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## **EDUCATION**

Ph.D. Mechanical Engineering, July 2003, **Drexel University, Philadelphia, PA**  
Thesis: "A Three-Dimensional Stress MRI Technique to Quantify the Mechanical Properties of the Ankle and Subtalar Joint: Application to the Detection of Ligament Injuries"

M.S.E. Mechanical Engineering, 1999, **Temple University, Philadelphia, PA**  
Thesis: "Correlation and Sequencing of Electromyographic Signals with the Kinematics of Gait"

B.S. Biomedical Engineering, Russian Minor, 1997 **Case Western Reserve University, Cleveland, OH**

## **RESEARCH EXPERIENCE**

**Research Fellow, Mayo Clinic**, August 2003-Present

- Studying healthy and pathologic muscle mechanics using Magnetic Resonance Elastography (MRE), material testing and finite element analysis.
- Evaluating the effects of posterior tibial tendon dysfunction (PTTD) on gait (*in vivo*).
- Evaluating the function of the muscles about the foot and ankle (*in vitro*) to assess the mechanics of PTTD.

**Research Assistant, Drexel University**, May 2000-July 2003

Used a combination of mechanical testing and magnetic resonance imaging to evaluate the effects of chronic lateral ankle ligament injuries on ankle flexibility. This information was used to evaluate diagnosis and treatment of such injuries both *in vivo* and *in vitro*.

**Research Assistant, Gait Study Center, Temple University School of Podiatric Medicine** June 1999–May 2000  
Responsible for progressing the development of a unilateral forward dynamic model of the stance phase of human gait using Simulation for Interactive Musculoskeletal Modeling or SIMM (MusculoGraphics, Inc., Evanston, IL), Dynamics Pipeline (MusculoGraphics, Inc., Evanston, IL) and SD/FAST (Symbolic Dynamics, Inc., Mountain View, CA).

**Research Assistant, Shriners Hospital for Children and Temple University**, March 1998-June 1999

Conducted preliminary work in functional electrical stimulation (FES) for ambulatory children and adolescents with incomplete spinal cord injury and cerebral palsy. Primary focus was to identify the deficiencies in the gait cycle, propose a stimulation function by differentially processing impaired electromyographic (EMG) signals with healthy EMGs, and to identify a biopotential (i.e., signal from intramuscular EMG electrode) to trigger the stimulation.

**Research Assistant, Temple University**, September 1997 – May 1999

Worked with a team of engineers and orthopedic surgeons to complete a biomechanical analysis of the forearm focusing on the determining the function of the interosseous membrane.

**Undergraduate Research Assistant, Cleveland FES Center** March 1996 - August 1997

Designed, built, and calibrated a device to measure isometric elbow moments in tetraplegic patients. Collected preliminary data to study the posterior deltoid to triceps tendon transfer and electrically stimulated triceps.

## HONORS AND AWARDS

- Graduate student research award, Drexel University, 2003
- Koerner Fellowship, academic year 2002-2003
- Drexel University Research Day 2002 best poster in basic and applied science
- International Society of Biomechanics Dissertation Award, 2000
- Temple University Fellowship September 1998-May 1999

## REFEREED PUBLICATIONS

**S. I. Ringleb**, A. Manduca, R.L. Ehman, et al., “Symmetry and Repeatability of *in vivo* Gastrocnemius and Tibialis Anterior, Measured by Magnetic Resonance Elastography.” In preparation.

**S.I. Ringleb**, D. Hansen, B. R. Kotajarvi, et al., “The Effect of Stage II Posterior Tibial Tendon Dysfunction on Gait,” in preparation.

Arai, K. **S.I. Ringleb**, H.B. Kitaoka et al., “Gliding Resistance of the Posterior Tibial Tendon During Passive Motion in an Intact and Simulated Flatfoot.” In preparation

C.W. Imhauser, S. Siegler, **S.I. Ringleb**, et al., “Development and Evaluation of a three-dimensional, image-based, patient-specific dynamic model of the hindfoot.” In preparation

S.F. Bensamoun, **S.I. Ringleb**, L. Littrell, et al., “Determination of Thigh Muscle Stiffness using Magnetic Resonance Elastography.” Journal of Magnetic Resonance Imaging, in preparation.

Q. Chen, **S.I. Ringleb**, A. Manduca, et al., “Differential Effects of Pre-tension on Shear Wave Propagation in Elastic Media with Different Boundary Conditions as Measured by Magnetic Resonance Elastography and Finite Element Modeling.” Journal of Biomechanics. Accepted with minor revisions October 2004.

**S.I. Ringleb**, Q. Chen, A. Manduca, et al. “Quantitative Shear Wave Magnetic Resonance Elastography: Comparison to a Dynamic Shear Material Test.” Journal of Magnetic Resonance in Medicine. in revisions September 2004.

**S.I. Ringleb**, J.K. Udupa, S. Siegler, et al., “The Effect of Ankle Ligament Damage and Surgical Reconstructions on the Mechanics of the Ankle and subtalar Joints Revealed Through a Three Dimensional Stress MRI (3D sMRI) Technique” Journal of Orthopaedic Research. In revisions September 2004.

Chen, Q., **Ringleb, S.I.**, Ehman, R.L., An, K.N., “A Finite Element Model for Analyzing Shear Wave Propagation Observed in Magnetic Resonance Elastography,” Journal of Biomechanics, in press.

Chen, Q., **Ringleb, S.I.**, Hulshizer, T.C., An K.N., “Identification of the Testing Parameters in High Frequency Dynamic Shear Measurement on Agarose Gels,” Journal of Biomechanics, in press.

S. Siegler, J.K. Udupa, **S.I. Ringleb**, et al., “A New Technique to Measure the Flexibility Characteristics of the Ankle and Subtalar Joints *in vivo*,” Journal of Biomechanics, in press.

W.D. Memberg, W.M. Murray, **S.I. Ringleb**, et al., “A Transducer to Measure Isometric Elbow Moments,” Clinical Biomechanics, Vol. 16, No. 10, pp 918-920, (2001)

## PRESENTATIONS AND CONFERENCE PROCEEDINGS

**S.I. Ringleb**, Q. Chen, A. Manduca, et al., “The Effect of Boundary Conditions on Dispersive and Non-Dispersive Systems using Magnetic Resonance Elastography and Finite Element Analysis” submitted to the 13<sup>th</sup> Scientific Meeting and Exhibition of the International Society of Magnetic Resonance in Medicine.

S.F. Bensamoun, **S.I. Ringleb**, Q. Chen, et al., "Ability of a pneumatic driver to measure the muscles thigh stiffness with a magnetic resonance elastography," submitted to the 13<sup>th</sup> Scientific Meeting and Exhibition of the International Society of Magnetic Resonance in Medicine.

A.J. Romano, P.B. Abraham, **S.I. Ringleb**, et al., "Analysis of Anisotropic Propagation Utilizing Wave-Guide Constrained Magnetic Resonance Elastography," submitted to the 13<sup>th</sup> Scientific Meeting and Exhibition of the International Society of Magnetic Resonance in Medicine.

**S.I. Ringleb**, D.K. Hansen, B.R. Kotajarvi et al., "Changes in Gait Associated with Posterior Tibial Tendon Dysfunction" submitted to the 2005 Annual Meeting of the Gait and Clinical Movement Analysis Society.

**S.I. Ringleb**, L. Littrell, Q. Chen, et al. "Magnetic Resonance Elastography for the Assessment of Muscles in Hyperthyroidism" 28<sup>th</sup> Annual Meeting of the American Society of Biomechanics. Portland, OR September 2004.

**S.I. Ringleb**, "An Image Based Study of the Effects of Soft Tissue Injury on the Kinematics of the Ankle and Subtalar Joints." Presented to the Medical Image Processing Group, University of Pennsylvania, Philadelphia, PA, September 23, 2002.

**S.I. Ringleb**, S. Siegler, J.K. Udupa, et al., "The Level of Symmetry in the Anthropometric and Mechanical Properties of the Ankle as Determined by a Mechanical/MRI Technique," presented at the foot and ankle biomechanics symposium at the Fourth World Congress in Biomechanics, Calgary, Alberta, Canada, August 4-9, 2002.

**S.I. Ringleb**, S. Siegler, J.K. Udupa, et al., "Quantification of Ankle and Subtalar Joint Instability: A New Technique." Presented at International Society of Biomechanics XVIII Congress, Zurich, Switzerland, July 2001.

**S. I. Ringleb**, S. Siegler, J.K. Udupa, et al., "A Joint Coordinate System for the Ankle and Subtalar Joint Complex". Presented at Podiatric Research Society, New Orleans, LA, February 2001.

**S.I. Ringleb**, H.J. Hillstrom, "Sensitivity Analysis of a Graphics-Based, Anatomically Detailed, Forward Dynamic Simulation of the Stance Phase of Gait," Presented at 24<sup>rd</sup> Annual Meeting of the American Society of Biomechanics, Chicago, IL, July 2000.

**S.I. Ringleb**, W.R. Ledoux, H.J. Hillstrom, "The Effects of Change in Pelvic Height on the Ground Reaction Forces in a Biomechanical Model of the Human Foot Emphasizing the Plantar Soft Tissue". Podium presentation at Podiatric Research Society, Miami, FL, February 2000.

**S.I. Ringleb**, W.D. Memberg, W.M. Murray, K.L. Kilgore. "A Transducer to Measure Elbow Extension Moments". Annals of Biomedical Engineering. 26(Supplement 1): S-134, 1998.

A.B. Barnes, S.H. Kozin, **S. I. Ringleb**, et al. "Forearm Strain During Load Application Before and After Interosseous Membrane Division". Proceedings from the Third Triennial International Hand and Wrist Biomechanics Symposium. 1998.

## POSTER PRESENTATIONS

K. Arai, **S.I.Ringleb**, L.J. Berglund, et al. "Gliding Resistance of the Posterior Tibial Tendon During Passive Motion in an Intact and Simulated Flatfoot." 51<sup>st</sup> Annual Meeting of the Orthopaedic Research Society, Washington D.C., February 2005.

S.F. Bensamoun, **S.I. Ringleb**, Hulshizer, T.C., et al. "Comparison Between Pneumatic and Mechanical Drivers Using Magnetic Resonance Elastography." 51<sup>st</sup> Annual Meeting of the Orthopaedic Research Society, Washington D.C., February 2005.

**S.I. Ringleb**, Q. Chen, A. Manduca, et al. "Quantitative Shear Wave Magnetic Resonance Elastography: Comparison to a Dynamic Shear Material Test." 28<sup>th</sup> Annual Meeting of the American Society of Biomechanics.

Portland, OR, September 2004.

**S.I. Ringleb**, S. Siegler, J.K. Udupa, et al. "A Comparative Study of Diagnostic Modalities for Injuries to the Lateral Collateral Ankle Ligaments." International Society for Magnetic Resonance in Medicine, Toronto, ON July 2003.

B.T. Smith, **S.I. Ringleb**, H.J. Hillstrom, et al., "Intramuscular Electromyography as a Means of Triggering Functional Electrical Stimulation to Improve Gait for Children with Motor Incomplete Spinal Cord Injury". Poster presented at 2<sup>nd</sup> World Congress in Neurological Rehabilitation Scientific Program, April 1999.

## **TEACHING EXPERIENCE**

**Teaching Fellowship, Drexel University**, Academic year 2002-2003

Responsible for redesigning, training teaching assistants, and lecturing for a mechanics and dynamics laboratory under the supervision of a senior faculty member

**Teaching Assistant, Drexel University**, June 2001-June 2002

- Recitation instructor for undergraduate dynamics class
- Laboratory instructor for the mechanics sections of undergraduate mechanical engineering laboratories.

**Teaching Assistant, Temple University**, September 1997-July 1998

- Advised an award winning senior design group
- Developed and taught the laboratory section of undergraduate finite element class using I-DEAS and ANSYS
- Laboratory instructor for undergraduate dynamics and solids laboratory
- Laboratory instructor for vibrations laboratory
- Recitation instructor for undergraduate materials course
- Recitation instructor for undergraduate machine theory and design course

## **FUNDING**

"Role of the Posterior Tibial Tendon in Acquired Flatfoot," submitted to NIH (R01), October 2004 (I am a 50% co-investigator, wrote the grant and collected the preliminary data), 1.475 million dollars over 4 years.

"Can the Arizona Ankle Foot Orthosis be Modified to Collect Foot and Ankle Kinematics without Compromising its Function?" Mayo Foundation, November 2004, 5k

"How does Healthy Gait Differ from Patients with Acute, Stage II Posterior Tibial Tendon Dysfunction?" Mayo Foundation, November 2004, 5k

"Quantification of the Effects of the Posterior Tibialis and Related Muscles upon Foot Posture," Mayo Foundation, November 2004, 5k

"Posterior Tibial Tendon Gliding During the Stance Phase of Gait, a Cadaver Study," Mayo Foundation, February 2004, 5k.

"Changes in Gait Associated with Posterior Tibial Tendon Dysfunction," Mayo Foundation January 2004, 5k

## **CONSULTING**

**NeuroControl Corporation, Cleveland, OH**, January 1997-June 1998

Compiled data from a multi-center clinical trial to report to the FDA for final approval of a neural prosthesis

## **LEADERSHIP ACTIVITIES**

- Mayo Research Fellow's Forum, Academic and Social Activity Coordinator, August 2004 – present.
  - Coordinating seminar series in conjunction with the life after graduate school program to help prepare graduate students and fellows for academic careers. Seminars include: early preparation for job hunting, a panel discussion on applying for a job (including a search committee member, junior faculty member and a fellow who has been offered a faculty position) and a grant writing workshop.
  - Coordinate social activities including coffee breaks and pizza parties.
- Mayo Research Fellow's Forum Steering Committee Member, Fall 2003-July 2004.
- Graduate Student Research Council (GSRC), an organization of engineering graduate students focused on improving research skills, promoting career development, and improving graduate student life.
  - Seminar coordinator June 2002-present. Responsible for organizing lectures from distinguished speakers and seminars to help students with their research and to find academic positions
  - Vice President and founding member, May 2001-June 2002
- Drexel University Women in Engineering Advisory Committee member. Academic year 2002-2003
- Mentor for a freshman woman-engineering student. Academic year 2002-2003
- Seminar coordinator for Mechanical Engineering Graduate Student Association, Fall 2000-June 2002

## **PROFESSIONAL DEVELOPMENT**

- Participated in Engineering Education Scholars, a NSF funded workshop designed “to broaden the preparation of advanced engineering graduate students and junior faculty,” July 2002.
- Organized seminar series in the college of engineering to prepare students for academic positions.

## **PROFESSIONAL MEMEBERSHIPS**

- American Society of Biomechanics
- International Society of Biomechanics
- International Society of Magnetic Resonance in Medicine

## **PEER REVIEWS**

- Applied Physiology
- Clinical Anatomy
- Clinical Biomechanics
- Journal of Rehabilitation, Research and Development
- Research in Sports Medicine: An International Journal

## **OTHER ACTIVITIES**

- Competitive rower (Vesper Boat Club, 1998-2003)
- High school rowing coach, Rochester Rowing Club, Fall 2003.
- Adult rowing coach Rochester Rowing Club, 2004.