**Basic Science Focus Forum**

**BASIC SCIENCE FOCUS FORUM**

**Target Audience**
Academic orthopaedic surgeons, community surgeons with an interest in clinically relevant basic science, basic and clinical researchers, residents and fellows will benefit most from this Basic Science Focus Forum.

**Learning Objectives**
Upon successful completion of this course, participants will be able to:

- Outline the biomechanical principles of injury
- Understand the implications of joint impact injuries
- Comprehend the clinical outcome scores used in orthopaedic research
- Discover new options for treatment of infection
- Explore the basic science and clinical outcomes of pain medication and their prescriptions
- Understand current concepts in tissue engineering

**Wednesday, October 11**

**Thursday, October 12**

Attendees of this activity can earn up to 11.75 AMA PRA Category 1 Credits™

**Basic Science Committee**

Edward J. Harvey, MD
Chair

Michael T. Archdeacon, MD
Mohit Bhanderi, MD, PhD, FRCSC
Joseph Borrelli Jr., MD
Brett Crist, MD
Todd O. McKinley, MD
Tyler Morris, MD
Aaron Nauth, MD
Emil H. Schemitsch, MD

**Wednesday, October 11**

**Thursday, October 12**

**Introduction**
Edward J. Harvey, MD

**Symposium I: Biomechanics**

Injury Biomechanics of Fractures

Moderators: Pierre Guy, MD and Peter Cripton, PhD

**Wednesday, October 11**

7:30am

**Introduction**
Pierre Guy, MD

7:35am – 8:45am

**Symposium I: Biomechanics**

Injury Biomechanics of Fractures

Moderators: Pierre Guy, MD and Peter Cripton, PhD

7:35am

**Introduction**
Pierre Guy, MD

7:40am

**Injury Biomechanics Primer**
Peter Cripton, PhD

7:53am

**Finite Element Modeling**
Benedikt Helgason, PhD

8:06am

**Fracture Models**
Luca Cristofolini, PhD

8:19am

**Biofidelic Models**
Ingmar Fleps, MSc

8:45am –9:24am

**Paper Session 1:**

APPLIED BIOMECHANICS

Moderators: Pierre Guy, MD and Peter Cripton, PhD

8:45am

**Overview**
Pierre Guy, MD

8:50am

**Paper 1**
Do Promising Biomechanical Research Studies Lead to Clinically Meaningful Results?
Jason Kang, MD; Grace Xiong; Julius A. Bishop, MD

8:56am

**Paper 2**
Validation of the Radiographic Union Score for Tibial Fractures (RUST) using Medical Imaging and Biomechanical Testing in an In-Vivo Rat Model
Sandra Fiset, MSc; Meghan Crookshank, MD; Charles Godbout, PhD; Radovan Zdro, PhD; Aaron Nauth, MD; Emil H. Schemitsch, MD

9:02am

**Paper 3**
Long Segment Blocking Screws (LSBS) Increase Stability of Retrograde Nail Fixation in Geriatric Supracondylar Femur Fractures: Eliminating the “Bell-Clapper Effect”
David Donohue; Darryl Auston; Kyle Stoops; Miguel Diaz, MS; Brandon Santoni, PhD; Hassan Mir, MD

9:08am

**Paper 4**
Bridge Plating Osteosynthesis: Effect of Bridge Span on Interfragmentary Motion
Michael Bottlang; Julia Henschel, MS; Stanley Tsi, MS; Daniel Fitzpatrick; Steven Madey
9:14am – 9:24am  Discussion

9:24am – 9:35am  Refreshment Break

9:35am – 10:50am  SYMPOSIUM II: INFECTION
Prevention of the Infected Fracture: Evidence Based Strategies for Success!
Moderators:  Emil H. Schemitsch, MD and Cyril Mauffrey, MD, FACS, FRCS

9:35am  Introduction
Emil H. Schemitsch, MD

9:40am  The Open Fracture: Are There Evidence Based Standards for Antibiotic Therapy?
David J. Hak, MD

9:50am  How I Debride a High Energy Open Fracture
Michael T. Archdeacon, MD

10:00am  The Induced Membrane Technique: How to Optimize Outcome
Cyril Mauffrey, MD, FACS, FRCS

10:10am  Management of Soft Tissue Defects: From Minor to Extreme
Martin I. Boyer, MD

10:20am  Beyond the Fracture: Can the Patient be Optimized?
Michael D. McKee, MD

10:30am  Adjuts to Prevent Infection: Is Anything Ready for Prime Time?
Peter V. Giannoudis, MD, FACS, FRCS

10:40am – 10:50am  Discussion

10:50am – 11:24am  PAPER SESSION II: INFECTION
Moderators:  Emil H. Schemitsch, MD and Cyril Mauffrey, MD, FACS, FRCS

10:50am  Overview
Emil H. Schemitsch, MD

10:55am  Paper 5
Immune-dysregulation in a Rat Model of Infected Femoral Segmental Bone Defect
Hyunhee Ahn; Mara Schenker, MD; Rishin Kadakia; Pallab Pradhan; Laura Weinstock; Levi Wood; Krishnendu Roy; Robert Guldberg; Nick Willett

11:01am  Paper 6
Intrawound Vancomycin Powder Reduces Staph Aureus Surgical Site Infections in a Rabbit Model
James Paul Hovis, MD; Robert O'Toole, MD; Theodore Manson, MD; Mark Shirtliff, PhD; Manjari Joshi, MD; Roman Natoli, MD

11:07am  Paper 7
Intrawound Vancomycin Powder Reduces Bacterial Load in Contaminated Open Fracture Model
Cyrus Caroom, MD; Dustin Moore, MD; Nithya Mudalair, MS; Craig Winkler, MD; Jefferson Murphree, MD; Ian Ratheal, MD; Michael Fry, BS; Jessica Tullar, PhD MPH; Abdul Hamood, PhD

11:13am  Paper 8
Release of Vancomycin and Tobramycin from PMMA Cements Impregnated with Calcium Polyphosphate Hydrogel
David C. Markel, MD; Wei Song, PhD; Weiping Ren

11:19am – 11:24am  Discussion

11:30am – 12:30pm  International Industry Lunch Symposium
West Ballroom CD (No CME credits offered)
Moderators:  Steven A. Olson, MD
Peter V. Giannoudis, MD, FACS, FRCS

12:35pm – 1:50pm  SYMPOSIUM III: JOINT SESSION WITH INTERNATIONAL SURGICAL GROUP
Joint Impact Injuries of the Lower Extremity
Moderators:  Peter V. Giannoudis, MD, FACS, FRCS and Joseph Borrelli Jr., MD

12:35pm  Introduction
Peter V. Giannoudis, MD, FACS, FRCS

12:40pm  The Basic Science/Molecular Make-up and Response to Injury of Articular Cartilage
Joseph Borrelli Jr., MD

12:48pm  The Role of Residual Articular Incongruity and Joint Instability in the Progression of PTOA?
Steven A. Olson, MD

12:56pm  Modulation of Cartilage's Response to Injury: Can Chondrocyte Apoptosis be Reversed?
Peter V. Giannoudis, MD, FACS, FRCS

1:04pm  Effectiveness of Cellular and Growth Factors for the Treatment of Injured Articular Cartilage
Emil H. Schemitsch, MD

12:00pm – 12:25pm  TBD

12:30pm – 12:55pm  Zimmer Biomet N-Force Fixation Solutions
Speaker: TBD

1:00pm – 1:25pm  TBD
1:12pm | Current Tissue Engineering Approaches to Regenerate Cartilage  
James P. Stannard, MD

1:40pm – 1:50pm | Discussion

1:50pm – 2:00pm | Break / Walk back to BSFF Room  
West Meeting Room 109-110

2:00pm – 2:40pm | PAPER SESSION III: GENERAL TRAUMA  
Moderators: Peter V. Giannoudis, MD, FACS, FRCS and Joseph Borrelli Jr., MD

2:00pm | Overview  
Joseph Borrelli, MD

2:05pm | Paper 9  
Synovial Fluid Analysis Reveals a Novel Panel of Vascular and Inflammatory Biomarkers that are Altered following Articular Fracture  
Steven A. Olson, MD; Bridgette Furman; Janet Heubner, MS; Farsh Gulak, PhD; Yi-Ju Li, PhD; Kelly Kimmerling; Yi-Hung Wu, PhD; Virginia Kraus, MD, PhD

2:11pm | Paper 10  
Hemorrhagic Shock and Surgical Strategy (Nailing versus External Fixation) affect the Microcirculation in Soft Tissues  
Roman Pfeifer, MD; Klemens Horst; Zhi Qiao; Michel Teuben; Frank Hildebrand; Hans-Christoph Pape, MD

2:17pm | Paper 11  
The Gut Microbiome: What Effect Does Our Diet Play in Fracture Healing?  
Ashlee MacDonald, MD; Christopher Farnsworth, PhD Student; Eric Schott, PhD Student; Alex Grier; Steven Gill, PhD; Hani Awad, PhD; Michael Zuscik, PhD; Robert Mooney, PhD; John Ketz, MD

2:23pm | Paper 12  
Can Intramuscular pH Levels Diagnose Acute Compartment Syndrome?  
Christopher Doro, MD; David Hennessy, MD; Robert O’Toole, MD; Thomas Higgins, MD

2:29pm – 2:40pm | Discussion

2:40pm – 3:55pm | SYMPOSIUM IV: TISSUE ENGINEERING—FACT OR FICTION?  
Moderators: Brett D. Crist, MD, FACS and Mark Lee, MD

2:40pm | Introduction  
Brett D. Crist, MD, FACS

2:45pm | How to Make a Bone in 2017  
J. Tracy Watson

3:00pm | Can We Get a Scaffold to Really Work?  
Harrie Weinans, MD

3:15pm | What are the Cartilage Options for Trauma Applications?  
Brett D. Crist, MD

3:30pm | Have We Made Any Head Way in Soft Tissue Engineering?  
Mark Lee, MD

3:45pm – 3:55pm | Discussion

3:55pm – 4:56pm | PAPER SESSION IV: MANIPULATING HEALING  
Moderators: Brett D. Crist, MD, FACS and Mark Lee, MD

3:55pm | Overview  
Mark Lee, MD

4:00pm | Paper 13  
Designer Chieric Protein BC-265/Composite Matrix Demonstrates Efficacy in Nonhuman Primate Bone Repair Models at Substantially Lower Concentrations than INFUSE®  
Howard Seeherman, PhD, VMD; Stephen Berasi, PhD; Marc Bohner, PhD; Christopher Brown, PhD; Orly Grinberg, PhD; Pablo Morales, DVM; Eric Vanderploeg, PhD; Christopher Wilson, PhD; John Wozney, PhD

4:06pm | Paper 14  
Adjunctive Immunomodulation Improves Efficacy of Autologous Minced Muscle Graft in a Porcine Model of Volumetric Muscle Loss  
Benjamin Corona, PhD; Jessica Rivera, MD; Joseph Wenke, PhD; Sarah Greising, PhD

4:12pm | Paper 15  
Effect of Cold Therapy on Bone Healing  
Daniel Castano, MD; Jose Ramirez-GarciaLuna, MD MsC; Geraldine Merle, PhD; Edward Harvey, MD, MsC

4:18pm – 4:28pm | Discussion

4:28pm | Paper 16  
Hypoxic Preconditioning of Mesenchymal Stem Cell Spheroids Stimulates Segmental Bone Defect Repair  
Nasser Heyrani, MD; Steve Ho; Ben Hung, PhD; Mark Lee; Jonathan Leach, PhD

4:34pm | Paper 17  
Platelet Rich Plasma as a Vehicle for Endothelial Progenitor Cell Delivery in Critical Sized Bone Defects  
David Ramnaraign, MSc; Charles Godbout, PhD; Brent Bates; Emil H. Schemitsch, MD; Aaron Nauth, MD
4:40pm  Paper 18
Aminocaproic Acid Inhibits Periosteal Chondrogenesis and Promotes Periosteal Osteogenesis during Fracture Healing
Dalibel Bravo, MD; Anna Josephson, MS; Vivian Bradaschia Correa, PhD; Jason Huo, BS; Philipp Leucht

4:46pm –4:56pm  Discussion

4:56pm  Adjourn for the Day

THURSDAY, OCTOBER 12

7:30am  Introduction
Edward J. Harvey, MD

7:35am – 8:30am  SYMPOSIUM V: PATIENT OUTCOMES IN ORTHOPAEDICS
How to Evaluate if Your Treatment is Really Working
Moderators: Mohit Bhandari, MD, PhD, FRCSC and Aaron Nauth, MD

7:35am  Lower Extremity Outcomes in Trauma Patients

7:45am  Upper Extremity Outcomes in Orthopaedic Trauma

7:55am  How Big of a Difference is Clinically Important? Using MCID in Orthopaedic Trauma

8:05am  General Health Outcomes and Economic Analysis: How to Determine if the Cost Treatment is Worth It

8:15am  The Impact of Psychosocial Factors on Outcomes in Orthopaedic Trauma

8:25am – 8:30am  Discussion

8:30am –9:27am  PAPER SESSION V: DOING IT BETTER
Moderators: Mohit Bhandari, MD, PhD, FRCSC and Aaron Nauth, MD

8:30am  Overview
Aaron Nauth, MD

8:35am  Paper 19
Negative Effects of Age-Related Chronic Inflammation on Skeletal Stem Cells
Anna Josephson, MS; Vivian Bradaschia Correa, PhD; Shane Neibart, BS; Philipp Leucht, MD

8:41am  Paper 20
Effect of Nifedipine and Ketotifen on Joint Capsule Cell Based Collagen Gel Contraction
Kristi Billard, BSc; Mei Zhang, MD; Prism Schneider, MD, PhD; Dave Hart, PhD; Paul Salo, MD; Kevin Hildebrand, MD, FRCSC

8:47am  Paper 21
Reduction in Angiogenic Support is the Primary Defect of Mesenchymal Stromal Cells Resident at the Site of Long Bone Non-Union
Richard James Cuthbert; Sarah Churchman; Penelope Castana, PhD; Hiang Boon Tan; Dennis McGonagle; Evangelia Papadimitriou, PhD; Elena Jones; Peter Giannoudis, MD

8:53am –9:01am  Discussion

9:01am  Paper 22
An Evaluation of Bone Marrow Aspirate Concentrate in Osteointegration of Fresh Osteochondral Allografts
James P. Stannard, MD; James Cook, PhD; Brett Crist, MD

9:07am  Paper 23
Femoral Neck Exposure for the Smith-Peterson Versus the Watson
Paul Lichstein, MD, MS; John Kleimeyer, MD; Michael Githens; John Vorhies, MD; Michael Gardner; Michael Bellino; Julius A. Bishop, MD

9:13am  Paper 24
The Effect of Smoking Cessation on Serum Biomarkers of Fracture Healing
Justin Kleiner, BS; Joseph Johnson, MD; Jeremy Trunzter; Scott McAllister; Matthew Deren; Mursal Gardezi; Olivia Cummings; Melanie Ambler; Dioscaris Garcia; Christopher Born

9:19am – 9:27am  Discussion

9:27am – 9:40am  Refreshment Break

9:40am –10:35am  SYMPOSIUM VI: SCIENCE BEHIND PAIN MANAGEMENT
Moderator: Todd O. McKinley, MD
William T. Obremskey, MD

9:40am  Overview
Presenter: Todd O. McKinley, MD

9:45am  Current Epidemiology and Extent of Our Problems
Hassan Mir, MD

9:55am  Pain Control - Pharmacology and Different Mechanisms of Pain
Jeremy Trunzter; Scott McAllister; Matthew Deren; Mursal Gardezi; Olivia Cummings; Melanie Ambler; Dioscaris Garcia; Christopher Born

10:05am  Clinical Management - Blocks, Multimodal, Medication Protocols and Contracts
Joseph Hsu, MD

10:15am  Health Policy - State, Federal, Insurer and Pharmacy Regulations
A. Alex Jahangir, MD

10:25am –10:35am  Discussion
10:35am – 11:05am PAPER SESSION VI:
Moderator: Todd O. McKinley, MD
William T. Obremskey, MD

10:35am Overview
Todd O. McKinley, MD

10:40am Paper 25
Reliability of Proxy-Based PROMIS Physical Function and Pain Interference to Measure Outcomes in Elderly Patients Following Musculoskeletal Trauma
Maria Loreto Alvarez-Nebreda, MD, PhD; Marilyn Heng, MD MPH; Bernard Rosner, PhD; Michael McTague, MPH; Houman Javedan, MD; Mitchel Harris, MD; Michael Weaver, MD

10:46am Paper 26
Over-Prescription of Opioids at Discharge in Patients After Fracture Surgery
Eric Chen, MD, PhD; Lulu Li, BS; Paul Tornetta III, MD

10:52am Paper 27
Prescription Reporting with Immediate Medication Utilization Mapping (PRIMUM): Impact of an Alert on Controlled Substance Prescribing
Rachel Seymour, PhD; Meghan Wally, MPH; Sharon Schiro, PhD; Joseph Hsu, MD; PRIMUM Group

10:58am –11:05am Discussion

11:05am ADJOURN TO INDUSTRY LUNCH SYMPOSIA