Marnie Marie Saunders

Associate Dean, The Graduate School
Associate Professor, Department of Biomedical Engineering

WORK ADDRESS:

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EDUCATIONAL AND RESEARCH INTERESTS/ EXPERIENCE:

* Education
  - Novel educational experiences for orthopaedic and dental residents
  - Educating engineers and biologists to conduct multidisciplinary orthopaedic research
  - Developing opportunities for K-12 students to engage them in math and science
  - Graduate education:
    - Accelerated degrees
    - Professional Science MS degrees
  - Microcredentialing and badges in post-baccalaureate education
* Orthopaedic and Dental Biomechanics
  - Evaluation of fixation techniques and surgical procedures
  - Orthopaedic and dental implant design
  - Direct skeletal attachment
  - Finite element analysis in prosthesis design
  - Small-scale mechanical testing systems and techniques
* Orthopaedic and Craniofacial Mechanobiology
  - Macroscopic remodeling for implant evaluation and selection
  - Bone/implant interface issues at the cellular level
  - Implant-induced osteolysis and mechanical necrosis
  - Breast cancer-induced bone metastasis
  - Bone cell-cell communication
  - Osteoporosis
  - Implant stabilization via osteoclastic regulation
  - Osteoblast stimulation effects on osteoclast activity
  - *In vitro* bone cell mechanotransduction modeling
  - Distraction osteogenesis
  - Bone remodeling, microgravity to microdamage
  - Micro total analysis systems and bone
  - Biomimicry
  - Bioreactor development
  - Microfluidic systems in metabolic bone disease
  - Regenerative Medicine
  - Orthopaedic and dental applications
  - Determination of osteogenic stimulatory factors (mechanical)

APPOINTMENTS:

8/17- The Graduate School, The University of Akron, Akron, OH 44325-0302
Position: Associate Dean
Primary responsibilities include: assisting the Dean with adminstrative functions of the Graduate School; colllaborating on strategic initiatives related to graduate assistantship allocation; conducting oversight of graduate students and graduate student events; assisting the Dean with programmatic issues and policies; attending CCGS meetings and retreats; working with faculty and university representatives to address policy inconsistencies and equity issues; and, working to improve and streamline the admissions to graduation process.

Working to enhance graduate student recruitment and retention efforts. Working to develop and promote activites that support graduate students including: undergraduate information sessions; new GA orientation; dissertation boot camps; professional development programming; graduate showcases; and, graduate blog.

9/18- Program Review, The University of Akron, Akron, OH 44325-0201
Position: Co-Chair
Charged with implementing a 7-year cycle of program review for all colleges on the UA campus. Committee responsibilities inlcude: timeline determination; self-study document template creation; evaluation matrix; program review; and, document preparation.

8/10- Department of Biomedical Engineering, University of Akron, Akron, OH 44325-0302
Position: Primary Faculty Appointment, Associate Professor
Joint Faculty Appointment, Department of Mechanical Engineering, 8/18-8/21
Running a research program investigating and quantifying the effects of mechanical loading on bone (mechanotransduction) utilizing a variety of novel *in vitro*, *in vivo* and *ex vivo* models. Of particular interest is the development of biomimetic, micro total analysis platforms (lab-on-a-chip) for the investigation of bone mechanotransduction mechanisms, specifically bone remodeling in response to mechanical overload and underload. Also conduct basic mechanical testing and develop testing platforms and fixturing for orthopaedic applications.

9/1/10- University of Akron, Akron, OH 44325-0302
Position: Graduate Faculty Membership (Category II)

9/06-8/10 Center for Biomedical Engineering, University of Kentucky, Lexington, KY 40506-0070
Position: Primary Faculty Appointment, Assistant Professor, Tenure Track
Established a research program into the effects of mechanical loading on bone (mechanotransduction) utilizing a variety of novel *in vitro*, *in vivo* and *ex vivo* models. Of particular interest was the development of whole bone organ culture models and the quantification of mechanically-induced osteogenesis with histological, molecular, immunohistochemical and mechanical techniques. Applications included bone turnover, metabolic bone disease regulation, bone/implant interfacing and bioreactor development.

10/06-8/10 University of Kentucky, Lexington, KY 40506
Position: Graduate Faculty Associate Membership

1/01-8/06 Division of Musculoskeletal Sciences, The Department of Orthopaedics and Rehabilitation, Pennsylvania State University College of Medicine, The Milton S. Hershey Medical Center, Hershey, PA 17033-0850.
Position: Primary Faculty Appointment, Assistant Professor, Tenure Track (effective 7/02)

2/02-8/06 Pennsylvania State University COM, The Milton S. Hershey Med Center, Hershey, PA 17033.
Position: Graduate Faculty Appointment

2/02-8/06 Pennsylvania State University COM, The Milton S. Hershey Med Center, Hershey, PA 17033.
Position: Secondary Faculty Appointment - Cell and Molecular Biology Program

2/03-8/06 Department of Bioengineering, Pennsylvania State University, State College, PA.
Position: Secondary Faculty Appointment

11/02-8/06 Biomechanics Core Facility, Center for Biomedical Devices and Functional Tissue Engineering, Pennsylvania State University College of Medicine, The Milton S. Hershey Medical Center, Hershey, PA 17033.
Position: Advisory Council; Director Biomechanics Core

1/99-12/00 Division of Musculoskeletal Sciences (formerly the Musculoskeletal Research Laboratory),
The Department of Orthopaedics and Rehabilitation, Pennsylvania State University College of Medicine, The Milton S. Hershey Medical Center, Hershey, PA, 17033.
Position: Post-doctoral Fellow
Conducted research into the mechanotransduction mechanisms of bone remodeling and osteoporosis at the cellular level. Responsibilities included fluid flowing osteoblastic cells in parallel plate flow chambers with the measurement of cytosolic calcium, prostaglandin E_2 and I_2 and assessment of gap junctional intercellular communication.

Conducted research into the role of gap junctions in an *in vitro* breast carcinoma model metastatic to bone. Responsibilities included measurement of homospecific and heterospecific gap junction coupling using fluorescent dye techniques and the development of flow cytometry protocols for gap junction assessment.

Post-doctoral Advisors:	Henry J. Donahue, Ph.D.	University of California
	Christopher R. Jacobs, Ph.D. (deceased)	Stanford

1/91-12/98 Musculoskeletal Biomechanics Laboratory, The University of Akron, Akron, OH, 44325.
Position: Research Assistant
Conducted mechanical testing of hard and soft skeletal tissues, orthopaedic implants and clinical fixation procedures. Responsibilities included: test fixture design; specimen preparation; mechanical testing; data analysis; and, presentation of results.

1/93-12/98 Orthopaedics Research Laboratory, Akron General Medical Center, Akron, OH, 44307.
Position: Research Assistant
Conducted mechanical testing in orthopaedic biomechanics related to orthopaedic resident research projects. Responsibilities included: grant writing (in-house foundation); test fixture design; mechanical testing; data analysis; and, preparation of posters/presentations for national conferences.

2/97-12/98 Cross Medical Products, Inc. (Interpore, Inc.) Dublin, OH
Position: Contract work through The University of Akron
Conducted fatigue testing of orthopaedic spinal constructs. Construct designs included stainless steel and titanium unilateral constructs utilizing various locking and set screw techniques. Charged with mechanical testing, data analysis and report preparation for FDA approval. (6 FDA reports submitted)

5/96-9/96 The Falor Center for Vascular Research, Akron City Hospital, Akron, OH, 44307.
Position: Summer Research Fellow
Assisted with research pertaining to wound healing models in the diabetic and normal pig. Primary responsibilities included assisting with surgeries, pre- and post-surgical monitoring and wound analysis using image analysis techniques. Additional research focused on femoral and carotid graft preparation and surgical implantation in canine models.

1/92-8/94 Acromed, Cleveland, OH
Position: Contract work through The University of Akron
Conducted mechanical testing of orthopaedic implants for FDA approval. Charged with mechanical testing of spine constructs following ASTM standards with report preparation. (2 FDA reports submitted)

EDUCATION:

12/00 Post-Doctoral Fellow, Musculoskeletal Research Laboratory, Department of Orthopaedics and Rehabilitation, The Pennsylvania State University College of Medicine, Hershey, PA, 17033.
Fields: Bone Biology Cell-Cell Communication Cell Mechanotransduction
Breast Cancer-Induced Metastasis Orthopaedic Biomechanics

12/98 PhD Engineering, Department of Biomedical Engineering,
The University of Akron, Akron, OH, 44325. Full Assistantship
Graduate Advisor: Glen O Njus, PhD The University of Iowa (deceased) Full Assistantship
Dissertation: *The Feasibility of Lower Limb Direct Skeletal Attachment: A Pilot Study*
Goal was to design, fabricate, and mechanically and clinically evaluate a press-fit direct skeletal attachment (DSA) device designed for directly attaching an artificial limb to the long bone of a residual limb. The implant was designed using adaptive bone remodeling theory and finite element analysis and evaluated through mechanical testing and clinical trials.

Teaching Experience during Graduate School:
8/97-12/98 Department of Mechanical Engineering, The University of Akron, Akron, OH, 44325.
4100:101 Tools for Engineering (4 Sections including Honors Engineering section)
Topics Covered: Personal Computers; DOS; Windows95; Word Processing; Spreadsheets; Computer-Aided Drafting; Math Calculating Packages; Mechanical Drawing; and, an Introduction to the Engineering Program and Curriculum. Charged with all aspects of classroom and lab work.

8/94 MS Engineering, Departments of Biomedical and Mechanical Engineering, The University of Akron, Akron, OH, 44325.
Graduate Advisor: Glen O Njus, PhD The University of Iowa (deceased) Full Assistantship
Thesis: *The Experimental and Theoretical Characterization of the Solid Ankle Cushioned Heel Foot*
Developed a multidisciplinary approach to prosthetic foot design, incorporating amputee motion analysis, experimental mechanical testing and finite element analysis

Graduate Courses: Advanced Analysis of Mechanical Components; Advanced Engineering Mathematics; Anatomy; Biocomputing; Biomaterials; Biometry; CAD/CAM; Continuum Mechanics; Finite Element Analysis I; Finite Element for Biomechanics; Fatigue; Fracture Mechanics; Hard Tissue Mechanics; Instrumentation; Kinematics of the Body; Muscle Mechanics; Physiology; Rehabilitation Engineering; Robotics; and, Soft Tissue Mechanics

12/91 BS (Honors) Mechanical Engineering, The University of Akron, Akron, OH
Minor: English **Co-op Semester:** British Petroleum
Senior Project: SAE Cargo Aircraft Design Competition, 5th Place/Nationally
Honors Project: *The Effects of Autoclaving on the Biomechanics of Bone Grafts*
Academic Honors: • Dean's List (5 years) • University Scholar • Phi Eta Sigma Honor Society • Alpha Lambda Delta Honor Society • Golden Key National Honor Society

INTELLECTUAL PROPERTY/DISCLOSURES:

- In vitro bone remodeling platform
  - Disclosed/ provisional patent status 7/2017 (62/527,241) (UA 1151 PRV)
  - Patent application filed 4/2018 (UOA.P.1151) – Lab-on-a-chip (LOC) for biomimetic bone remodeling analysis
- Point-of-care bone diagnostics
  (Disclosed/ provisonal patent status 11/2013)
- The development of a novel anchoring system for use in ACL reconstruction
  (Disclosed/provisional patent status/2003)
- The development of a cost-effective small-scale loading machine for biomechanical testing
  (Disclosed at PSU, 7/04 Disclosure # 2004-2961)

GRANTS (OVER $8.7 MILLION TO DATE AS PI AND CO-PI):

CURRENT:

NSF (Unsolicited) – *Quantification of bone's load-induced multicellular interactions with a lab-on-a-chip platform*

The key objective of this proposal is to utilize a self-contained LOC platform to quantify functional bone remodeling as a function of mechanical loading.

Awarded 9/01/17 $ 329,383.00 Principal Investigator 2017-2020
Supplemental REU Awarded 2/18 $16,632.00

8/6-8/10/2018 – Biomimicry Summer Camp

Utilized a summer camp format centered on biomimicry to develop a learning community with 6, 6th graders. Activities included building a solar powered car; robot bugs; stained glass art on acrylic; and, a variety of smaller group games and challenges. Students will be invited to return for additional camps and will be followed to determine if the community helps the students maintain their interest in STEM.
Graduate Student: Shari Truesdell
Undergraduate Students: Liam Omer; Sean Sullivan; Gunther Mandt

COMPLETED:

Major Grant Awards as PI

NIH (R15) – *A novel, in vitro platform for correlating and quantifying mechanically-induced bone cell microdamage effects*
PI: Marnie Saunders, The University of Akron
Co-I: Palaniappan Sethu, University of Alabama

This research was aimed at understanding the mechanisms and pathways by which bone remodels in response to mechanical damage. Specifically, this research investigated the role the osteocyte bone cells play in sensing mechanical damage and locally transmitting this signal to bring about bone resorption/formation. A pure uniaxial microloading platform was designed and developed to subject osteocytes to pure uniaxial load seeded on stepped PDMS profiles to correlate load and cellular response. Understanding the mechanisms by which bone remodels enables exploitation of this knowledge to develop novel osteoporosis and osteonecrosis treatments; improve fracture healing and fixation of orthopaedic and craniofacial implants; develop bioreactors to aid in functional tissue engineering of bone substitutes; and, develop new laboratory models and 'lab-on-a-chip' sensors in metabolic bone disease detection and treatment efficacy.

Funded by the National Institutes of Health (NIDCR) Principal Investigator 2012-2017
$ 462,311.00
Granted a no-cost extension (through 3/2017)

NSF Career Award - *A biomimetic, micro total analysis system platform of bone remodeling: elucidating the role of cellular communication*

The key objective of this project was to develop an in vitro biomimetic mechanotransduction model incorporating osteocytes, osteoblasts and osteoclasts to investigate the role of cellular communication in bone remodeling. The lab-on-a-chip platform approach eliminates temporal and spatial limitations while enabling the quantification of functional bone cell activity.

Funded by the National Science Foundation Principal Investigator 2010-2016
$ 450,015.00
Granted a no-cost extension (through 9/2016)

EPSCoR Award: *Engineered platforms for exploring cellular and molecular signaling processes*

PI: Andrea Gobin, University of Louisville
Co-PI: Marnie Saunders, University of Kentucky

The key objective was to a develop a nationally recognized center in which we develop new technology to further elucidate cellular and molecular signaling processes with real-time spatial and temporal resolution. These new tools will aid in enhancing knowledge in biological sciences, thus facilitate better understanding of disease processes and promote innovation in development of tools to improve the quality of life. #0814194

Funded by the National Science Foundation
$1,100,000.00 (UK Portion; PI) 2008-2013
$6,515,984.00 (Total, Original Award; Co-PI)

Research Scholars Program (RSP) Funding:

Katelyn Gurley (2010). *Mechanical characterization of PDMS as a function of thickness and mixture ratio,*
$ 5,000.00 Principal Investigator 2009-2010

Osteoblast stimulation effects on osteoclast activity

Grant was a Career Development Award through NIH to investigate the role of substrate, cell-cell networking and mechanical stimulation (fluid flow) on osteoblastic activity and the effect of the stimulated soluble factors on functional osteoclastic activity.

Funded by NIH (Aging) 1 K25 AG022464 Principal Investigator 2003-2009
$ 450,772.00

Development of a small-scale loading system enabling organ culture mechanotransduction and functional tissue engineering research

The key objective of this project was to expand the small scale loading system to *ex vivo* (organ culture) modeling of the rat long bone.

Funded by LSC Greenhouse of Central Pennsylvania Principal Investigator 2004-2005
$ 80,000.00

Quantification of differential osteoblastic activity as a function of substrate and deformation utilizing a novel in situ loading system

Grant was designed to study the effect of substrate deformation on osteoblastic activity. Substrate deformation was applied via a novel bending system developed by the PI to control for 3-pt and 4-pt bending, contact placement and loading magnitude and frequency. Finite element analysis and atomic force microscopy were used to correlate experimental results with numerical modeling of strain distributions.

Funded by The Whitaker Foundation Principal Investigator 2002-2005
$ 238,856.00

Development and validation of a novel in vitro micromechanical testing system for bone cell loading

Funded by The Pennsylvania State University College of Medicine, Dean's Feasibility Award
$ 30,000.00 Principal Investigator 2001

Minor Grant Awards as PI and Collaborative Awards

UA (FRC) Faculty Research Fellowship – *Osteoblast/osteoclast co-culture in a LOC bone remodeling platform* 2017
$ 10,000.00 PI: Marnie Saunders

Biomimicry Center, *Soluble effects of microgravity-exposed osteocytes on osteoclastic resorption* 2015
$ 10,000.00 PI: Marnie Saunders, The University of Akron

NSF I-Sites - *Osteoporosis flowthrough analysis* 2014-2015
$ 2,500.00 PI: Marnie Saunders

Firestone Research Initiative Funding (FRIF) – *Development of an osteoporosis screening kit* 2013-2014
$ 10,000.00 PI: Marnie Saunders
This project is to establish proof of concept of an osteoporosis screening kit using microsystems technologies.

Summer Research Fellowship Program: *Mechanical testing evaluations in a pelvic adhesion swine model*
Adhesions are a common complication of surgery. Adhesions are bands of scar tissue that bind together tissues that normally should remain separate. The collaboration will utilize rigorous mechanical testing and advanced analysis techniques to evaluate and validate a porcine model.
Funded by SUMMA PI: Brandon Fenton, SUMMA Medical System
$ 1,800.00 Co-Investigator 2011

Summer Research Fellowship Program: *Perfusion systems for eye organ culture pressure measurements*
Funded by SUMMA PI: Deepak Edward, SUMMA Medical System
$ 1,800.00 Co-Investigator 2011

Development of a reversible vas deferens occlusion device
Funded by The Department of Surgery Co-Investigator 2004-2005
$ 10,000.00
Renewal awarded by The Department of Surgery Co-Investigator 2005-2008
$ 10,000.00

MRI and micro-CT evaluation of endochondral healing after fracture in the rat femur
$ 15,000.00 Co-Investigator 2005-2008

Three-dimensional modeling software for surgical planning, research and education in orthopaedics
Funded by The Department of Orthopaedics and Rehabilitation (Software purchase)
$ 24,800.00 Principal Investigator 2004-2005

Comparison of the biomechanical stability of antegrade versus retrograde intramedullary nail fixation for subtrochanteric femur fractures in a synthetic femur model.
Funded by a gift from Stryker
$ 60,000.00 Co-Investigator 2005

Diaphyseal femur fracture after proximal and distal shaft fixation
Funded by the Department of Orthopaedics and Rehabilitation, Penn State University COM
$ 8,800.00 Co-Investigator 2002

A biomechanical and clinical assessment of femoral bone strength at graft donor sites (Author)
Funded by the Department of Orthopaedics and Rehabilitation, Penn State University COM
$ 5,000.00 Co-Investigator 2002

Biomechanical analysis of in situ single versus double screw fixation in a non-reduced slipped capital femoral epiphysis (SCFE) model
Funded by the Department of Orthopaedics and Rehabilitation, Penn State University COM
$ 4,800.00 Co-Investigator 2002

The effect of COX-2 specific inhibitors on fracture healing in the rat femur
Funded by Arthritis Foundation
$ 5,000.00 Co-Investigator 2002

The effects of peritendonous or intratendonous corticosteroid injections on the biomechanical properties of rabbit achilles tendons
Funded by the Department of Orthopaedics and Rehabilitation, Penn State University COM
$ 12,000.00 Co-Investigator 2001

Effect of trephine size on bone integrity in ulnohumeral arthroplasty procedures (Author)
Funded by the Department of Orthopaedics and Rehabilitation, Penn State University COM
$ 1,500.00 Author/Co-Investigator 2001

A press-fit approach to lower limb Direct Skeletal Attachment: A pilot study

Funded by Akron General Medical Center
$ 2,500.00 Principal Investigator 1998
Supplemental Grant Support
Funded by the Institute for Biomedical Engineering
$ 5,000.00 Principal Investigator 1998
Funded by Akron General Medical Center
$ 5,000.00 Principal Investigator 1997

Obtaining permanent implant/skin and implant/bone interfaces through a sustained negative electric charge on titanium and carbon implant surfaces

Funded by Akron General Medical Center
$ 5,000.00 Principal Investigator 1997

The experimental and theoretical characterization of the Solid Ankle Cushioned Heel (SACH) foot

Funded by Akron General Medical Center
$ 2,500.00 Principal Investigator 1994

EDUCATION/PROGRAM DEVELOPMENT AWARD:

Development of 3D modeling instructional videos for student learning and engagement, new course development and on-line courses

Led undergraduates in the creation of SolidWorks videos using Panopto. Thirty chapters in the Reyes 2017 text were demoed. A manual, Companion Guide to SolidWorks Instructional Videos 2017 was also created.
Funded by EX[L] Center/Faculty-Driven Initiatives, The University of Akron
$ 6,750.00 Principal Investigator 2017

Development of a post-baccalaureate credit certificate program in academic medicine: An innovative approach to orthopaedic resident education

The primary goal of this program was to provide residents interested in academic medicine with a formal, structured program that would prepare them to pursue an academic appointment upon graduation. The 15 credit hour program combined hands-on research training with formal coursework in clinical and basic science research, workshops in grant writing and leadership development, and formal mentoring from clinical and basic science faculty throughout the six year residency program. Candidates were required to complete 12 hours of coursework at the 500 level and successfully defend a research project for the additional 3 credit hours.
Funded by Orthopaedic Research and Education Foundation (OREF)
$ 25,000.00 Creator/Principal Investigator 2005

AWARDS AND HONORS:

- Participant in the MAC Academic Leadership Development Program 2018-2019
- Recipient of an unsolicited NSF award (PI) (EBMS) 2017
- Invited Speaker, NSF Career Award Panel, NSF Organizer, BMES Annual Mtg, Tampa FL 2015
- Recipient of the Faculty Mentor of the Year Award, The University of Akron 2015
- Featured in International Innovation (1 of 25 North American Research Labs) 2014
- I-Corps Sites (NSF) Participant (1 of 13 faculty at UA) 2013
- National Institutes of Health AREA (R15) Award (PI) 2012-2015
  - National Institute of Dental and Craniofacial Research (NIDCR)
- National Science Foundation Career Award (PI) (CBET) 2010-2015
- National Science Foundation EPSCOR Award (Co-PI) 2008-2013
- 2nd Place Award – Basic Science Category, Pennsylvania Annual Medical Society Conference 2007
  - *MRI and CT evaluation of endochondral healing after fracture in the rat femur* (Co-Investigator)
- Plenary Poster Award, American Society for Bone and Mineral Research 2006
- Outstanding Sponsor/Mentor Award
  - Senior Class Project, ME 417 Penn State University 2005
  - *A torsional unit for small-scale biomechanical testing*
- Basic Science, National Research Awards
  - *Osteocytes communicate fluid flow-mediated effects to osteoblasts altering their phenotype*

- Young Investigator Research Award (Co-Investigator) 2004
- ASBMR (American Society for Bone and Mineral Research)

- Hinkle Society Junior Faculty Award 2004
  - "This award is bestowed on one young investigator each year who is considered a 'rising star' and who has great potential for continued success in research. It is the most prestigious award given to a junior faculty member at the Pennsylvania State University College of Medicine" (voted upon by tenured faculty)
  - Presentation: *A role for engineering in orthopaedic research*
- National Institutes of Health Mentored Quantitative Research Career Development Award (PI) 2003-2009
  - National Institute on Aging (NIA)
  - *Osteoblast stimulation effects on osteoclast activity*
- Whitaker Foundation Research Award (PI) 2002-2005
- Resident Research Awards (Co-Investigator)
  - *Effect of COX-2 specific inhibition on fracture healing in the rat femur*
    - Ruth Jackson Research Award
    - American Academy of Orthopaedic Surgeons 2003
  - *A comparison of wear debris induced osteolysis along a cemented and cementless interface: an animal model in the rabbit*
    - Eastern Orthopaedic Association 2002
  - *Augmentation of sliding hip screw fixation with polymethylmethacrylate: A biomechanical study in a cadaveric model*
    - American Orthopaedic Association 1992
- Honorarium: *Towards engineering the human heart.* Web Page Article for ASME 1999
- Travel Grant, 3rd Annual Indiana Conference, Indianapolis, IN, May 13-16 1998
- Dept of Biomedical Engineering, The University of Akron, *IBER Poster Competition* 1998,1993-94
- Dept of Biomedical Engineering, The University of Akron, *IBER Talk* 1997 & 1992
- Biomedical Engineering Society Outstanding Member, The University of Akron Chapter 1995 & 1994

PROFESSIONAL AFFILIATIONS (since 1994, not all active):

Biomedical Engineering Society (Active)
Orthopaedic Research Society
American Society for Bone and Mineral Research
European Calcified Tissue Society
Biomechanics, Bioengineering and Biotransport
American Society of Biomechanics
American Society of Mechanical Engineering
Central PA Life Sciences Community

SERVICE:

REVIEWER:

GRANTS/FELLOWSHIPS:

Netherlands Organisation for Scientific Research (NOW/ZonMw) TOP grants	2018
NIH/CSR Orthopedics, Musculoskeletal and Oral Sciences SEP	2016-2018
NIH MOSS U90 Special Emphasis Panel	2015-2016
Solicited External Tenure Letters (UColorado, UNewMexico, UCLA, Louisville)	2014-present
AAAS Grant Reviewer	2013-2016
CT Review Panel (Invited Panelist)	2013-2015
NSF Grant Review Panel (Engineering Directorate)	2014-present
National Institutes of Health Study Section (NIDCR SBIR)	2012
NSF Grant Review Panel (Education Directorate)	2008-2013
Medical Research Council (UK) Ad hoc	2007-2009

JOURNALS: (Review ~2-3 per year)

Journal of Biomechanical Engineering, Biochemistry and Cell Biology, Journal of Biomechanics, Journal of Applied Physiology, Journal of Dental Research, Journal of Investigative Surgery, PLOS One, Journal of Biomedical Materials Research: Part A, Computer Methods in Biomechanics and Biomedical Engineering, Frontiers in Bioengineering and Biotechnology

NATIONAL SOCIETY SERVICE:

Education Committee Member, Biomedical Engineering Society 2016-2019

CONFERENCE ABSTRACTS/POSTER JUDGING:

SB^3C Summer Biomechanics Conference	2015-present
REU Abstract Reviewer	
Annual BMES Meeting, Austin, TX	2010
Invited Judge, New Investigator Research Awards (NIRAs),	
Orthopaedic Research Society 52nd Annual Meeting	2006
5TH Combined Meeting of the Orthopaedic Research Societies	2004

DEPARTMENT SERVICE:

(OH)	Chair Evaluation Committee	2016-2017
	Tenure Committee Chair	
	Rouzbeh Amini (Replaced with administrative promotion)	2014-2017
	Hossein Tavana (Tenured 2016)	2014-2016
	Merit Raise Committee	2013-2014
	Faculty Search Committees	
	Biomechanics, Assistant Professor	12/2012-5/2013
	Instrumentation, Signals and Imaging Track, Assistant Professor	12/2012-5/2013
	Instrumentation, Signals and Imaging Track, Assistant Professor	11/2011-4/2012
(KY)	Curriculum Committee	2007-2010
	Admissions Committee	2006-2010
	Faculty Search Committees	
	Center for Biomedical Engineering	2007-2010
	College of Dentistry	2007-2010
	Open House Coordinator (Yearly event in conjunction with EPSCoR award)	2009-2010
(PA)	Resident Candidate Evaluation Committee Pre-Reviewer (Orthopaedics)	2001-2002
	Resident Candidate Interviewer (Orthopaedics)	2001-2006
	Advisory Council, Applied Biotechnology Center	2002-2006
	Organizer, Orthopaedic Basic Science Course (Resident Education)	2003-2006
	Academic Committee Member: Post-Baccalaureate Credit Certificate Program	
	In Academic Medicine	2004-2009
	Faculty Search Committees	
	Faculty, Molecular Biology	2003
	Faculty, Bioengineering	2003
	Chair, Tissue Engineering	2004

UNIVERSITY SERVICE:

(OH)	University of Akron Research Foundation, Board Member	2019-
	Co-Chair Formative Program Review	2018-
	SAVE Team	2018-
	Program Review Executive/Advisory Committee (Campus-wide APR)	2017-2018
	Program Review Committee (Campus-wide APR)	2017-2018
	Graduate Council Member	2017-
	Staff Search Committee/ Machinist Position	2017
	Pre-Medicine Oversight Committee	2017-2019
	Firestone Grant Reviewer	2017
	BS/MD Interviewer (2/yr)	2016-2017
	Search Committee Member	
	Chair, Department of Biology	2015-2016
	Dean, College of Engineering	2015-2016
	Coordinator, Upward Bound Biomedical Engineering Activities	2015
	Faculty Senate	2013-2016
	Accessibility Committee	2014-2017
	Outstanding Staff Award Selection Committee, College of Engineering	2013
	Biomimicry Center, Development Committee, The University of Akron	2012-2013
	ABIA Medical Device Development Center (Committee – UA representative)	2012-2014
	Engineering Educators Workshop (Coordinator: Edward Evans)	2012, 2015

	Summer Engineering Workshops (Coordinator: Heidi Cressman)	2011-2014
	Project Lead the Way	2011
	Upward Bound	2011-2013
	STEM Girls in Science (Kids Career Day)	2011-2013
	Biomedical Academy Development, Woodridge High School	2010-present
	Scholarship Day (as needed)	2010-present
(KY)	Organizing Committee: Craniofacial Regenerative Applications Meeting	2007-2008
(PA)	Medical Student Candidate Evaluation Committee	2001-2006
	Institutional Review Board – Human Subjects Protection Board (C)	2003-2004 (18 months)

COMMUNITY SERVICE:

(OH)	Women in Science HS Career Day (Panelist YSU)	2015-2017
	Westbrook Park United Methodist Church, Missions Committee	2014-present
	Project Lead the Way (Hoover middle school)	2013-2015
	Orthopaedic Research Committee Board Member/Summa	2013-2016
	Westbrook Park United Methodist Church, Scholarship Committee	2011-present
	Woodridge High School, Biomedical Engineering Academy, Program Development	2011-present
(KY)	*Engineering Day*, University of Kentucky	2006-2010
	Promoting Science, Technology, Engineering and Mathematics (STEM) among Kentucky Girls (Member)	2008-2010
	Kentucky State Science Fair Judge, Eastern Kentucky University, 3/29	2008-2010
	Rosa Parks Elementary School Science Fair Judge	2009-2010
	Robinsons Scholars Program	2008-2010
	Pulaski County Outreach	2008-2009
	Creator: **B**iomedical **E**ngineering **B**rought to **U**nderserved **C**hildren in **K**entucky (**BEBUCK**)	
	Goal: To yearly introduce approximately 120 gifted 4th and 5th graders in Pulaski County to biomedical engineering with hands-on biomechanical testing demonstrations and discussions	
	Pulaski County, Engineering Exposition Judge	2008-2010
	Girls Enjoy Math and Science (GEMS)	2008-2010
	UK EPSCoR Outreach and Diversity Activities	
	Organizer: CBME open house for 120 5th graders 11/05	2008
(PA)	Community Partners Program/Harrisburg High School Science Program	
	Bioengineering Days hosted at Penn State College of Medicine	2004-2006
	SEPA: Science Education Partnership Award	2006

EDUCATIONAL RESPONSIBILITIES:

The University of Akron (OH)

BME 4800:111 Freshman Design

Course Objectives: The objective of this lab is to introduce freshman students to problem-solving and teamwork through biomedically-related hands-on projects. The design process is taught in addition to organizational methods and creative thinking. Group projects introduce students to hand tools and basic power tools.

BME 4800:365 Mechanics of Biological Tissues

Course Objectives: The objective of this course is to familiarize the undergraduate biomedical engineering student with the mechanical behavior of tissues of the musculoskeletal system, the basic principles of mechanical testing and the application of these principles in conducting biomechanical studies.

BME 4800:601 Introduction to Continuum Biomechanics

Course Objectives: To introduce graduate students to the theory of continuum mechanics and finite element applications and to set the stage for all future graduate mechanics courses. The specific objectives of this course will be to: Establish governing fundamental laws defining behavior of solids; Present theory in a unified manner so as to demonstrate commonality between areas of 'fluid' and 'solid' mechanics; Establish clear fundamental basis for such areas so that future assumptions, assertions and approximations in purely application oriented courses are clarified; Specialize general applications to solid mechanics so as to clarify special aspects of such areas; Establish basis for all future graduate level courses in solid mechanics.

BME 4800:601 Introduction to Bone Biomechanics and Mechanobiology

Course Objectives: This undergraduate/ graduate course will introduce the student to mechanical aspects of bone through discussion of two main fields: Bone Biomechanics and Bone Mechanobiology. Within the field of Bone Biomechanics, emphasis will be placed upon mechanical testing of bones, mechanical testing systems and applications to orthopaedic biomechanics. Within the field of Bone Mechanobiology emphasis will be placed upon bone and bone cell biology, mechanical stimulation models and systems and applications to regenerative medicine. Efforts will be made to tie the two fields together to show the intricate and critical relationship between bone and mechanical loading at the cellular, tissue and organ levels.

BME 4800-101 Tools for Engineering (1/3 of course (lab)) 3 sections/semester

Course Objectives: To introduce undergraduate students to the basics of SolidWorks through hands-on, self-paced tutorials and guided instruction.

BME 4800-697 Engineering Careers in Academia

Course Objectives: This course, aimed at engineering graduate students focuses on academic aspects of the profession, specifically teaching. The semester long course project enables each student to begin to develop a course related to their interest. Students learn to develop/deliver lectures, homeworks, exams and syllabi in conjunction with ABET. Grant writing for the NIH and NSF is discussed as time and class size permit. (Course was developed prior to promotion to Associate Dean, will teach if opportunity arises)

(KY) BME 670 Biosolid Mechanics I (Full Course) 2008-2009

Course Objectives: To introduce graduate students to the theory of continuum mechanics and finite element applications and to set the stage for all future graduate mechanics courses.

BME 481G Bone Mechanotransduction 2006-2009

Course Objectives: Independent study will be a hands-on course in mechanotransduction research incorporating organ culture (*ex vivo*) modeling. The enrolled student will learn isolation of long bones for organ culture, organ culture maintenance, operation of a small-scale loading machine for organ culture distraction, quantification of mechanical distraction and analysis techniques including FTIR.

BME481G (Spring 2007)	Introduction to Mechanotransduction
BME481G (Fall 2007)	Organ Culture Perfusion Effects
BME781 (Spring 2008)	Organ Culture Viability Assessment with Histology

(PA) Orthopaedic Basic Science 1999-2006
Coordinator *Biomechanics and Biomaterials*

PARTICIPATION IN TEAM TAUGHT COURSES

BME 4800: Experimental Techniques in Biomechanics 3-4 mechanical testing topics 2010-2013
(Tension/Bending/Torsion/Creep Laboratories)

(KY) BME501 Foundations of Biomedical Engineering: Bone Mechanotransduction 2006-2010

BME530 Biomedical Instrumentation: Tissue Testing Laboratory 2007-2008

BME670 Biosolid Mechanics I – Finite Element Analysis - Applications (1/3 of course) 2007
Basic finite element method theory
COSMOS/Geostar finite element analysis software
SolidWorks 3D modeling software and CosmosWorks

LECTURE RESPONSIBILITIES

(OH)

BME 4800-601 Foundations of Biomedical Engineering 2012, 2018
Bone Mechanobiology
Mechanical Testing/ Solid Mechanics

PSPE 9821 Cell-Biomaterial Interactions 2012-2014, 2017
Introduction to Mechanotransduction (Bone Cells and Mechanical Loading)

BME 4800-485 Tissue Engineering
Bioreactor Design and Applications 2011-2014

BME 4800-400 Biomaterials

	Applications of Tissue Engineering to Orthopaedic and Craniofacial Research	2010-2012
(KY)		
OBI829	Oral Biology: Mechanics of Bone Manipulation	2007-2010
OBI650	Oral Biology for Postgraduate Dental Students I: Distraction Osteogenesis	2007-2010
OBI651	Oral Biology for Postgraduate Dental Students II: Distraction Osteogenesis (Case-based reading/research activity)	2008-2010
(PA)		
BioE 519	Artificial Devices, Bioengineering Orthopaedic Implants and Related Current Issues	2001-2006
PSIO 505	Cellular and Integrative Physiology II Osteoclast: Biology and Function	2002–2006
	Elements of Clinical Research Orthopaedic Research	2002-2006
KINES 578	Osteoblast: Biology and Function Osteoclast: Biology and Function Introduction to Cellular Mechanotransduction	2004-2006
BioE 201	Cells and Molecules Cells and Molecules: Applications to Orthopaedics	2005-2006

MEDICAL RESIDENT CURRICULUM DEVELOPMENT

(PA) Post-Baccalaureate Credit Certificate Program in Academic Medicine 2004-2009

Certificate Objectives: To formally train orthopaedic residents interested in pursuing an academic appointment upon residency completion. Residents were given formal training in grant and manuscript writing, basic science (cellular/molecular) techniques, clinical research methods and leadership development.

Biomechanics Practicum 2004-2009

Practicum Objectives: To introduce medical students and orthopaedic residents to basic biomechanics and biomechanical testing in a hands-on setting. Basics covered included basic mechanical theory, mechanical testing machine operation, specimen preparation, protocol and fixture development, hard and soft tissue testing, data collection, analysis and interpretation. Testing modes covered included compression/tension and *torsion* with emphasis on fracture and fatigue. To assist with OITE preparation, topics chosen coincided with key concepts routinely featured on the exams.

MENTOR AND ADVISORY RESEARCH RESPONSIBILITIES:

The University of Akron

GRADUATE STUDENT ADVISOR:

(OH)

Sharon Truesdell PhD Student 12/2015-present

The role of sphingosine 1 phosphate in bone cell mechanotransduction

National Science Foundation Graduate Research Fellowship Recipient 2018

Estee George PhD Student 9/2014-5/2019

Dissertation: Quantifying the roles of stimulated osteocytes and inflammation in bone remodeling

Travel Award, The Biomedical Engineering Society, Annual Meeting 2018

Graduate Excellence and Leadership Award, The University of Akron 2017

Verstraete Outstanding Graduate Student, The University of Akron 2016

Travel Award, The Biomedical Engineering Society, Annual Meeting 2016

Mariam Crow MS Student – Non-thesis 12/2018

The Glen O Njus Award 2017

Jonathan King MS Student 1/2013-12/2014, 8/2016

Correlating mechanical substrate deformation and osteocytic cellular response

Graduate student LIFE award, The University of Akron

Visar Berki, BS (JS Tan) MS Student 7/2012-8/2013
In vitro cadaveric biomechanical study on spinal deformity correction

Spencer York, BS MS Student 10/2011-10/2014
Quantification of the effects of microdamage on osteocytes
UASIS Outstanding Graduate Student Researcher Award, 2014
Dean's Summer Graduate Fellowship, 2013

Karan Shah, BS MS Student 12/2010-8/2012, ABD
Quantification of a porcine adhesion inhibition model using mechanical testing
Research completed, formal defense required
Force and Motion Foundation $500.00 Competitive Travel Award Recipient

CO-ADVISOR:

Bharath Koya, BS (J Elias) MS Student 10/2011-2013

GRADUATE STUDENT COMMITTEES:

(OH)	Putu Ustriyana	PhD Student	12/2017-
	Anup Pant (Amini)	PhD Student	9/2017-12/2018
	Vineet Thomas (Amini)	PhD Student	9/2017-12/2018
	Farai Gombedza (Parachuri)	PhD Student	2/2017-8/2017
	Antonio Cuppulo (Tavana)	MS Student	11/2016-12/2017
	Ramila Joshi (Tavana)	PhD Student	12/2016-12/2018
	Qing Yu (Landis)	PhD Student	9/2015-12/2016
	Wenchen Li (Liu)	PhD Student	5/2014-9/2017
	Abdullah Amin (Zhe)	MS Student	8/2014-12/2014
	Qing Wang (Newby)	PhD Student	5/2014-12/2017
	Christina Webber (Davis)	MS Student	8/2013-8/2014
	Evan Wujcik (Monty)	PhD Student	1/2012-8/2013
(KY)	Sundeep Ramineni, BS	PhD Candidate	10/2009-8/2010
	Amanda Clark, BS	PhD Candidate	4/2009-8/2010
	Cameron Jones, BS	PhD Candidate	3/2008-8/2010
	Nirmal Ravi, MS	PhD Candidate	10/2006-5/2009
	Joseph Petrey, DDS	DMD, MS Candidate	1/2007-8/2008
	Ju Hyeong Jeon, BS	PhD Candidate	2/2007-5/2008
	Randy Hilliard, BS	MS Candidate	6/2007-8/2007
	Michael Brown, BS	MS Candidate	6/2007-8/2007
(PA)	Elizabeth Eaton, BS	Master's Student	11/2005-5/2006
	Michael Jekir, BS	Master's Student	8/2003-8/2005
	Ryan Riddle, BS	PhD Candidate	11/2003-8/2006
	Jiyao Zou, BS	PhD Candidate	12/2002-8/2006

UNDERGRADUATE STUDENT ADVISOR:

(OH)	Christopher Van Vranken	Part-time researcher		9/2018-
	Catherine Seno	Part-time researcher		9/2017-
	Alexandria Magyar	Part-time researcher		8/2017-
	Gunther Mandt	Part-time researcher		5/2017-9/2018
	Drake Smalley	Part-time researcher		9/2016-12/2017
	Luke Schmitt	Part-time researcher		9/2016-5/2019
	UA Trajectory Award Winner 2018		$10000.00	
	Robby Thoerner	Part-time researcher		8/2015-8/2018
	Ohio Space Grant Consortium Recipient 2017		$3500.00	
	Dominic Conte	Part-time researcher		1/2015-5/2016
	Olivia Petrey	Part-time researcher		1/2015-5/2016
	Dr Mugler Honors Research Award		$1000.00	
	Ohio Space Grant Consortium Recipient 2015		$3500.00	
	Ohio Space Grant Consortium Recipient 2016		$3500.00	

	James Triner	Part-time researcher	10/2014-5/2015
	Erica Grutkowski	Part-time researcher	9/2014-5/2015
	AlRitia Gore	Part-time researcher	9/2014-5/2015
	Ohio Space Grant Consortium Recipient	$3000.00	
	Johnathon Long	Part-time researcher	10/2013-2/2014
	Ziad Shwaiki	Honors Students/Biology	8/2013-2/2014
	Craig Seisel	Volunteer	6/2013-8/2013
	Dustin Hayes	Part-time researcher	4/2013-5/2014
	Collin Haben	Part-time researcher	4/2013-8/2013
	Daniel Gerber	Part-time researcher	4/2013-12/2013
	Ohio Space Grant Consortium Recipient	$3000.00	
	Abel Pietros	Part-time researcher	4/2013-12/2013
	Ohio Space Grant Consortium Recipient	$3000.00	
	Ryan Manges	Part-time researcher	3/2012-12/2012
	Calia Battista	Part-time researcher	12/2011-12/2011
	Ohio Space Grant Consortium Recipient	$3000.00	
	Jeffrey McPherson	Part-time researcher	11/2011-4/2014
	Brandon Lab	Part-time researcher	8/2011-12/2012
	Joseph Drockton	Summer researcher	5/2011-9/2011
	Eric Payne	Summer researcher	6/2011-7/2011
	Jennifer Smith, MS	Summer researcher	5/2015-8/2015
(KY)	Katelyn Gurley	University of Kentucky	1/2010-8/2010
	John Martin	University of Kentucky	8/2009-5/2010
	Kristen Lough	University of Kentucky	6/2008-8/2008
	Rebecca Tarrant	Vanderbilt University	6/2007-8/2007, 6/2008-8/2009
(PA)	Renee Peterkin, BS	Penn State University	2/2006-6/2006
	Paul Sahd, BS	Elizabethtown College	5/2005-8/2005
	Gretchen Reed, BS	Penn State University	5/2005-8/2006
	John Magruder, BS	Hershey Medical Center	2/2006-8/2006
	Recipient of competitive work-study funding support		

MEDICAL STUDENT/RESIDENT RESEARCH ADVISOR:

(PA)	Jason Bergandi, MD	Resident	1/2000-6/2001	
	Christopher Bryce, MD	Resident	10/2004-8/2006	
	Christopher Donaldson, BS	Resident	7/2002-7/2003	
	Jon Eastman, BS	Medical Student	4/2003-5/2006	
	Mike Fernandez, MD	Resident	10/2004-8/2006	
	Terry Foust, BS	Medical Student	1/2001-9/2001	
	Jeffrey Hodrick, BS	Medical Student	7/2001-7/2002	
	Karen Huang, MD	Resident	7/2001-8/2006	(3 projects)
	Ronald Hugate, MD	Resident	1/2001-3/2002	
	Brian Hutchinson, BS	Medical Student	1/2000-5/2002	
	John Ingraham, BS	Medical Student	7/2002-7/2003	
	Justin Jacobson, BS	Medical Student	1/2000-7/2003	
	Abigail Lynn, BS	Medical Student	3/2003-7/2003	
	Trevor Magee, MD	Resident	12/2005-8/2006	
	Jason Pennypacker, BS	Medical Student	2/2002-12/2005	(2 projects)
	Todd Preston, MD	Resident	1/2006-8/2006	
	Ryan Riddle, BS	Graduate Student	4/2006-8/2006	
	Daniel Zanotti, MD	Resident	1/2000-12/2001	

HIGH SCHOOL STUDENT ADVISOR:

(OH)	Mariah Costa	St Vincent St Mary Student	9/2014-5/2015
	Best Medicine Award, 2015	Local Science Fair Award, 2015	
(KY)	Danielle Brittle	Jefferson County Schools	6/2010-7/2010
	Anderson Adams	Fayette County	9/2008-12/2008

Saleem Sleman Saeed	Fayette County	9/2007-12/2007
Lécé Webb	Fayette County	1/2007-6/2007

SPONSOR/MENTOR:

Senior Class Project, ME 417 Penn State University 9/2005-12/2005

Sponsored and mentored four senior mechanical engineering students in the design, development and fabrication of an external torsional unit to augment with an existing small-scale, linear loading machine.

(Outstanding Mentor Award)

A torsional unit for small-scale biomechanical testing

Burger, Rustin B; Kalantari, Baback; Nichols, Andrew D; Witman, Chris

CONTRACT WORK EXPERIENCE

Private Company Testing Contracts

Static and Dynamic, Nondestructive and Destructive Spine Construct Testing

Cross Medical Products, Inc.	Dublin, OH	1997-1998
Acromed	Cleveland, OH	1992-1994
Construct Designs:	Unilaterals (Ti and SS)	
	Raised Offsets (Ti and SS)	
	Bilaterals with and without cross braces (Ti and SS)	

Technical Reports for Submission of FDA Approval with 510k Status

1. Technical Report #05982 - *Fatigue Testing of Titanium Unilateral Constructs with Double Dovetail Sliders and Variable Locking Screws*
2. Technical Report #05981 - *Fatigue Testing of Titanium Unilateral Constructs with Double Dovetail Sliders and Double Dovetail Screws*
3. Technical Report #01981 - *Fatigue Testing of Titanium Unilateral Constructs with Double Dovetail Sliders and Screws*
4. Technical Report #11971 - *Fatigue Testing of Titanium Unilateral Constructs with Modified Hex Nuts*
5. Technical Report #9971 - *Fatigue Testing of Stainless Steel and Titanium Unilateral Constructs*
6. Technical Report #7971 - *Fatigue Testing of Stainless Steel Unilateral Constructs*
7. Technical Report #52A-994 - *Fatigue Testing of Stainless Steel and Titanium Unilateral Constructs*
8. Technical Report #53A-1094 - *Fatigue Testing of Stainless Steel and Titanium Bilateral Constructs*

PUBLICATIONS:

Book

1. **Saunders MM**. *Mechanical Testing for the Biomechanical Engineer: A Practical Guide.* Synthesis Digital Library of Engineering and Computer Science, Morgan and Claypool Publishing, 276 pgs, 2015.
   This textbook focuses on the practical aspects of mechanical testing and covers basic mechanics, measurement and measurement tools, design, basic machining, mechanical platform and fixture design, and fabrication and practical examples of orthopaedic biomechanics research. ISBN-13:978-1627055130 ISBN-10: 1627055134

Featured Work/Laboratory

2. **Saunders MM**, York SL, King JD, von Deak L, Hayes D. In International Innovation Sept, 2014.
3. **Saunders MM**. *Development of a cost-effective torsional unit for rodent long bone assessment. New investigational results*. In Issues in Biomedical Engineering Research and Application: 2011 Edition. Scholarly Editions, Atlanta GA. Biomedical Engineering Chapter, p 724.

Book Chapters and Solicited Publications

4. Truesdell SM, **Saunders MM**. (2019) *Bone remodeling platforms: Understanding the need for multicellular lab-on-a-chip systems and predictive agent-based models.* Mathematical Biosciences and Engineering. *Special Issue: Recent Advances in Biomedical and Mechanical Engineering and Related Sciences* (invited paper) (submitted)
5. York SL, Shah KS, **Saunders MM**. (2012) *Biomimicry, microsystems and bone*. In Focus on Biomimetics Research. Nova Science Publishers, 27-42.
6. **Saunders MM.** (2011). *Biomimetics in bone cell mechanotransduction: Understanding bone's response to mechanical loading*, Advances in Biomimetics, Prof. Marko Cavrak (Ed.), InTech, DOI: 10.5772/14362. Available from:

https://www.intechopen.com/books/advances-in-biomimetics/biomimetics-in-bone-cell-mechanotransduction-understanding-bone-s-response-to-mechanical-loading 317-348 (Ch 16).

7. **Saunders MM**, Lee J. (2008) *The influence of mechanical environment on bone healing and distraction osteogenesis*. In Atlas of the Oral and Maxillofacial Surgery Clinics of North America devoted to Distraction, 16(2):147-158 (Ch 1).
8. Segal LS, **Saunders MM**. (2007) *Single gegen doppelte Schraubenfixierung fur geglittenes femoral Hauptepiphysis. Ein Bericht der biomechanischen Studien.* Orthopaedische Praxis 43(2):54-59 – translation Orthopedic Practice *(Single versus double screw fixation for slipped capital femoral epiphysis. A review of biomechanical studies)* (invited paper – German Surgical Journal).
9. Donahue HJ, Chen Q, Jacobs CR, **Saunders MM**, Yellowley CE. (2003) *Bone cells and mechanotransduction*. In Molecular Biology in Orthopaedics (AAOS) Editors: Rosier and Evans, 179-190 (Ch 14).
10. **Saunders MM**, Jacobs CR. (1999) *Towards engineering the human heart.* Web Article for the American Society of Mechanical Engineers (ASME). (honorarium)

Manuscripts and Conference Proceedings in Publication

11. George EL, **Saunders MM**. (2019) *The effects of zoledronic acid-treated osteocytes and inflammation on osteoclast activity.* (in review)
12. Truesdell S, George E, **Saunders MM**. (2019) *Cellular considerations for optimizing bone cell culture and remodeling in lab-on-a-chip/organ-on-a-chip platforms.* (in review)
13. Truesdell S, George E, Seno CE, **Saunders MM**. (2019) *3D-printed loading device for inducing cellular mechanotransduction via matrix deformation.* Experimental Mechanics. DOI:10.1007/s11340-019-00531-1; Available online 8/1/19: https://link.springer.com/article/10.1007/s11340-019-00531-1
14. George EL, Truesdell SL, Maygar A, **Saunders MM**. (2019) *The effects of mechanically loaded osteocytes and inflammation on bone remodeling in a bisphosphonate-induced environment.* Bone 127:460-473.
15. Young J, Jankord K, **Saunders MM**, Smith TD. (2018) *Getting into shape: limb bone strength in perinatal Lemur catta and Propithecus coquereli.* Anatomical Record, https://doi.org/10.1002/ar.24045 online 12/08/18.
16. Thoerner R, King JD, **Saunders MM.** (2018) *Application of design aspects in uniaxial loading machine fabrication.* Journal of Visualized Experiments 139. DOI:10.3791/58168, published 9/19/18.
17. George EL, Lin YL, **Saunders MM**. (2018) *Bisphosphonate-related osteonecrosis of the jaw: A mechanobiology perspective.* Bone Reports 8:104-109.
18. George EL, Truesdell S, York SL, **Saunders MM**. (2018) *Lab-on-a-chip platform for quantification of multicellular interactions in bone remodeling.* Experimental Cell Research 365:106-118.
19. Van Scoy GK, George EL, Asantewaa FFO, Kerns L, **Saunders MM**, Prieto-Langarica A. (2017) *A cellular automata model of bone formation.* Mathematical Biosciences 286:58-64.
20. York SL, Sethu P, **Saunders MM**. (2016) *In vitro osteocytic microdamage and viability quantification using a microloading platform.* Medical Engineering and Physics 38(10):1115-1122.
21. King JD, **Saunders MM.** (2016) *Design, fabrication and characterization of a pure uniaxial microloading system for biologic testing*. Medical Engineering and Physics 38(4):411-416.
22. York SL, Sethu P, **Saunders MM**. (2015) *Impact of gap junctional intercellular communication on MLO-Y4 sclerostin and soluble factor expression.* Annals of Biomedical Engineering 44(4): 1170-1180.
23. York SL, King JD, Pietros AS, Zhang Newby B, Sethu P, **Saunders MM**. (2015) *Development of a microloading platform for in vitro mechanotransduction studies*. Mechanics of Biological Systems and Materials 7:53-59. (Conference Proceedings)
24. King JD, Hayes D, Shah KS, York SL, Sethu P, **Saunders MM**. (2015) *Development of a multi-strain profile for cellular mechanotransduction testing.* Mechanics of Biological Systems and Materials 7:61-67. (Conference Proceedings)
25. York SL, Shah KS, Sethu P, **Saunders MM**. (2012) *Osteocyte characterization on polydimethylsiloxane substrates for microsystems applications.* Journal of Biomimetics, Biomaterials and Tissue Engineering 16:27-42.
26. Shah K, York S, Sethu P, **Saunders MM**. (2012) *Developing a microloading platform for applications in mechanotransduction research.* Mechanics of Biological Systems and Materials 5:197-205. (Conference Proceedings)
27. **Saunders MM**, Brecht JS, Verstraete MC, Kay D, Njus G. (2012) *Lower limb direct skeletal attachment: a Yucatan micropig pilot study.* Journal of Investigative Surgery 25(6):387-397.
28. **Saunders MM,** Van Sickels J, Heil B, Gurley K. (2011) *Organ culture modeling of distraction osteogenesis*. In Mechanics of Biological Systems and Materials 2:163-169. (Conference Proceedings)
29. **Saunders MM.** (2011) *Small-scale mechanical testing: Applications to bone biomechanics and mechanobiology.* In Time Dependent Constitutive Behavior and Fracture/Failure Processes, Vol 3:345-352. (Conference Proceedings)
30. **Saunders MM.** (2010) *See the math behind the medicine.* Mathematics Teaching in the Middle School 16(4):240-246.
31. **Saunders MM**, Burger RB, Kalantari B, Nichols AD, Witman C. (2010) *Development of a cost-effective torsional unit for rodent long bone assessment.* Medical Engineering and Physics 32(7):802-807.

32. Petrey JS, **Saunders MM**, Kluemper GT, Beeman CS. (2010) *Temporary anchorage device insertion variables: effects on retention*. Angle Orthodontist 80(4):446-453.
33. **Saunders MM**, Simmerman LA, Reed GL, Sharkey NA, Taylor AF. (2010) *Biomimetic bone mechanotransduction modeling in neonatal rat femur organ cultures: Structural verification of proof of concept.* Biomechanics and Modeling in Mechanobiology 9:539-550.
34. **Saunders M**, Baxter C, Abou-Elella A, Kunselman AR, Trussell J. (2009) *BioGlue and Dermabond save time, leak less and are not mechanically inferior to two-layer and modified one-layer vasovasostomy.* Fertility and Sterility 91(2):560-565.
35. Taylor AF, **Saunders MM**, Shingle D, Cimbala JM, Zhou Z, Donahue HJ. (2007) *Mechanically stimulated osteocytes regulate osteoblastic activity via gap junctions.* The American Journal of Physiology-Cell Physiology 292(1):C545-C552.
36. Segal LS, Jacobson JA, **Saunders MM**. (2006) *Biomechanical analysis of in situ single versus double screw fixation in a nonreduced slipped capital femoral epiphysis model*. Journal of Pediatric Orthopaedics 26(4):479-485.
37. **Saunders MM**, Taylor AF, Du C, Zhou Z, Pellegrini VD Jr, Donahue HJ. (2006) *Mechanical stimulation effects on functional end effectors in osteoblastic MG-63 cells.* Journal of Biomechanics 39(8):1419-1427.
38. Naidu SH, Kulkarni N, **Saunders MM**. (2006) *Titanium basal joint arthroplasty: a finite element analysis and a clinical study.* Journal of Hand Surgery 31(5):760-765.
39. Li Z, Zhou Z, **Saunders MM**, Donahue HJ. (2006) *Modulation of connexin43 alters expression of osteoblastic differentiation markers.* The American Journal of Physiology-Cell Physiology 290(4):C1248-1255.
40. Bennett GL, Cameron B, Njus G, **Saunders M**, Kay DB. (2005) *Tibiotalocalcaneal arthrodesis: a biomechanical assessment of stability.* Foot and Ankle International 26(7):530-536.
41. Black KP, **Saunders MM**. (2005) *Expansion anchors for use in anterior cruciate ligament (ACL) reconstruction: establishing proof of concept in a benchtop analysis.* Medical Engineering and Physics 27(5):425-434
42. **Saunders MM**, Donahue HJ. (2004) *Development of a cost-effective loading machine for biomechanical evaluation of mouse transgenic models*. Medical Engineering and Physics 26(7):595-603.
    - **11 press releases including:** Biotech Law Weekly, Medical Devices & Surgical Technology Week, Biotech Week, Life Science Weekly and Science Letter
43. Kapoor P, **Saunders MM**, Li Z, Zhou Z, Schaeffer N, Kunze EL, Samant RS, Welch DR, Donahue HJ. (2004) *Breast cancer metastatic potential: Correlation with increased heterotypic gap junctional intercellular communication between breast cancer cells and osteoblastic cells.* International Journal of Cancer 111(5):693-697.
44. Hugate R, Pennypacker J, **Saunders M**, Juliano P. (2004) *The effects of intratendinous and retrocalcaneal intrabursal injections of corticosteroid on the biomechanical properties of rabbit Achilles tendons.* Journal of Bone and Joint Surgery Am 86-A(4):794-801.
45. Huang-Brown KM, **Saunders MM**, Kirsch T, Donahue HJ, Reid JS. (2004) *Effect of COX-2-specific inhibition on fracture healing in the rat femur*. Journal of Bone and Joint Surgery Am 86-A(1):116-23.
46. Donahue HJ**, Saunders MM**, Li Z, Mastro AM, Gay CV, Welch DR. (2003) *A potential role for gap junctions in breast cancer metastasis to bone*. Journal of Musculoskeletal and Neuronal Interactions 3(2):156-161.
47. **Saunders MM**, Schwentker N, Kay D, Bennett G, Jacobs C, Verstraete MC, Njus GO. (2003) *Finite element analysis as a tool for parametric prosthetic foot design and evaluation. Technique development in the solid ankle cushioned heel (SACH) foot.* Computer Methods in Biomechanics and Biomedical Engineering 6(1): 75-87.
48. **Saunders MM**, You J, Zhou Z, Li Z, Yellowley CE, Kunze E, Jacobs CR, Donahue HJ. (2003) *Fluid flow-induced prostaglandin E2 response of osteoblastic ROS 17/2.8 cells is gap junction-mediated and independent of cytosolic calcium.* Bone 32(4): 350-356.
49. **Saunders MM**, You J, Trosko JE, Yamasaki H, Donahue HJ, Jacobs CR. (2001) *Gap junctions and fluid flow response in MC3T3-E1 cells*. The American Journal of Physiology-Cell Physiology 281(6):1917-1925.
50. **Saunders MM**, Seraj, MJ, Li, Z, Zhou, Z, Winter, CR, Welch, DR, Donahue, HJ. (2001) *Breast cancer metastatic potential correlates with a breakdown in homospecific and heterospecific gap junctional intercellular communication.* Cancer Research, Advances in Brief 61(5):1765-1767.
51. Samant RS, Seraj MJ, **Saunders MM**, Sakamaki TS, Shevde LA, Harms JF, Leonard TO, Goldberg SF, Budgeon L, Meehan WJ, Winter CR, Christensen ND, Verderame MF, Donahue HJ, Welch DR. (2000) *Analysis of mechanisms underlying BRMS1 suppression of metastasis*. Clinical and Experimental Metastasis 18(8):683-693.
52. Black KP, **Saunders MM**, Stube KC, Moulton MJ, Jacobs CR. (2000) *Effects of interference fit screw length on tibial tunnel fixation for anterior cruciate ligament reconstruction*. American Journal of Sports Medicine 28(6): 846-849.
53. **Saunders M**, Njus GO, Kay DB, Brecht JS: *The feasibility of directly attaching artificial limbs to bone.* In *Bridging the gap between dental and orthopaedic implants*, 1998.
54. **Saunders MM**. (1998) *The feasibility of lower limb direct skeletal attachment: A pilot study.* PhD Dissertation
55. **Saunders MM**. (1994) *The experimental and theoretical characterization of the SACH foot.* Masters Thesis

Abstracts/Presentations at National/International Conferences:

1. Crow MJ, Truesdell SL, Mandt G, Omer L, Sullivan S, **Saunders MM**. *The Akron learning community program.* Biomedical Engineering Society 2018 Annual Fall Meeting, Atlanta, Georgia, October 2018.
2. George EL, **Saunders MM**. *Quantifying the roles of mechanically stimulated osteocytes and inflammation in bone remodeling.* Biomedical Engineering Society 2018 Annual Fall Meeting, Atlanta, Georgia, October 2018.
3. George EL, Magyar A, **Saunders MM**. *The Effects of lipopolysaccharide on osteoclast activity in vitro.* Biomedical Engineering Society 2018 Annual Fall Meeting, Atlanta, Georgia, October 2018.
4. Truesdell SL, George EL, Seno KE, Crow MJ, **Saunders MM**. *Fabrication and finite element analysis of a 3D-printed loading device for osteocyte stimulation.* Biomedical Engineering Society 2018 Annual Fall Meeting, Atlanta, Georgia, October 2018.
5. George EL, Truesdell SL, Magyar A, Crow M, **Saunders MM**. *In vitro lab-on-a-chip platform for the functional quantification of bone remodeling.* World Congress of Biomechanics, Dublin, Ireland, July 2018. (abstract in proceedings) (Death in family – did not attend)
6. Schmitt L, Smalley D, Mandt G, **Saunders MM**. *Rotary torsion fixtures for augmentation to existing testing machines: Generating pure torsion loading from axial motion.* World Congress of Biomechanics, Dublin, Ireland, July 2018. (abstract in proceedings) (Death in family - did not attend)
7. Amini R, **Saunders MM**, Cohn M, Thoerner R. Work in progress: Using video tutorials to assist biomedical engineering students in learning solid modeling skills (23810/T304). 2018 ASEE Annual Conference and Exposition. Salt Lake City, Utah, June 2018.
8. George EL, Van Scoy GK, Petrey O, Conte DJ, Prieto-Langarica A, **Saunders MM**. *Toward an individual-based model for bone remodeling.* Biomedical Engineering Society 2016 Annual Fall Meeting, Wisconsin, October 2016.
9. George EL, **Saunders MM**. *The effect of Interleukin-1B on osteoblastic bone formation*. Biomedical Engineering Society 2016 Annual Fall Meeting, Wisconsin, October 2016.
10. **Saunders MM**, George EL, Truesdell S, Thoerner R. *A biomimetic lab-on-a-chip platform of bone remodeling*. Biomedical Engineering Society 2016 Annual Fall Meeting, Wisconsin, October 2016.
11. Truesdell S, George EL, Mukherjee S, **Saunders MM**. *The soluble effects of microgravity-exposed osteocytes on bone resorption*. Biomedical Engineering Society 2016 Annual Fall Meeting, Wisconsin, October 2016.
12. George EL, Opoku Asantewaa FF, Van Scoy GK, Prieto-Langarica A, **Saunders MM**. *A cellular automata model verifying osteoblastic bone formation in vitro*. SB^3 Conference, Washington DC, June 2016.
13. **Saunders MM**, York SL, George EL, Grutkowski EL, Smith JL. *Modeling bone formation with a lab-on-a-chip platform.* SB^3 Conference, Washington DC, June 2016.
14. George EL, York SL, McPherson JK, Gore A, Costa M, Grutkowski E, **Saunders MM**. *Characterization of osteoblasts and the effect of osteocytic soluble factors on bone formation.* Biomedical Engineering Society 2015 Annual Fall Meeting, Tampa, FL, October 2015.
15. George EL, York SL, Miller R, Ott DW, **Saunders MM**, Prieto-Langarica A. *Mathematical model for bone turnover*. Biomedical Engineering Society 2015 Annual Fall Meeting, Tampa, FL, October 2015.
16. vonDeak L, Petrey O, Pero T, Moussa F, Safadi F, **Saunders MM**. Mechanically unloaded osteocytes increase osteoclastogenesis. Biomedical Engineering Society 2015 Annual Fall Meeting, Tampa, FL, October 2015.
17. VonScoy G, George E, **Saunders MM**, Prieto-Langarica, A. *Math models of bone metabolism*. MAA MathFest, Washington DC, August 5-8, 2015. ***(Recipient of The Anderson Award in Biological Modeling)***
18. Hayes D, King JD, York SL, **Saunders MM**. *Quantification of color intensity in cellular colorimetric assays.* American Society of Biomechanics, Akron, OH 2015.
19. vonDeak, L, Moussa, F, Safadi F, Leuttmer-Strathmann J, Prieto Langarica A, **Saunders MM**. *Osteocytes under the influence of microgravity release soluble factors that increase bone resorption.* American Society of Biomechanics, Akron, OH 2015.
20. vonDeak, L, Moussa, F, Safadi F, Leuttmer-Strathmann J, Prieto Langarica A, **Saunders MM**. *Microfluidic device for the study of soluble cellular interaction.* American Society of Biomechanics, Akron, OH 2015.
21. York SL, Sethu P, **Saunders MM**. *A microloading platform for out of plane tenting of polydimethylsiloxane.* American Society of Biomechanics, Akron, OH 2015.
22. York SL, Pietros AS, Newby BM, Sethu P, **Saunders MM**. *Development of a polydimethylsiloxane substrate for in vitro cellular microdamage studies.* American Society of Biomechanics, Akron, OH 2015.
23. York SL, Newby BM, Sethu P, **Saunders MM**. *Quantification of sclerostin and soluble factor expression in microdamaged osteocytes*. American Society of Biomechanics, Akron, OH 2015.
24. George E, York SL, **Saunders MM**, Prieto Langarica A. *Cellular automata model for metabolism of bone.* American Society of Biomechanics, Akron, OH 2015.
25. George E, McPherson JK, York SL, von Deak L, Shwaiki Z, Costa M, Ott DW, **Saunders MM**. *The effect of osteocytic soluble factors on mineralization of osteoblasts.* American Society of Biomechanics, Akron, OH 2015.

26. York SL, King JD, Pietros AS, Newby BM, Sethu P, **Saunders MM**. *Osteocyte viability changes in response to microdamage*. Biomedical Engineering Society 2014 Annual Fall Meeting, San Antonio, TX, October 2014.
27. York SL, **Saunders MM**. *Quantification of gap junction communication and sclerostin expression in microdamaged osteocytes*. Biomedical Engineering Society 2014 Annual Fall Meeting, San Antonio, TX, October 2014.
28. York SL, Shah KS, **Saunders MM**. *Characterization of a microloading platform for in vitro mechanotransduction studies*. Biomedical Engineering Society 2014 Annual Fall Meeting, San Antonio, TX, October 2014.
29. King JD, Hayes D, McPherson J, York SL, **Saunders MM**. *Development and characterization of a pure uniaxial microloading device for biologic testing*. Biomedical Engineering Society 2014 Annual Fall Meeting, San Antonio, TX, October 2014.
30. King JD, Shah K, York SL, Sethu P, **Saunders MM**. *Characterization of a multi-strain profile for mechanotransduction cellular research*. Biomedical Engineering Society 2014 Annual Fall Meeting, San Antonio, TX, October 2014.
31. Hayes D, Novak K, Safadi F, **Saunders MM**. *Effect of osteoactivin on the mechanical properties of mouse bone*. Biomedical Engineering Society 2014 Annual Fall Meeting, San Antonio, TX, October 2014. **(*Recipient of a Reviewer Choice Award (Top 5%)*)**
32. Gerber D, Habin C, Vinyard C, **Saunders MM**. *Mechanical characterization of Gough Island mice femora*. Biomedical Engineering Society 2014 Annual Fall Meeting, San Antonio, TX, October 2014.
33. McPherson J, York SL, Sewell A, George E, von Deak L, **Saunders MM**. *The effect of soluble factors released by mechanically stimulated osteocytes on the mineralization capacity of osteoblasts.* Biomedical Engineering Society 2014 Annual Fall Meeting, San Antonio, TX, October 2014.
34. York SL, King JD, Pietros AS, Zhang Newby B, Sethu P, **Saunders MM**. *Development of a microloading platform for in vitro mechanotransduction studies*. Society for Experimental Mechanics, June 2014.
35. King JD, Hayes D, Shah KS, York SL, Sethu P, **Saunders MM**. *Development of a multi-strain profile for cellular mechanotransduction.* Society for Experimental Mechanics, June 2014.
36. King JD, **Saunders MM**. *Development and characterization of a pure uniaxial microloading device for biologic testing*. American Society of Biomechanics, Akron, OH 2014.
37. Berki V, **Saunders MM**, Tan JS. *In vitro cadaveric biomechanical study on spinal deformity correction* American Society of Biomechanics, Akron, OH 2014.
38. Shah KS, Evancho-Chapman M, Fenton B, **Saunders MM**. *Quantifying the mechanical characteristics of pelvic adhesions.* Biomedical Engineering Society 2012 Annual Fall Meeting.
39. Shah KS, York SL, Arida AR, Sethu P, **Saunders MM**. *Microloading of polydimethylsiloxane membranes for applications in mechanotransduction research*. Biomedical Engineering Society 2012 Annual Fall Meeting.
40. Shah KS, York SL, Sethu P, **Saunders MM**. *Developing a microloading platform for applications in mechanotransduction research*. Society for Experimental Mechanics, 2012.
41. **Saunders MM**, Van Sickels J, Heil B, Gurley K. *Organ culture modeling of distraction osteogenesis.* Invited Paper Transactions of the Society for Experimental Mechanics, Uncasville, CT, Jun15, 2011. (Invited presentation)
42. Gurley K, Gobin AS, **Saunders MM**. *MicroCT assessment of bone organ culture viability in a neonatal rat femur model.* Annals of Biomedical Engineering, Biomedical Engineering Society 2010 Annual Fall Meeting, Austin, TX, Oct 6-9, 2010.
43. Simmerman LA, Martin J, Sethu P, **Saunders MM**. *Osteocyte characterization on polydimethylsiloxane substrate: viability, growth and sclerostin production*. Annals of Biomedical Engineering, Biomedical Engineering Society 2010 Annual Fall Meeting, Austin, TX, Oct 6-9, 2010.
44. Simmerman LA, Sethu P, **Saunders MM**. *Osteocyte characterization on polydimethylsiloxane substrate: quantification of functional communication*. Annals of Biomedical Engineering, Biomedical Engineering Society 2010 Annual Fall Meeting, Austin, TX, Oct 6-9, 2010.
45. **Saunders MM,** Van Sickels J, Heil B, Gurley KM. *Distraction osteogenesis in organ culture.* Annals of Biomedical Engineering, Biomedical Engineering Society 2010 Annual Fall Meeting, Austin, TX, Oct 6-9, 2010.
46. Martin J, Sethu P, **Saunders MM**. *Mechanical characterization of polydimethylsiloxane for microsystems applications.* Annals of Biomedical Engineering, Biomedical Engineering Society 2010 Annual Fall Meeting, Austin, TX, Oct 6-9, 2010.
47. **Saunders MM**. *Small-scale mechanical testing: Applications to bone biomechanics and mechanobiology.* Transactions of the Society for Experimental Mechanics, Indianapolis, IN, June 6-10, 2010. (Invited presentation/invited publication)
48. **Saunders MM**, Simmerman LA. *Organ culture mechanotransduction modeling*. Annals of Biomedical Engineering, Biomedical Engineering Society 2009 Annual Fall Meeting, Pittsburgh, PA, Oct 7-10, 2009.
49. Tarrant R, **Saunders MM**. *Organ culture mechanotransduction modeling*. Skeletal Development and Remodeling in Health, Disease and Aging, New York Academy of Sciences, Mt Sinai Medical Center, New York, NY, April 28-May 2, 2009.
50. **Saunders MM.** *Cost-effective rack and pinion system for torsion testing of rodent bones*. 30th Annual meeting of the American Society for Bone and Mineral Research, Montreal, Canada, September 11-16, 2008.
51. Petrey JS, **Saunders MM**, Kluemper GT, Beeman CS. *Orthodontic mini-implant insertion variables: effects on retention*. American Association of Orthodontists 2008 Annual Session, Denver, CO, May 16-19, 2008. (poster)

52. Petrey JS, Kluemper GT, Beeman CS, **Saunders MM**. *Orthodontic mini-implant insertion variables: effects on retention*. American Association for Dental Research Annual Meeting, Dallas, TX, April 3-5, 2008. (oral presentation)
53. Brown KM, **Saunders MM**, Dardzinski BJ, Miller P, Smith MB, Mosher TJ. *MRI and CT evaluation of endochondral healing after fracture in the rat femur.* Pennsylvania Medical Society Annual Business and House of Delegates Meeting, Hershey, PA, October 2007 (oral presentation). ***(2nd Place/ Basic Science Category)***
54. Zapanta C, Abou-Elella A, **Saunders MM**, Baxter C, Trussell J. *BioGlue and dermabond save time and leak less than sutured microsurgical vasovastostomy.* 62nd Annual Meeting, American Society for Reproductive Medicine, New Orleans, LA, Oct 21-25, 2006.
55. **Saunders MM**, Taylor AF. *Ex vivo bone mechanotransduction modeling in neonatal rat femurs.* 28th Annual meeting of the American Society for Bone and Mineral Research, Philadelphia, PA, September 15-19, 2006. ***(Plenary Poster Award)***
56. **Saunders MM**, Taylor AF. *Development of an organ culture model for mechanotransduction research.* Bone Innovation Summit, Cleveland Clinic, May 2-5, 2006.
57. **Saunders MM**, Segal LS. *Development of an orthopaedic-based post-baccalaureate credit certificate program in academic medicine*. Lilly East Conference on College and University Teaching, 2006 Annual Meeting, University of Delaware, April 6-8, 2006.
58. Reed G, **Saunders MM**. *Collagen coating does not enhance mechanoresponsiveness of hFOB 1.19 cells*. 52nd Annual Meeting, Transactions of the Orthopaedic Research Society, Chicago, Illinois, Mar 19-22, 2006. (poster)
59. Sahd P, Taylor AF, Zhang X, Connor JR, **Saunders MM**. *Ex vivo mechanotransduction modeling in neonatal rat femurs.* 52nd Annual Meeting, Transactions of the Orthopaedic Research Society, Chicago, Illinois, Mar 19-22, 2006. (poster & mini-talk)
60. Shingle DL, Taylor AF, Paul EM, **Saunders MM**, Donahue HJ. *Osteocytes are unique in their ability to communicate mechanical signals to osteoblasts*. 52nd Annual Meeting, Transactions of the Orthopaedic Research Society, Chicago, Illinois, Mar 19-22, 2006. (talk)
61. Brown KM, Eastman J, Stauff M, **Saunders MM**, Reid JS. *Fracture between proximal and distal femoral implants - effect of the length of the uninstrumented segment*, Orthopaedic Trauma Association, 2005 Annual Meeting, Ottawa, Ontario, Canada, Oct 19-22, 2005. (podium presentation)
62. Brown KM, Eastman J, Stauff M, **Saunders MM**, Reid JS. *Fracture between proximal and distal femoral implants - effect of the length of the uninstrumented segment*, Orthopaedic Trauma Association, 2005 Annual Meeting, Ottawa, Ontario, Canada, Oct 19-22, 2005. (poster presentation)
63. Donahue HJ, Taylor A, **Saunders MM**, Genetos D, Riddle R. *Fluid flow activation of osteocytic to osteoblastic communication.* Annals of Biomedical Engineering, Biomedical Engineering Society Annual Fall Meeting, Baltimore, MD Sept 28-Oct 1, 2005.
64. Donahue HJ, Taylor AF, **Saunders MM**, Genetos DC, Riddle RC. *Fluid flow activation of gap junctional communication and hemichannel activity in bone cells.* 7th International Bone Fluid Flow Workshop, New York, Sept 21-22, 2005.
65. **Saunders MM**. *Development of a cost-effective small-scale loading machine for in vivo, ex vivo and in vitro osteoporosis research.* 2nd Joint meeting of the ECTS and IBMS, European Calcified Tissue Society, Geneva, Switzerland, June23-29, 2005.
66. **Saunders MM**, Du C, Taylor AF, Donahue HJ. *In vitro mechanical stimulation effects on osteoblastic release of osteoprotegerin.* 2nd Joint meeting of the ECTS and IBMS, European Calcified Tissue Society, Geneva, Switzerland, June23-29, 2005.
67. Taylor AF, **Saunders MM**, Shingle D, Zhou Z, Donahue HJ. *Mechanically stimulated osteocytes mediate osteoblastic activity via gap junctions.* Skeletal Development and Remodeling in Health, Disease and Aging, New York Academy of Sciences, Mt Sinai Medical Center, New York, NY, May 18-21, 2005.
68. **Saunders MM**, Du C, Zhou Z, Donahue HJ, Taylor AF. *Mechanical stimulation effects on OPG/RANKL ratio in osteoblastic cells.* Annals of Biomedical Engineering, Biomedical Engineering Society Annual Fall Meeting, Philadelphia, PA, Oct 13-16, 2004.
69. **Saunders MM.** *Development of a cost-effective loading machine for small-scale biomechanical testing*. Annals of Biomedical Engineering, Biomedical Engineering Society Annual Fall Meeting, Philadelphia, PA, Oct 13-16, 2004.
70. Black KP, **Saunders MM**. *Design of a novel expansion anchor for use in anterior cruciate ligament reconstruction. A benchtop analysis.* Annals of Biomedical Engineering, Biomedical Engineering Society 2004 Annual Fall Meeting, Philadelphia, PA, Oct 13-16, 2004.
71. Segal L, Jacobson J, **Saunders MM**. *Biomechanical analysis of in situ single vs double screw fixation in non-reduced slipped capital femoral epiphysis (SCFE) model.* Annals of Biomedical Engineering, Biomedical Engineering Society 2004 Annual Fall Meeting, Philadelphia, PA, Oct 13-16, 2004.
72. Kulkarni N, **Saunders MM**, Paul, EM; Naidu SH: *Finite element analysis of prosthetic joint replacement arthroplasty of the basal joint.* Annals of Biomedical Engineering, Biomedical Engineering Society 2004 Annual Fall Meeting, Philadelphia, PA, Oct 13-16, 2004.

73. Taylor AF, **Saunders MM**, Zhou Z, Donahue HJ. *Osteocytes communicate fluid flow-mediated effects to osteoblasts altering their phenotype.* 6th Annual meeting of the ASBMR oral presentation 1031; 2004. ***(Recipient of a Young Investigator Research Award)***
74. Hugate R, Pennypacker J, **Saunders M**, Juliano P. *The effects of intratendinous or retrocalcaneal bursal injections of corticosteroids on the biomechanical properties of rabbit Achilles tendons.* 71st Annual American Academy of Orthopaedic Surgery Meeting, San Francisco, CA, February 28 – March 4, 2004.
75. Segal L, Jacobson J, **Saunders M**, Wallach D. *Biomechanical analysis of in situ single versus double screw fixation in a non-reduced slipped capital femoral epiphysis model*. Pediatric Orthopaedic Society of North America, Amelia Island, FL, May 2, 2003.
76. **Saunders MM**, Mastro AM, Zhou Z, Welch DR, Donahue HJ. *OPG/RANKL is downregulated in metastatic cells in response to mechanical loading*. 94th Annual Meeting, Proceedings of the American Association for Cancer Research, Volume 44, 2003.
77. **Saunders MM**, You, J, Zhou Z, Pellegrini VD Jr, Donahue HJ. *Substrate deformation upregulates OPG/RANKL ratio in osteoblastic MG-63 cells*. 49th Annual Meeting, Transactions of the Orthopaedic Research Society, Vol.28, 2003.
78. Goodspeed DC, **Saunders MM**, Foust TL, Hodrick J, Huang-Brown KM. *A torsional assessment of femoral bone strength at three distal bone graft harvest sites.* 49th Annual Meeting, Transactions of the Orthopaedic Research Society, Vol.28, 2003.
79. Huang-Brown KM, **Saunders MM**, Lynn AK, Goodspeed DC, Kirsch T, Donahue HJ, Reid JS. *The effect of COX-2 specific inhibitors on fracture healing in the adult rat femur.* 49th Annual Meeting, Transactions of the Orthopaedic Research Society, Vol.28, 2003. ***(Recipient of the 2003 Ruth Jackson Research Award)***
80. Hugate R, Juliano P, Pennypacker J, **Saunders M**. The effects of intratendonous or retrocalcaneal bursal injections of corticosteroids on the biomechanical properties of rabbit Achilles tendons. 44th Annual Meeting, Society Of Military Orthopaedic Surgeons, 2002.
81. Donahue HJ, **Saunders MM**, Li Z, Mastro AM, Gay CV, Welch DR. *Intercellular communication in breast cancer metastasis to bone*. Sun Valley, 2002.
82. Donahue HJ, Li Z, Zhou Z, Kapoor P, Welch DR, **Saunders MM**. *Gap junctions and bone metastasis*. Era of Hope DOD Breast Cancer Metastasis Program Meeting, 2002.
83. **Saunders MM**, Foust TL, You J, Zhou Z, Donahue HJ, Pellegrini VD Jr. *Mechanical stimulation via oscillatory fluid flow upregulates osteoprotegerin production in human osteoblastic MG-63 cells.* 48th Annual Meeting, Transactions of the Orthopaedic Research Society, Vol.27, 2002.
84. Bergandi, JA, Feinblatt, J, Rumi, MN, **Saunders MM**, Naidu, SH, Pellegrini, VD, Jr. *A comparison of wear debris induced osteolysis along a cemented and cementless interface: An animal model in the rabbit.* 35th Annual American Academy of Orthopaedic Surgery Residents' Conference, Nashville, TN, April 12-14, 2002.
85. Bergandi, JA, Feinblatt, J, Rumi, MN, **Saunders MM**, Naidu, SH, Pellegrini, VD, Jr. *A comparison of wear debris induced osteolysis along a cemented and cementless interface: An animal model in the rabbit.* Southern Orthopaedic Association Annual Meeting, Nashville, TN, November 8 – 9, 2001.
86. Bergandi, JA, Feinblatt, J, Rumi, MN, **Saunders MM**, Naidu, SH, Pellegrini, VD, Jr. *A comparison of wear debris induced osteolysis along a cemented and cementless interface: An animal model in the rabbit*, Eastern Orthopaedic Association 32nd Annual Meeting, Southampton, Bermuda, October 10 – 14, 2001. ***(Recipient of a Resident Research Award)***
87. Bergandi JA, **Saunders MM**, Kaag M, Jacobs CR, Parrish WM. *Torsional and bending evaluation of femoral allograft fixation techniques in a cadaveric model: A comparison of double plate to IM nail and plate fixation*. Transactions of the Orthopaedic Research Society, San Francisco, CA, February 24-28, 2001.
88. Bergandi JA, Rumi M, **Saunders MM**, Sanjiv N, Pellegrini V. *Periprosthetic osteolysis in a rabbit model: A comparison of latency to onset of osteolytic lesions in cemented and cementless knee implants.* American Academy of Orthopaedic Surgeons (AAOS), San Francisco, California, February 24-28, 2001.
89. Bergandi, JA, Feinblatt, J, Rumi, MN, **Saunders MM**, Naidu, SH, Pellegrini, VD, Jr. *A comparison of wear debris induced osteolysis along a cemented and cementless interface: An animal model in the rabbit.* 68th Annual American Academy of Orthopaedic Surgery Meeting, San Francisco, CA, February 28 – March 4, 2001.
90. Bergandi, JA, Feinblatt, J, Rumi, MN, **Saunders MM**, Naidu, SH, Pellegrini, VD, Jr. *A comparison of wear debris induced osteolysis along a cemented and cementless interface: An animal model in the rabbit*. 34th Annual American Academy of Orthopaedic Surgery Residents' Conference, Hershey, PA, March 30 – April 1, 2001.
91. Jacobs CR, You J, Reilly GC, **Saunders MM**, Kurokouchi K, Yellowley CE, Donahue HJ. *An overview of oscillatory fluid flow as a potent loading-induced physical signal in bone*. Proceedings of the 2001 ASME Summer Bioengineering Conference, BED-Vol.50: p339-340, 2001.
92. You J, **Saunders MM**, Yellowley CE, Donahue HJ, Jacobs CR. *Oscillatory flow-induced prostaglandin E2 release involves protein kinase A and cyclooxygenase-2 in MC3T3-E1 osteoblasts.* Proceedings of the 2001 ASME Summer Bioengineering Conference, BED-Vol.50: p163-164, 2001.
93. Li Z, Zhou Z, **Saunders M**, Casey G, Welch D, Donahue H. *Connexin and osteopontin expression correlate with breast cancer*

cell metastatic potential. Proceedings of the American Association for Cancer Research, Vol42:No 4244, 2001.

94. You J, **Saunders MM**, Yellowley CE, Donahue HJ, Jacobs CR. *Oscillatory flow-induced PGE2 release involves protein kinase A and cyclooxygenase2 in MC3T3-E1 osteoblasts.* SPRBM 20th Annual Meeting, Charleston, SC, 2001.
95. **Saunders MM,** You J, Trosko J, Yamasaki H, Donahue HJ, Jacobs CR. *Oscillatory fluid flow-induced prostaglandin E2 production is dependent upon gap junctional intercellular communication in MC3T3-E1 cells.* 47th Annual Meeting, Transactions of the Orthopaedic Research Society, Vol.26:p525, 2001.
96. **Saunders MM,** Kunze E, Li Z, Mastro A, Donahue HJ. *Quantification and characterization of gap junctions and gap junctional intercellular communication in an in vitro breast carcinoma model metastatic to bone.* 47th Annual Meeting, Transactions of the Orthopaedic Research Society, Vol.26, 2001.
97. You J, **Saunders MM**, Yellowley C, Donahue HJ, Jacobs CR. *Oscillatory flow stimulates PGE2 release via protein kinase A in MC3T3-E1 osteoblasts involving cyclooxygenase-2.* 47th Annual Meeting, Transactions of the Orthopaedic Research Society, Vol.26: p326, 2001, San Francisco, CA, 2001.
98. Seraj MJ, Samant RS, Shevde LA, **Saunders MM**, Sakamaki TS, Meehan WJ, Donahue HJ, Budgeon L, Leonard TO, Harms JF, Christensen ND, Winter CR, Verderame MF, Welch DR. *BRMS1- a human breast cancer metastasis suppressor gene encoded on chromosome 11q13.1-q13.2.* Era of Hope – DOD Breast Cancer Research Program Meeting, 2000.
99. **Saunders MM**, You J, Donahue HJ, Jacobs CR. *Prostaglandin E2 response in MC3T3-E1 osteoblastic cells is dependent upon gap junctional coupling*. Annals of Biomedical Engineering, pg S-86. Biomedical Engineering Society 2000 Annual Fall Meeting, Seattle, WA, 2000.
100. **Saunders MM**, Bergandi JA, Kaag M, Jacobs CJ, Parrish WM. *Torsional evaluation of femoral allograft fixation: A comparison of plates to intramedullary nails.* Transactions of the BMES Annual Meeting. Abstract Supplement 1, Vol.28: p S-10, 2000.
101. **Saunders MM**, You J, Yellowley C, Donahue HJ, Jacobs CR. *Prostaglandin E2 response is independent of intracellular calcium concentration in osteoblastic ROS 17/2.8 cells.* Annals of Biomedical Engineering, pg S-87. Biomedical Engineering Society 2000 Annual Fall Meeting, Seattle, WA, 2000.
102. **Saunders MM**, Seraj MJ, Yellowley CE, Hoke A, Welch DR, Donahue HJ. *Gap junctional intercellular communication is restored in metastasis suppressed breast carcinoma cells.* Experimental Biology (FASEB), 2000.
103. You J, **Saunders MM**, Yellowley C, Donahue HJ, Jacobs CR. *Frequency dependent effects of oscillating fluid flow on bone cells.* Annals of Biomedical Engineering, Abstract Suppl 1, Vol.28: pS-105, Seattle, WA, 2000.
104. **Saunders MM**, Brecht JS, Kay D, Njus G, Jacobs CR. *The feasibility of lower limb direct skeletal attachment (DSA) in a Yucatan micropig model.* Annals of Biomedical Engineering, pg S-10. Biomedical Engineering Society 2000 Annual Fall Meeting, Seattle, WA, Oct 12-14, 2000.
105. **Saunders MM**, You J, Yellowley CE, Jacobs CJ and Donahue HJ. *Differential effect of oscillating fluid flow on cytosolic calcium and prostaglandin in osteoblastic ROS 17/2.8 cells*. 46th Annual Meeting, Transactions of the Orthopaedic Research Society, Orlando, FL, 2000.
106. Blankenhorn BD, Pellegrini VD, Deol GS, **Saunders MM**, Jacobs C. *Effect of joint line movement in revision total knee arthroplasty on quadriceps force.* 46th Annual Meeting Transactions of the Orthopaedic Research Society, Vol 25 2000.
107. Bergandi, JA, Kaag, M, **Saunders MM**, Jacobs, CR, Parrish, WM. *A biomechanical evaluation of femoral allograft constructs*. 33rd Annual American Academy of Orthopaedic Surgery Residents' Conference, St. Louis, MO, February 25-27, 2000.
108. **Saunders MM,** Li Z, Seraj MJ, Welch DR, Donahue H. *Metastatic breast carcinoma correlates with a breakdown in gap junction function and expression.* Clinical and Experimental Metastasis (1999) 17:P50. (actual publication 2000).
109. **Saunders M**, Njus GO, Kay DB, Brecht SJ. *The feasibility of directly attaching artificial limbs to bone.* 3rd Annual Indiana Conference, Indianapolis, Indiana, May 13-16, 1998.
110. Cameron BC, Bennett G, Njus GO, **Saunders MM.** *A comparative assessment of micromotion in various methods of tibiocalcaneal fusion.* Mid-America Orthopaedic Association, 16th Annual Meeting, Acapulco, Mexico, Apr 22-26, 1998.
111. **Saunders MM**, Njus GO, Kay DB, Brecht SJ. *Finite element analysis of an implantable prosthesis in a pig model.* American Orthopaedic Foot and Ankle Society, 14th Annual Summer Meeting, Boston, MA, July 24-26, 1998.
112. **Saunders MM**, Njus GO, Kay DB, Shamp D. *Adaptive bone remodeling in a lower limb direct skeletal attachment system.* ASME Summer Bioengineering Conference, Sun River, OR, June 1997.
113. Weresh M, Cutright M, **Saunders MM**, Vrabec G, Njus G. *Fixation stability of displaced femoral neck fractures.* Orthopaedic Trauma Association, Annual Conference, (podium) Boston, MA, Sept 1996.
114. Cutright M, Weresh M, **Saunders M**, Vrabec G, Njus G. *Fixation stability of displaced femoral neck fractures.* Orthopaedic Trauma Association, Annual Conference, (poster) Boston, MA, Sept 1996.
115. Lang GJ, Njus GO, Flanagan JP, **Saunders MM.** *Augmentation of sliding hip screw fixation with polymethylmethacrylate: A biomechanical study in a cadaveric model.* The American Academy of Orthopaedic Surgeons, 62nd Annual Meeting, Orlando, FL, Feb 1995.
116. **Saunders M**, Verstraete MC, Njus GO. *Mechanical characterization of a common prosthetic foot.* American Society of Mechanical Engineering, Winter Annual Meeting, Chicago, IL, Nov 1994.

117. Lang GJ, Njus GO, Flanagan JP, **Saunders MM.** *Augmentation of sliding hip screw fixation with polymethylmethacrylate: A biomechanical study in a cadaveric model.* The American Orthopaedic Association 25th Annual Residents' Conference, Ann Arbor, MI, Mar 11-14, pp.99, 1992. ***(Recipient of a Resident Research Award)***

Local Research and Invited Presentations

1. **Saunders MM.** *Lab-on-a-chip bone remodeling: Platform development and applications.* Department of Anatomy and Neurobiology Lecture Series. NEOMED, April 11, 2019.
2. George EL, **Saunders MM**. *Quantifying the roles of mechanically stimulated osteocytes and inflammation in bone remodeling.* Engineering Research Day, The University of Akron, December 7, 2018. ***(2nd place poster presentation)***
3. Schmitt L, Smalley D, Mandt G, **Saunders MM**. *Rotary torsion fixtures for augmentation to existing testing machines: Generating pure torsion loading from axial motion.* Engineering Research Day, The University of Akron, December 7, 2018. ***(2nd place poster presentation)***
4. **Saunders MM**. *Lab-on-a-chip bone remodeling platform: development and applications.* Graduate Seminar, The University of Akron, September 30, 2016.
5. vonDeak, L, **Saunders MM**. *Osteocytes under the influence of microgravity release soluble factors that increase bone resorption.* UASIS, The University of Akron, April 9, 2015. ***(1st place presentation/section winner) (Outstanding Graduate Student Researcher Award, 2015)***
6. Hayes D, **Saunders MM**. *Quantification of color intensity in cellular colorimetric assays.* UASIS, The University of Akron, April 9, 2015.
7. Triner J, **Saunders MM**. *Development of a fixture to generate pure biaxial loading from a uniaxial platform.* UASIS, The University of Akron, April 9, 2015.
8. George E, **Saunders MM**. *The effect of osteocytic soluble factors on mineralization of osteoblasts*. UASIS, The University of Akron, April 9, 2015.
9. King JD, Hayes D, **Saunders MM**. *Development of a pure uniaxial microloading system for biologic testing*. UASIS, The University of Akron, April 2014. ***Life Award (Graduate Student)***
10. York SL, **Saunders MM**. *Quantification of bone cell microdamage in initiating bone repair*. UASIS, The University of Akron, April 2014. ***(1st place presentation/section winner) (Outstanding Graduate Student Researcher Award, 2014)***
11. **Saunders MM**. Mechanobiology: *Biomimicry and bone remodeling.* Integrative Biosciences Seminar Series, The University of Akron, Akron, OH, April 12, 2013.
12. Battista C, Manges R, York S, **Saunders MM**. *PDMS characterization as a precursor to cellular mechanoresponsiveness*. Ohio Space Grant Consortium Presentation, Cleveland, OH, April 5, 2013.
13. **Saunders MM.** *Mechanobiology: Can we model bone remodeling?* Graduate Student Seminar. Department of Biology, Youngstown State University, Youngstown, OH, October 12, 2012.
14. **Saunders MM.** *Mechanobiology: Can we model bone remodeling?* Graduate Student Seminar. The University of Akron, Akron, OH, October 5, 2012.
15. **Saunders MM**. *OsteoChip Technologies and related products.* Commercial pitch to Angel Investors, Austen Bioinnovation Institute of Akron, Akron, OH, April 30, 2012.
16. **Saunders MM**. *Research in the bone biomechanics and mechanobiology laboratory.* The University of Akron, Akron, OH, February 17, 2012.
17. **Saunders MM.** Utilizing microsystems tools and technologies to develop lab-on-a-chip devices for bone research, clinical disease detection and treatment efficacy. IDEAtion Session, ABIA, Akron, OH, January 26, 2012.
18. **Saunders MM**. *Bone biomechanics and mechanobiology: Research capabilities at The University of Akron.* NEOMED, Rootstown, OH, December 9, 2011.
19. **Saunders MM**, Shah K, Drockton J. *Applications of mechanical testing platforms for basic science and translational research.* Summa's Research Forum 2011, Akron City Hospital, September 23, 2011.
20. Drockton J, Shah K, Nemer R, **Saunders MM**. Mechanical characterization of polydimethylsiloxane substrates for Microsystems applications. Summa's Research Forum 2011, Akron City Hospital, September 23, 2011.
21. Shah K, Fenton B, Evancho Chapman M, **Saunders MM**. *Mechanical characterization of pelvic adhesions in a swine model.* Summa's Research Forum 2011, Akron City Hospital, September 23, 2011.
22. Shah K, Fenton B, **Saunders MM**. *Quantification of a porcine adhesion model using mechanical testing*. Summer Research Fellowship Program, Summa, Akron City Hospital, July 29, 2011.
23. **Saunders MM.** *Introduction to and preparation of an NSF Graduate Research Fellowship Application.* Graduate/Undergraduate Student Seminar. The University of Akron, Akron, OH, April 5, 2011.
24. **Saunders MM.** *Bone biomechanics and mechanobiology.* Graduate Student Seminar. The University of Akron, Akron, OH, October 29, 2010.

25. **Saunders MM.** *How to design an implant*. Natural Science Honors Colloquium. The University of Akron, Akron, OH, September 28, 2010.
26. **Saunders MM**. *Towards microsystems modeling of bone cell processes and phenomena.* Engineering Platforms for Exploring Cellular and Molecular Signaling Processes Annual Conference. University of Louisville, Louisville, KY, June 29, 2010.
27. Gurley KM, Gobin AS, **Saunders MM**. *A microCT assessment of bone organ culture viability in a neonatal rat femur model.* Engineering Platforms for Exploring Cellular and Molecular Signaling Processes Annual Conference. University of Louisville, Louisville, KY, June 29, 2010.
28. Brittle DE, Gurley KM, Gobin AS, **Saunders MM**. *MicroCT analysis of whole bone culture viability out to one month.* Engineering Platforms for Exploring Cellular and Molecular Signaling Processes Annual Conference. University of Louisville, Louisville, KY, June 29, 2010.
29. Simmerman LA, Martin J, Sethu P, **Saunders MM**. *Osteocyte characterization on polydimethylsiloxane substrate: viability, proliferation and sclerostin production*. 15th Annual Kentucky EPSCoR Conference, Lexington, KY, May 24, 2010.
30. Simmerman LA, Sethu P, **Saunders MM**. *Osteocyte characterization on polydimethylsiloxane substrate: quantification of functional communication*. 15th Annual Kentucky EPSCoR Conference, Lexington, KY, May 24, 2010.
31. Martin JR, Sethu P, **Saunders MM**. *Mechanical characterization of polydimethylsiloxane for microsystems applications.* 15th Annual Kentucky EPSCoR Conference, Lexington, KY, May 24, 2010.
32. Gurley KM, Gobin AS, **Saunders MM**. *A microCT assessment of bone organ culture viability in a neonatal rat femur model.* 15th Annual Kentucky EPSCoR Conference, Lexington, KY, May 24, 2010.
33. **Saunders MM**. *Biomechanics and mechanobiology in bone research.* Department of Biomedical Engineering, The University of Akron, Akron, OH, May 7, 2010.
34. Heil B, **Saunders MM.** *Mechanical loading for increasing bone responsiveness in organ culture.* Biomaterials Day, University of Kentucky, Lexington, KY, Sept 25, 2009.
35. **Saunders MM.** *Biomechanics and mechanobiology in bone research.* Dept of Bioengineering, University of Louisville, Louisville, KY, Sept 2, 2009.
36. **Saunders MM**. *Organ culture mechanotransduction*. Center for Clinical and Translational Sciences, Lexington Convention Center, Lexington, KY, April 23, 2009.
37. **Saunders MM**. *Organ culture mechanotransduction – What is it and what can we do with it?* 5th Annual Visiting Professorship, College of Dentistry, University of Kentucky, Lexington, KY, April 18, 2009.
38. **Saunders MM**. *Osteogenic potential of distraction*. 5th Annual Visiting Professorship, College of Dentistry, University of Kentucky, Lexington, KY, April 18, 2009.
39. **Saunders MM**, Simmerman L, Long C. *Organ culture mechanotansduction modeling*. Annual Research Day, College of Dentistry, University of Kentucky, Lexington, KY, March 10, 2009.
40. **Saunders MM.** *Engineered platforms for exploring cellular and molecular signaling*. NSF EPSCoR Annual Meeting, Louisville, KY, October 3, 2008.
41. Petrey JS, **Saunders MM**, Kluemper GT, Beeman CS. *Orthodontic mini-implant insertion variables: effects on primary stability*. Annual Research Day, College of Dentistry, University of Kentucky, Lexington, KY, March 11, 2008. ***(1st place presentation/Resident Oral Presentations)***
42. **Saunders MM**. *Ex vivo mechanotransduction. What is it and what can we do with it?* 17th Annual James Buchanan Memorial Lecture, The Department of Orthopaedics, Penn State University College of Medicine, Hershey, PA, June 16, 2006.
43. **Saunders MM**. *Bone and mechanical loading.* Center for Biomedical Engineering, University of Kentucky, Lexington, KY, Mar 12, 2006.
44. **Saunders MM**, Burger RB, Kalantari B, Magruder JL, Nichols AD, Reed GL, Witman C. *Development of a cost-effective torsional unit for small-scale biomechanical testing.* Penn Sate University College of Engineering Research Day, Dec 3, 2005. ***(Outstanding Sponsor/Mentor Award)***
45. **Saunders MM**. *Bone and mechanical loading.* Invited Presentation: Surgery Grand Rounds, Pennsylvania State University College of Medicine, Hershey, PA, Nov 16, 2005.
46. **Saunders MM**. *Design of a cost-effective, small-scale loading machine for biomedical research: From concept to production.* Innoventure 2005, Pennsylvania State University College of Medicine, Hershey, PA, April 15, 2005.
47. **Saunders MM**, Taylor AF, Du C, Donahue HJ, Eastman J, Cavener P, Saggers G, Ehrlich HP, Zhang X, Connor J. *Design of a cost-effective, small-scale loading machine for biomedical research: From production to application.* Innoventure 2005, Pennsylvania State University College of Medicine, Hershey, PA, April 15, 2005.
48. **Saunders MM.** *A role for engineering in orthopaedic research.* Penn State College of Medicine, Hershey, PA, May 26, 2004. ***(Hinkle Society Award Presentation (Rising Star Award))***
49. Huang-Brown KM, **Saunders MM**, Lynn AK, Goodspeed DC, Kirsch T, Donahue HJ, Reid JS. *The effect of COX-2 specific*

inhibitors on fracture healing in the adult rat femur. 14th Annual James Buchanan Memorial Lecture, The Department of Orthopaedics, Penn State University College of Medicine, Hershey, PA, June 20, 2003.

50. Hugate R, Pennypacker J, **Saunders M**, Juliano P. *The effects of intratendinous or retrocalcaneal bursal injections of corticosteroids on the biomechanical properties of rabbit Achilles tendons.* 14th Annual James Buchanan Memorial Lecture, The Department of Orthopaedics, Penn State University College of Medicine, Hershey, PA, June 20, 2003.
51. Black KP, **Saunders MM**. *Development of a novel expansion anchor for use in anterior cruciate ligament reconstruction.* Innoventure 2003, Pennsylvania State University College of Medicine, Hershey, PA, May 2, 2003.
52. Donahue HJ, Hanson JC, Lim JY, **Saunders MM**, Siedlecki CA, Vogler E, Yellowley C, You J. *Rational design of an optimized bioreactor for in vitro engineering of skeletal tissue*. Innoventure 2003, Pennsylvania State University College of Medicine, Hershey, PA, May 2, 2003.
53. **Saunders MM**. *Orthopaedic Implants: From theoretical design and mechanical testing to in vitro and in situ mechanotransduction.* Invited presentation. Bioengineering Seminar Penn State University, Nov 1, 2002.
54. Donahue HJ, Jacobs CR, Li Z, **Saunders MM**, Yellowley CE, You J, Zhou Z. *Bone cell mechanobiology*. 9th Annual Technical Meeting of the Society of Engineering Science, State College, PA, Oct 13-16th, 2002.
55. Goodspeed DC, **Saunders MM**, Foust TL, Hodrick J, Huang-Brown KM. *A torsional assessment of femoral bone strength at three distal bone graft harvest sites.* 13th Annual James Buchanan Memorial Lecture, The Department of Orthopaedics, Pennsylvania State University College of Medicine, Hershey, PA, June 21, 2002.
56. Huang-Brown KM, **Saunders MM**, Lynn AK, Goodspeed DC, Kirsch T, Donahue HJ, Reid JS. *The effect of COX-2 specific inhibitors on fracture healing in the adult rat femur.* 13th Annual James Buchanan Memorial Lecture, The Department of Orthopaedics, Penn State University College of Medicine, Hershey, PA, June 21, 2002.
57. Zanotti DJ, **Saunders MM**, Pellegrini VD Jr, Naidu S. *Biomechanical stability following ulno-humeral arthroplasty (Outerbridge-Kashiwagi Arthroplasty).* 13th Annual James Buchanan Memorial Lecture, The Department of Orthopaedics, Pennsylvania State University College of Medicine, Hershey, PA, June 21, 2002.
58. Bergandi, JA**,** Feinblatt, J, Rumi, MN, **Saunders MM**, Naidu, SH, Pellegrini, VD, Jr. *A comparison of wear debris induced osteolysis along a cemented and cementless interface: An animal model in the rabbit.* 12th Annual James Buchanan Memorial Lecture, Department of Orthopaedics and Rehabilitation, The Pennsylvania State University College of Medicine, June, 2001.
59. Bergandi, JA, Kaag, M, **Saunders MM**, Jacobs, CR, Parrish, WM. *Torsion and bending evaluation of femoral allograft fixation techniques in a cadaveric model: A comparison of double plate to intramedullary nail and plate fixation.* 11th Annual James Buchanan Memorial Lecture, Department of Orthopaedics and Rehabilitation, The Pennsylvania State University College of Medicine, June, 2000.
60. **Saunders MM,** Seraj J, Yellowley C, Hoke A, Welch D, Donahue H. *Gap junctional intercellular communication in metastatic breast carcinoma cells.* Biomolecular Transport Dynamics Symposium, Pennsylvania State University College of Medicine, Hershey, PA, November 30, 1999.
61. **Saunders MM**, Njus GO. *The feasibility of lower limb direct skeletal attachment*. Annual Breakfast. The Institute for Biomedical Engineering Research. May, 1998. ***(2nd place poster presentation)***
62. **Saunders MM**, Njus GO, Kay DB, Shamp D. *Adaptive bone remodeling in a lower limb direct skeletal attachment system.* - Invited Speaker. Wound Care Symposium, Health and Wellness Center, Akron, OH, Oct 29, 1997.
63. **Saunders MM**, Njus GO. *Adaptive bone remodeling in the design of a lower limb direct skeletal attachment device.* Annual Breakfast. The Institute for Biomedical Engineering Research. Akron, OH, May, 1997. ***(1st place oral presentation)***
64. **Saunders MM**, Njus GO. *The use of finite element analysis as a tool for clinical orthopaedics.* Annual Breakfast. The Institute for Biomedical Engineering Research. Akron, OH, May, 1995.
65. **Saunders MM**, Njus GO. *Mechanical characterization of a common prosthetic foot.* Annual Breakfast. The Institute for Biomedical Engineering Research. Akron, OH, May, 1994. ***(1st place poster presentation)***
66. **Saunders MM**, Njus GO. *The use of finite element analysis in prosthetic foot design.* Annual Breakfast. The Institute for Biomedical Engineering Research. Akron, OH, May, 1993. ***(2nd place poster presentation)***
67. **Saunders MM**, Lang GJ, Flanagan JP, Njus GO. *Augmentation of sliding hip screw fixation with polymethylmethacrylate: A biomechanical study in a cadaveric model.* Annual Breakfast. The Institute for Biomedical Engineering Research. Akron, OH, May, 1992. ***(1st place oral presentation)***

TECHNICAL DEVELOPMENT:

- Career Development Award (2003-2007) (NIH) Technical Development Program Outline
  Completed Formal Coursework:
  - *Cellular Biology (3 credit graduate course)* (1/04-4/04)
  - *Molecular Biology (3 credit graduate course) BioE 201: Cells and Molecules* (1/05-4/05)

- *Machine Trades I (Adult education course – 42 hours)* (2/06-3/06)
  - *Offered by*: Lancaster County Career and Technology Center, Mount Joy, PA

Completed Formal Workshops:

- *Skeletal Development and Remodeling in Health, Disease and Aging*
  - *Sponsor*: New York Academy of Sciences, Mount Sinai Medical Center, NY, Apr 28-May 2, 2009.
- *Cosmos FloWorks*
  - *Sponsor:* 3DVision Technologies, Cincinnati Training Center, Cincinnati, OH, March 31-April 1, 2008.
- *CosmosWorks Designer and Professional*
  - *Sponsor:* 3DVision Technologies, Cincinnati Training Center, Cincinnati, OH, February 6-8, 2008.
- *SolidWorks Essentials*
  - *Sponsor:* 3DVision Technologies, Louisville Training Center, Louisville, KY, June 10-13, 2007.
- *Bone Innovation Summit*
  - *Sponsor:* Cleveland Clinic Foundation, InterContinental Hotel and MBNA Conference Center, Cleveland, OH, May 3-5, 2006.
  - *Aim:* To provide innovation in bone research and to recognize and foster the multidisciplinary skills needed to advance development and optimal use of current and future therapeutic options
- *Techniques in Molecular Biology (2 credit graduate course)*
  - *Sponsor:* The Pennsylvania State University, June 14-25, 2004 (6/04)
  - *Aim:* To provide basic training in molecular biology including hands-on experience in purifying DNA, analyzing DNA by restriction enzymes, gel electrophoresis and nucleic acid hybridization, generating nucleic acid probes, cloning and screening for desired clones, DNA sequencing, PCR amplification and protein analysis by western blotting
- *Skeletal Development and Remodeling in Health, Disease and Aging*
  - *Sponsor*: New York Academy of Sciences, Mount Sinai Medical Center, NY, May 18-21, 2005.

Completed Training Courses:

- *Osteoporotic Vertebral Fracture: Everything you need to know.*
  - *Sponsor:* ECTS Training Course (9 hour course), Geneva Switzerland, June 25, 2005
- *Bone and Mechanical Loading*
  - *Sponsor:* European Calcified Tissue Society, University of Edinburgh, Edinburgh, Scotland; Sept 3-4, 2003
  - *Aim:* To provide a comprehensive tutorial of both the methodologies used and those being developed for use in the study of the response of skeletal tissues to mechanical stimuli

- Additional Seminars:
  - *Non-invasive Bone Measurement Techniques Workshop*, American Society for Bone and Mineral Research Annual Meeting, Montreal, Canada, September 12, 2008.
  - *Measurement of Biological Forces on Cells* Workshop, The Biomedical Engineering Society 2004 Annual Fall Meeting, Philadelphia, PA, October 13, 2004.
  - *Introduction and Advanced Topics in Abaqus*: Cleveland, OH. April 30 - May 4, 2001.
  - *Quiktest Controls Training Session:* EnduraTec System Corp., Minnetonka, MN September 14-15, 1999. Topics covered included: closed-loop control theory, user interface and test setup, control optimization and data acquisition, service and calibration of equipment and hands-on training
  - *Bridging the Gap between Dental and Orthopaedic Implants*: Indiana University School of Dentistry, Indianapolis, IN, May 13-16, 1998. Travel Grant Recipient

PROFESSIONAL DEVELOPMENT:

- MAC Academic Leadership Development Program Fellow, The University of Akron, 2018-2019
- Professional Science Masters Degree Workshop, The University of Toledo, March 15-16, 2018
- 2017 ABET Symposium, Baltimore, MD, April 20-21, 2017
  i. EAC Workshop, April 19
  ii. Fundamentals of Program Assessment, April 22
- *Women Entrepreneurship Program*, Austen Bioinnovation Institute, Spring, 2012
  i. *Intention is to facilitate the development of a start-up company*
     1. Developing Business Plan for screening products (Disclosure Filed)
     2. Continuing to develop technology and plan to apply for developmental funding

- *To Tenure and Beyond: Building an Intentional Career in STEM*, a Forward to Professorship Program 2010-2011, Case Western Reserve University, Cleveland, OH
- *New Faculty Orientation and Development Series,* University of Kentucky, Fall 2007-Spring 2008
- *Engineering Junior Faculty Series*, University of Kentucky, Fall 2007-Spring 2008
- *Circles of Power (COP) Leadership Program*, President's Commission on Women, University of Kentucky, Lexington, KY, Fall 2007-Spring 2008
- *Lilly East Conference on College and University Teaching,* University of Delaware, Clayton Hall, Newark, DE, April 7-8, 2006.
- *Problem-based Learning Workshop* (3 Hr). Sponsored by *Lilly East Conference on College and University Teaching,* University of Delaware, Clayton Hall, Newark, DE, April 6, 2006.
- *Career Development Award (2003-2007) (NIH, Aging)*
- *Women as Leaders: A Leadership Summit,* Dean's Council on Diversity and Office of Professional Development, Penn State College of Medicine, March 29, 2005.
- *Elements of Clinical Research,* The Milton S. Hershey Medical Center, Hershey PA, (9/03-5/04).
- *Junior Faculty Development Program,* The Milton S. Hershey Medical Center, Hershey PA, (9/03-5/04).
- *Lilly East Conference on College and University Teaching,* Towson University, Teaching and Learning Burkshire Conference Center, Towson MD, Apr 1-3, 2004
- *Write Winning Grants,* The Milton S. Hershey Medical Center, Hershey PA, Aug 19-20, 2002.
- *Protecting Human Subjects of Research at the Penn State University:* Hershey Medical Center, Hershey, PA, November, 2000.
- *Orientation to the Responsible and Ethical Conduct of Research:* Hershey Medical Center, PA, Oct 2, 2000.