SYMPOSIUM ON MOBILE BEARING TOTAL KNEE REPLACEMENT DEVICES

Sponsored by ASTM Committee F04 Medical and Surgical Materials and Devices

Symposium Chairs: A. Seth Greenwald, D. Phil (Oxon)
Orthopaedic Research Laboratories
Cleveland, OH, USA

Hani Haider, Ph.D.
University of Nebraska Medical Center
Omaha, NE, USA

William Mihalko, MD, Ph.D.
Campbell Clinic Orthopaedics
Collierville, TN, USA

Kathy Trier, Ph.D.
Corin USA,
Tampa, FL, USA

ABOUT THE SYMPOSIUM
The purpose of this Symposium is to provide a scientific discussion on potential failure modes for mobile knee devices and mechanical testing protocols as specified in current and draft ASTM standards with regards to their relevance to clinical outcomes and clinical failures.

Session papers will discuss the clinical data relevant to bench performance on the following topics related to mobile bearing total knee replacement devices:

- Mobile bearing knee tibial baseplate/ bearing resistance to dynamic disassociation
- Mobile bearing knee tibial baseplate rotational stops
- Dislocation, spin out, spit out
- Determination of constraint for mobile bearing total knee replacements
- Cyclic fatigue testing of metal tibial tray components for mobile bearing total knee joint replacements
- Knee bearing (tibial insert) endurance and deformation under high flexion for mobile bearing knee replacements
- Knee bearing (tibial insert) wear including backside wear
- Contact area, contact pressure distribution for mobile bearing knee joint replacements
- Range of motion testing for mobile bearing knee joint replacements

The goal of the Symposium is to evaluate whether the mechanical testing protocols specified in ASTM standards can be used to discriminate between implant designs.

TUESDAY, May 18th, 2010

8:00AM
Opening Remarks
Kathy Trier, Symposium Co-Chair
8:05AM
**MBK reclassification**
Tom Craig, Orthopedic Surgical Manufacturers Association, Memphis, Tennessee, USA. 
Peter Allen, Food and Drug Administration, CDRH, Silver Springs, Maryland, USA.

8:15 AM
**Mobile and Fixed Bearing Total Knee Arthroplasty Outcomes: A Meta-Analysis of the Literature**
W. Mihalko, M.D., Ph.D., J. Sykes, MD, R. Benner, MD, C. Snearly, MS, M. Bernard, MD, 
Campbell Clinic Orthopaedics, Collierville, Tennessee, USA.

8:25 A.M. SESSION I: Component disassociation
**Chairperson:** William Mihalko, MD, Ph.D.

8:25 AM Spin out/spit out

- **31 year evolution of the rotating-platform TKR: Coping with “spinout” and wear. (#1865)**

- **Matched pair comparison of rotating platform & fixed bearing knees 5 yr follow up. (#1868)**
  A.S. Ranawat, M.D., Y. Blum, M.D., A. Maheshwari, M.D., T. Koob, G. Bonci, C. Ranawat, M.D., Hospital for Special Surgery, New York, New York USA.

- **Early instability with mobile bearing TKA. (#1878)**
  J.T. Moskal M.D., S.R. Ridgeway, M.D., Roanoke Orthopedic Center, Roanoke, Virginia, USA.

8:55 A.M. Tibial Tray/poly bearing disassociation: gap discussion
F.F. Buechel, M.D., A.S. Ranawat, M.D., J.T. Moskal, M.D.

9:10 A.M. Standards overview: F2724-08 spin out/spit out & F2723-08 tibial tray/poly bearing disassociation
Peter Walker, Professor of Orthopaedic Surgery (Research), New York University-Hospital for Joint Diseases, New York, New York USA.

9:20 A.M. Discussion Central Question: “Are the standards sufficient to differentiate across device designs and predict clinical outcomes?”

9:30 A.M. SESSION II: Mechanical Fracture
**Chairperson:** A. Seth Greenwald, D. Phil (Oxon).

9:30 A.M. Rotational stop, bearing deformation, tibial tray fatigue/fracture

- **A 10 year follow-up study comparing fixed versus mobile bearing total knee replacement outcomes - Are they the same?**

- **Tibial plateau abrasion in mobile bearing knee systems: A finite element study. (#1867)**
  E.A. Morra, MSME, A. Seth Greenwald, D.Phil.(Oxon), Orthopaedic Research Laboratories, Cleveland, Ohio, USA.

- **Mobility and contact mechanics of a rotating platform total knee replacement.**
  JK Otto, J J Callaghan, M.D., TD Brown, Department of Biomedical Engineering, University of Iowa, Iowa City, Iowa, USA.

**ASTM BREAK 10:00 to 10:15 A.M.**
10: 15 A.M.  SESSION II: Mechanical Fracture continued

10:15 A.M. Standards overview: F2722-08 rotational stop, WK14915 bearing deformation/fracture, F1800-07 tibial tray fatigue/fracture
Peter Walker, Professor of Orthopaedic Surgery (Research), New York University-Hospital for Joint Diseases, New York, New York USA.

10:25 A.M. Discussion Central Question: “Are the standards sufficient to differentiate across device designs and predict clinical outcomes?”

10: 35 A.M.  SESSION III: Functional Performance
Chairperson: William Mihalko, MD, Ph.D.

10:35 A.M. Constraint & ROM: Part 1
Systematic review of complications in TKA mobile bearing knees. (#1859)
C. Hopley, DePuy Orthopaedics International Leeds, England, L. Crossett, M.D., Univ Pittsburgh Medical Center, Pittsburgh, PA, USA.
Evidence of tibial rotation before and after mobile bearing knee replacement. (#1863)
J. Stiehl, M.D., Neuromuscular Orthopaedic Institute, Salem, Illinois USA.
In-vitro wear and radiographic analyses of high flex mobile and fixed posterior stabilized knee implants. (#1871)
O. Popoola, Ph.D., N. Yu Ph.D., Zimmer Orthopedics, Warsaw Indiana USA, G. Scuderi, M.D., Insall Scott Kelly Institute, New York, New York USA.

11:05 A.M. Constraint & ROM: Part 2
Comparable clinical outcomes in randomized clinical trial of fixed vs mobile bearing posterior stabilized tricompartmental knee prosthesis. (#1858)
O. Mahoney, M.D., T. Kinsey, MSPH, Athens Orthopedic Clinic, PA, Athens, Georgia USA.
Design rationale and mid-term results of the e-motion mobile bearing knee system.
R.K. Miehlke, M.D. The Rhine-Main Centre for Joint Diseases, Wiesbaden, Germany.

11:25 A.M. Standards overview: F1223-08 constraint & ROM
Peter Walker, Professor of Orthopaedic Surgery (Research), New York University-Hospital for Joint Diseases, New York, New York USA.

11:35 A.M. Discussion Central Question: “Are the standards sufficient to differentiate across device designs and predict clinical outcomes?”

11:50 A.M. Wrap up Sessions I, II, and III

12:00 P.M. LUNCH (On Your Own)

1:00 P.M.  SESSION IV: Longevity & Wear
Chairperson: Hani Haider, Ph.D.

1:00 P.M. Backside Wear
Cement debris – what is its real impact on mobile bearing wear? (#1855)
Backside wear process in rotating platforms illuminated by 3D surface profilometry using light interferometry. (#1856)

Wear of mobile bearing uni-compartmental knee replacement prosthesis: A comparison of in-vitro and in-vivo wear rates. (#1866)
P.J. Ellison, Ph.D., A. Traynor, B.P. Casey, Ph.D., S.N. Collins, Ph.D., Corin Ltd, Cirencester England.

Complications encountered in a randomized clinical trial of a fixed vs mobile bearing posterior stabilized cemented tricompartmental knee prosthesis. (#1857)
O. Mahoney, M.D., T. Kinsey, MSPH, Athens Orthopedic Clinic, PA, Athens, Georgia, Theresa D’Errico, B.S., Jianhua Shen, M.S., Stryker Orthopedics, Mahwah, New Jersey USA.

1:40 P.M. Total Wear
Wear advantage of rotating bearing knee – an In-Vitro study (#1853)
L. Angibaud, A. Burstein, W.B. Balcom, G. Miller. Exactech, Gainesville, Florida USA.

Retrieval analysis of mobile bearing total knee prostheses. (#1862)
R. Fu, N.Kelly, D. Padgett, Timothy Wright, Ph.D., Hospital for Special Surgery, New York, New York USA

Biotribology of mobile bearing total knee replacement implants – Influence of tibio-femoral bearing type on wear, kinematics and particle release. (#1861)
Christian Kaddick, Ph.D., EndoLab GmbH Bayern, Germany, J. Schwiesau, Aesculap AG Research & Development, Tuttingen, Germany, T.M. Grupp, Grosshadern Medical Center, Munich, Germany.

Wear of mobile bearing knees: Is it necessarily less?
H. Haider, Ph.D., University of Nebraska Medical Center, Omaha, Nebraska USA, Christian Kaddick, Ph.D., EndoLab GmbH Bayern, Germany.

2:20 P.M. Standards overview: F2083-08 contact area, backside wear discussion
Peter Walker, Professor of Orthopaedic Surgery (Research), New York University-Hospital for Joint Diseases, New York, New York USA.

2:35 P.M. Discussion Central Question: “Are the standards sufficient to differentiate across device designs and predict clinical outcomes?”

ASTM BREAK 2:55 to 3:15 P.M.

3:15 P.M. Panel discussion on the risk assessment and special controls for mobile bearing knees (stability, soft tissue balancing of fixed and mobile bearing knees)
Moderators: A. Seth Greenwald, D. Phil (Oxon) & William Mihalko, MD, Ph.D.

Invited participants:
Doug Dennis, M.D., Colorado Joint Replacement, Denver, Colorado USA.
Leo Whiteside, M.D., Missouri Bone and Joint Clinic, St Louis, Missouri USA.
John Callaghan, M.D., Department of Biomedical Engineering, University of Iowa, Iowa City, IA USA.
Tom Craig, Orthopedic Surgical Manufacturers Association, Memphis, Tennessee, USA.
Hani Haider, Ph.D., University of Nebraska Medical Center, Omaha, NE, USA.
Peter Walker, Professor of Orthopaedic Surgery (research), New York University-Hospital for Joint Diseases, New York, NY USA.
4:45 P.M. Symposium Wrap up
Chairperson: William Mihalko, MD, Ph.D.

5:00 P.M. Adjournment

5:30 P.M. – 6:30 P.M. Reception (cash bar)   Landmark 1 (level 1)