Symposium on Beyond the Implant: Retrieval Analysis Methods for Implant Surveillance

Sponsored by ASTM Committee F04 on Medical and Surgical Materials and Devices

May 9, 2017
Sheraton Centre Toronto Hotel
Toronto, ON, Canada

Symposium Co-Chairmen:  William Mihalko
Campbell Clinic/University of Tennessee
Memphis, TN, USA

Jack Lemons
University of Alabama at Birmingham
Birmingham, AL, USA

A. Seth Greenwald
Orthopaedic Research Laboratories
Cleveland, OH, USA

Steve Kurtz
Exponent Inc.
Philadelphia, PA, USA

TUESDAY, MAY 9, 2017

8:00 AM
Welcome and Overview
William M. Mihalko, MD Ph.D., Symposium Co-Chairman

Session I: Hurdles to Establishing a Retrieval Analysis Network
Moderator: W. Mihalko
University of Tennessee
Memphis, TN, USA

8:05 AM  Keynote Address
Current Status of Standards and Unmet needs in Retrieval Analysis
A. S. Greenwald, Orthopaedic Research Laboratories, Cleveland, OH, USA

8:30 AM
Experience since 1970 and Recommendations
J. Lemons and A. Eberhardt, University of Alabama, Birmingham, AL, USA
8:45 AM
**Opportunities and Challenges of Retrieval Analysis: a Faulty Implant, Suboptimal Technique or Aggravated Host Response?**
Y. Torosyan, J. Bowsher, C. Rhim and D. Marinac-Dabic, Food and Drug Administration, Silver Spring, MD, USA; S. M. Kurtz, Drexel University, Philadelphia, PA, USA and W. M. Mihalko, University of Tennessee, Memphis, TN, USA

9:00 AM
**Systematic and Consecutive Retrieval Management Procedure in a Single Surgical Center**
U. Mueller and J. P. Kretzer, Heidelberg University Hospital, Heidelberg, Germany

9:15 AM
**The Value of Explant Retrieval Analysis in Collaboration with Orthopaedic Registries**
G. Higgs, D. W. MacDonald, S. Kurtz, Drexel University, Philadelphia, PA, USA; L. Paxton, San Diego, CA, USA; and D. Marinac-Dabic, Food and Drug Administration, Silver Spring, MD, USA

9:30 AM
**Expert Panel: Hurdles to Establishing a National Retrieval Database**

9:45 AM     Break

**Session II: Analysing the Local Environment and the Host**
Moderator: Jack Lemons
University of Alabama at Birmingham
Birmingham, AL, USA

10:15 AM
**Metal Release and Damage Mechanisms in Autopsy Total Knee Arthroplasty Femoral Components**
C. Arnholt, D. MacDonald and S. M. Kurtz, Drexel University, Philadelphia, PA, USA; J. Lowell, W. M. Mihalko, University of Tennessee, Memphis, TN, USA; and J. Gilbert, Syracuse, NY, USA

10:30 AM
**The Use of Semi-Quantitative Histology for Reporting Periprosthetic Tissue Features: A Review**
M. Nguyen, N. Yuan, and P. Campbell, JVL Orthopaedic Research Center at Orthopaedic Institute for Children, Los Angeles, CA, USA
10:45 AM
Inflammatory Cytokines as Potential Biomarkers for Damage in Total Knee Arthroplasty
W. Mihalko, C. Bettin, A. Wodowski, A. Kerkhof, J. Lowell, and M. Perkins, University of Tennessee, Memphis, TN, USA

11:00 AM
Genetic Predilections in a Group of Failed Metal on Metal Total Hip Replacement Patients
W. M. Mihalko, A. Kerkhof, Y. Jiao, J. Hallock, J. Yan, and W. Gu, University of Tennessee, Memphis, TN, USA

11:15 AM
Developing MRI as a Biomarker for Adverse Local Tissue Reaction in Total Hip Arthroplasty: The Roles of Retrieval Analysis and Histopathology
T. M. Wright, M. F. Koff, C. I. Esposito, D. E. Padgett and H. G. Potter, Hospital for Special Surgery, New York, NY, USA; T. W. Bauer, The Cleveland Clinic Foundation, Cleveland, OH, USA

11:30 AM
Characterization of Cobalt in Periprosthetic Tissues and Fluids: Toxicological and Clinical Importance of Standardizing Quality Analytical Methods for Differentiating Cobalt Partitioning on a Molecular Level
B. Kreger, Exponent, Inc., Irvine, CA

11:45 AM Questions and Expert Panel: What Should the Minimum Tissue and Host Data Obtained at Time of Implant Removal?

12:00 PM Lunch (On Your Own)

Session III: Characterization of Metallic Alloy and Polyethylene Surfaces
Moderator: A. Seth Greenwald
Orthopaedic Research Laboratories
Cleveland, OH, USA

1:00 PM
An Automated Method For Characterising Corrosion At Stem Trunnions In Retrieved Total Hip Arthroplasty Implants Using Digital Image
R Milimonfared, Adelaide, Australia

1:15 PM
Characterization of Material Loss from Femoral Stem Taper Surfaces through Development of a Responsive Morphological Filtering Technique
K. Darshil, R. Racasan, and P. Bills, University of Huddersfield, Huddersfield, United Kingdom; and M. Al-Hajjar, University of Leeds, Leeds, United Kingdom
1:30 PM  
**CoCrMo and Ti6Al4V Alloy Degradation Modes in THR Modular Head-Neck Junctions**  
D. J. Hall, R. Pourzal, M. T. Mathew, H. J. Lundberg, J. J. Jacobs, and R. M. Urban; Rush Medical Center, Chicago, IL, USA

1:45 PM  
**Corrosion Modes in THR Modular Junctions Depend on Implant Alloy Microstructure—a Retrieval Study**  
R. Pourzall, D. J. Hall, S. M. McCarthy, M. T. Mathew, J. J. Jacobs and R. M. Urban, Rush University Medical Center, Chicago, IL, USA; and J. Ehrich, Duisburg, Germany

2:00 PM  
**Fretting Corrosion and Polyethylene Damage Mechanisms in Modular Dual Mobility Total Hip Arthroplasty**  
D. W. MacDonald, H. Spece, and S. M. Kurtz, Drexel University, Philadelphia, PA, USA; M. A. Mont, Cleveland Clinic, Cleveland, OH, USA; and G. C. Lee, University of Pennsylvania, Philadelphia, PA, USA

2:15 PM  
**An Analysis Method of Corrosion at the Acetabular Taper**  
J. L. Gilbert, Clemson University, Clemson, SC, USA

2:30 PM  
**An Electrochemical Impedance Method for In-Situ Analysis of Corrosion State of Localized Modular Taper Implant Surfaces**  
J. L. Gilbert and J. Lin, Clemson University, Clemson, SC, USA

2:45 PM  
**Break**

3:00 PM  
**Method of Estimating Material Loss for Retrieved Femoral Stems with Gross Trunnion Failure**  
G. B. Higgs, D. W. MacDonald and S. Kurtz, Drexel University, Philadelphia, PA, USA; L. Paxton, San Diego, CA, and M. Marinac-Dabic and S. Kurtz, Exponent, Philadelphia, USA

3:15 PM  
**Using Coordinate Measuring Machine Validated with White Light Interferometry to Identify Contributos Material Loss Due to Corrosion of Modular Junctions**  
A. Martin, Thayer School of Engineering, Dartmouth College, Hanover, NH, USA

3:30 PM  
**Questions and Answers**
Session IV: Analysing Polyethylene Retrievals
Moderator: Steve Kurtz
Exponent, Inc.
Philadelphia, PA

3:45 PM
Using Linear Penetration as a Surrogate Measure for Volumetric Wear in Retrieved TKR Tibial Inserts,
E. Rad, M. P. Laurent, C. B. Knowlton, H. J. Lundberg, R. R. Pourzal and M. A. Wimmer; Rush University Medical Center, Chicago, IL, USA

4:00 PM
Tribological Properties of Retrieved, Remelted, Highly Crosslinked Polyethylene
D. W. MacDonald, G. Clarkin-Wright, S. M. Kurtz, Drexel University, Philadelphia, PA, USA; D. Baykal, Exponent, Inc. Philadelphia, PA, USA; G. Klein, M. Kraay, University Hospitals Case Medical Center, Cleveland, OH, USA

4:15 PM
Characterization of Edge Wear in Ceramic Acetabular Cups
R. Racasam, K. Darshil, P. Bills, University of Huddersfield, Huddersfield, United Kingdom; and M. Al-Hajjar, University of Leeds, Leeds, United Kingdom

4:30 PM Questions and Answers

4:45 PM Expert Panel: Where do we go from here? Planning out our Unmet Needs

5:15 PM SYMPOSIUM ADJOURNS
Posters

Surface Characterization of Total Ankle Replacement: Retrieved vs. In-vitro Simulation
A. A. Stratton-Powell, A. Smyth, S. Williams, A. C. Redmond, J. L. Tipper and C. Brockett, University of Leeds, Leeds, West York, United Kingdom

Creep-Related Failure Mechanism of a PE Insert in a Specific Acetabular Cup Design
U. Mueller and J. P. Kretzer, Heidelberg University Hospital, Heidelberg, Germany

Long Term Wear Analysis of Retrieved Medially Pivoting TKA Inserts
S. N. Nambu and I. Timmerman, MicroPort Orthopedics, Arlington, TN

Validation of a Heterodyne Fringe Projection Technique for Measuring Volumetric Wear in Acetabular UHMWPE Retrieval
F. Medel, University of Zaragoza, Zaragoza, Spain