Christina Salas
(530) 566-4158
108 Tulane Dr. NE Albuquerque, NM 87106
chrsalas@salud.unm.edu

EDUCATION

Ph.D. in Biomedical Engineering, University of New Mexico Albuquerque, May 2014

Honors: Passed dissertation defense with distinction
Passed comprehensive exam with distinction

Dissertation: *The Trapeziometacarpal Joint: Tissue Characterization and Surgical Techniques for Treatment of Osteoarthritis*

PhD Transcripted Minor: Nanoscience and Microsystems Engineering

Advisor: Mahmoud Reda Taha, PhD

M.S. in Mechanical Engineering, University of New Mexico Albuquerque, December 2008

Honors: Passed thesis defense with distinction

Thesis: *A Biomechanical Comparison of Locked Plates Contrasted with Intramedullary Treatment of Distal Femur Fracture*

Emphasis: Orthopaedic biomechanics/finite element analysis

B.S. in Mechanical Engineering, California State University Chico, May 2005

Senior Design Project: *An Automated Vineyard Irrigation Tank Controller*

Minor: Manufacturing

TRAINING AND RESEARCH EXPERIENCE

Senior Research Engineer (January 2007-Present)

Department of Orthopaedics and Rehabilitation, University of New Mexico, Albuquerque

Supervisor: Deana Mercer, MD

- Manager of the orthopaedic biomechanics research laboratory
- Design biomechanics projects to address clinical orthopaedic problems
- Research areas: Trapeziometacarpal ligament characterization and joint osteoarthritis treatment, volar plating for fractures of the distal radius, development of treatment options for patella fractures, prediction of hip fractures through computational finite element modeling, periprosthetic fractures of the distal femur using locked plating, benign osseous tumors of the distal femur
- Mentor/advise orthopaedic residents (9) and fellows (7), medical students (6) and graduate level engineering students (6)
- Compose funding proposals, peer-reviewed publications, and conference presentations
- Develop collaborations between the School of Engineering and School of Medicine and investigate potential for collaboration with other universities
- Collaborating with medical school Office of Diversity to develop Medical Student Outreach Program (MSOP) to encourage incoming female medical students to pursue careers in orthopaedic surgery
- Developed research committee to pair medical students with research active faculty to facilitate completion of medical student research project requirements
- Network with orthopaedic implant company representatives to facilitate resident trainings and funding for research projects
- Member of the University of New Mexico Biodesign Group for development and implementation of new biomedical technologies for clinical and translational education and research, liaison between the School of Engineering and the Department of Orthopaedics

Pre-doctoral Research Engineer (June 2010 – August 2012)

Biomedical Modeling and Analysis Group, Division of Engineering and Technical Services, Mayo Clinic, Rochester

Supervisor: Dan Dragomir-Daescu, PhD

- Led sub-group for advanced finite element analyses of proximal femurs to develop hip fracture prediction tool using quantitative computed tomography
- Large scale experimental testing (>100) of proximal femurs to simulate a fall-on-the-hip condition to investigate patterns of failure through high speed video and digital image correlation
- Developed Matlab code for analyses of experimental and computational data
- Created tutorials for all aspects of the experimental and computational research for incoming interns, engineers, and post-doctoral fellows to resume study
- Composed peer-reviewed publications and conference presentations

Project Manager (January 2009 – July 2009)

Biomechanical Testing Facility, San Francisco General Hospital Orthopaedic Trauma Institute, University of California, San Francisco

Supervisor: Jenni M. Buckley, PhD

- Engineer responsible for leading research group investigating treatment of the acetabulum and evaluation of treatment in standing, walking, and sit-to-stand positions
- Collaborated with researchers from UC Santa Barbara on novel, less-invasive bone quality analysis tool for clinical and surgical use
- Designed and fabricated all testing fixtures for advanced simulation
- Preparation of conference presentations and publications

Undergraduate Intern (January 2005- May 2005)

Lares Research, Chico, California

Supervisor: John Dahlgren

- Responsible for sound testing of dental handpieces
- Documenting of results for certification of ISO decibel standard

GRANT PROPOSALS

1. NIH Director's Early Independence Award (DP5), "Restoring Function of the Thumb Basal Joint Through Ligament Tissue Engineering", Role: Primary Investigator, Status: In Review. January 2014
2. University of New Mexico Student Research Project and Travel Grant, Role: Grant Author, Status: Awarded $500 for travel expenses to present research. January 2014
3. Acumed AcuLoc2 Plating System, Role: Grant Author, Status: Awarded $15,000. March 2013
4. University of New Mexico Research Support Equipment Grant, "Premier fluoroscan imaging system mini C-arm", Role: Grant Author, Status: Awarded $33,500. January 2013
5. University of New Mexico Clinical and Translational Science Center Pilot and Collaborative Research Project Program, "Biomechanical evaluation of structures responsible for thumb basal joint stability", Role: Grant Author, Status: Awarded $17,423. December 2012

Christina Salas
(530) 566-4158
108 Tulane Dr. NE Albuquerque, NM 87106
chrsalas@salud.unm.edu

PATENT APPLICATIONS

- Provisional patent #61812978; Full patent filed April 2014 – "Low-profile high tension mesh plate for subcutaneous fracture fixation"

CERTIFICATES

- Grant Writing, University of New Mexico, 2011
- Primary Investigator Eligibility, University of New Mexico, 2011
- Biomedical Research Publication Writing, Mayo Clinic, 2011

FELLOWSHIPS, ASSISTANTSHIPS, AWARDS, AND HONORS

- Outstanding Graduate Student Award for Chemical and Nuclear Engineering, Spring 2014
- $3,250 Graduate Student Success Scholarship, University of New Mexico, Spring 2014
- First place poster award in the Medicine and Health Science division; third place poster award overall – New Mexico Shared Knowledge Conference and Research Exposition April 2013
- Featured in Diversity Careers in Engineering & Information Technology magazine in a special edition on Technical Women of Color, April/May 2012
- $60,000 Integrative Graduate Education and Research Traineeship (IGERT) in Nanoscience and Microsystems, National Science Foundation, 2009-2011
- Podium presentation at 18th Symposium on Computational Methods in Orthopaedic Biomechanics selected to be published in a special edition of the International Journal of Computer Methods in Biomechanics and Biomedical Engineering entitled Novel Computational Techniques in Orthopaedic Biomechanics (2010; published 2011)
- Graduate Research Assistantship, Department of Civil Engineering, The University of New Mexico, Albuquerque, NM 2006-Present
- National Science Foundation Scholarship, California State University, Chico, CA, 2005
- Math, Engineering and Science Achievement (MESA) Programs Scholarship, California State University, Chico, CA, 2004

PROFESSIONAL SERVICE

- Journal of Orthopaedic Research manuscript reviewer
- Student representative on faculty hiring committee seeking assistant professor hire in biomedical engineering and computational modeling, Spring 2013
- Student representative on faculty hiring committee seeking assistant professor hire for advanced materials and cyber security research, Spring 2012
- Co-chartered Biomedical Engineering Graduate Student Association Spring 2012, developed program website; Secretary, 2012-present

PROFESSIONAL AFFILIATIONS

Orthopaedic Research Society, Associate Member
Sigma Xi Scientific Research Society, Full Member

American Society of Mechanical Engineers, Student Member
Biomedical Engineering Society, Student Member
Society of Women Engineers, Student Member

PEER-REVIEWED JOURNAL PUBLICATIONS

1. Cheema T, **Salas C**, Morrell N, Lansing L, Reda Taha MM, Mercer D. Opening wedge trapezial osteotomy as possible treatment for early trapeziometacarpal osteoarthritis: A biomechanical investigation of radial subluxation, contact area, and contact pressure. J Hand Surg Am. 2012 Apr; 37(4): 699-705.
2. **Salas C**, Mercer D, DeCoster TA, Reda Taha MM. Experimental and probabilistic analysis of distal femoral periprosthetic fracture: a comparison of locking plate and intramedullary nail fixation. *Part A: experimental investigation*. Comput Methods Biomech Biomed Eng. 2011 Feb;14(2):157-164.
3. **Salas C**, Mercer D, DeCoster TA, Reda Taha MM. Experimental and probabilistic analysis of distal femoral periprosthetic fracture: a comparison of locking plate and intramedullary nail fixation. *Part B: probabilistic investigation*. Comput Methods Biomech Biomed Eng. 2011 Feb;14(2):175-182.
4. Dragomir-Daescu D, Op Den Buijs J, McEligot S, Dai Y, Entwistle R, **Salas C**, Melton LJ 3rd, Bennet K, Khosla S, Amin S. Robust QCT/FEA models of proximal femur stiffness and fracture load during a sideways fall on the hip. Ann Biomed Eng., 2011; 39(2): 742-755.
5. Afifi A, Medoro A, **Salas C**, Reda Taha MM, Cheema T. A novel cadaver model investigating irreducible metacarpophalangeal joint dislocation, J Hand Surg Am, 2009; 34(8): 1506-1511.

CONFERENCE PUBLICATIONS

1. **Salas C**, DeCoster T, Mercer D, Firoozbakhsh K, Reda Taha MM. Examining damage accumulation in osteoporotic distal femur fracture repair, Society for Experimental Mechanics 2009 Annual Conference & Exposition on Experimental & Applied Mechanics, Albuquerque, NM
2. Neidigk S, **Salas C**, Soliman E, Mercer D, Reda Taha MM. Creep and relaxation of osteoporotic bone, Society for Experimental Mechanics 2009 Annual Conference & Exposition on Experimental & Applied Mechanics, Albuquerque, NM

PEER-REVIEWED JOURNAL PUBLICATIONS IN REVIEW/IN PREPARATION

1. **Salas C**, Dragomir-Daescu D. QCT/FEA predictions of proximal femur strength and stiffness depend on CT settings. J Biomech. *In review.*
2. Mercer D, **Salas C**, O'Mahoney G, Stewart D, McClellan W, Moneim M. Partial trapeziectomy with capsular interposition as treatment for thumb carpometacarpal osteoarthritis: A cadaveric and clinical study. J Hand Surg Br. *In review.*
3. Dickens A, **Salas C**, Rise L, Reda Taha M, Gehlert R. Titanium mesh as a low-profile alternative for patella fracture fixation: A biomechanical study. J Orthop Res. *In review.*
4. Hoopes D, **Salas C**, Reda Taha M, DeCoster TA. Finite element design and experimental testing of a novel triangular external fixator configuration for tibial shaft fracture treatment. Orthopaedics. *In review.*
5. **Salas C**, Brantley J, Baldwin E, Carlston C, Reda Taha M, Mercer D. High resolution motion analysis of the thumb carpometacarpal joint: Relative contribution of the joint ligaments to thumb stability. J Orthop Res. *In preparation.*

6. **Salas C**, Brantley J, Baldwin E, Carlston C, Reda Taha M, Mercer D. Mechanical properties of the thumb carpometacarpal joint ligaments and their correlation to joint stability. J Biomech. *In preparation.*
7. **Salas C**, Brantley J, Baldwin E, Carlston C, Reda Taha M, Mercer D. Patient-specific finite element models of the thumb carpometacarpal joint: The effects of ligamentous laxity on joint contact pressure and stability. Ann Biomed Eng. *In preparation.*
8. **Salas C**, Brantley J, Clark J, Baldwin E, Evans S, Reda Taha MM, Mercer D. Patterns of failure in the distal radius following treatment for AO 23-A3.2 fractures using two-column volar plating. J Biomech. *In preparation.*
9. Hoblet A, **Salas C**, Brantley J, Mikola E. Pullout strength and stiffness of a non-metallic suture anchoring system for repair of the central slip of the extensor mechanism at the proximal interphalangeal joint. J Hand Surg Am. *In preparation.*

PODIUM PRESENTATIONS

1. **Salas C**, Hoblet A, Brantley J, Godfrey J, Mikola E. Pullout strength and stiffness of a non-metallic suture anchoring system for repair of the central slip of the extensor mechanism at the proximal interphalangeal joint. 68th Annual Meeting of the American Society for Surgery of the Hand, October 2013, E-presentation
2. **Salas C**, Mercer D, O'Mahoney G, LaBaze D, Moneim M. Biomechanical study investigating partial trapeziectomy with local soft tissue interposition as possible treatment for trapeziometacarpal osteoarthritis. 59th Annual Meeting of the Orthopaedic Research Society, January 2013
3. Mercer D, Morrell N, Cheema T, **Salas C**. "Trapezial osteotomy reduces radial subluxation and improves contact pressure distribution across the thumb carpometacarpal joint in lateral pinch", 74th Annual Meeting of the Western Orthopaedic Association, August 2010 (Presented by Morrell N)
4. Mercer D, **Salas C**, Love J, Lansing L, Medoro A, Reda Taha MM, Cheema T. "Simulated osteotomy of the trapezium reduces radial subluxation and improves contact pressure distribution across the thumb carpometacarpal joint in lateral pinch", American Society of Mechanical Engineers Summer Bioengineering Conference, Naples, FL, June 2010
5. **Salas C**, Tai F, Mercer D, DeCoster TA, Reda Taha MM. "Probabilistic failure analysis of locking compression plating vs. intramedullary nailing for the treatment of distal femur fractures", 18th Symposium on Computational Methods in Orthopaedic Biomechanics, March 2010, New Orleans, LA
6. **Salas C**, DeCoster T, Mercer D, Firoozbakhsh K, Reda Taha MM. "Examining Damage Accumulation in Osteoporotic Distal Femur Fracture Repair", Society for Experimental Mechanics Meeting, June 2009, Albuquerque, NM
7. Neidigk S, **Salas C**, Soliman E, Mercer D, Reda Taha MM. "Creep and Relaxation of Osteoporotic Bone", Society for Experimental Mechanics Meeting, June 2009, Albuquerque, NM (Presented by Neidigk S)
8. Afifi A, Medoro A**, Salas C**, Reda Taha MM, Cheema T. "Anatomy of Irreducible Metacarpophalangeal Dislocation in a Cadaver Model", American Society for Surgery of the Hand Conference, September 2009
9. **Salas C**, Reda Taha MM, DeCoster T, Mercer D. "Pattern of Failure of LCP's Contrasted with Conventional Treatment of Distal Femur Fracture", 27th Annual University of New Mexico Orthopaedic Alumni Conference, June 2008

Christina Salas
(530) 566-4158
108 Tulane Dr. NE Albuquerque, NM 87106
chrsalas@salud.unm.edu

POSTER PRESENTATIONS

1. **Salas C**, Brantley J, Clark J, Baldwin E, Reda Taha MM, Mercer D. Patterns of failure in the distal radius following treatment for extra-articular fractures (AO 23-A3.2) using two colum volar plates. 60th Annual Meeting of the Orthopaedic Research Society, March 2014
2. **Salas C**, Dickens A, Rise L, Reda Taha MM, Gehlert R. Titanium mesh as a low-profile alternative for treatment of patella fractures: A feasibility study. 60th Annual Meeting of the Orthopaedic Research Society, March 2014
3. **Salas C**, Brantley J, Hoblet A, Mikola E. Pullout strength and stiffness of a non-metallic suture anchoring system for repair of the central slip of the extensor mechanism of the proximal interphalangeal joint. 60th Annual Meeting of the Orthopaedic Research Society, March 2014
4. Mercer D, Brady C, Brantley J, Evans S, **Salas C**. Volar percutaneous approach for treatment of scaphoid fractures: An anatomical study investigating structures at risk. 68th Annual Meeting of the American Society for Surgery of the Hand, October 2013
5. **Salas C**, DeCoster TA, Reda Taha MM, Hoopes D. Finite element design and experimental testing of a novel triangular external fixation configuration for tibial shaft fracture treatment. Biomedical Engineering Society 2012 Annual Meeting, October 2012
6. **Salas C**, Dragomir-Daescu D. "Finite element models of the proximal femur: Changing CT settings and meshing strategy", 58th Annual Meeting of the Orthopaedic Research Society, February 2012
7. **Salas C**, Mercer D, Reda Taha MM, Mercer R, DeCoster T. "Biomechanical and finite element evaluation of intramedullary nail vs. locking compression plate used in the treatment of osteoporotic distal femur fractures", 56th Annual Meeting of the Orthopaedic Research Society, March 2010, New Orleans, LA
8. **Salas C**, Marmor M, Chu T, Hansma P, Matityahu A, Buckley J. "Assessment of Local Bone Quality of the Distal Radius Using a Novel Hard Tissue Diagnostic Instrument", American Society of Mechanical Engineers Summer Bioengineering Conference, Lake Tahoe, CA, June 2009
9. Afifi A, Medoro A, **Salas C**, Reda Taha MM, Cheema T. "Anatomy of Irreducible Metacarpophalangeal Dislocation in a Cadaver Model", American Orthopaedic Association Meeting, June 2009 (Presented by Afifi A)

OUTREACH

- Perry Outreach Program satellite at the University of New Mexico, Albuquerque (March 2013, November 2013) Promoting the advancement of women in orthopaedic surgery and engineering by providing hands on experience in surgical techniques, biomechanical experiments, mentoring/networking. UNM site coordinator and program mentor
- Exploring Interests in Technology and Engineering (E.X.I.T.E.) Camp Hosted by IBM (August 9th-13th, 2010) Rochester, MN area middle school girls are teamed up with mentors/volunteers to help them learn about careers in math, science and engineering. Co-organized Mayo Clinic presentation highlighting current research projects in biomedical engineering
- Perry Outreach Program at the University of California, San Francisco (July – August 2009) Program coordinator and mentor for the inaugural year
- Upward Bound Math and Science Program at California State University, Chico (August 2004-May 2005) An academic program which assists a diverse population of motivated low income and first

generation high school students to achieve their goals of succeeding in post-secondary education. Program tutor for high school math/science

- San Antonio Pre-freshman Engineering Program (PREP), San Antonio, TX (Summers 2000-2002) A collaborative effort of local school districts, colleges and universities to encourage underrepresented junior high school and high school students to begin preparing for scientific and engineering career paths. Program mentor, physics instructor, curriculum editor

REFERENCES

- Dr. Mahmoud Reda Taha, Professor and Regent's Lecturer, Department of Civil Engineering, The University of New Mexico, Albuquerque mrtaha@unm.edu 505-277-1258 (MS and PhD faculty advisor)
- Dr. Deana Mercer, Assistant Professor, Department of Orthopaedics and Rehabilitation, Division of Hand Surgery, The University of New Mexico Hospital, Albuquerque dmercer@salud.unm.edu 505-414-8815 (PhD committee member, research collaborator)
- Dr. Thomas A. DeCoster, Professor, Department of Orthopaedics and Rehabilitation, Division of Orthopaedic Trauma, The University of New Mexico Hospital, Albuquerque TDeCoster@salud.unm.edu 505-272-4107 (MS committee member, research collaborator)
- Dr. Dan Dragomir-Daescu, Assistant Professor, Department of Biomedical Engineering, Principal Engineer, Division of Engineering, Mayo Clinic, Rochester MN dragomirdaescu.dan@mayo.edu 507-538-4946 (Primary supervisor at the Mayo Clinic)