

Curriculum Vitae  
**Mark Owen Papuga**  
Email: opapuga@nycc.edu

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**Education:**

**Doctor of Philosophy** - Biomedical Engineering, March 2011

University of Rochester – Rochester, New York

Thesis: “The Development of a Murine Model of Compression Induced Vertebral Degeneration with Associated Bone Marrow Edema”

**Master of Science** – Biomedical Engineering, August 2004

Case Western Reserve University – Cleveland, Ohio

Thesis: “Biomechanical Analysis of the Lateral Sliding Transfer”

**Bachelor of Science (with honors)** – Bioengineering, May 2000

Syracuse University – Syracuse, New York

Thesis: “Quantification of Rhabdom Shedding in *Limulus polyphemus*”

**Supplemental Courses:**

**Good Laboratory Practices for Pre-clinical Trials**

Center for Professional Development—Malvern Pennsylvania September 2008

**Clinical Gait Analysis**

Gillette’s Children’s Specialty Healthcare – Minneapolis, Minnesota. May 2006.

**Experience:**

**Assistant Professor** – Research Department, New York Chiropractic College (NYCC), Jan 2011 – Present

- Clinical gait analysis, posture and balance, foot orthotic interventions, MRI investigations of low back pain, fMRI investigation of central pain mechanisms, functional assessment outcomes measures.

**Adjunct Assistant Professor** - Center for Musculoskeletal Research, Univ. of Rochester, Jan 2012- Present

- Clinical gait analysis, MRI investigations of low back pain, fMRI investigation of central pain mechanisms, functional assessment outcomes measures, animal models of osteoarthritis and rheumatoid arthritis.

**VA Research WOC** – Canandaigua VA Medical Center Mar 2012 – Present

- Without compensation (WOC) appointment at the Veterans Administration medical center in Canandaigua NY to oversee and assist in several research projects involving patient reported outcomes assessment and clinical gait analysis.

**Research Associate** – The Center for Musculoskeletal Research, Univ. of Rochester, Jan 2007- Jan 2011

- Material testing, animal preparation, MRI, Micro CT, histology, animal recovery surgeries, data analysis, and manuscript preparation.

**Research Engineer** – New York Chiropractic College, July 2004 –Jan 2011

- Primary Engineer for both Gait Lab (Peak Motus, Optotrak, AMTI force plates, Labview interfaces) and Neurophysiology lab (Electrophysiological investigation including, electrical stimulation, EMG recordings, motor evoked potentials). Scheduling and running of experiments, data analysis, and manuscript preparation for a variety of projects.

**Research Assistant** – Cleveland Functional Electrical Stimulation Center, June 2000-June 2004

- Design and refinement of experimental testing in quadriplegic locomotion. Set up of experimental protocols, scheduling and running of experiments and analysis of kinetic and kinematic data described in three-dimensional space. Biomechanical modeling and routine writing in solving of joint moments and joint angles through all phases of motion.

**Research Assistant** – Institute for Sensory Research, June 1998 –May 2000

- Conduct research on the vision system of the North American horseshoe crab. Microscopy including Confocal. Antibody assay use. Experimental protocol setup and design. Microstructure motion analysis and statistical analysis.

### **Teaching Experience:**

Lead Instructor – Graduate Level, Instrumented Biomechanics, Fall 2013, New York Chiropractic College

Lead instructor – Graduate Level, Human Physiology, Spring 2010, New York Chiropractic College

Laboratory instructor—Graduate Level, Principles of Human Movement Analysis, Fall 2007, NYCC

Teaching assistant – Graduate Level, Biomechanics, Dr. Amy Lerner, Fall 2006, University of Rochester

Teaching assistant – Undergraduate Level, Signal Processing, Dr. Niles Otani, Fall 2003

Teaching assistant – Graduate Level, Biomedical Instrumentation, Dr. Miklos Gratzl, Fall 2003

Teaching assistant – Graduate Level, Biomechanics, Dr. Patrick Crago/Dr. Joseph Mansour, Fall 2001

Teachers aid – Undergraduate Level, Bioengineering, Dr. Steven Chamberlain/Dr. Gustav Engbretson, Spring 2000

### **Frequently Used Tools:**

Matlab, Labview, SPSS, MRI, Optotrak, Toolbench, OpenSim, Peak Motus, Vicon, Body Builder, Cybex, Biodex, AMTI, Osirix, Grass Stimulators and EMG, SensorMedics, Magstim, PROMIS, GaitRite, Matscan, BOLD fMRI.

### **Committee Involvement:**

Institutional Review Board Chair-- New York Chiropractic College, July 1 2012 –Present

Institutional Review Board Member-- New York Chiropractic College, September 2004 –June 2012

Faculty Senate -- New York Chiropractic College, Jan 2011- Present

Annual NYCC Research Symposium, June 2004-Present

Campus Research Committee, New York Chiropractic College, August 2005- Present

### **Society Membership:**

Orthopaedic Research Society: Oct 2012- Present

## **Individual Awards:**

Faculty Excellence Award - Research and Scholarly Activity, New York Chiropractic College  
Integrative Graduate Education and Research Traineeship, National Science Foundation  
CASE Prime Fellowship, Case Western Reserve University  
Louis N. DeMartini Award for undergraduate research, Syracuse University  
NYCC Pilot Research Project Award, New York Chiropractic College

## **Publications:**

**M. Owen Papuga**; Christopher A. Beck; Stephen L. Kates; Edward M. Schwarz; Michael D. Maloney. "Validation of GAITRite and PROMIS as High-Throughput Physical Function Outcome Measures Following ACL Reconstruction" in review submitted 9/2013

**M. Owen Papuga** and Jeanmarie R. Burke, "Stabilogram and EMG Analysis of Posture and Balance in Adults from 20 to 80 Years of Age" in review Submitted 10/2012.

**M. Owen Papuga** and Jeanmarie R. Burke, "Rehabilitative footwear: Importance of comfort." *Lower Extremity Review*. 2012 June (invited review)

Jeanmarie R. Burke and **M. Owen Papuga**, "Effects of Foot Orthotics on Running Economy: Methodological Considerations" *Journal of Manipulative and Physiological Therapeutics*. 2012 May;35(4):327-36

**M. Owen Papuga**, Edmund Kwok, Zhigang You, Paul T. Rubery, Paul E. Dougherty, Gloria Pryhuber, Christopher A. Beck, Matthew J. Hilton, Hani A. Awad, Edward M. Schwarz "TNF is required for the induction but not the maintenance of compression-induced BME signals in murine tail vertebrae: limitations of anti-TNF therapy for degenerative disc disease" *Journal of Orthopedic Research*. 2011 Sep;29(9):1367-74

**M. Owen Papuga** and Jeanmarie R. Burke, "The Reliability of the Associate Platinum Digital Foot Scanner in Measuring Previously Developed Footprint Characteristics: A Technical Note" *Journal of Manipulative and Physiological Therapeutics*. 2011 Feb; 34(2):114-8

**M. Owen Papuga**; Steven T. Proulx; Edmund Kwok; Zhigang You; Paul T. Rubery; Paul E. Dougherty; Matthew J. Hilton; Hani A. Awad and Edward M. Schwarz. "Chronic axial compression of the mouse tail segment induces MRI bone marrow edema changes that correlate with increased marrow vasculature and cellularity" *Journal of Orthopedic Research*; 2010 Sep;28(9):1220-8.

David G. Reynolds, Saad Shaikh, **M. Owen Papuga**, Amy L. Lerner, Regis J O'Keefe, Edward M. Schwarz, Hani A. Awad "Micro-CT-Based Measurement of Cortical Bone Graft-to-Host Union." *Journal of Bone and Mineral Research* 24(5):899-907. (2009)

T.K. Koo, **M.O. Papuga**. "A computer aided method for closed reduction of diaphyseal tibial fracture using projection images: A feasibility study" *Computer Aided Surgery* 10:1-13 (2009)

Steven T. Proulx, Edmund Kwok, Zhigang You, **M. Owen Papuga**, Christopher A. Beck, David J. Shealy, Laura M. Calvi, Christopher T. Ritchlin, Hani A. Awad, Brendan F. Boyce, Lianping Xing, and Edward M. Schwarz "Elucidating Bone Marrow Edema and Myelopoiesis in Murine Arthritis Using Contrast-Enhanced Magnetic Resonance Imaging." *Arthritis Rheum.* 58(7):2019-29(2008)

Proulx ST, Kwok E, You Z, **Papuga MO**, Beck CA, Shealy DJ, Ritchlin CT, Awad HA, Boyce BF, Xing L, Schwarz EM. (2007) Longitudinal assessment of synovial, lymph node, and bone volumes in inflammatory arthritis in mice by in vivo magnetic resonance imaging and microfocal computed tomography. *Arthritis Rheum.*, 56, 4024-4037.

Sacunas, RB, **Papuga, MO**, Malone MA, Pearson AC Jr, Marjanovic M, Stroope DG, Weiner WW, Chamberlain SC, Battelle BA., "Multiple Mechanisms of Rhabdom Shedding in the Lateral Eye of *Limulus polyphemus*", *The Journal of Comparative Neurology* 449:26-42 (2002).

## **Abstracts & Presentations:**

**Papuga MO**, Schwarz EM, Maloney, MD, “Validation of GAITRite and PROMIS as High-Throughput Physical Function Outcome Measures of ACL Repair” Poster presentation at Orthopedic Research Society 59<sup>th</sup> Annual Meeting 2013

**Papuga MO**, Kwok E, Rubery P, Dougherty PE, Hilton MJ, Awad HA, Schwarz EM. “TNF is required for the induction but not the maintenance of compression-induced BME signals in murine tail vertebrae: limitations of anti-TNF therapy for degenerative disc disease.” Poster presentation at Orthopedic Research Society 57<sup>th</sup> Annual Meeting 2011

**Papuga, M**, Hilton M, Awad H, Schwarz E. “Chronic axial compression of the mouse tail segment induces MRI bone marrow edema changes that correlate with increased marrow vasculature and cellularity” (ORS2010-0221) Podium presentation at Orthopedic Research Society 56<sup>th</sup> Annual Meeting 2010

**Papuga MO**, Dougherty PE, Awad H, Schwarz EM. “A compression model of vertebral degeneration elicits bone marrow edema signal on CE-MRI”, (ORS2009-0398) Poster presentation at Orthopedic Research Society 55<sup>th</sup> Annual Meeting 2009.

T.K.K. Koo<sup>1</sup>, **M.O. Papuga**, J.A. Taylor A.F.T. Mak. “X-ray Based Computer- Aided Correction of Fracture Deformity” *Proc ISB* 2007. The 7th Annual Meeting of the International Society for Computer Assisted Orthopaedic Surgery.

Dougherty PE, **Papuga MO**, Awad H, Schwarz EM. “The Effect of a Manipulative-like Force on Inflammatory Changes in a Transgenic Mouse Tail: A Chiropractic Research Model”, *New York Chiropractic College Research Symposium 2007*.

Burke JR, **Papuga MO**. “Motor Learning and Drop Jump Techniques; Effects of Orthotic Intervention on Neuromuscular Adaptations and Performance Gains”, *New York Chiropractic College Research Symposium 2006*.

**Papuga MO**, Memberg WD, Crago PE. “Biomechanics of Sliding Transfer: Feasibility of FES Assistance” *Proc. 4<sup>th</sup> Biannual ISG meeting*, June 17-18 (2002)

**Papuga MO**, Memberg WD, Crago PE. “The Biomechanics of a Sliding Transfer” *Annual ANCR Day*, (2001)

Sacunas, R.B., **Papuga, M.O.**, et al., “Multiple Mechanisms of Rhabdom Shedding in the Lateral Eye of *Limulus polyphemus*”, *The ARVO 2000 Annual meeting* (2000).

## **Submitted Grant Proposals:**

***Defining the role of BMP signaling the development of degenerative disc disease.*** Mesfin A, **Papuga MO**

Funding Agency: Orthopaedic Research and Education Foundation

Status: submitted

Requested Amount: \$49,775

Requested Period: July 1, 2014-June 30, 2015

***Developing assessment tools and chondroregenerative therapy for osteoarthritis.*** **Papuga MO**

Funding Agency: National Institutes of Health (K01)

Status: submitted

Requested Amount:\$567,760.00

Requested Period: June 1, 2013 to May 31, 2016

***GAITRite and PROMIS Validation to Assess Physical Function in ACL Reconstruction.*** Maloney M, **Papuga MO**, Beck C

Funding Agency: National Institutes of Health (U01)

Status: Unfunded

Requested Amount:\$ 421,095.00

Requested Period: June 1, 2014 to May 31, 2019

***Combined Manual and Cognitive Behavioral Therapies for Chronic Lower Back Pain.*** Dougherty PE, **Papuga MO**, Karuza J, Weiner DK, Long C  
Funding Agency: Veterans Administration (I01)  
Status: unfunded – resubmission pending  
Requested Amount:\$ 1,071,367  
Requested Period: November 1, 2012 to October 31, 2016

### **Funded Grant Proposals:**

***Efficacy of Foot Orthotics in Veterans with Chronic Lower Back Pain.*** Dougherty PE, **Papuga MO**, Karuza J  
Funding Agency: Foot Levelers, Inc. (Private)  
Status: Funded  
Requested Amount:\$243,270.00  
Requested Period: January 1, 2013- December 31, 2015

***Investigation of Seated Pressure, Sagittal Spinal Alignment, and EMG of Core Muscles using The Perfect Sit.*** **Papuga MO**  
Funding Agency: Currier Plastics (Private)  
Status: Funded  
Requested Amount:\$9,580.00  
Requested Period: June 1, 2012 (Single Distribution)

***Cortical Responses to Pressure Stimulus of the Lumbar Spine: An fMRI Protocol.*** Dougherty PE, **Papuga MO**, Lerner AL, Schwarz EM  
Funding Agency: Rochester Center for Brain Imaging Pilot Research Grant (Univ. of Rochester Internal)  
Status: Funded and Completed  
Award Amount: \$10,000.00  
Award Period: June 1, 2011 (Single Distribution)

***Reliability and Validity of Associate Digital Scanner in Measuring Foot Characteristics.*** **Papuga MO**, Burke JR  
Funding Agency: Foot Levelers, Inc. (Private)  
Status: Funded and Completed  
Award Amount: \$11,864.00  
Award Period: January 1, 2009 to June 30, 2009

***Development of Gait Database in Adult Subjects.*** Koo TK and **Papuga MO**  
Funding Agency: Foot Levelers, Inc. (Private)  
Status: Funded and Completed  
Award Amount: \$5,500 + Donation of Metascan Foot Pressure Mapping System  
Award Period: February 2008 (Single Donation)

### **Unfunded Grant Proposals:**

***Defining the role of BMP Signaling in the development of degenerative disc disease.*** Mesfin A, **Papuga MO**  
Funding Agency: North American Spine Society  
Requested Amount: \$47,199.00  
Requested Period: January 1, 2014-December 31, 2014

***Defining the role of BMP signaling in the development of cervical degenerative disc disease.*** Mesfin A, **Papuga MO**  
Funding Agency: Cervical Spine Research Society  
Requested Amount: \$25,000.00  
Requested Period: July 1, 2013-June 30, 2014

***Development of Chondroregenerative Therapy for Human Osteoarthritis.*** Rosier R, Zuscik M, **Papuga MO**

Funding Agency: National Institutes of Health (Transformative R01)

Status: Unfunded

Requested Amount:\$7,557,828.00

Requested Period: September 1, 2012 to August 31, 2017

***Mind Body Intervention for "High Risk" Veterans with Chronic Lower Back Pain.*** Dougherty PE Karuza J, Matteson-Rusby S, Savino D, and Papuga MO

Funding Agency: VA Clinical Science Research And Development (CSR&D) Merit Review Award

Status: Unfunded

Award Amount: \$586,129.00

Award Period: April 1, 2013 - March 31, 2017

***The effect of Glucosamine Synergy® in Chronic Lower Back Pain (CLBP) patients with mild to moderate degenerative disc disease (DDD) undergoing Spinal Manipulative Therapy (SMT) ): A double blind randomized placebo controlled trial.*** Paul Dougherty; Erica Callahan; Owen Papuga; Jurgis Karuza

Funding Agency: Standard Process (Private)

Status: Unfunded

Requested Amount:\$700,000.00

Requested Period: June 1, 2013 –May 31, 2015

***Cortical Responses to Pressure Stimulus of the Lumbar Spine: An fMRI Protocol.*** Dougherty PE, Papuga MO, Lerner AL, Schwarz EM

Funding Agency: Department of Veterans Affairs

Status: Unfunded

Award Amount: \$150,000.00

Award Period: October 1, 2011 to September 30, 2014

***Modeling Painful Scoliosis in Mice.*** Rubery PT, Schwarz EM, Awad H, Beck C, Dougherty PE, and **Papuga, MO.**

Funding Agency: National Institutes of Health (R21)

Status: Unfunded

Requested Amount: \$423,000.00

Award Period: April 1, 2008 to March 31, 2010