" *Scoliosis Research Society (SRR)* International Meeting on Advanced Spinal Techniques (IMAST), July, 2007
145. **Patel VV**, Estes S, Burger EL: "The Financial Implications of Lumbar Disc Replacement vs. Fusion" *Scoliosis Research Society (SRS)* International Meeting on Advanced Spinal Techniques (IMAST), July 2007

146. McGilvray, Lyons A, Turner AS, **Patel VV**, Puttlitz CM. “Kinetic and biomechanical testing of two-level cervical disc replacement.” 2007 *ASME* Summer Bioengineering Conference, Keystone, CO, June 20-24, 2007
147. Puttlitz CM, McGilvray K, Lyons A, Ayturk U, Turner AS, **Patel VV**. “Acute biomechanical implications of two-level cervical disc replacement and associated salvage procedure.” 7th Annual Meeting of the *Spine Arthroplasty Society (SAS)*, Berlin, May 1-4, 2007.
148. **Patel VV**: “Novel Cell-Binding Peptide As A Bone Graft Substitute” Annual Meeting *Orthopaedic Research Society (ORS)*, San Diego, CA, February 2007
149. **Patel VV**, Benedict J, Turner S, Seim W: “Lumbar Spine Fusion In An Ovine Model Comparing P-15/Bgs To Autogenous Bone” Annual Meeting *Orthopaedic Research Society (ORS)*, San Diego, CA, February 2007
150. **Patel VV**: “Novel Cell-Binding Peptide As A Bone Graft Substitute” Annual Meeting *American Academy of Orthopaedic Surgeons (AAOS)*, San Diego, CA, February 2007
151. Puttlitz C. M., McGilvray, K., Lyons, A., Ayturk, U. Turner, S., **Patel, VV**. “Acute Biomechanical Implications of Two-Level Cervical Disc Replacement and Associated Salvage Procedure. *Spine Arthroplasty Society* Annual Meeting 2007
152. **Patel VV**, Freudenberger C, Reckling CC, Beard D: “Lumbar Fusion: Anterior Plating vs Posterior Instrumentation” *Western Orthopaedic Association* Annual Meeting, Santa Fe, NM, Oct 11-15 2006.
153. **Patel VV**, Estes S: “Intraoperative C-Arm Based Multiplanar Myelography” *Western Orthopaedic Association* Annual Meeting, Santa Fe, NM, Oct 11-15 2006.
154. **Patel VV**, Estes S: “Use of Intraoperative Multiplanar Imaging and Myelography for Immediate Evaluation of Lumbar Spinal Decompression” International Meeting of *Advanced Spinal Concepts*, Athens Greece, July 2006
155. **Patel VV**, Pradhan BB, Zhao L, Wong P, Bae HW, Delamarter RB,: “Controlling Bone Morphogenetic Protein Stimulated Bone Growth with Fibrin Glue (A Biologic Sealant)” Proceedings of the *World Spine Society* Annual Meeting Rio de Janeiro Brazil, Aug. 2005
156. **Patel VV**, Hsu S, Bae H, Pradhan B, Hedman T, Delamarter R,: “Biomechanical Evaluation of Floating and Fixed Center of Rotation Total Disc Replacements” Proceedings of the *World Spine Society* Annual Meeting Rio de Janeiro Brazil, Aug. 2005
157. **Patel VV**, Pradhan B, Bae HW, Andrews C, Kanim LEA, Delamarter RB,: “Computed Tomography Evaluation of Positioning of Artificial Discs, Along with Its Radiographic and Clinical Relevance” Proceedings of the *World Spine Society* Annual Meeting Rio de Janeiro Brazil, Aug. 2005
158. Pradhan BB, Bae HW, Kropf MA, **Patel VV**, Zhao L, Wong P, Delamarter RB: “Leakage of BMP from Absorbable Collagen Sponges during ACDF: Quantification and Radiographic Analysis for Ectopic Bone Formation in Canal” Proceedings of the *World Spine Society* Annual Meeting Rio de Janeiro Brazil, Aug. 2005

159. Pradhan BB, Rudin B, Bae HW, Kanim LEA, Kamrava W, **Patel VV**, Delamarter RB: “Artificial Disc Replacement as a Salvage Treatment for Failed Back Syndrome” Proceedings of the *World Spine Society* Annual Meeting Rio de Janiero Brazil, Aug. 2005
160. BB Pradhan, Bae HW, **Patel VV**, Dawson EG, Delamarter RB,: “Graft Resorption with Recombinant Human Bone Morphogenetic Protein-2: Lessons from Anterior Lumbar Interbody Fusion Using Stand-Alone Femoral Ring Allografts” Proceedings of the *World Spine Society* Annual Meeting Rio de Janiero Brazil, Aug. 2005
161. **Patel VV**, Hsu S, Bae HW, Pradhan BB, Hedman T, Delamarter RB,: “Biomechanical Evaluation of Floating and Fixed Center of Rotation Total Disc Replacements” *International Meeting on Advanced Spinal Techniques (IMAST)*, Banff Canada 2005
162. **Patel VV**, Baldini T, Pradhan BB, Bach J: “Size Does Matter: Facet Joint Loads Relative to Pedicle Screw Head Size” *International Meeting on Advanced Spinal Techniques (IMAST)*, Banff Canada 2005.
163. **Patel VV**, Pradhan BB, Zhao L, Wong P, Bae HW, Delamarter RB,: “Controlling Bone Morphogenetic Protein Stimulated Bone Growth with Fibrin Glue” Proceedings of the *International Society of Study of the Lumbar Spine* Annual Meeting, New York, NY, Feb. 2005
164. **Patel VV**, Pradhan BB, Zhao L, Wong P, Bae HW, Delamarter RB,: “Controlling Bone Morphogenetic Protein Stimulated Bone Growth with Fibrin Glue” *North American Spine Society (NASS)* Annual Meeting, Chicago, IL, Nov 2004
165. Pradhan BB, Delamarter RB, **Patel VV**, Kropf MA, Bae HW, Dawson ED,: Can rhBMP-2 Enhance Fusion in Anterior Lumbar Interbody Fusion with Stand-Alone Femoral Ring Allografts?” *North American Spine Society (NASS)* Annual Meeting, Chicago, IL, Nov 2004
166. **Patel VV**, Pradhan BB, Zhao L, Wong P, Bae HW, Delamarter RB,: “Controlling Bone Morphogenetic Protein Stimulated Bone Growth with Fibrin Glue” *Scoliosis Research Society (SRS)* Annual Meeting, Buenos Aires, Argentina, Sept 2004
167. Pradhan BB, Delamarter RB, **Patel VV**, Kropf MA, Bae HW, Dawson EG’: Can rhBMP-2 Enhance Fusion in Anterior Lumbar Interbody Fusion with Stand-Alone Femoral Ring Allografts? *Scoliosis Research Society (SRS)* Annual Meeting, Buenos Aires, Argentina, Sept 2004
168. Pradhan BB, Delamarter RB, **Patel VV**, Kropf MA, Bae HW,: Kyphoplasty for Osteoporotic Vertebral Compression Fractures -- Correction of Local Kyphotic Deformity versus Overall Sagittal Alignment. *Scoliosis Research Society (SRS)* Annual Meeting, Buenos Aires, Argentina, Sept 2004.
169. **Patel VV**, Pradhan BB, Bae HW, Delamarter RB,: “Cervical Spine Motion After Disc Replacement”, Proceedings of The 11th *International Meeting on Advanced Spine Techniques(IMAST)* July 1-3, 2004 Southampton, Bermuda
170. **Patel VV**, Zhao L, Pradhan BB, Bae HW, Delamarter RB,: “Controlling BMP-stimulated Bone Growth using Fibrin Glue, Proceedings of The 11th *International Meeting on Advanced Spine Techniques (IMAST)*. July 1-3, 2004 Southampton, Bermuda

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A handwritten signature in black ink, appearing to read 'Vikas V. Patel', with a large, sweeping flourish underneath.

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