Objective

The purpose of this Symposium is to provide a forum for consensus development and scientific exchange on the needs for characterization and standardized testing related to modularity and tapers used in total joint replacement devices. The main focus of this Symposium is to address unmet standardization needs and to help establish best testing practices in the following four areas:

- Characterization of Fretting, Taper Corrosion & Associated Adverse Tissue Reactions
- What Do Retrievals Tell Us in Total Joint Arthroplasty?
- Contemporary & Evolving Test Methodologies
- Design Parameters for Taper Connections in TJA

Each topic of interest will be addressed by a faculty whose brief is to present methodological innovations relevant to the title of the Symposium including a discussion of elements in each presentation that merit consideration for standardization.
Program

8:00 AM
Welcome & Opening Remarks
A. Seth Greenwald, D.Phil.(Oxon), Symposium Co-Chair

SESSION I: Clinical, Regulatory & Litigation Considerations
Session Chairperson: A. Seth Greenwald, D.Phil.(Oxon), Symposium Co-Chair

8:05 AM
Talk 1: Experience & Opinions on Modular Connections for Surgical Implant Devices
Jack E. Lemons, Ph.D., Symposium Co-Chair

8:15 AM
Talk 2: Orthopaedic Surgeon Modularity Utilization & Surgical Technique Considerations in the Face of Implant Corrosion
William M. Mihalko, M.D., Ph.D., Symposium Co-Chair

8:25 AM
Talk 3: Trunnion Options in Primary Total Hip Arthroplasty in 2014
Carlos J. Lavernia, M.D., C. Emerson, J. M. Villa and S. D. Cook, The Center for Advanced Orthopedics at Larkin, South Miami, FL, USA

8:35 AM
Talk 4: A Critical Review of Registry & Other Data
John M. Cuckler, M.D., Alabama Medical Consultants, Naples, FL, USA

8:45 AM
Talk 5: Patient Outcomes Following Implantation of Modular Neck Hip Prostheses in Primary THA
Takayuki Murayama, M.D., J. D. Blaha, A. E. Pour and R. Borden, II, University of Michigan, Ann Arbor, MI, USA

8:55 AM
Talk 6: Corrosion at the Head-Neck Taper Interface Affects the Prognosis of Hip Revision Surgery
PD Dr. Emmanouil Liodakis, D. Zukor, O. Huk and J. Antoniou, Jewish General Hospital, McGill University, Montreal, Canada; and A. Carli, Hospital for Special Surgery, New York, NY, USA

9:05 AM
Talk 7: Regulatory Update on Modular Femoral Stem Tapers: What We Look For & Study Overviews
John S. Goode, Center for Devices & Radiological Health, USFDA

9:15 AM
Talk 8: The Role of ASTM Standards & Taper Corrosion Litigation
Mindy A. Finnigan, Esq. and Adrienne Busby, Esq., Faegre Baker Daniels, Chicago, IL, USA
SESSION II: Assembly & Bearing Effects on the Modular Taper Junction
Session Chairperson: William M. Mihalko, M.D., Ph.D., Symposium Co-Chair

9:25 AM
Talk 9: Is Taper Fretting Corrosion a Threat to the Clinical Performance of Large-Diameter Highly Crosslinked Polyethylene Bearings?
Steven M. Kurtz, Ph.D. and D. W. MacDonald, Drexel University, Philadelphia, PA, USA; J. L. Gilbert, Syracuse University, Syracuse, NY, USA; M.A. Mont, Sinai Hospital, Baltimore, MD, USA; G. Klein, Hackensack University Medical Center, Hackensack, NJ, USA; J. Parvizi, Rothman Institute at Jefferson University, Philadelphia, PA, USA; M. Kraay, UH Case Medical Center, Cleveland, OH, USA; B. Stulberg, Cleveland Clinic, Cleveland, OH, USA; and C. M. Rimnac, Case Western Reserve, Cleveland, OH, USA

9:35 AM
Talk 10: Characterizing the Strength of the Taper Connection & its Effect on Taper Damage in Retrieved Total Hip Devices
Genymphas B. Higgs, M.S. and S. M. Kurtz, Drexel University, Philadelphia, PA, USA; J. L. Gilbert, Syracuse University, Syracuse, NY, USA; W. M. Mihalko, Campbell Clinic Orthopaedics, Memphis, TN, USA; and C.M. Rimnac, Case Western Reserve, Cleveland, OH, USA

9:45 AM
Talk 11: Contact Mechanics & Plastic Deformation at the Local Surface Topography Level After Assembly of Modular Head-Neck Junctions in Modern Total Hip Replacement Devices
Robin Pourzal, Ph.D., N. Q. Ha, D. J. Hall, R. M. Urban, B. R. Levine and H. J. Lundberg, Rush University Medical Center, Chicago, IL, USA

9:55 AM- Roundtable Discussion

10:15 AM- Poster Session

SESSION III: Assessment of Taper Connection Damage
Session Chairperson: Jack E. Lemons, Ph.D., Symposium Co-Chair

11:00 AM
Talk 12: Validating a Simplified Method for Assessing THA Taper Corrosion Susceptibility with a 15-Year Retrieval Database
Patrick Aldinger, M.B.A., B. Jones and J. Cartner, Smith & Nephew, Memphis, TN, USA

11:10 AM
Radu Racasan, Ph.D., P. Bills and L. Blunt, University of Huddersfield, UK; and A. Hart and J. Skinner, University College London, London, UK
11:20 AM
Talk 14: Mechanically Assisted Crevice Corrosion Damage in Total Shoulder Arthroplasty is Comparable to Total Hip Arthroplasty
Judd Day, Ph.D. and S. M. Kurtz, Drexel University, Philadelphia, PA, USA and Exponent Inc., Philadelphia, PA, USA; D. W. MacDonald and R. McCloskey, Drexel University, Philadelphia, PA, USA; J. A. Abboud and G. R. Williams, Rothman Institute at Jefferson University, Philadelphia, PA, USA; C. Rimnac, Case Western University, Cleveland, OH, USA; and M. J. Kraay, UH Case Medical Center, Cleveland, OH, USA

11:30 AM
Talk 15: Validation of an Optical CMM for the Measurement of Wear at the Taper Interface in Total Hip Replacement
Christian Maul and M. A. Strickland, RedLux, Chandlers Ford, UK; and R. B. Cook, University of Southampton, Highfield, Southampton, UK

11:40 AM
Talk 16: Quantifying Material Loss & Patient Ion Levels in a Dual Taper Modular Hip Design
Douglas Van Citters, Ph.D., J. H. Currier and D. J. Assael, Thayer School of Engineering at Dartmouth, Hanover, NH, USA

11:50 AM - Roundtable Discussion

12:10 PM - Lunch & Poster Session

**SESSION IV: Testing & Standards Considerations of Modular Taper Junctions**
Session Chairperson: Steven M. Kurtz, Ph.D., Symposium Co-Chair

1:35 PM
Talk 17: State-of-the-Art Understanding of In Vivo Modular Taper Corrosion & In Vitro Testing
Jeremy L. Gilbert, Ph.D., Syracuse University, Syracuse, NY, USA

1:55 PM
Talk 18: Femoral Stem Modularity: A Structural Fatigue Characterization
A. Seth Greenwald, D.Phil.(Oxon), Orthopaedic Research Laboratories, Cleveland, OH, USA

2:05 PM
Talk 19: A Proposed Classification System for Taper Surface Morphology: Smooth vs. Micro-grooved
Christina Arnhol, Drexel University, Philadelphia, PA, USA; and R. J. Underwood and S. M. Kurtz, Drexel University, Philadelphia, PA, USA and Exponent Inc., Philadelphia, PA, USA

2:15 PM
Talk 20: The Effect of Cleaning on the Evaluation of Corrosion
Ashleen Knutsen, S.-H. Park, E. Ebramzadeh and P. Campbell, Orthopaedic Institute for Children/UCLA, Los Angeles, CA, USA

2:25 PM
Talk 21: Influence of Physiological Test Fluids on the Fatigue Performance of a Double Taper Hip Prosthesis
Marc Baxmann, Aesculap, AG, Tuttlingen, Germany; T. M. Grupp, Aesculap AG, Tuttlingen, Germany and Ludwig Maximilians University, Munich, Germany; and M. M. Morlock, TUHH Hamburg, University of Technology, Germany
2:35 PM
Talk 22: On the Measurement of 3D Taper Moments Due to Friction & Contact Load in Total Hip Replacement
Dr.-Ing. Christian Kaddick, M. Malczan, C. Buechele and M. Hintner, Endo Lab GmbH, Rosenheim, Germany; and M. A. Wimmer, Rush University Medical Center, Chicago, IL, USA

2:45 PM
Talk 23: Accelerated Fretting Corrosion Testing of Modular Necks for THA
Satya Nambu, M.S., O. Richard and M. Roark, MicroPort Orthopedics, Arlington, TN, USA; and D. Linton, S. Bible and J. Moseley, Wright Medical Technology, Memphis, TN, USA

2:55 PM
Talk 24: Correlating Fretting Corrosion & Micromotions in Modular Tapers: Test Method Development & Assessment
Sachin Mali, M.S. and J. L. Gilbert, Syracuse University, Syracuse, NY, USA

3:05PM
Talk 25: Simultaneous Hip Head-Stem Taper Junction Measurements of Electrochemical Corrosion & Micromotion: A Comparison of Taper Geometry & Stem Material
Laura Scholl, M.S., V. Swaminathan, R. Lee, A. Faizan, M. Thakore, K. TenHuisen and J. Nevelos, Stryker Orthopaedics, Mahwah, NJ, USA

3:15 PM- Roundtable Discussion

3:35 PM- Poster Session

SESSION V: Biologic Responses
Session Chairperson: William M. Mihalko, M.D., Ph.D., Symposium Co-Chair

4:15 PM
Talk 26: Histological Characterization of Solid Corrosion Products from Modular Total Hip Replacements
Pat Campbell, Ph.D., M. Kung, A. Knutsen, S. Park, J. Markantonis and E. Ebramzadeh, Orthopaedic Institute for Children/ UCLA, Los Angeles, CA, USA

4:25 PM
Talk 27: Tissue Response to Metal-on-Metal Articulations is Dependent on Head Size
Christoph H. Lohmann, M.D., Otto-von-Guericke University, Magdeburg, Germany

4:35 PM- Roundtable Discussion

4:55 PM
Remains of the Day: Closing Remarks
Steven M. Kurtz, Ph.D., Symposium Co-Chair

5:00 PM
Adjourn
POSTER PRESENTATIONS

Comparison of Visual Assessment Techniques for Taper Wear/Corrosion in Modular Hip Replacement Systems
Matthew DiPrima, O. Vesnovsky, T. Topleski, C. A. Engh and R. Hooper

Effects of Impaction Assembly Forces on Micromotion & Electrochemical Performance of Taper Junctions

Influence of Molybdate Ion & pH on the Fretting Corrosion of a CoCrMo Titanium Alloy Couple
Johnny Dufils, M. P. Laurent, D. Royhman, M. T. Mathew and M. Wimmer

Taper Corrosion in Modular Hip Prostheses: Evaluation of the Metal Ion Release
Thomas M. Grupp, M. M. Morlock and M. Baxmann

Corrosion of Modular Junctions in Femoral & Acetabular Components for Hip Arthroplasty
D. J. Hall, R. Pourzal, R. M. Urban, C. J. Della Valle, J. O. Galants and J. J. Jacobs

The Role of Design Parameters and Microstructure in the Corrosion and Fretting of Hip Taper Interfaces: A Retrieval Study
Carlos J. Laverna, J. L. Gonzalez, J. M. Villa, W. K. Jones and S. D. Cook

In Vitro Simulation of Modular Neck Fracture, Wear & Corrosion in Total Hip Replacements
Hakim Louati

No Free Lunch! Large Metal Heads & Vitamin-E Polyethylene Increase Frictional Torque in Total Hip Arthroplasty Bearings
L. R. Lovro, J. M. Wallace, A. Faizan and R. M. Meneghini

Tribocorrosion in Hip Modular Taper Junctions: A Mechanistic Study
Matthew T. Mathew, D. Royhman, M. Patel, M. Runa, J. Jacobs, M. A. Wimmer and N. J. Hallab

Taper Fracture as Endpoint of Corrosion Instead of Biological Reactions the Titanium-Titanium Story

Diagnosis & Management of Adverse Local Tissue Reactions in Association with Tribocorrosion at the Head-Neck Junction in Patients with Metal-on-Polyethylene Bearings

Head Size Does Not Affect Fretting & Corrosion at the Head-Stem Modular Junction of Metal-on-Polyethylene Total Hip Arthroplasty
Georgios Triantafyllopoulos, M. E. Elpers, J. C. Burket, C. I. Esposito, D. E. Padgett and T. M. Wright

Factors Related to Imprinting Corrosion in Modular Head-Neck Junctions
Douglas Van Citters, M. B. Mayor, J. H. Currier and A. Edidin

Effect of Impaction Force at Assembly on Fretting Wear at the Taper Junction of Total Hip Prosthesis
Ariyan Ashkanfar, R. English and G. Rothwell
Corrosion Topology of the Neck-Stem Taper of a Bi-Modular Total Hip Arthroplasty Design (Rejuvenate)

Dennis Bünte, D. Huber and M. Morlock