

CLARE MARIE RIMNAC

UNIVERSITY ADDRESS

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PERSONAL

Date and Place of Birth: February 2, 1956 Chicago, Illinois

EDUCATION

Lehigh University, Bethlehem, PA	Ph.D.	1983	Metallurgy and Materials Engineering
Lehigh University, Bethlehem, PA	M.S.	1980	Metallurgy and Materials Engineering
Carnegie-Mellon University, Pittsburgh, PA	B.S.	1978	Metallurgy and Materials Science

PROFESSIONAL EXPERIENCE

Academic

CASE WESTERN RESERVE UNIVERSITY, Cleveland, OH:

2000-Present Director, Musculoskeletal Mechanics and Materials Laboratories
1996-Present Associate Professor, Department of Mechanical and Aerospace Engineering
1997-Present Associate Professor, Department of Orthopaedics, School of Medicine

CORNELL UNIVERSITY MEDICAL COLLEGE, New York, NY:

1989-1996 Associate Professor (with tenure) of Applied Biomechanics in Surgery (Orthopaedics)
1985-1989 Assistant Professor of Applied Biomechanics in Surgery (Orthopaedics)

LEHIGH UNIVERSITY, Bethlehem, PA:

1979-1982 Teaching Assistant, Department of Metallurgy and Materials Engineering

CARNEGIE-MELLON UNIVERSITY, Pittsburgh, PA:

1976-1978 Teaching Assistant, Department of Metallurgy and Materials Science

Clinical

THE HOSPITAL FOR SPECIAL SURGERY, New York, NY:

1990-1996 Associate Engineer, Department of Applied Biomechanics
1991-1994 Supervisor for Materials, Department of Applied Biomechanics
1987-1990 Supervisor for Quality Assurance, Department of Applied Biomechanics
1984-1989 Assistant Engineer, Department of Applied Biomechanics

Research

THE HOSPITAL FOR SPECIAL SURGERY, New York, NY:

1996-1997 Visiting Scientist, Research Division
1995-1996 Senior Scientist, Research Division
1988-1995 Associate Scientist, Research Division
1984-1988 Assistant Scientist, Research Division
1983-1984 Postgraduate Research Fellow, Department of Biomechanics

ADDITIONAL EDUCATION

July 29, 2004

Radiation Sterilization of Medical Polymers, University of Wisconsin, October, 1994
Infrared Spectroscopy, Bowdoin College, July 1992.
Training in physical characterization of polymers, Institute for Polymers and Polymer Testing,
University of Stuttgart, West Germany, July 1988.
Quality Auditing, American Society for Quality Control, February-March, 1988.
Quality Assurance Programs for Good Manufacturing Practices, Stat-A-Matrix Institute, August, 1987.

HONORS AND AWARDS

2002-2006 National Institutes of Health Musculoskeletal Oral and Skin Sciences
Study Section Member
2003 Article, Engineering Women, by Amy Garvey, Shaker Magazine, Vol. 21, No. 4
2002 Nominee for the CWRU Carl F. Wittke Award for undergraduate teaching
2000 Article, The Perfect Implant, by Kristen Ohlson, CWRU Magazine, Winter 2000,
Vol. 12, No. 2
2000 Who's Who in Plastics and Polymers
1999 Fellow, American Institute for Medical and Biological Engineering
1998-2000 One of the featured faculty in CWRU Connections
1994 The Knee Society Award
1992-1996 NIH Research Career Development Award
1991 Young Investigator, 3rd U.S.A.-China-Japan Conference on Biomechanics
1989 AAOS Ann Doner Vaughan Kappa Delta Award
1987-1991 NIH First Independent Research Support and Transition Award, NIH
1987 "Modeling of Total Knee Replacements", 3-2-1 Contact,
Children's Television Workshop, Public Broadcasting System
1985 The Frank Stinchfield Award of The Hip Society
1984 The Hospital for Special Surgery Philip D. Wilson Award
1980-82 Lehigh University IBM Graduate Fellowship
1976 Carnegie-Mellon University Faculty Women's Club Award

MEMBERSHIPS

American Academy of Orthopaedic Surgeons (Associate Member / Basic Science)
American Chemical Society (through 2001)
American Institute for Medical and Biological Engineering
American Society of Biomechanics
American Society for Metals
American Society for Testing and Materials
Orthopaedic Research Society
Sigma-Xi
Society for Biomaterials
Society of Plastics Engineers
The Office of Women in Medicine (Cornell University Medical College, 1984 - 1995)

OFFICES

1985-1987 Vice President, The Office of Women in Medicine, Cornell University Medical College

COMMITTEES AND ACTIVITIES AT CASE WESTERN RESERVE UNIVERSITY

2002-Present	Steering Committee for Women in Science and Engineering Roundtable (WISER) Program
1997-Present	Orthopaedic Research Committee (Department of Orthopaedics)
1996-Present	Orthopaedic Total Joint Replacement Committee (Department of Orthopaedics)
2003-2004	Strategic Planning Committee for the Case Center for Women
2001-2003	President's Advisory Council on Women
2000-2001	Search Committee, Dean of the School of Engineering
1999-2003	Society of Women Engineers, Faculty Advisor
1999-2002	Graduate Studies Committee of the Faculty Senate
1998-2003	Committee on Appointments, Promotion and Tenure (Department of Orthopaedics)
1998-2000	Advisory Committee, Center for Science and Math Education
1998-2000	Executive Committee of the Case School of Engineering
1997-2003	Status of Women Faculty Committee of the Faculty Senate (Acting Chair, Fall, 1997)
1997-1998	Smith -Treuhaft Scholarship Panel
1996-1998	Freshman Orientation Transitions

COMMITTEES AT THE HOSPITAL FOR SPECIAL SURGERY

1988-1995	Library Committee
1986-1995	Resident Selection Committee
1990-1991	Ad-Hoc Survey Committee, Research Division
1984-1988	Child-Care for New York Hospital/Cornell University Medical College Committee, The Office of Women in Medicine

NATIONAL COMMITTEES

2001-2002	Orthopaedic Research Society Program Committee (adjunct member)
2001-2002	Orthopaedic Research Society Nominating Committee
2000-2002	American Academy of Orthopaedic Surgeons Research, Bioengineering and Biomaterials Panel
1999-Present	American Society for Testing and Materials, F 04 Committee
1997-2003	American Academy of Orthopaedic Surgeons Biomedical Engineering Committee
1995-2001	American Academy of Orthopaedic Surgeons Subcommittee on Orthopaedic Basic Science Evaluation
1995-1998	Orthopaedic Research Society Education and Special Projects Committee (Chair, 1997-1998)
1993-1994	Orthopaedic Research Society Program Committee, 1994 Annual Meeting
1992-1993	Society for Biomaterials Program Committee (adjunct member)
1991-1992	Society for Biomaterials Awards, Ceremonies and Nominating Committee

REVIEWER

Grant Applications

National Institutes of Health (Regular study section member, Musculoskeletal Oral and Skin Sciences Study Section , 2002-2006)

National Institutes of Health (Ad-Hoc reviewer, Orthopaedic Study Section, November, 2001)

National Institutes of Health (Special reviewer, NCR applications, February, 1999)

National Institutes of Health (Special reviewer, AREA applications, July, 1998)

National Science Foundation (Invited reviewer, Division of Undergraduate Education, July, 1996)

National Institutes of Health (Ad-Hoc reviewer, Orthopaedic Study Section, June 1996)

National Institutes of Health (Regular study section member, NRSA applications, Clinical Sciences, Subcommittee 1, 1990-1994)

National Institutes of Health (Special Reviewer, SBR applications)

July 29, 2004

Medical Research Council of Canada (Special reviewer)
Department of Health, State of Nebraska Research of Cancer and Smoking Disease (Special reviewer)

Journals

Journal of Bone and Joint Surgery (**Deputy Editor for Research, 2003-present**)
Journal of Orthopaedic Research (**Board of Associate Editors, 1991-2003, Editorial Advisory Board, 1998-2004**)
Bone
Biomaterials
Calcified Tissue International
Clinical Materials (**Editorial Advisory Board, 1990-1994**)
Journal of Applied Biomaterials
Journal of Biomechanics
Journal of Biomechanical Engineering
Journal of Biomedical Materials Research (**Board of Editors, 1996-2003**)

Other

American Society for Materials

RESEARCH ACTIVITIES

Mechanical Properties of Polymeric Biomaterials

Characterization and constitutive modeling of the cyclic and static mechanical performance of ultra high molecular weight polyethylenes, acrylic polymers, and other non-resorbable and resorbable polymeric biomaterials as a means of understanding in-vivo failure mechanisms and of improving the performance of these implant materials. Examination of the effect of sterilization, shelf-life aging and in-vivo aging on the degradation of the physical, chemical and mechanical properties of polymeric biomaterials as a means of improving degradation resistance and long-term performance of implants.

Mechanical Properties of Bone Tissue

Identification of ultrastructural and microstructural mechanism(s) for permanent deformation in bone tissue by measuring mechanical properties in creep, torsion, tension, compression, bending, and fatigue. Correlation of mechanical performance with microstructural and ultrastructural properties of normal, treated (e.g., radiation sterilized), and diseased bone tissue.

Implant Retrieval Analysis

Failure and damage analysis of orthopaedic and other medical implants removed at revision or re-operation surgery to determine the cause of failure and the mechanisms responsible for the damage. Application of results in design analyses to improve the performance of implant designs.

3D Bone Scaffolds for Repair of Critical-Sized Craniofacial Defects

Design, manufacture by rapid prototyping methods, and validation of three-dimensional (3D) scaffolds for repair of large structural bone defects using resorbable polymers such as poly(propylene fumarate).

TEACHING

Case Western Reserve University School of Engineering

Fall 1996-2002 EMAE 480 Fatigue of Materials
Spring 2004

Spring 1997-1998,
2000-2003 EMAE 372 Relation of Materials to Design
Fall 2003

Spring 1999,
2001-2002 EMAE 415 Musculoskeletal Biomechanics

Spring 1997-1998,
Fall 1997 EMAE 172 Mechanical Manufacturing (selected lectures)

Spring, 1997 EBME 405 Materials for Prosthetics and Orthotics (team-taught)
Fall 1998,2000-2003

Case Western Reserve University Medical School/University Hospitals

Fall, 2000-present Medical School Core Curriculum: Annual lecture on biomechanics of skeletal tissues

Spring, 1997-present Orthopaedic Resident Core Curriculum: Annual lectures on Properties of Implant Materials

Fall, 2002-present Orthopaedic Resident Core Curriculum: Annual lectures on Mechanical Behavior of Biological and Implant Materials

Other Teaching Activities

2001-present Annual lectures on mechanical properties of biomaterials and orthopaedic biomechanics, Montefiore Hospital, New York, NY.

2002 Wear in UHMWPE Total Joint Replacements, Department of Orthopaedics resident lecture series, Cleveland Clinic Foundation, Cleveland, OH.

1985-1995 Annual lectures on properties of orthopaedic biomaterials and development of implants, CORE curriculum, The Hospital for Special Surgery, New York, NY.

1985-1995 Annual lectures on mechanical properties of biomaterials and orthopaedic biomechanics, Montefiore Hospital, New York, NY.

1984-1995 Annual lectures on mechanical performance of implant materials, Department of Mechanical and Aerospace Engineering, Cornell University, Ithaca, NY.

1985-1995 Annual lectures on mechanical properties of biomaterials and orthopaedic biomechanics, Lenox Hill Hospital, New York, NY.

1990, 1988 Lectures on implant materials, Department of Materials Science and Engineering, Lehigh University, Bethlehem, PA.

1989, 1987,
1985 Elastic behavior of materials and properties of implant materials, George Washington University, Washington, D.C.

SUPERVISION OF RESEARCH ACTIVITIES

Case Western Reserve University

Graduate Students - Department of Mechanical and Aerospace Engineering

Ph.D. Students

Malcolm Cooke: Rapid prototyping of resorbable skull implants (**Ph.D. to be awarded, August, 2004**).

Kirk Olsen: Fatigue failure of aircraft bolts (**Ph.D. to be awarded, August 2004**).

Ozan Akkus: The Relation of Microdamage to Fracture and Material Property Degradation in Human Cortical Bone Tissue (**Ph.D. awarded, August 2000**). Present position: Assistant Professor, Bioengineering, University of Toledo, Toledo, Ohio).

Ravi Varadarajan, M.S.: Kinetics of fatigue crack growth in human bone (Ph.D. candidate; expected graduation; May 2005).

Michael Sobieraj, M.S.: Constitutive modeling of UHMW polyethylene (M.D./Ph.D. candidate).

M.S. Students

Thomas Penoyar: Effect of microdamage and strain rate on the fracture resistance of human cortical bone (**M.S. to be awarded, August, 2004**).

Irebert Delgado, B.S.: Retirement-for-cause fatigue analysis of aircraft engine rotor disks (**M.S. awarded, May, 2004**).

Sara Gencur, B.S.: Fracture behavior of highly crosslinked UHMW polyethylenes (**M.S. awarded, May, 2004**).

Michael Sobieraj, B.S.: Constitutive modeling of UHMW polyethylene (**M.S. awarded, January, 2004**).

Allison Stawarz, B.S.: Short and long fatigue crack growth in bone (**Case Prime Fellow, NSF Graduate Fellow, M.S. awarded, January 2001**).

Rebecca Lehman Thomas, B.S.: Cyclic stability and constitutive modeling of UHMW polyethylene materials (**M.S. awarded, January, 2001**).

Eric Kolb, B.S.: A Finite Element Analysis of Design Factors Affecting Performance of Acetabular Components in Total Hip Arthroplasty (**M.S. awarded, May 2000**).

Gail Perusek, B.S.: Design and Test of an Extensometer for Global Measurement of Bone Strain Suitable for Use In Vivo in Humans (**M.S. awarded, May 2000**).

Matthew Collier, B.S.: Radiographic measurement methods to determine hip anteversion and wear in total hip replacements (**M.S. awarded, January 2000**).

Elizabeth Karla Dapp, B.S.: Effect of notch-preparation on the J-integral static fracture resistance of ultra high molecular weight polyethylene (**M.S. awarded, January, 1999**).

Patrick Dunlap, B.S.: Effect of resin type and sterilization Method on the fatigue crack propagation behavior of ultra high molecular weight polyethylene (**M.S. awarded, January, 1998**).

Graduate Students - Department of Biomedical Engineering

Sameer Rohatgi, B.S.: Failure analysis of MG I and II retrieved total knee replacements (**M.S. awarded, January, 1998**).

Undergraduate Students

Karlos Mackey (Fisk): Dynamic fracture behavior of UHMWPE (summer, 2004).

Angela Wong (Cornell): Wear of crosslinked UHMWPE (summers, 2003 and 2004).

Sara Gencur: Fracture behavior of highly crosslinked UHMW polyethylenes (Senior Project, 2002-2003).

Tom Penoyar: Bone Ingrowth into biologically active and biologically inert porous surfaces (Senior Project, 2002-2003).

Adam Ratzel and Sara-Jane Anderson: Mechanical degradation of human cortical bone (Experimental Project, 2001).

Allison Olinginski: Fracture toughness of acrylic bone cement (Senior Project, 2000-2001).

Elizabeth Perepezko: Microrack damage formation in gamma radiation sterilized bone allografts (Senior Project, 1999-2000, **recipient of a Materials Research Society Fellowship**).

Rebecca Lehman: Material and Design Factors Affecting Severe Rim Wear Damage in Acetabular Hip Components (Senior Project, 1999).

Sara Platte: Retrieval Analysis of Hylamer-M UHMW polyethylene tibial knee components (1997-1998) and ultrastructural analysis of UHMW polyethylene lamellae during deformation (Senior Project, 1998-1999).

Heather Konko: Failure analysis of fractured total hip replacement metal femoral components (Senior Project, Spring, 1997).

Engineering Postdoctoral Fellows

Mary Matthiesen, Ph.D.: Damage accumulation and histomorphometry of human cortical bone (2002-2003).

Ramazan Kayacan, Ph.D.: Fatigue crack growth in human cortical bone (2002-2003). Current position: Assistant Professor, Department of Mechanical Engineering, Suleyman Demirel University, Isparta, Turkey.

Research Residents and Visiting Medical Fellows – Department of Orthopaedics

Nam Choi, M.D.: Wear of Conventional and Crosslinked UHMWPE Total Hip Replacement Components (2003-2004)

Sam Akhavan, M.D.: Fatigue crack growth in radiation sterilized human cortical bone (2002-2003). **Recipient of the Barry Friedman Award.**

Nayoa Taki, M.D.: UHMW polyethylene wear and damage (2000-2003).

Erika Mitchell, M.D.: Short and long fatigue crack growth in radiation sterilized human cortical bone (2000-2001). **Recipient of the Ruth Jackson Society Resident Research Award.**

Sabine Schmitt, M.D.: Effect of resin type and manufacturing method on wear damage to IB I and IB II UHMW polyethylene tibial knee components (1999).

Choong-Hee Won, M.D., Ph.D.: Effect of resin type and manufacturing method on wear damage to MG I and MG II UHMW polyethylene tibial knee components (1997-1998).

Medical Students

Leah Schulte, B.S.: Bone Ingrowth into biologically active and biologically inert porous surfaces (2001-2003).

Jesse Torbert, M.S.: Bone Ingrowth into biologically active and biologically inert porous surfaces (2001-2003).

Gina Jefferson, B.S.: Generation of in vitro UHMW polyethylene wear debris (summer, 1997).

High School Students

Angela Wong: Implant retrieval analysis (summer 2002).

Bridget Gallagher: Implant retrieval analysis (summer 2002).

Alexandra Breedlove (Hathaway Brown): Ultrastructural and microstructural damage mechanisms in human bone tissue (1999 –2002).

Michael Hering (Shaker Middle School): Relationship between stiffness, strength, and density of woods (2000).

Research Engineers

Rebecca Thomas, M.S.: Orthopaedic implant retrieval analysis (2001-present).

Jay Bensusan, M.S.: Orthopaedic biomechanics (1999 – present).

David Krzypow, M.S.: Orthopaedic implant retrieval analysis, fatigue crack propagation behavior and cyclic stabilization behavior of UHMW polyethylene (1996 - 2000).

The Hospital for Special Surgery (1983-1995)

Engineering Graduate Students

Steven Kurtz (Cornell University, Mechanical and Aerospace Engineering): Chemical and mechanical degradation of polyethylene joint components (1990-1994). Ph.D. dissertation co-advisor.

Ji-Yhun Koo (Brown University, Division of Engineering): Fatigue crack propagation in ultra high molecular weight polyethylene under fully compressive loading (1992).

Katrin Elbert (Cornell University, Mechanical and Aerospace Engineering): Surface damage in polyethylene joint components (1988).

Engineering Undergraduate Students

Kevin Shea (Cornell University, Mechanical and Aerospace Engineering): Mechanical properties of ultra high molecular weight polyethylene (1995).

Nitin Khanna (University of Pennsylvania, Bioengineering): Post-irradiation aging of polyethylene (1992-1993). Ad-hoc senior thesis advisor.

Eric Knochenhauer (Johns Hopkins, Materials Engineering): Fracture mechanics of polyethylene (1986).

Louis Boogh (Lausanne, École Polytechnique, Materials Engineering): Mechanical properties of polyethylene, microstructural analysis of implant metal alloys (1985).

James Thompson (Lehigh University, Materials Engineering): Fracture mechanics of acrylic bone cement (1984).

Research Engineers

Rumana Huq, B.S.: Mechanical testing core laboratory projects (1995).

Todd Baldini, M.S.: In vitro degradation behavior of polyethylene and mechanical behavior of cancellous bone tissue (1994 - 1995).

Alesia Bennett, B.S.: Mechanical properties of compact bone, retrieval analysis and examination of total joint replacement components, degradation of polyethylene, and quality control of implantable materials for manufacture of total joint replacement components (1988 -1994).

Robert Klein, B.S.: Fracture and degradation behavior of polyethylene, retrieval analysis and examination of total joint replacement components, and quality control of implantable materials for manufacture of total joint replacement components (1986 -1994).

Postdoctoral Fellows

Franz Menschik, M.D. (Hospital for Special Surgery Biomechanics Fellow): Effect of environment and sterilization on the fracture resistance of polyethylene; mechanical behavior of osteoporotic cancellous bone (1994-1995).

Nancy Camacho, Ph.D. (Hospital for Special Surgery, NIH Training Grant Fellow): Effect of ultrastructure on the mechanical properties and permanent deformation mechanisms of compact bone (1992-1994).

Olga Huk, M.D. (Hospital for Special Surgery, Hip Fellow): Generation of metal and polyethylene debris from modular acetabular hip components (1992-1993).

Residents

Jay Lieberman, M.D. (Hospital for Special Surgery, Hip Fellow): Head-neck taper interfaces of modular femoral hip components (1991-1992).

Robert Schwartz, M.D. (Hospital for Special Surgery, Biomechanics Fellow): Permanent deformation of compact bone and retrieval analysis of porous-coated implants (1984-1985).

Mathias Bostrom, M.D. (Hospital for Special Surgery): Degradation in polyethylene total knee components as a result of sterilization, storage and in-vivo use (1993-present).

Donna Aston, M.D. (University Hospitals, Case Western Reserve University): Generation of polyethylene debris from metal-backed acetabular hip components (1992).

Medical Students

Liat Kaplan (Cornell University Medical College): Cyclic stress-strain behavior of polyethylene (1995).

Paul Simic (Cornell University Medical College): In-vivo degradation of polyethylene (1994).

Kurt Voellmicke (Cornell University Medical College): Effect of Boron deficiency on mechanical behavior of compact bone (1993).

Jay Weintraub (Cornell University Medical College): Post-irradiation aging of polyethylene (1992).

Carlos Garcia (Cornell University Medical College): Chemical degradation analysis of polyethylene (1991).

Lawrence Levin (Cornell University Medical College): Retrieval analysis and examination of total shoulder replacements (1991).

Elana Schapiro (Cornell University Medical College): Chemical degradation analysis of polyethylene (1991).

Lance Peters (Cornell University Medical College): Retrieval analysis and examination of in-vivo degradation of polyethylene total hip and total knee components (1989-1990).

Donna Pacicca (New York University Medical College): Retrieval analysis and historical documentation of total joint replacements (1989); Characterization of bovine bone (1990).

Donna Astion (Albert Einstein Medical School): Permanent deformation of compact bone (1985).

Roger Frey (Cornell University Medical College): Permanent deformation of compact bone (1984).

Dennis McGill (New York University Medical College): Setting properties of acrylic bone cement with and without centrifugation (1984).

Craig Gordon (Cornell University Medical College): Retrospective study of T-28® type hip replacements (1984).

Benisse Lester (Cornell University Medical College): Retrospective study of T-28® type hip replacements, and of antibiotics in bone cement (1983).

High School Students

John Afthinos (Bronx High School of Science): Mechanical behavior of vertebral monkey bone (1995). (**A Westinghouse Science Project Semifinalist**).

Raena Selip (Bronx High School of Science): Degradation of retrieved polyethylene tibial knee components (1993). (**A Westinghouse Science Project Semifinalist**).

Doug Paget (Fieldston High School): Effect of Boron deficiency on mechanical behavior of compact bone (1993).

RESEARCH SUPPORT (Active and Past)

<u>Agency, Foundation or Company</u>	<u>Dates</u>	<u>Title and Role in Research</u>
Musculoskeletal Transplant Foundation \$84,197	2005	Inelastic Stress-Strain Behavior of Radiation Sterilized Bone (pending) Co-Investigator
Musculoskeletal Transplant Foundation \$92,000	2003-2004	Effect of Radiation Sterilization and Mechanically Induced Damage on the Fragility of Allograft Cortical Bone Principal Investigator
National Institutes of Health \$1,024,347 R01 AR47904 (NIAMS)	2001-2005	Mechanics and Performance of Traceable UHMWPE Hip Implants (Competing renewal pending) Principal Investigator (sub-contract to Drexel)
National Institutes of Health \$750,915 R01 AR47192 (NIAMS)	2001-2005	Constitutive Model for Polyethylenes in Total Joint Replacements (Competing renewal pending) Principal Investigator
National Institutes of Health \$1,178,250 R01 AR43785 (NIAMS)	2001-2004	Non-Linear Stress-Strain Behavior of Cortical Bone Co-Investigator
National Institutes of Health \$606,700 R01 AG17171 (NIA)	2000-2004	Short and Long Fatigue Crack Growth in Bone Principal Investigator
National Institutes of Health \$1,389,283 R01 DE1374001 (NIDR)	2000-2004	Strength and Resorption of Biodegradable Skull Implants Co-Investigator
National Institutes of Health 5T32 AR07505 (NIAMS)	2001-2006	Training Program in Musculoskeletal Research Co-Investigator
Wright Medical	2001-2002	In-vivo Rabbit Studies of the Effect of Calcium-Sulfate-Based Coatings on the Osseous Integration of Orthopaedic Prostheses Co-Investigator
Zimmer	2000-2002	Fatigue Crack Propagation Behavior of UHMWPEs Co-Investigator
Stryker, Howmedica, Osteonics	2000-2001	Cyclic Stability of Modified UHMW Polyethylenes Co-Investigator
Wright Medical	1999-2001	Cyclic Deformation and Fracture of Crosslinked UHMW Polyethylenes Co-Investigator

Orthopaedic Research and Education Foundation	1999-2002	Prospective Randomized Study of Zirconia Ceramic vs. Co-Cr-Mo Alloy Femoral Heads With respect to Wear of Polyethylene Acetabular Cups in THR Co-Investigator
Musculoskeletal Transplant Foundation	1999	Effect of Radiation Sterilization on the Fracture Resistance of Cortical Bone Allografts Principal Investigator
National Institutes of Health	1996-2000	Cellular Mechanisms of Implant Loosening Co-Investigator
Johnson & Johnson Professional	1996-1997	Effect of Resin Type and Sterilization Method on the Static and Cyclic Fracture Resistance of UHMWPE Principal Investigator
National Institutes of Health (Research Career Development Award)	1992-1997	Degradation and Fracture of Polyethylene Joint Components Principal Investigator
National Institutes of Health	1989-1994	Degradation in Polyethylene Joint Components Principal Investigator
National Institutes of Health	1987-1995	Surface Failure in UHMWPE Joint Components Co-Investigator
National Institutes of Health	1992-1994	Orthopaedic Training Grant Co-Investigator
Depuy-DuPont	1993-1994	Degradation in Enhanced Polyethylene Joint Components Co-Investigator
Zimmer	1993-1994	Observations of Retrieved Zimmer Implants Co-Investigator
National Institutes of Health (First Independent Research Support and Transition Award)	1987-1991	Permanent Deformation of Compact Bone Principal Investigator
North Atlantic Treaty Organization	1988-1990	Surface Failure and Material Degradation in Polyethylene Joint Components Principal Investigator
DuPont	1988-1990	Study of Extended Chain UHMWPE Co-Investigator

Whitaker Foundation

1985-1988

Surface Failure in Polyethylene Joint
Components
Co-Investigator

WORKSHOPS/SPECIAL CONFERENCES

Invited speaker, NIH Consensus Development Conference on "Total Knee Replacement", Bethesda, MD, December, 2003.

Invited panelist, "Medical Implant Information, Performance and Policies", NIH/FDA/NIST sponsored workshop, Gaithersburg, MD, September, 2002.

Invited panelist, "Ultra-High Molecular Weight Polyethylene", 27th Annual Meeting of the Society for Biomaterials, Minneapolis, MN, April, 2001.

Session co-ordinator and moderator, "Wear 2000", AAOS & NIH sponsored workshop, Chicago, IL, October, 2000.

Co-ordinator, "Polyethylene 2001", 46th Annual Meeting of the Orthopaedic Research Society, Orlando, FL, March, 2000.

Session Organizer, Polyethylene Wear, Biomedical Engineering Society, Cleveland, OH, October, 1998.

Attendee, Gordon Research Conference on Bioengineering and Orthopaedic Sciences: "Orthopaedics at the Millenium. Develop, Repair, or Replace?" Andover, NH, July, 1998.

Invited panelist, (Biomechanical Solutions panel), "Bioengineering, Building the Future of Biology and Medicine", National Institutes of Health, Bethesda, MD, February, 1998.

Co-ordinator, "Bearing Surfaces and Biomaterials" 2nd Combined Meeting of the Orthopaedic Research Societies of USA, Japan, Canada, and Europe, San Diego, CA, November, 1995.

Invited participant, "Considerations of Implant Wear for the Future of Total Joint Replacement" AAOS & NIH sponsored workshop, Chicago, IL, September, 1995.

Invited participant, "Chemical Degradation" and "Tests to Predict Clinical Performance" Workshop on Polyethylene Wear, sponsored by the BWH / MIT-Industry Consortium for Polymeric Articulating Surfaces for Total Joint Replacement, September, 1993.

Invited panelist, "Corporate Affiliates Workshop: Prosthetic Articular Interfaces" 36th Annual Meeting of the Orthopaedic Research Society, New Orleans, LA, February, 1990.

INVITED PRESENTATIONS

"Observations of Fatigue Crack Growth in Human Cortical Bone", Department of Mechanical and Aerospace Engineering, Notre Dame University, South Bend Indiana, April, 2003.

"Fatigue Crack Growth in Human Cortical Bone", Zimmer, Warsaw, IN, June, 2002.

"Crack Formation and Growth in Human Cortical Bone", University of Toledo, Toledo, OH, March, 2002.

"Joint Appointment: Engineering the Natural History of Total Joint Replacements", Lorain County Community College, OH, March, 2002.

"Examining the Relationship Between Microcracking and Fracture Resistance in Human Cortical Bone: Implications for Allografts" and "UHMWPE in Total Joint Replacements: What We Know and What We Need to Know", The Center for Hip and Knee Surgery Annual Orthopaedic Symposium, Mooresville, IN, May, 2001.

"Joint Appointment: Engineering the Natural History of Total Joint Replacements", Spotlight on Women Lecture Series, Case Western Reserve University, Cleveland, OH, January, 2001.

"Examining the Relationship Between Microcracking and Fracture Resistance in Human Cortical Bone", Cleveland Clinic Foundation, Cleveland, OH, June, 2000.

"Wear in Total Joint Replacements", Ohio Aerospace Institute, Cleveland, OH, July, 1998.

"The Effect of Irradiation and Other Important Variables on Polyethylene Quality", Joint Replacement 1997, sponsored by Duke University, Pinehurst, NC, May, 1997.

"The Use of UHMW Polyethylene in Total Joint Replacements", The Cleveland Clinic, Cleveland, OH, May, 1997.

"Polyethylene Wear Issues", Johnson & Johnson Professional Advisory Panel, Boston, MA, September, 1996.

"Material Factors Affecting the Performance of Acetabular Components" and "Chemical and Mechanical Degradation of UHMWPE", The Center for Hip and Knee Surgery Annual Orthopaedic Symposium, Mooresville, IN, May, 1995.

"New Trends in Bearing Surfaces", Lenox Hill Hospital, New York, NY, May, 1995.

"Design and Material Factors Affecting the Performance of UHMW Polyethylene Joint Components", University of California, Berkeley, CA, March, 1995.

"Decreasing Wear Through Changes in Design", VI Annual Meeting Holiday Total Knee and Hip Course, New York, NY, December, 1994.

"Polyethylene Wear Debris", The Scientific / Regulatory Interface Symposium, sponsored by Bio-Research Laboratories, Ltd., the Centre for Biomaterials at the University of Toronto, and the École Polytechnique, Montréal, Quebec, October, 1994.

"The Effect of Sterilization on UHMWPE", The Summer Meeting of the Hip Society, The Hospital for Joint Diseases, New York, NY, September, 1994.

"Material Properties of Ultra High Molecular Weight Polyethylene", Polyethylene in Total Joint Replacements Symposium, sponsored by the University of Toronto Centre for Biomaterials and the Wellesley Hospital Division of Orthopaedic Surgery, Toronto, Ontario, May, 1994.

"Diminution of Wear Through Implant Design", V Annual Meeting Holiday Total Knee Course, New York, NY, December, 1993.

"Degradation and Wear of UHMW Polyethylene Joint Components", Johnson & Johnson Orthopaedics PFC® Advisory Panel, Boston, MA, June 1993.

"Factors Affecting Polyethylene Wear", Johnson & Johnson Orthopaedics Advanced Sales School, Louisville, KY, and Minneapolis, MN, May, June and October, 1993, and June, 1994.

"Degradation and Wear of UHMW Polyethylene Joint Components", Case Western Reserve University, Cleveland, OH, April, 1993. (Sponsored by the CWRU President's Office to enhance the visibility of women scientist and engineers and to provide role models for prospective women scientists and engineers).

"Polyethylene Wear", IV Annual Meeting Holiday Total Knee Course, New York, NY, December, 1992.

"Polyethylene Wear in THA and TKA"; "Metal vs. Ceramic Femoral Bearing Surfaces"; and, "HA Coating: What's its Role and What Surface", North American Hip and Knee Symposium, Tucson, AZ, October, 1992.

"Mechanisms of Failure of Polyethylene Joint Components", Dartmouth Biomedical Engineering Center Fourth Annual Conference, Burlington, VT, October, 1992.

"Performance of Ultra High Molecular Weight Polyethylene Total Joint Replacement Components", Brown University, Providence, RI, May, 1992.

"Creep of Compact Bone", Beth Israel Biomechanics Seminar, Boston, MA, March, 1992.

"What are the Long-term Problems with Polyethylene and Should this Affect Implant Configuration?", Questions and Controversies in Total Knee Replacement, New York, NY, November, 1991.

"Influence of Design and Material on Wear", Techniques and Science for Successful Joint Arthroplasty, Burlington, VT, October, 1991.

"Polyethylene Wear Mechanism", William H. Harris, M.D., 21st Annual Hip Course, Boston, MA, September, 1991.

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