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Education

Ph.D.	Case Western Reserve University (Structure and Mechanical Design), 1970
M.S.	Case Western Reserve University (Bioengineering), 1966
B.S.M.E.	University of Minnesota (Mechanical Engineering), 1959

Principal Areas of Research, Teaching and Consulting

Assistive Devices, Biomechanics, Development of Composite Materials, Stress Analysis, Failure Analysis

Engineering Experience

2008-	Kinetic Muscles, Inc., Chief Scientific Office, Tempe, Arizona
1999-07	Kinetic Muscles, Inc., President, Tempe, Arizona
1994-	Senior Bioengineering Consultant, BTI Consultants, Tempe, Arizona
1994-98	V.P. of Engineering, OrthoLogic Corporation, Phoenix, Arizona
1984-94	Head of Bioengineering Division, Harrington Arthritis Research Center, Phoenix, Arizona
1981-83	President, Paulson Medical Devices, Inc., Erie, Pennsylvania
1974-81	Lord Corporation, Erie, Pennsylvania
1970-74	Bell Telephone Laboratories, Inc., Columbus, Ohio
1960-64	Reactor Engineering Division, U.S. Atomic Energy Commission, Argonne, Illinois
1959-60	Idaho Division, Argonne National Laboratory, Idaho Falls, Idaho
1956-57	Minneapolis-Honeywell, Aero Division, Minneapolis, Minnesota

Principal Professional Publications And Presentations (Partial Listing)

"Bone Adaptation Modeling: On the Road to Tissue Engineering," 23rd Society for Biomaterials Meeting, 1997

"Effects of the BAK Interbody Implant System on Cervical Spine Flexibility," with A.G.U. Brantley and T. Oxland, 41st Orthopedic Research Society #662, Orlando, Florida, February 1995

"Environmental Degradation of Orthopedic Composites," with M.K. Overland, 39th Society for Advancement of Material and Process Engineering (SAMPE) Symposium, April 1994

Principal Professional Publications And Presentations (Partial Listing)(Continued)

"The Effect of Interface Bonding and Geometry on Long Term Periprosthetic Bone Changes," with others, Washington, D.C., 1994

"The Influence of Radiation Sterilization on the Tensile Strength of Lipid Conditioned PSF and PEEK Polymers," with M.K. Overland and L.E. Hendrickson, 20th Society for Biomaterials Transaction #191, Boston, Massachusetts, 1994

"The Effects of Pedicle Screw Fit - An In-Vitro Study," with A.G.U. Brantley, J.K. Mayfield, and K.R. Clark, SPINE, Vol. 19, No. 15, 1994

"A Biomechanical Comparison of Gardner-Wells Tongs and Halo Device Used for Cervical Spine Traction," with J.A. Lerman, R.J. Haynes, E.J. Koeneman, and W.B. Wong, SPINE, Vol. 19, No. 21, 1994

"Long Term Biocompatability and Material Evaluation of a Composite Femoral Stem in the Canine," with others, European Society for Biomaterials, Davos, Switzerland, September 1993

"SYMPOSIUM: Porous-Coating Methods: The Pros and Cons," with J.E. Lemons, J.P. Collier, W.C. Head, R.H. Rothman, and L.A. Whiteside, Contemporary Orthopaedics, Vol. 27, No. 3, September 1993

"The Effect of Implant Stiffness and Design on Periprosthetic Bone Changes," with others, European Society for Biomaterials, Davos, Switzerland, September 1993

"The Effect of Implant Interface Bonding on Stress Related Periprosthetic Bone Changes," with others, 19th Meeting, Society for Biomaterials, April 1993

"The Effect of Implant Stiffness and Design on Bone Changes," with others, 19th Meeting, Society for Biomaterials, April 1993

"Evaluation of a Carbon Fiber Composite Hip: Six Year Retrieval Analysis," with others, 19th Meeting, Society for Biomaterials, April 1993

"Effects of a Long Term In-Vivo/In-Vitro Environmental Exposure on the Shear Strength of Polysulfone/Carbon Fiber Composites," with others, 19th Meeting, Society for Biomaterials, April 1993

"A Longitudinal Evaluation of a Four-Wheeled Walker: Effects of Experience," with Cristobel Eblen, Topics in Geriatric Rehabilitation, 8(3)3, 1993

"Advanced Materials for Assistive Devices," Topics in Geriatric Rehabilitation, Vol. 8, No. 2, December 1992

"Evaluation of Six and One Half Year Canine Composite Implants," with others, Implant Retrieval Symposium, Society for Biomaterials #86, September 1992

"Preliminary Test and Evaluation of DATAHAND, A Keyboard Alternative Designed to Prevent Musculoskeletal Disorders and to Improve Performance," with others, Proceedings of the Ergonomics and Safety Conference, June 1992

"The Effect of Human Hip Stem Stiffness on Bone Strains," with others, Fourth World Biomaterials Congress, April 1992

Principal Professional Publications And Presentations (Partial Listing) (Continued)

"Material and Geometric Effect on Femoral Strain Restoration and Micromotion: An In-Vitro Comparison of Canine Femoral Components," with others, Fourth World Biomaterials Congress, Berlin, April 1992

"Long-Term Performance and Load Sharing Effects of HA-Coated Macrotextured Titanium," with others, Fourth World Biomaterials Congress, Berlin, April 1992

"Comparison of Four Femoral Stem Surface Coatings in a Canine Model," with others, Fourth Word Biomaterials, Berlin, April 1992

"The Effect of Femoral Component Geometry and Material on In-Vitro Proximal Femoral Strain Restoration," with others, Washington, D.C., 1992

"3-D FEM Analysis of Interference Fixation of Acetabular Implants," with others, Orthopedic Research Society, Washington, D.C., 1992

"In-Vivo Evaluation of Four Stem Interface Conditions in a Canine Hemiarthroplasty," with others, Orthopedic Research Society, Washington, D.C., 1992

"Torsional Stability of Uncemented Revision Hip Stems," with others, Orthopedic Research Society, Washington, D.C., 1992

"A Multi-Dimensional Evaluation of a Four-Wheeled Walker," with others, Assistive Technology, Vol. 4, No. 1, 1992

"Evaluation of the DATAHAND Key Entry System for Physically Challenged Users," with others, Rehabilitation Engineering Society of North America, Montreal, 1992

"How the Interaction of Implant Stiffness, Position and Boundary Conditions Affect Bone Stress and the Interpretation of Test Results," American Society of Testing and Materials Symposium on Characterization and Testing of Composite Materials for Implant Applications in the Human Body, San Diego, California, November 1991

"Effect of Implant Geometry, Position and Boundary Conditions on Cancellous Bone Stresses: A Finite Element Analysis," with others, AMD-Vol. 120, American Society of Mechanical Engineers Biomechanics Symposium, 1991

"Unicompartmental Total Knee Arthroplasty: A Comparison of Mechanical Stability in Various Types of Fixation of an Uncemented Unicompartmental Tibial Component," with others, American Academy of Orthopedic Surgeons Scientific Exhibit, 1991

"A Hydrogel Pericardial Patch," with others, American Society of Artificial Internal Organ Transactions, Vol. 36, No. 3, July-September 1990

"Mechanical Properties of Pericardial Substitutes," with others, First World Congress of Biomechanics, San Diego, California, 1990

"Workshop on Characterization of Calcium Phosphate Materials," with J. Lemons, P. Ducheyne, W. Lacefield, F. Magee, T. Calahan, J. Kay, Journal of Applied Biomaterials, Vol. 1, 1990

Patents

U.S. Patent 4,895,141 - Unilateral External Fixation (1990)
U.S. Patent 4,895,573 - Composite Hip Stem (1990)
U.S. Patent 4,474,400 - External Fracture Frame (1988)
U.S. Patent 4,757,809 - Pin Clamps (1988)
U.S. Patent 4,655,778 - Artificial Finger Joint (1987)
U.S. Patent 4,738,681 - Hip Prosthesis Geometry (1987)
U.S. Patent 4,750,905 - Composite Hip Prosthesis Construction (1987)
U.S. Patent 4,621,629 - Compression Hip Screw (1986)
U.S. Patent 4,584,995 - External Fracture Frame (1986)

Awards, Scholarships And Honor Societies

1999	International Fellow of Biomaterials Science and Engineering; International Union of Societies for Biomaterials Science and Engineering
1997	Clemson Award for Contributions to the Literature, Society for Biomaterials
1992	Fellow of Society for Advancement of Material and Process Engineering International (SAMPE)
1990	Chapter Fellow Award, Society for Advancement of Materials and Process Engineering (SAMPE)
1987-89	Spencer T. and Ann W. Olin Endowed Chair for Arthritis Biomedical Research
1982	Engineer of the Year Award, Erie Engineering Society Council

Academic Experience

1984- Pres Arizona State University, Adjunct Professor, Department of Chemical and Bioengineering

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