

Steven M. Kurtz, Ph.D.
Corporate Vice President, Practice Director, and Director, Philadelphia Office

Professional Profile

Dr. Steven M. Kurtz is a Corporate Vice President, Director of Exponent's Biomedical Engineering practice, and Director of the Philadelphia, Pennsylvania office. Concurrently, he serves as a part-time Research Professor and director of the Implant Research Center at Drexel University's School of Biomedical Engineering, Science, and Health Systems. Dr. Kurtz has expertise in the clinical performance of polyethylene, ceramic, and metal-on-metal hip implants. His professional career has involved the evaluation of medical device technologies, from a combined analytical, experimental, and clinical perspective. His research activities have emphasized real-world clinical performance of medical devices, including orthopedic, spine, and cardiovascular implants, as assessed by human implant retrieval specimens and national health care databases; mechanical behavior of synthetic biomaterials; contact mechanics of artificial joints; and structural evaluation of bone-implant systems. Dr. Kurtz is active in many professional societies, including the American Academy of Orthopedic Surgeons, the Spine Arthroplasty Society, and the American Society for Testing and Materials. Dr. Kurtz has edited five books and written over 145 journal articles and 380 conference abstracts. He is the founding editor of two educational websites: the UHMWPE Lexicon (www.uhmwpe.org) and the Medical PEEK Lexicon (www.medicalpeek.org). He has recently completed the PEEK Biomaterials Handbook.

Academic Credentials and Professional Honors

Ph.D., Mechanical Engineering, Cornell University, 1995
M.S., Mechanical Engineering, Cornell University, 1992
B.S., Mechanical Engineering, Cornell University, (with Distinction), 1990

John W. Hyatt Award (Benefit to Society), for Outstanding Achievement in Plastics that Benefit Mankind, Awarded by the Society of Plastics Engineers, 2008

Lawrence D. Dorr Award, American Association of Hip and Knee Surgeons, for Most Outstanding Paper in Surgical Techniques and Technologies, 2008, 2009

Leroy Wyman Award, for Outstanding Contributions to Committee F-04 on Medical & Surgical Materials & Devices, American Society for Testing and Materials, May 2008

Otto Aufranc Hip Society Award, for the Best Paper Encompassing Important Advances in the Management of Hip Disorders, 2006

The Spine Education in Research Award, for the Best Basic Science Paper, Awarded by the Spine Arthroplasty Society, 2006

Fulbright Senior Specialist, Fulbright Scholar Program, Council for International Exchange of Scholars, 2006

MOSES Award, Committee F-04 on Medical & Surgical Materials & Devices, American Society for Testing and Materials, May 2000

Patents

Patent 6,267,011: Method and Apparatus for Determining the True Stress and True Strain Behavior of a Ductile Polymer,” Issued July 31, 2001 (with C.W. Jewett and J.R. Foulds).

Publications

Bozic KJ, Lau E, Kurtz S, Ong K, Berry DJ. Patient-related risk factors for postoperative mortality and periprosthetic joint infection in Medicare patients undergoing TKA. *Clin Orthop Relat Res.* 2012; 470:130–137.

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Kurtz SM, Toth JM, Siskey R, Ciccarelli L, MacDonald D, Isaza J, Lanman L, Punt I, Steinbeck M, Goffin J, van Ooij A. The latest lessons learned from retrieval analyses of ultra-high molecular weight polyethylene, metal-on-metal, and alternative bearing total disc replacements. *Seminars in Spine Surgery.* Published online: Jan 14, 2012.

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Rundell SA, Isaza JE, Kurtz SM. Biomechanical evaluation of a spherical lumbar interbody device at varying levels of subsidence. *SAS Journal* 2011; 5:16–25.

Greenspon AJ, Patel JD, Lau E, Ochoa JA, Frisch DR, Ho RT, Pavri BB, Kurtz SM. 16-year trends in the infection burden for pacemakers and implantable cardioverter-defibrillators in the United States 1993 to 2008. *J Am Coll Cardiol* 2011; 58:1001–1006.

Jaekel DJ, MacDonald DW, Kurtz SM. Characterization of PEEK biomaterials using the small punch test. *J Mech Behav Biomed Mater* 2011; 4:1275–1282.

Kurtz SM, Gawel HA, Patel JD. History and systematic review of wear and osteolysis outcomes for first-generation highly crosslinked polyethylene. *Clin Orthop Relat Res* 2011; 469:2262–2277.

MacDonald D, Sakona A, Ianuzzi A, Rimnac CM, Kurtz SM. Do first-generation highly crosslinked polyethylenes oxidize in vivo? *Clin Orthop Relat Res* 2011; 469:2278–2285.

Huet R, Sakona A, Kurtz SM. Strength and reliability of alumina ceramic femoral heads: Review of design, testing, and retrieval analysis. *J Mech Behav Biomed Mater* 2011; 4:476–483.

Kurtz SM, Costa L. UHMWPE for arthroplasty: From powder to debris. Editorial comment: A perspective on polyethylene. *Clin Orthop Relat Res* 2011; 469:2260–2261.

Edidin AA, Ong KL, Lau E, Kurtz SM. Mortality risk for operated and nonoperated vertebral fracture patients in the Medicare population. *J Bone Miner Res* 2011; 26:1617–1626.

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Johanson NA, Kleinbart FA, Cerynik DL, Brey JM, Ong KL, Kurtz SM. Temporal relationship between knee arthroscopy and arthroplasty: a quality measure for joint care? *J Arthroplasty* 2011; 26:187–191.

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Lau E, Ong K, Kurtz S, Schmier J, Edidin A. Mortality following the diagnosis of a vertebral compression fracture in the Medicare population. *J Bone Joint Surg Am* 2008; 90(7):1479–1486.

Manley M, Ong K, Lau E, Kurtz SM. Effect of volume on total hip arthroplasty revision rates in the United States Medicare population. *J Bone Joint Surg Am* 2008; 90(11):2446–2451.

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Editorships and Editorial Review Boards

Founding Editor: UHMWPE Lexicon Website (www.uhmwpe.org); Medical PEEK Lexicon Website (www.medicalpeek.org)

Editorial Board: *Journal of Arthroplasty*

Founding Board Member: Arthroscopy Research Foundation, Paoli, PA

Conference Moderator: Orthopaedic Research Society, Society for Biomaterials

Co-Chairman, Symposium on Highly Crosslinked and Thermally Treated UHMWPE for Total Joint Replacements, Miami FL, November 7–8, 2002, Committee F04, American Society for Testing and Materials (ASTM)

Planning Committee Member, 2002–2003, Consensus Development Conference on Total Knee Replacement, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) and the Office of Medical Applications of Research (OMAR) of the National Institutes of Health (NIH).

Co-Chairman, Workshop on Characterization of Metal-on-Metal Total Hip Replacements, Anaheim CA, May 17, 2011, Committee F04, American Society for Testing and Materials (ASTM)

Co-Chairman, Symposium on Metal-on-Metal Total Hip Replacement Devices, Phoenix, AZ, May 15, 2012, Committee F04, American Society for Testing and Materials (ASTM)

Peer Reviewer

Journal of Bone and Joint Surgery
Clinical Orthopaedics and Related Research
Journal of Biomechanics
Journal of Biomechanical Engineering
Biomaterials
Journal of Biomedical Materials Research
Scanning Microscopy/Cells and Materials

Selected Invited Seminars and Workshops

Kurtz S. What are metal-on-metal retrievals really telling us? Workshop on Metal-Metal Bearings: Facts, Fictions, and Futures. 2012 ORS Annual Meeting, San Francisco, February 2012.

Kurtz S. Current trends and projected utilization of total joint replacements. Spotlight speaker, 2012 ORS Annual Meeting, San Francisco, February 2012.

Kurtz S. Articulation choices update. Invited speaker, Chinese Orthopaedic Association, Beijing, China, December 2011.

Kurtz S. Advances in PEEK Biomaterials for implant applications. Invited speaker, Medical Implants Technology Summit, Shanghai, China, September 2011.

Kurtz S. PEEK: Clinical applications of an international standard biomaterial. Invited speaker, China Medical Devices Information Network Annual Meeting, Beijing, China, January 2011.

Kurtz S. PEEK: A new frontier in structural biomaterials and bone scaffolds. Keynote speaker, Third International Conference on Mechanics of Biomaterials and Tissues, Clearwater, FL, December 2009.

Kurtz, S. UHMWPE implant technology in 2009: State of the art and future directions. Invited speaker, 4th International UHMWPE Meeting, Torino, Italy, September 2009.

Kurtz S. Performance of artificial disc bearings. Symposium on Controversies in Bearing Surface Science, 2009 ORS/AAOS Annual Meeting, Las Vegas, NV, February 2009.

Kurtz S. PEEK Biomaterials: From isoelastic hip stems to bone scaffolds. Symposium on Biological Materials Science, The Minerals, Metals & Material Society, San Francisco, CA, February 2009.

Kurtz S. Utilization in TJA: Something's got to give. Carl T. Brighton Workshop on Health Policy Issues in Orthopaedic Surgery, Tampa, FL, November 2008.

Kurtz S. Retrieval analysis of motion preserving spine implants. Future of Arthroplasty Standards Workshop, American Society for Testing and Materials, St. Louis, MO, November 2008.

Kurtz S. Explant analyses of disc arthroplasties. Symposium on Lessons Learned from Disc Arthroplasty, North American Spine Society, Toronto, Canada, October 2008.

Kurtz S. Implantable PEEK polymer: Properties, processing and applications. 8th World Biomaterials Congress, Amsterdam, the Netherlands, May 2008.

Kurtz S. How have total disc replacements in the spine influenced wear behavior? 2007 AAOS Osteolysis and Implant Wear: Biological, Biomedical Engineering, and Surgical Principles, Austin, TX, November 2007.

Kurtz S. *In vivo* oxidation and oxidation potential of historical, conventional, and highly crosslinked polyethylene. 3rd UHMWPE International Meeting - Polyethylene in Total Joint Replacement Systems: Concerns and Solutions. Facultad de Medicina, Universidad Autónoma de Madrid, Madrid, Spain, September 2007.

Kurtz S. Overview of the regulatory process and reimbursement for scientist inventors. Coulter Foundation Early Career Awardees Meeting, Key Biscayne, FL, August 2007.

Kurtz S. Wear and surface damage of total joint replacement components: Lessons of retrieval analysis. Wear Instructional Course, 7th Annual Meeting of the Spine Arthroplasty Society, Berlin, Germany, May 2007.

Kurtz S. Logistics and implementation of a multi-center, regional total hip replacement retrieval program to investigate *in vivo* oxidation of polyethylene. WG 3 Meeting of COST 537, Porto, Portugal, March 2007.

Kurtz S. Artificial discs. Artificial Discs Workshop, 52nd Annual Meeting of the Orthopaedic Research Society, March 2006.

Kurtz S. A primer on polyethylene. 7th Annual Alternative Bearing Symposium, University of Pennsylvania, PA, October 2004.

Kurtz S. Lessons learned from retrieval analysis of highly crosslinked UHMWPE. 7th Annual Alternative Bearing Symposium, University of Pennsylvania, PA, October 2004.

Kurtz S. Overview of medical device law and regulation. Introduction to food and drug law workshop, food and drug law institute. San Francisco, CA, June 2004.

Kurtz S. Advanced finite element analysis and model validation. ASTM Workshop, Salt Lake City, UT, April 2004.

Kurtz S. The required mechanical properties for hip and knee components. UHMWPE For Arthroplasty: Past, Present, and Future. University of Torino, Torino, Italy, September 2003.

Kurtz S. International perspective of standards development and overview of new miniature specimen mechanical test methods for UHMWPE. 25th Meeting of the European Society for Biomaterials, London, England, September 2001.

Kurtz S. Risk and failure analysis of medical devices. Central Atlantic States Association (CASA) of Food and Drug Officials Annual Medical Device Conference, May 2001.

Kurtz S. Oxidation resistance and shelf life of UHMWPE. New Test Methods for Evaluating the Performance of Conventional and Crosslinked UHMWPE Workshop, F04 Meeting for the American Society for Testing and Materials, May 2001.

Kurtz S. Miniature specimen mechanical testing techniques for UHMWPE used in orthopedic components. Ultra-High Molecular Weight Polyethylene Workshop, 27th Annual Meeting of the Society for Biomaterials, April 2001.

Kurtz S. Morphology and mechanical behavior in UHMWPE after natural and accelerated aging. Polyethylene 2001 Workshop, 46th Annual Meeting of the Orthopaedic Research Society, March 2000.

Kurtz S. The mechanical behavior of UHMWPE at large deformations: Bulk and miniature specimen testing. Department of Mechanical Engineering Seminar, University of Leeds, October 1998.

Kurtz S. Polyethylene properties and contact simulation for total hip arthroplasty. Contact Mechanics Workshop, 43rd Annual Meeting of the Orthopaedic Research Society, February 1997.

Guest Lectures

Cleveland Clinic, Cleveland, OH
Princeton University, Princeton, NJ
Temple University, Philadelphia, PA
Drexel University, Philadelphia, PA
University of California at Berkeley, Berkeley, CA
Stanford University, Palo Alto, CA
University of Zaragoza, Zaragoza, Spain
University of Madrid, Spain

Current Academic Appointments

Director, Implant Research Center
Research Professor, School of Biomedical Engineering, Science, and Health Systems, Drexel University, Philadelphia, PA
Research Assistant Professor, Department of Orthopaedic Surgery, Rothman Institute, Thomas Jefferson University, Philadelphia, PA

Professional Affiliations

American Academy of Orthopaedic Surgeons

American Association for Hip and Knee Surgeons

Orthopaedic Research Society, Society for Biomaterials

American Society for Testing and Materials (Vice-Chairman of Subcommittee F04.11 on Polymeric Materials; task force chair for UHMWPE and PEEK specification and characterization; task force chair for metal-on-metal hip clinical characterization)

Spine Arthroplasty Society