

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Anderson, Donald D.	POSITION TITLE Research Engineer		
eRA COMMONS USER NAME andersondd			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
The University of Iowa, Iowa City, IA	B.S.E.	1985	Biomedical Engineering
The University of Iowa, Iowa City, IA	M.S.	1986	Mechanical Engineering (Biomechanics)
The University of Iowa, Iowa City, IA	Ph.D.	1989	Mechanical Engineering (Biomechanics)

A. Positions and Honors

Positions and Employment

1985–1989	Graduate Research Assistant	Orthopaedic Biomechanics Laboratory The University of Iowa, Iowa City, IA
1990–1997	Director	Biomechanics Research Laboratory Allegheny-Singer Research Institute, Pittsburgh, PA
1990–1997	Adjunct Assistant Professor	Mechanical Engineering University of Pittsburgh, Pittsburgh, PA
1990–1994	Research Assistant Professor	Orthopaedic Surgery Medical College of Pennsylvania, Pittsburgh, PA
1994–1997	Assistant Professor	Orthopaedic Surgery Allegheny Univ. of the Health Sciences Pittsburgh, PA
1996	Visiting Assistant Professor	McCaig Center for Joint Injury and Arthritis Research University of Calgary, Calgary, Alberta, Canada
1997–2002	Director	Biomechanics Laboratory Minneapolis Sports Medicine Center, Minneapolis, MN
1999–2002	Assistant Professor	Department of Orthopaedic Surgery University of Minnesota, Minneapolis, MN
2001–2003	Lecturer, Associate Member of Graduate Faculty	Department of Biomedical Engineering University of Minnesota, Minneapolis, MN
2002–2008	Associate Research Engineer	Department of Orthopaedics & Rehabilitation The University of Iowa, Iowa City, IA
2004–Present	Adjunct Assistant Professor	Department of Biomedical Engineering The University of Iowa, Iowa City, IA
2008–Present	Research Engineer	Department of Orthopaedics & Rehabilitation The University of Iowa, Iowa City, IA

Other Experience and Professional Memberships

Member, American Society of Mechanical Engineers, American Society of Biomechanics, International Society of Biomechanics, Orthopaedic Research Society, Orthopaedic Trauma Association, Osteoarthritis Research Society International

Ad Hoc Review: Clinical Orthopaedics and Related Research, Journal of Biomechanics, ASME Journal of Biomechanical Engineering, American Journal of Sports Medicine, Journal of Orthopaedic Research

Session Moderator, Meetings of the American Society of Biomechanics, ASME Bioengineering Division, Orthopaedic Research Society, International Hand and Wrist Biomechanics Symposium

Newsletter Editor, American Society of Biomechanics 2000–2003; Editorial Board, Journal of Applied Biomechanics 2000–Present; Panelist, Review of NSF CAREER / Biomedical Engineering Grant Award applications 2001–2006; Secretary/Treasurer, American Society of Biomechanics 2004–2007

Honors

Tau Beta Pi (Engineering Honor Society-1983); ASB Pre-Doctoral Young Scientist Award (1989); ASB Travel Award (2000); ASB MicroStrain Award (2006).

B. Selected peer-reviewed publications

1. Brown TD, Anderson DD, Nepola JV, Singerman RJ, Pedersen DR, Brand RA. Contact stress aberrations following imprecise reduction of simple tibial plateau fractures. *J. Orthop. Res.* 1988;6(6):851–862.
2. Nelson BH, Anderson DD, Brand RA, Brown TD. Effect of osteochondral defects on articular cartilage: Contact pressures studied in dog knees. *Acta Orthop. Scand.* 1988;59(5):574–579.
3. Meyer SJ, Brown TD, Jimenez ML, Van Hoeck JE, Anderson DD, Brand RA. Benchtop mechanical performance of prophylactic knee braces under dynamic valgus loading: A cadaver study. *Iowa Orthop. J.* 1989;9:92–97.
4. Anderson DD, Brown TD, Yang KH, Radin EL. A dynamic finite element analysis of impulsive loading of the extension-splinted rabbit knee, *J. Biomech. Eng.* 1990;112:119–128.
5. Anderson DD, Brown TD, Radin EL. Stress wave effects in a finite element analysis of an impulsively loaded articular joint. *Proc. ImechE, Part H: The Journal of Engineering in Medicine*, 1991;205:27–34.
6. Anderson DD, Brown TD, Radin EL. The influence of basal cartilage calcification on dynamic juxtaarticular stress transmission, *Clin. Orthop. Relat. Res.* 1993;286:298–307.
7. Anderson DD, Daniel TE. A contact coupled finite element analysis of the radiocarpal joint. *Semin. Arthroplasty.* 1995;6(1):30–36.
8. Baratz ME, Des Jardins JD, Anderson DD, Imbriglia JE. Displaced intra-articular fractures of the distal radius: The effect of fracture displacement on contact stresses in a cadaver model. *J. Hand Surgery.* 1996;21A(2):183–188.
9. Anderson DD, Bell AL, Gaffney MB, Imbriglia JE. Contact stress distributions in malreduced intraarticular distal radius fractures. *J. Orthop. Trauma.* 1996;10(5):331–337.
10. Morgan EA, McElroy JJ, Des Jardins JD, Anderson DD, Steensen RN. The effect of intercondylar notchplasty on the patellofemoral articulation. *Am. J. Sports Med.* 1996;24(6):843–846.
11. Loebig TG, Baratz ME, Badia A, Anderson DD. Correlation of wrist ligamentotaxis with carpal distraction in external fixation. *J. Hand Surgery.* 1997;22A(6):1052–1056.
12. Kurtz C, Anderson DD, Loebig TG, DeMeo P, Campbell PG. IGF-I accelerates functional recovery following rat achilles tendon injury. *Am. J. Sports Med.* 1999;27(3):363–369.
13. Anderson DD, Campbell PG, Guaniche CA. The use of biological agents to accelerate recovery from rotator cuff repair. *Oper. Techniq. Sports Med.* 2002;10(2):58–63.
14. Rundquist PJ, Anderson DD, Guaniche CA, Ludewig PM. Shoulder kinematics in subjects with frozen shoulder. *Arch. Phys. Med. Rehabil.* 2003;84(10):1473–1479.
15. 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.
16. Anderson DD, Deshpande BR, Daniel TE, Baratz ME. A three-dimensional finite element model of the radiocarpal joint: Distal radius fracture step-off and stress transfer. *Iowa Orthop. J.* 2005;25:108–117. PMID: 1888764
17. 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. PMID: 2194755.
18. Anderson DD, Goldsworthy JK, Shivanna K, Grosland NM, Pedersen DR, Thomas TP, Tochigi Y, Marsh JL, Brown TD. Intra-articular contact 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. PMID: 2194754
19. Anderson DD, Thomas TP, Willis AR, Brown TD, Marsh JL. Identifying fracture fragment morphology for 3-D puzzle solving/surgical planning. 3rd Annual Meeting of the Orthopaedic Research Society, February 11–14, 2007, San Diego, California. Abstract 4161A26492.
20. Millington SA, Grabner M, Wozelka R, Anderson DD, Hurwitz SR, Crandall JR. Quantification of ankle articular cartilage topography and thickness using a high resolution stereophotography system. *Osteoarthritis Cartilage.* 2007;15(2):205–211.
21. Willis A, Anderson D, Thomas T, Brown T, Marsh JL. 3D reconstruction of highly fragmented bone fractures. SPIE Medical Imaging, February 17–22, 2007, San Diego, California. Abstract MI07-MI05-63.
22. 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. *J. Biomech.* 2007;40(8):1662–1669. PMID: 1945165

23. 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.
24. 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* 26(8):1039–1045, 2008. NIHMS Manuscript #37837.
25. 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* 26(8):1046–1052, 2008. NIHMS Manuscript #37836.

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. Working from these data, 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 for which three to five year outcome data will be available.

Role: Principal-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 method 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: Principal Investigator

1 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: Co-Principal Investigator Project 4: Quantifying Injury Severity to Assess the Risk for Post-Traumatic Osteoarthritis

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: Co-Investigator

Neil A. Segal (PI) 02/01/07–08/31/08

University of Iowa OVPR Biological Sciences Funding Program

Articular Contact—Identifying Patients At Risk For Painful Knee Osteoarthritis

The primary goal of the proposed research is to determine whether symptomatic knee OA development by 30 months is predicted by biomechanical factors in the local knee joint environment exceeding a threshold of contact pressure or shear stress at baseline. Incorporation of biomechanical modeling of knee joint stress

(using discrete element analysis) based on baseline data is a novel aspect of this study bridging the gap between associative and physical models of knee OA by strengthening the ability of an epidemiological model to test whether risk factors identified at baseline may act through increased articular surface loading.

Role: Co-Investigator

J. Lawrence Marsh (PI)

01/01/07–12/31/08

World Arthrosis Organization

Quantifying Intra-articular Fracture Severity as a Risk Factor for Post-traumatic Osteoarthritis

The goals of this research are to establish the utility of two new approaches to objectively measure fracture severity in the routine clinical care of displaced high-energy intra-articular fractures. Specific Aim 1 is to implement an expedited intra-articular fracture severity measurement tool using automated texture analysis of CT scans, and to demonstrate that this automated technique can be used clinically to predict the risk for post-traumatic OA. Aim 2 is to develop techniques to establish a continuously modifiable web-based database to rank order fracture severity by expert opinion, and to demonstrate that these techniques can be used clinically across multiple institutions.

Role: 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: Co-Principal Investigator

5 P50 AR048939 Joseph A. Buckwalter (PI)

09/16/02–08/31/08 NC Extension

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) supports and coordinates 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.

Role: Investigator Project 1: Mechanical Determinants of Post-Traumatic OA and Biomechanics Core

Completed Research Support

04-A43 Donald D. Anderson (PI)

10/01/04–03/31/07

AO Research Fund

Development of Fracture Energy for Objective Clinical Scoring of Injury Severity in Highly Comminuted Fractures

The major goal of this project was to extend CT-derived injury severity analyses as currently implemented to include a soft tissue injury metric, based on fracture fragment displacement. We enhanced our existing techniques to take into account the paths that fracture fragments traverse through surrounding tissues during the fracture event. This fundamentally new information is important because it reflects additional injury severity beyond bony fracture *per se*, linking bone fracture with damage to the surrounding soft tissues and vasculature.

Role: Principal Investigator

Donald D. Anderson (PI)

04/01/05–06/30/06

Orthopaedic Trauma Association

Objective Assessment of Injury Severity in Complex Intra-Articular Fractures

Fracture treatment begins with an assessment of injury severity. Important decisions hinge on this judgment. Traditional classification systems fail in highly comminuted fractures, hindering improvements in patient care. New CT-based measures exploit principles of fracture mechanics to objectively quantify injury severity. This research project aimed to further refine and validate these measures to enable utilization in clinical research and patient care by: (1) extending these analysis techniques to incorporate bone density; (2) comparing the new measures to clinical assessments of injury severity in a prospective series of tibial pilon fractures; and (3) incorporating credible CT-based assessment of soft tissue injury.

Role: Principal Investigator