BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Brown, Thomas D.	Richard & Janice Johnston Chair of Orthopaedic Biomechanics
eRA COMMONS USER NAME tdbrown	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Case Institute of Technology, Cleveland, Ohio			Metallurgy/Materials Science
University of Maryland, College Park, Maryland	B.S.	1972	Mechanical Engineering
Carnegie-Mellon University, Pittsburgh, Pennsylvania	M.S.	1973	Mechanical Engineering-Bioengineering
Carnegie-Mellon University, Pittsburgh, Pennsylvania	Ph.D.	1976	Mechanical Engineering-Bioengineering

A. Positions and Honors.

Positions and Employment

1975–1976	Senior Engineer	Westinghouse Research and Development Center Churchhill, PA
1976–1981	Research Assistant Professor of Orthopaedics and Civil Engineering	University of Pittsburgh, Pittsburgh, PA
1981–1983	Research Associate Professor of Orthopaedics and Civil Engineering	University of Pittsburgh, Pittsburgh, PA
1983–1987	Associate Professor	Departments of Orthopaedic Surgery and Biomedical Engineering University of Iowa, Iowa City, IA
1987–1997	Professor	Departments of Orthopaedic Surgery and Biomedical Engineering, University of Iowa University of Iowa, Iowa City, IA
1997–Present	Professor	Richard and Janice Johnston Chair of Orthopaedic Biomechanics University of Iowa, Iowa City, IA

Honors

General Motors Scholar; Elected to Tau Beta Pi, Pi Tau Sigma, and Sigma Xi Honorary Societies; NIH Training Grant Recipient; Borelli Award, ASB; Kappa Delta Award, AAOS/ORS; Frank Stinchfield Award (3 times), The Hip Society; Fellow, AIMBE; Clinical Biomechanics Award (2 times), ASB; William Harris Award, ORS; Microstrain Award (2 times), ASB; OREF Clinical Research Award, AAOS.

Other Experience and Professional Memberships

Member of AIMBE; ASME; ASTM (Chairman, F04 Task Group on External Fixation); Society for Biomaterials; ORS [Membership Committee 1984–1988, (Chairman 1986–1987), Board of Directors 1986–1987, 1997–2000, Program Committee 1987–1988, 1991–1992, 1996–1998, (Chairman 1998–1999), President 2001–2002, Chair of the Hip & Knee – Disease Process Topic Committee, 2008-2010]; Society for Experimental Mechanics; American Society of Biomechanics [Program Committee 1985–1988, (Chairman 1987), Executive Committee 1986–1987, 1992–1995, Membership Committee 1988–1992, (Chairman 1991–1992), President 1993–1994]; AAOS (Associate 1986–Present, Committee on Biomedical Engineering 1991–1997, Program Committee 1998–2001; Committee on Research 2002–2006); The Hip Society (Associate 1985–Present, Education Committee 1999–2002); SAS, OARSI; Editorial Consultants Panel, Journal of Biomechanics 1984–Present; Associate Editor, Journal of Orthopaedic Research 1987–1923; Associate Editor, ASME Journal of Biomechanical Engineering 1988–1993; Consulting Editor for Research, Journal of Bone and Joint Surgery 1989–Present; Advisory Panel, International Journal of Orthopaedic Trauma 1995–Present; Editorial Board, Journal of Musculoskeletal Research 1996–present; Editorial Board, Journal of Orthopaedic Trauma, 2005-Present; NIH Orthopaedic and Musculoskeletal Study Section (Regular Member 1989–1993).

B. Selected peer-reviewed publications (Selected from 237 full-length publications and 611 abstracts.)

1. BeardsleyCL, Heiner AD, Brandser EA, Marsh JL, Brown TD. High density polyetherurethane foam as a fragmentation and radiographic surrogate for cortical bone. Iowa Orthop. J. 2000;20:24–30. PMCID1888748.
2. Beardsley CL, Bertsch CR, Marsh JL, Brown TD. Interfragmentary surface area as an index of comminution severity–Proof of concept in a bone fracture surrogate. J. Biomech. 2002;35(3):331–338.
3. Beardsley C, Marsh JL, Brown TD. Quantifying comminution as a measure of severity of articular injury. Clin. Orthop. Relat. Res. 2004;243:74–78.
4. Anderson DD, Muehling VL, Marsh JL, Brown TD. Precise identification of bone fragment boundaries to assist in reduction of highly comminuted fractures. Comput. Aided Surg. 2004;9(3):116.
5. Dirschl DR, Marsh JL, Buckwalter JA, Gelberman R, Olsen S, Brown TD, Llinas A. Articular fractures. The J Am Acad Orthop Surg. 2004;12(6):416–23.
6. Beardsley CL, Anderson DD, Marsh JL, Brown TD. Interfragmentary surface area as an index of comminution severity in cortical bone impact. J. Orthop. Res. 2005;23(3):686–690. PMCID2194755.
7. McKinley TO, Rudert MJ, Koos DC, Pedersen DR, Baer TE, Tochigi Y, Brown TD. Contact stress transients during functional loading of ankle step-off incongruities. J. Biomech. 2006;39:617–626.
8. Anderson DD, Goldsworthy JK, Shivanna K, Grosland NM, Pedersen DR, Thomas TP, Tochigi Y, Marsh JL, Brown TD. Intra-articular contract stress distributions at the ankle throughout stance phase—Patient specific finite element analysis as a metric of degeneration propensity. Biomech. Model. Mechanobiol. 2006;5(2–3):82–89. PMCID2194754
9. Marsh JL, Muehling V, Dirschl D, Hurwitz S, Brown TD, Nepola JV. Tibial plafond fractures treated by articulated external fixation: A randomized trial of postoperative motion versus nonmotion. Journal of Orthopaedic Trauma 2006;20 (8):536–541.
10. Brown TD, Johnston RC, Saltzman CL, Marsh JL, Buckwalter JA. Post-traumatic osteoarthritis: A first estimate of incidence, prevalence, and burden of disease. J. Orthop. Trauma. 2006;20(10):739–744.
11. Anderson DD, Goldsworthy JK, Li W, Rudert MJ, Tochigi Y, Brown TD. Physical validation of a patient-specific contact finite element model of the ankle. 2006 ASB Microstrain Award Paper. J. Biomech. 2007;40(8)1662–1669. PMCID1945165
12. McKinley TO, Rudert MJ, Tochigi Y, Brown TD. Instability-associated changes in contact stress and contact stress rates near a stepoff incongruity. J. Bone Joint Surg. 2008;90:375–383. NIHMS41218.
13. Thomas TP, Anderson DD, Marsh JL, Brown TD. A method for the estimation of normative bone surface area to aid in objective CT-based fracture severity assessment. Iowa Orthop. J. 2008;28:9–13. PMC Journal – In Process.
14. Li W, Anderson DD, Goldsworthy J, Marsh JL, Brown TD. Patient-specific finite element analysis of chronic contact stress exposure after intraarticular fracture of the tibial plafond. J. Orthop. Res 2008;26(8):1039–1045. NIHMS37837.
15. Anderson DD, Mosqueda TV, Thomas TP, Hermanson EL, Brown TD, Marsh JL. Quantifying tibial plafond fracture severity: Absorbed energy and fragment displacement agree with clinical rank ordering. J. Orthop. Res. 2008;26(8):1046–1052. NIHMS37836.

C. Research Support

Ongoing Research Support

1 R21 AR054015 Donald D. Anderson (PI) 07/01/08–03/31/10
US DHHS, National Institutes of Health/NIAMS
Quantifying Fracture Severity Using a 3-D Puzzle Solving Approach
The major goal of this project is to advance innovative methods for the evaluation of patients who have sustained comminuted intra-articular fractures. Specific Aim 1 is to generate representative fracture fragmentation in test specimens machined from a bone surrogate material, and encased in a soft tissue surrogate. The accuracy of fracture fragment segmentation, and 3-D puzzle solution accuracy in reconstructing the known pre-fracture specimen geometry, will be determined. Aim 2 is to obtain 3-D puzzle solutions, and associated fracture severity indices, working from an existing series of tibial plafond fracture cases.
Role: Co-Investigator

Donald D. Anderson (PI) 01/01/08–03/31/09
Orthopaedic Trauma Association
Objective Assessment of Fracture-Associated Soft Tissue Injury Using CT-Based Texture Analysis

The major goal of this project is to convincingly establish new physically grounded non-invasive techniques to quantify the severity of the soft tissue injuries associated with fractures. Digital image texture analysis methods will be used to analyze standard-of-care CT data to objectively assess soft tissue damage. These methods will also be used to explore the resolution of soft tissue injury over a four to six week time period following the initial injury in a smaller group of patients
Role: Investigator

Department of Veterans Affairs John J. Callaghan (PI) 10/01/07–09/30/11
Biomechanics of Total Hip Impingement & Dislocation
Three research objectives are proposed, addressing emerging concerns with (1) the combined deleterious effects of reduced toughness and reduced liner thickness in highly cross-linked metal-on-polyethylene bearings, (2) impingement events in metal-on-metal and ceramic-on-ceramic bearings, and (3) potential anatomic limitation of the motion range increases geometrically afforded by larger head size designs.
Role: Co-Investigator

5 P50 AR055533 Joseph A. Buckwalter (PI) 09/10/07–08/31/12
US DHHS, National Institutes of Health/NIAMS
New Approaches to Assess and Forestall Osteoarthritis in Injured Joints
The goal of the University of Iowa CORT is to develop new methods of forestalling post-traumatic osteoarthritis (PTOA) through a multi-disciplinary translational approach including biological science, bioengineering, imaging, and clinical research. The central theme is that joint injuries initiate a sequence of biologic events that lead to PTOA and that new treatments of joint injuries will minimize these deleterious events and promote joint healing.
Role: CORT Associate Director, Principal Investigator Biomechanics & Imaging Core, Advisor on Projects 2, 3, 4 and Tissue & Experimental Modeling Core.

5 R01 AR053899 Thomas D. Brown (PI) 09/07/07–08/31/11
US DHHS, National Institutes of Health
Local Biomechanics of Median Nerve Insult in Carpal Tunnel
The long-term goal of the study is to establish an objective mechanistic framework for linking CTS with quantifiable biomechanical influence factors. An interdisciplinary approach will be adopted, integrating research team member expertise in the areas of biomechanical stress analysis, hand surgery, and musculoskeletal MRI.
Role: Principal Investigator

5 R01 AR053344 Jeffrey A. Weiss (PI) 07/01/07–06/30/12
US DHHS, National Institutes of Health
Biomechanics of the Dysplastic Hip
The overall hypothesis of this study is that acetabular dysplasia causes alterations in hip joint biomechanics, which predispose the joint to cartilage degeneration. Subject-specific, 3D finite element (FE) modeling techniques will be developed and validated to study hip joint biomechanics. Then, using three patient populations (normal, traditional dysplastic and retroverted dysplastic), patient-specific FE models will be used to determine stresses in and around the hip joint during simulated walking, stair-climbing and descending stairs. The primary focus of the University of Iowa subcontract is development and validation of a sensor for transient contact stress measurement in the hip, based on the TekScan technology.
Role: Principal Investigator, University of Iowa Subaward

Yuki Tochigi (PI) 02/01/07–12/31/08
University of Iowa OVPR Biological Sciences Funding Program
Development of an Animal Model of Human Intra-Articular Fracture
The purpose of this project is to develop a novel animal model of intraarticular fracture that allows *in-vivo* pilot studies of new treatment strategies for human post-traumatic osteoarthritis. The goal is to establish definitive methodology to realistically replicate the pathophysiology of human intraarticular fractures in animal joints.
Role: Consultant

Thomas D. Brown (PI) 02/01/07–03/31/09
The University of Iowa Roy J. and Lucille A. Carver College of Medicine Roy J. Carver Charitable Trust Medical Research Initiative Grants
Three-Dimensional Virtual Orthopaedic Reconstruction of Comminuted Fractures
The goal of this pilot study is to build proof-of-concept evidence that the enabling technology of 3-dimensional puzzle-solving is applicable to fragmentation/dispersal patterns typical of comminuted fractures of bone.

Role: Principal Investigator

Annunziato Amendola (PI) 01/01/07–12/31/08
Arthrosurface, Inc.
The Effects of Osteochondral Defects and Focal Resurfacing on Joint Contact Mechanics
This research aims to clarify the pathomechanics of focal osteochondral defect in the ankle and to assess the ability of resurfacing to restore functional joint contact mechanics.
Role: Investigator

5 R01 AR53553 Thomas D. Brown (PI) 09/25/06–08/31/10
US DHHS, National Institutes of Health/NIAMS
Implant/Construct Interactions in the Biomechanics of Total Hip Dislocation
The major goal of this project is to study the interaction between implant design parameters, surgical placement, and capsule integrity/repair on the dislocation propensity of total hip constructs. The work involves three-dimensional nonlinear FEA, validated cadaverically in a multi-axial servohydraulic hip simulator.
Role: Principal Investigator

5 R01 AR052653 Thomas D. Brown (PI) 09/22/05–06/30/10
US DHHS, National Institutes of Health/NIAMS
Wear Analysis of Intervertebral Disc Replacements
The major goals of this project are to measure in vivo (radiographic) wear, and to develop laboratory and computational methodologies for pre-clinical study of wear, in total disc replacement implants.
Role: Principal Investigator

Completed Research Support

5 P50 AR048939 Joseph A. Buckwalter (PI) 09/16/02–08/31/08
US DHHS, National Institutes of Health/NIAMS
Pathogenesis—Prevention of Post-Traumatic OA
The University of Iowa Specialized Center of Research (SCOR) in Osteoarthritis (OA) supported and coordinated a multidisciplinary group of experienced investigators in clinical, bioengineering, cell and molecular biology research to advance understanding of the pathogenesis of post-traumatic OA, and develop innovative approaches for preventing and treating this disease. The Biomechanics Core provided technical support for SCOR Projects 1–4, and operated from the University of Iowa's Orthopaedic Biomechanics Laboratory.
Role: Principal Investigator Biomechanics Core

5 R01 AR049919 Thomas D. Brown (PI) 04/01/03–03/31/08
US DHHS, National Institutes of Health/NIAMS
The Emu as a Model for Necrotic Femoral Head Collapse
Because total hip replacement often proves unsatisfactory for patients with osteonecrosis, means are needed to forestall necrotic femoral head collapse. Cryogenically induced osteonecrosis in the emu, a large and very active biped, shows great promise for overcoming this difficulty. The central goal of the project was to bring this new emu model optimally into concordance with human disorder.
Role: Principal Investigator

5 R01 AR047653 Thomas D. Brown (PI)
US DHHS, National Institutes of Health 09/05/02–08/31/07
Mechanisms of Third Body Acceleration of THA Wear
The major goals of this project involved combined laboratory biomechanics and clinical long-term follow-up study of how third body particles exacerbate abrasive/adhesive wear of ultra-high molecular weight polyethylene acetabular components of total hip replacements.
Role: Principal Investigator

R49 CCR721745 Todd O. McKinley (PI) 09/30/02–09/29/06
US DHHS/CDC
Unstable Joints: Stress Anomaly and OA
The goal of this project was to determine the means by which injuries that cause a joint to become unstable lead to arthritis. This involved characterizing how injured joints that are rendered unstable react as indexed by changes in the biochemistry of the cartilage, in the microscopic appearance of cartilage, and by changes on x-ray.
Role: Investigator