Basic Science Focus Forum

Wednesday-Thursday
October 20 - 21, 2021
Fort Worth Convention Center
Fort Worth, Texas

Basic Science Committee
Aaron Nauth, MD Chair
Andrew Evans, MD, FACS
Justin Haller, MD
Michael Hast, PhD
Christopher Lee, MD

Saam Morshed, MD, PhD
Emil Schemitsch, MD
Andrew Trenholm, MD
John Wixted, MD

11.5 AMA PRA Category I Credits™

2021 OTA Annual Meeting
October 20 - 23, 2021

#OTA2021

Schedule and presenters are subject to change.
Overview
The 2021 Basic Science Focus Forum Course (BSFF) is directed towards orthopaedic surgeons with an interest in the basic science of orthopaedic trauma and how it relates to or impacts their practice. Basic science researchers will also obtain valuable knowledge about translational opportunities and how their research has the potential to change orthopaedic care. This course will involve 6 main symposia specifically designed to ‘bridge the gap’ between basic science and clinical practice, in addition to 29 original research papers from the cutting edge of basic science research.

The attendees of the BSFF program will also have the opportunity to join together with the attendees at the International Trauma Care Forum for a special joint symposium. This combined session has proved to be a great collaboration and a chance to discuss ideas with our international colleagues.

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.

Symposia
- Combined Session with International Trauma Forum: Management of (Aseptic) Non-unions and Severe Done Defects: Let’s Get This Thing Healed
- Post-Traumatic OA: From Basic Science to Clinical Implications
- Orthopaedic Infections: What Have We Learned?
- SRI Collaborative Session: Simple Design and Analysis Strategies for Solving Common Problems in Orthopaedic Clinic Research
- Other Symposia Topics Include: Biomechanics, Orthobiologics, and Fracture Healing

Learning Objectives
Upon successful completion of this course, participants will be able to:
- Update knowledge in the basic science of orthopaedic trauma
- Demonstrate an improved understanding of the biomechanics of fracture fixation
- Understand the basic science and clinical implications of orthopaedic infections
- Explore the latest research on polytrauma from a basic science and clinical perspective
- Understand the basic science and clinical aspects of post-traumatic osteoarthritis
- Explore the latest basic and clinical research on enhancing fracture healing
- Understand the concepts around design and analysis in clinical research

Wednesday, October 20
12:05 PM - 1:00 PM
International Industry Lunch Session
Sponsored by: Zimmer Biomet
Current Topics in Clavicle Fracture Management
Speaker: Anil Dutta, MD

<table>
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<tr>
<th>Early Bird Registration</th>
<th>OTA Member On/Before 9/30/21</th>
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Register Today at ota.org
Wednesday, October 20, 2021

7:30 AM - 7:35 AM  Introduction  
Aaron Nauth, MD

7:35 AM - 7:40 AM  Symposium I  
Great Debates in Trauma Biomechanics  

Moderators:  
Michael Hast, PhD  
Emil H. Schemitsch, MD

7:35 AM  Overview  
Michael Hast, PhD

7:40 AM  Locked Plate vs. Forward Dynamization vs. Reverse Dynamization - Which Way Should I Go?  
(5 minutes per speaker)  
Samir Mehta, MD  
Utku Kandemir, MD  
Vaida Glatt, PhD  

7:58 AM  Discussion

8:13 AM  Sawbones vs. Cadaver Models - What Should I Believe Most?  
William M. Ricci, MD  
Michael Hast, PhD

8:25 AM  Discussion

8:40 AM  Mechanics vs. Biology - Which is “More Important” to Consider?  
Robert O’Toole, MD  
Ara Nazarian, PhD

8:52 AM  Discussion

9:05 AM - 10:00 AM  Paper Session I  
Biomechanics

Moderators:  
Michael Hast, PhD  
Emil H. Schemitsch, MD

9:05 AM - 9:13 AM  PAPER 1  
Smart Facture Plate Monitors Callus Stiffness  
Eric H. Ledet, PhD; Madelyn Stout;  
Sydney M. Caparaso; Keegan Cole MD;  
Benjamin Liddle, BS; Nathaniel Cady, PhD;  
Reena Dahle, PhD;  
Michael T. Archdeacon, MD, FAAOS

9:13 AM - 9:21 AM  PAPER 2  
A Biomechanical Comparison of Two Fixation Methods for Unstable Lateral Compression (AO/OTA 61B2) Pelvic Ring Injuries  
Eric Hempen, MD;  
Benjamin Matthew Wheatley, MD;  
Patrick Schimoler;  
Alexander Kharlamov, MD, PhD;  
Patricia Melvin, MD; Mark Carl Miller, PhD;  
Gregory T. Altman, MD; Daniel T. Altman, MD;  
Edward Ryan Westrick, MD

9:21 AM  Discussion

9:28 AM - 9:36 AM  PAPER 3  
The Effect of Screw Fixation on Sacroiliac Joint Stiffness using Vibration Energy Color Doppler Imaging  
Caleb Gottlich, MD;  
Alex Stephen Drusch, MS;  
Thomas Githens, DO;  
Cyrus Theodore Caroom, MD;  
Phillip Spelman Sizer, PhD, PT

9:36 AM - 9:44 AM  PAPER 4  
Orthogonal Plating of Distal Femur Fractures: A Biomechanical Comparison with Plate-Nail and Parallel Plating Constructs  
Zoe Beatrice Cheung, MD; Philip Nasser, MS;  
James C. Iatridis, PhD; David Forsh, MD
Wednesday, continued

9:44 AM - PAPER 5
9:52 AM A Biomechanical Comparison Between TightRope and Suture-Post Fixation: A Novel Technique
Pierce Johnson, MD; Paulo Castaneda, MD; Robert Walker, MD; Tony K. Nguyen, MD; J .Tracy Watson, MD

9:52 AM Discussion

10:00 AM Morning Break

10:15 AM - SYMPOSIUM II
11:07 AM SRI Collaborative Session: Simple Design and Analysis Strategies for Solving Common Problems in Orthopaedic Clinic Research
Moderators: Saam Morshed, MD Gerard Slobogean, MD

10:15 AM Overview
Saam Morshed, MD

10:17 AM Not a RCT? How Do We Get Causal Inference from Observational Data
Renan Castillo, MD

10:27 AM Confounding Bias and How to Best Adjust for It [Stratification, Matching, Regression, and PSA]
Saam Morshed, MD

10:37 AM The Power of Repeated Measures and Longitudinal Data [Longitudinal Regression, etc.]
Gerard Slobogean, MD

10:47 AM Handling Missing Data and Loss to Follow-up [Imputation, Time to Event Analysis, etc.]
Herman Johal, MD, PhD

10:57 AM Discussion

11:07 AM - PAPER SESSION II
12:00 PM Quantifying Fracture Healing
Moderators: Saam Morshed, MD Emil H. Schemitsch, MD

11:07 AM - PAPER 6
11:15 AM A Short Course of Dehydroepiandrosterone is Associated with Accelerated Fracture Healing in a Mouse Fracture Model
David Kirby, MD; Daniel B. Buchalter, MD; Cyrus Luczkow; John Frederick Dankert, MD; Devan Mehta, MD; Philipp Leucht, MD

11:15 AM - PAPER 7
11:23 AM Adult Collagen X Fracture Biomarker Levels Demonstrate Early Peak After Fracture to Match Preclinical Model
Zachary Mark Working, MD; Kaitlyn E. Whitney, BS; Justin Hellwinkel, MD, MSc; Lauren Pierpoint; Ryan Coghlan; Darin M. Friess, MD; Theodore Miclau, MD; William Horton, MD; Brian Johnstone, PhD; Chelsea S. Bahney, PhD

11:23 AM Discussion

11:29 AM - PAPER 8
11:37 AM Novel Profiling Method to Detect Hypoxia Biomarker After Cold Therapy at Bone Injury Site
Matthew Zakaria, BS, MSc; Yazan Honjol, BA, MD; Drew Schupbach, MD, BS; Géraldine Merle; Edward J. Harvey, MD, MSc

11:37 AM - PAPER 9
11:45 AM Three-dimensional Ultrasound Reconstruction of Sonographic Callus: A Novel Imaging Modality for Early Evaluation of Fracture Healing
Jamie A. Nicholson, MBCHB, MRCSED; William M. Oliver, MBBS, MRCSED; Tom MacGillivray, PhD; Christopher M. Robinson, MD; Hamish Robert Wallace Simpson, ChB, DMed, MA, MB

11:45 AM Discussion

Wednesday, continued

11:45 AM - PAPER 10
11:53 AM Advanced Imaging Evaluation of Distal Radius Fractures Using FE Analysis of HR-pQCT
Phillip John Curtis Spanswick, MSc; Mohammad Salem, PhD; Danielle Whittier, BS; Robert Korley, MD; Steven Boyd; Prism Schneider, MD, PhD

11:53 AM Discussion

12:00 PM Proceed to Ballroom C

12:05 PM – 1:00 PM BSFF/ITCF Combined Industry Lunch

1:00 PM Return to Meeting Room 201AB

1:05 PM - Symposium III
1:07 PM Orthopaedic Infections: What Have We Learned?
Moderator: Christopher Lee, MD

1:05 PM Overview
Christopher Lee, MD

1:07 PM Host Modulation in Infection Prevention
Nicholas Bernthal, MD

1:17 PM Race to the Surface – Orthopaedic Implants and Infection
Joseph Wenke, PhD

1:27 PM PO vs. IV Antibiotics in Orthopaedic Infections
Paul Holtom, MD

1:37 PM Antibiotic Powder Use in Orthopaedic Infection and Prevention – Current Concepts
Robert V. O’Toole, MD

1:47 PM Discussion

1:57 PM - Paper Session III
1:57 PM Infection, Scaffolds and Osteoporosis
Moderator: Christopher Lee, MD

1:57 PM - PAPER 11
1:57 PM A Micro-CT and Biomechanical Analysis of the Effects of Intra-Wound Vancomycin Powder on Infection and Bone Healing in a Rat Model
Ikran Ali; Charles Godbout, PhD; Hening Sun, BS; Graeme Hoit, MD; Emil H. Schemitsch, MD; Aaron Nauth, MD

2:05 PM - PAPER 12
2:05 PM Microgel-Enhanced Delivery of Adenosine to Accelerate Fracture Healing
Shyni Vargheese, PhD; Jiaul Hoque, PhD; Mark Gage, MD

2:05 PM - PAPER 13
2:05 PM Human Mesenchymal Stromal Subcellular Compositions Depends on Bone Mass Density: A Single Cell Level Study by Mass Cytometry
Benjamin Eggerschwiler; Elisa Anna Casanova; Daisy Canepa, MSc; Sascha Halvachizadeh, MD; Georg Osterhoff, MD; Yannik Kalbas; Hans-Christoph Pape, MD; Paolo Cinelli, PhD

2:13 PM - PAPER 14
2:13 PM Bone Targeting Nanocarrier-Assisted Delivery of Adenosine to Treat Osteoporotic Bone Loss
Shyni Vargheese, PhD; Jiaul Hoque, PhD; Mark Gage, MD

2:13 PM - PAPER 15
2:13 PM Thrombelastography Platelet Mapping Identifies Platelet-mediated Hypercoagulability Following a Hip Fracture
Prism Schneider, MD, PhD; Daniel You, MD; Andrew Dodd, MD; Paul James Duffy, MD; Ryan Martin, MD; Robert Korley, MD

2:20 PM - Discussion

2:28 PM - PAPER 14
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2:44 PM Discussion

2:52 PM Afternoon Break
Wednesday, continued

3:05 PM - 3:57 PM
Symposium IV
Post-Traumatic OA: From Basic Science to Clinical Implications

Moderators: Justin Haller, MD
Andrew Trenholm, MD

3:05 PM
Overview
Justin Haller, MD

3:07 PM
Role of Bone Remodeling in PTOA Development
Marjolein van der Meulen, PhD

3:17 PM
Assessing Mechanical Variables that Impact PTOA Development and Outcome
Donald D. Anderson, PhD

3:27 PM
Influence of Inflammatory Cytokines on the Pathogenesis of PTOA
Steven Olson, MD

3:37 PM
Biologic Enhancements for the Prevention of PTOA
J. Lawrence Marsh, MD

3:47 PM
Discussion

3:57 PM - 4:52 PM
Paper Session IV
Infection, Scaffolds and Osteoporosis

Moderators: Justin Haller, MD
Andrew Trenholm, MD

3:57 PM - 4:05 PM
PAPER 16
Greater Acute Articular Inflammatory Response in Tibial Plafond Fractures as Compared to Rotational Ankle Fractures
Lucas Scott Marchand, MD; David Lynn Rothberg, MD; Thomas F. Higgins, MD; Justin Haller, MD

4:05 PM - 4:13 PM
PAPER 17
Articular Fragment Restoration is Critical to Mitigate Post-traumatic Osteoarthritis in a Porcine Pilon Fracture Model
Graham John Dekeyser; Richard Tyler Epperson; Dustin Williams, PhD; Aaron L. Olsen, DVM, PhD; Justin Haller, MD

4:13 PM
Discussion

4:20 PM - 4:36 PM
PAPER 18
Articular Fracture Increases Inflammatory Chondrocyte Gene Expression more than Compression with a High Synovitis Co-culture Model
Megan Libke; Daniel Joseph Cunningham, MD; Bridgette D. Furman, BS; Virginia Byers Kraus, PhD; Farshid Guilak, PhD; Amy L. McNulty, BS, PhD; Steven A. Olson, MD

4:36 PM - 4:52 PM
PAPER 19
Combination of lidocaine and IL-1Ra Is Effective at Reducing Degradation of Porcine Cartilage Explants
Michael W. Buchanan, BS; Bridgette D. Furman, BS; Amy L. McNulty, BS, PhD; Steven A. Olson, MD
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Wednesday, continued

4:36 PM - 4:44 PM  PAPER 20
Systemic Glucose-Insulin-Potassium Reduces Skeletal Muscle Injury, Kidney Injury, and Pain in a Murine Ischemia-Reperfusion Model
Daniel B. Buchalter, MD; David Kirby, MD; Devan Mehta, MD; John Frederick Dankert, MD; Kenneth A. Egoi, MD; Sanjit R. Konda, MD; Philipp Leucht, MD

4:44 PM  Discussion

4:52 PM  Adjourn for the Day

Please attend the International Reception on Level 2 - Ballroom Lobby

Thursday, October 21, 2021

Basic Science Focus Forum and International Trauma Care Forum will have their combined symposium in Ballroom C

7:30 AM - 7:35 AM  Introduction
Hans-Christoph Pape, MD

7:35 AM - 8:35 AM  Joint Session - Symposium V
Management of (Aseptic) Non-unions and Severe Bone Defects: Let's Get This Thing Healed!

Moderators: Aaron Nauth, MD
Hans-Christoph Pape, MD

7:35 AM  The Biomechanics of Nonunion Etiology and Treatment
Brett Crist, MD

7:45 AM  Induced Membrane Technique for Nonunion Management
Peter Giannoudis, MD

7:55 AM  Biological Treatments for Nonunions: Bone Graft Types and Bone Graft Substitutes
Martin Poeze, MD

8:05 AM  Outlook for New Research Options: The AO Registry Initiative
Hans-Christoph Pape, MD

8:15 AM  Putting It All Together: A Comprehensive Approach to Nonunion Management
Aaron Nauth, MD

8:25 AM  Discussion

8:35 AM  Break/Proceed to Meeting Room 201 AB
Thursday, continued

8:45 AM - 9:40 AM  Paper Session V
Polytrauma and Compartment Syndrome
Moderator: Aaron Nauth, MD

8:45 AM - 9:40 AM  Humanitarian Scholar - Kenya
PAPER 21
Post-Traumatic Inflammatory Load: IL-6 and IL-8 Levels, Associated Potential Surrogate Markers and Regression Analysis for Impact of Various Injury Properties
Dennis K. Rono, MBCHB, MMED

8:53 AM - 9:01 AM  PAPER 22
Lipidomic Analysis in a Porcine Polytrauma Model Show Significant Posttraumatic Changes to the Circulating Lipid Profile
Yohei Kumabe, MD; Yannik Kalbas; Sascha Halvachizadeh, MD; Thorsten Hornemann, PhD; Roman Pfeifer, MD; Paolo Cinelli, PhD; Hans-Christoph Pape, MD

9:01 AM  Discussion

9:09 AM - 9:17 AM  PAPER 23
Protective Effects of New Femoral Reaming Techniques (Reamer Irrigator Aspirator, RIA I and II) on Pulmonary Function and Posttraumatic Contusion (CT Morphology) - Results from a Standardized Large Animal Model
Sascha Halvachizadeh, MD; Michel Paul Johan Teuben, MD, MSc; Yannik Kalbas; Nikola Cesario, DVM, PhD; Paolo Cinelli, PhD; Roman Pfeifer, MD; Hans-Christoph Pape, MD

9:16 AM - 9:24 AM  PAPER 24
In vivo Intramuscular pH in Tibia Fractures is Acidic But Normalizes After Stabilization & Resuscitation
Loren O. Black, MD, MBA; Megan Catherine Rushkin, MPH; Emelia Sodders, MS; Jeffrey Samuel Cheesman, MD; James E. W. Meeker, MD; Jung U. Yoo, MD; Darin M. Friess, MD; Zachary Mark Working, MD

9:24 AM - 9:32 AM  PAPER 25
Pre-Clinical Acute Compartment Syndrome with a Porcine Continuous Measurement Model
Yazan Honjol, BA, MD; Rachel Monk; Drew Schupbach, MD, BS; Géraldine Merle; Edward J. Harvey, MD, MSc

9:32 AM  Discussion

9:40 AM - 10:32 AM  Symposium VI
Fracture Healing - Orthobiologics: From Basic Science to Clinical Application
Moderators: Andrew Evans, MD John Wixted, MD

9:40 AM  Overview
Andrew Evans, MD

9:42 AM  Basic Science Pathways for Pharmacologic Approaches to Enhancing Fracture Repair
Ralph Marcucio, PhD

9:52 AM  Translational Challenges in Fracture Repair - What the FDA Needs to See
Doug Dischel, MD

10:02 AM  Study Design Tactics that Optimize the Potential for Clinical Translation of Basic Science Research
Joseph Johnson, MD

10:12 AM  Candidate Basic Science Pathways as Potential Targets for Clinical, Surgical, and Orthobiologics Modification
Jaimo Ahn, MD, PhD

10:22 AM  Discussion
Thursday, continued

10:32 AM - 11:15 AM
**Paper Session VI**
Fracture Healing: Cells and Bone Grafting

Moderators: Andrew Evans, MD  
John Wixted, MD

**10:32 AM - 11:15 AM**

**PAPER 26**
Biomimetic Hematoma: Novel Carrier Delivers Extremely Low Dose rhBMP-2 for Highly Effective Healing of Large Bone Defects in Goats

*Vaida Glatt, PhD; Anna Woloszyk; Animesh Agarwal, MD*

**10:40 AM - 11:15 AM**

**PAPER 27**
Short Platelet Rich Plasma Exposure Induces a Priming Effect on the Biophysiological Potency of Bone Marrow Mesenchymal Stem Cells in Human

*James Vun, MBCHB, MRCSED; Paul Harwood, FRCS (Ortho), MSc; Jehan Jomaa El-Jawhari, MBCHB, MSc, PhD; Elena Jones, PhD; Peter Giannoudis, MD, BS, MBBS*

**10:48 AM - 11:15 AM**

**PAPER 28**
Bone Graft Composition with RIA from a Native vs. Previously Reamed Long Bone for bone graft harvest?

*Stephanie N. Moore-Lotridge, PhD; Cesar Cereijo, DO; Sam Robert Johnson, BS; Jonathan G. Schoenecker, MD; Cory Alan Collinge, MD; William T. Obremskey, MD, MPH*

**10:56 AM - 11:15 AM**

**PAPER 29**
Comparison of Reamer-Irrigator-Aspirate (RIA) to Bone Marrow Aspirate Concentrate (BMC) for Osteoprogenitor Cell Retention and Osteoinductive Protein Release on Cancellous Bone

*Brett D. Crist, MD; Aaron Michael Stoker, MS, PhD; Jane Liu, MD; James P. Stannard, MD; James L. Cook, DVM, PhD*

11:04 AM Discussion

11:12 AM Adjourn to Industry Symposia

The Orthopaedic Trauma Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The Orthopaedic Trauma Association designates this live activity for a maximum of 11.5 AMA PRA Category 1 Credits™.

Physicians should claim only the credit commensurate with the extent of their participation in the activity.