Nicole L. Ramo

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Education

Ph.D. Candidate in Biomedical Engineering *Anticipated Summer 2018*
Dissertation: *Spinal Cord and Meningeal Mechanics: material property characterization and sensitivity of finite element predictions*
Colorado State University, Fort Collins, CO

B.S. in Mechanical Engineering, Summa Cum Laude December 2012
Concentration in Bioengineering
Thesis: *Three-Dimensional Quantification of Cervical Intervertebral Disc Deformation*
Kettering University, Flint, MI

Research Experience

Graduate Research Assistant, Colorado State University 2013 - Present
Orthopaedic Bioengineering Research Laboratory

- Designed mechanical testing procedures to obtain the material properties of spinal cord-meningeal complex tissues
- Utilized constitutive models to describe the viscoelastic behavior of the above tissues
- Created finite element computational model of spinal cord-meningeal complex to investigate the effects of geometrical and material simplifications
- Advisor: Dr. Christian Puttlitz

Research Assistant, Henry Ford Hospital – Bone and Joint Center 2010 – 2013
Herrick-Davis Motion Analysis Laboratory

- Assisted in the kinematic analysis of dynamic in-vivo joint motion using a biplane x-ray and CT model-based tracking technique
- Completed the data acquisition, data processing, data analysis, and manuscript preparation of thesis related to cervical spine intervertebral disc deformation
- Advisor: Dr. Michael Bey

Biomechanics Section

- Created image processing protocol for separating cortical and cancellous bone in digital volume correlation images of vertebrae to study the distribution of mechanical stress in each type of bone
- Prepared human vertebral specimens for digital tomosynthesis imaging and mechanical testing
- Advisor: Dr. Yener Yeni

Publications

1. **Ramo NL**, Troyer KL, Puttlitz CM. Contribution of the Pia and Arachnoid Maters to the Mechanical Response of the Spinal Cord. *In preparation.*

2. Easley J, Puttlitz CM, Palmer R, **Ramo N**, Abjornson C, Cammisa FP, McGilvray K. Biomechanical and Histological Assessment of a Novel Screw Retention Technology in an Ovine Lumbar Fusion Model. *The Spine Journal,* under review.

3. **Ramo NL**, Shetye SS, Streijger F, Lee JHT, Troyer KL, Kwon BK, Cripton P, Puttlitz CM. Comparison of In-Vivo and Ex-Vivo Viscoelastic Behavior of the Spinal Cord. *Acta Biomaterialia,* 68: 78-89, 2018

4. **Ramo NL**, Puttlitz CM, Troyer KL. The Development and Validation of a Numerical Integration Method for Non-linear Viscoelastic Modeling. *PLoS One,* 13(1):e01901371-13, 2018

5. **Ramo N**, Shetye SS, Puttlitz CM. Damage Accumulation Modeling and Rate Dependency of Spinal Dura Mater. *ASME Journal of Engineering and Science in Medical Diagnostics and Therapy,* 1(1):110061-8, 2018

6. Peltz CD, Divine G, Drake A, **Ramo NL**, Zauel R, Moutzouros V, Bey MJ. Associations Between In-Vivo Glenohumeral Joint Motion and Morphology. *Journal of Biomechanics,* 48(12):3252-7, 2015

7. Peltz CD, Baumer TG, Mende V, **Ramo N**, Mehran N, Moutzouros V, Bey MJ. Effect of Arthroscopic Stabilization on In-Vivo Glenohumeral Joint Motion and Clinical Outcomes in Patients with Anterior Instability. *The American Journal of Sports Medicine,* 43(11):2800-8, 2015

8. Peltz CD, Zauel R, **Ramo N**, Mehran N, Moutzouros V, Bey MJ. Differences in Glenohumeral Joint Morphology Between Patients with Anterior Shoulder Instability and Healthy, Uninjured Volunteers. *Journal of Shoulder and Elbow Surgery,* 24(7):1014-20, 2015

9. McDonald CP, Chang V, McDonald M, **Ramo N**, Bey MJ, Bartol S. Three-dimensional Motion Analysis of the Cervical Spine for Comparison of Anterior Cervical Decompression and Fusion versus Artificial Disc Replacement in 17 Patients: Clinical Article. *Journal of Neurosurgery: Spine*, 20(3):245-55, 2014

10. Peltz CD, Haladik JA, Hoffman SE, McDonald M, **Ramo NL**, Divine G, Nurse M, Bey MJ. Effects of Footwear on Three-dimensional Tibiotalar and Subtalar Joint Motion During Running. *Journal of Biomechanics,* 47(11):2647-53, 2014

11. Peltz CD, Haladik JA, Hoffman SE, McDonald M, **Ramo N**, Moutzouros V, Bey MJ. Associations Among Shoulder Strength, Glenohumeral Joint Motion, and Clinical

Outcome After Rotator Cuff Repair. *American Journal of Orthopedics*, 43(5):220-6, 2014

Presentations/Posters

1. **Ramo N**, Troyer KL, Puttlitz CM. Viscoelastic Behavior of Isolated Cervical Spinal Cord and Pia Mater Tissues. Summer Biomechanics, Bioengineering & Biotransport Conference, Podium #294, 2017

2. **Ramo N**, Troyer KL, Puttlitz CM. An Efficient Numerical Integration Method for Non-linear Viscoelastic Modeling. Summer Biomechanics, Bioengineering & Biotransport Conference, Poster #151, 2017

3. **Ramo N**, Shetye SS, Puttlitz CM. Damage Accumulation Modeling and Rate Dependency of Spinal Dura Mater. Summer Biomechanics, Bioengineering & Biotransport Conference, Poster #271, 2015

4. Peltz CD, Haladik JA, McDonald M, **Ramo N**, Mehran N, Moutzouros V, Bey MJ. Effect of Arthroscopic Stabilization on In-Vivo Glenohumeral Joint Motion in Patients with Anterior Instability. Orthopaedic Research Society annual meeting, Paper #0129, 2014

5. Peltz CD, Haladik JA, Hoffman SE, McDonald M, **Ramo N**, Nurse M, Bey MJ. Effects Of Footwear on Three-dimensional Tibiotalar and Subtalar Joint Motion During Running. Orthopaedic Research Society annual meeting, Poster #1041, 2014

6. Peltz CD, Haladik JA, McDonald M, **Ramo N**, Moutzouros V, Bey MJ. The Effect of Shoulder Instability on Dynamic In-Vivo Glenohumeral Joint Motion: Preliminary Findings. Orthopaedic Research Society annual meeting, Poster #1896, 2013

7. Bey MJ, Haladik J, McDonald MJ, **Ramo NL**, Kolowich P, Lock T, Moutzouros V. Shoulder Strength Ratio Is Associated with Joint Mechanics and Clinical Outcome After Rotator Cuff Repair. Orthopaedic Research Society annual meeting, 37:291, 2012

8. Peltz CD, Haladik J, Zauel R, McDonald M, **Ramo NL**, Kolowich P, Lock T, Moutzouros V, Bey MJ. Relationships Between Glenoid Morphology and In-Vivo Glenohumeral Joint Motion. Orthopaedic Research Society annual meeting, 37:2218, 2012

9. Bey MJ, Haladik J, McDonald MJ, **Ramo NL**, Kolowich PA, Lock TR, Moutzouros V. The Effect Of Rotator Cuff Integrity On Dynamic, In-Vivo Glenohumeral Joint Motion. Orthopaedic Research Society annual meeting 37:1241, 2012

10. Bey MJ, Haladik JA, McDonald M, **Ramo N**, Kolowich PA, Lock TR, Moutzouros V. Shoulder Strength Ratio Is Associated with Joint Mechanics and Clinical Outcome

After Rotator Cuff Repair. American Shoulder and Elbow Surgeons' Closed Meeting, Sea Island, GA, October 2012

11. Peltz CD, Ciarelli K, Haladik J, McDonald M, **Ramo N**, Moutzouros V, Bey MJ. The Relationship Between In-Vivo Glenohumeral Joint Motion and Joint Morphology in Rotator Cuff Repair Patients and Healthy Control Subjects. ASME Summer Bioengineering Conference, Abstract #53240, 2011

12. McDonald CP, McDonald MJ, **Ramo NL**, Bartol SW, Bey MJ. Artificial Disc Versus Fusion: Effect on Three-Dimensional Dynamic In Vivo Cervical Spine Motion. ASME Summer Bioengineering Conference, Abstract #53301, 2011

Honors and Awards

Teaching Excellence Award, School of Biomedical Engineering 2017

Summer Travel Award, Graduate Student Council, Colorado State University 2017

Graduate Teaching Fellowship, College of Engineering 2016

Shrake-Culler Scholarship, College of Engineering 2016

Force and Motion Foundation Academic Scholarship, AMTI 2015

Image-Based Biomedical Modeling Summer Course Fellowship recipient 2015

Ford Foundation Predoctoral Fellowship - Honorable Mention, 2015
National Research Council of National Academies

Wheeler-Toth Scholarship for Innovation and
Diversity in Biomedical Engineering, Colorado State University 2014

Tau Beta Pi Engineering Honor Society Member since 2010

Teaching Experience

Engineering Education Publications

1. **Ramo NL,** Nejad JE, Popat KC, Catton K. Student Assessment of Active Learning Elements in 100-level Introductory Biomedical Engineering Course. *American Society for Engineering Education Annual Conference & Exposition,* 2018

2. Asher ZD, **Ramo NL**, Bradley T. The Use of Systems Engineering Principles to Improve Learning Outcomes and Team Function in a Multi-Disciplinary Course. *American Society for Engineering Education Annual Conference & Exposition,* 2018

Graduate Teaching Assistant Fall 2016
Introduction to Biomedical Engineering – Colorado State University
Participated in weekly teaching focused professional development events to learn how to contribute to retention efforts for first year students in engineering; created and facilitated active learning activities to help enforce important topics and increase critical thinking; developed and delivered lectures on biomechanics and bioinstrumentation

Graduate Teaching Assistant Fall 2014 – Spring 2016
Biomedical Engineering Capstone Design – Colorado State University
Mentored teams of fifth year biomedical engineering dual degree students as they designed, built, and validated devices for corporate and faculty sponsors

Graduate Teaching Assistant Spring 2014
Engineering Design III – Colorado State University
Led laboratory discussions and tutorials related to topics in finite element analysis and computational flow dynamics

Volunteer Work/Community Outreach

Graduate Student Representative, Spring 2016 – Spring 2017
School of Biomedical Engineering Curriculum Committee
Worked with faculty and administrators to address issues and consider changes to the graduate biomedical engineering program

President, Graduate Student Council Spring 2016 – Spring 2017
Worked with Colorado State University's Graduate School to advocate for graduate student interests in various faculty council and university wide committees; created graduate travel award to support conference travel

STEAM and Education Room Volunteer 2015 - 2016
Boys and Girls Clubs of Larimer County
Tutored club members (ages 6-17) in math and science; assisted with science, technology, engineering, arts, and mathematics focused hands-on activities

Graduate Student Council Representative 2014 - 2017
University Technology Fee Advisory Board
Worked with representatives from diverse student organizations/departments to determine how to best allocate the ~1.7 million dollars generated from the student technology fee

Post-Flood Restoration 2013
Helped repair a trail system and outdoor area maintained by Colorado State University that was damaged by flooding

Hobbies and Interests

Watching college sports, hiking, reading