

# Ross H. Miller

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## Education

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- 2010–2012 **Postdoctoral Training** in Mechanical Engineering, Queen's University  
Advisor: Kevin J. Deluzio  
Program: *Bone and joint health technologies*
- 2006–2010 **Doctor of Philosophy** in Kinesiology, University of Massachusetts  
Advisor: Graham E. Caldwell  
Dissertation: *Optimal control of human running*
- 2004–2006 **Master of Science** in Exercise & Sport Science, Iowa State University  
Advisor: Jason C. Gillette  
Thesis: *Lower extremity mechanics of iliotibial band syndrome during an exhaustive run*
- 2003–2005 **Master of Science** in Mechanical Engineering, Iowa State University  
Advisor: Francine Battaglia  
Thesis: *A numerical analysis of hemodynamics for arterial medical procedures*
- 1999–2003 **Bachelor of Science** in Mechanical Engineering, Iowa State University

## Professional History

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- 2013–pres **University of Maryland** Affiliate Faculty, Neuroscience & Cognitive Science Program
- 2012–pres **University of Maryland** Assistant Professor, Department of Kinesiology
- 2011–2012 **C-Motion Inc.** Research Associate, Canadian Office
- 2010–2012 **Queen's University** Postdoctoral Fellow, Human Mobility Research Centre
- 2006–2010 **University of Massachusetts** Graduate Assistant, Department of Kinesiology
- 2005–2006 **Iowa State University** Graduate Assistant, Department of Health & Human Performance
- 2003–2005 **Iowa State University** Graduate Assistant, Department Mechanical Engineering

## Scholarship

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### *Journal Publications*

30. **Miller RH**, Esterson AY, and Shim JK (2015). Joint contact forces when minimizing the external knee adduction moment by gait modification: a computer simulation study. *The Knee*, **revision submitted**.
29. Koh K, Kwon HJ, Yoon BC, Cho Y, Shin JH, Hahn JO, **Miller RH**, Kim YH, and Shim JK (2015). The role of tactile sensation in online and offline hierarchical control of multi-finger force synergy. *Experimental Brain Research*, **accepted**.
28. **Miller RH** and Hamill J (2015). Optimal footfall patterns for cost minimization in running. *Journal of Biomechanics*, in press (DOI: 10.1016/j.jbiomech.2015.04.019).
27. Gentili RJ, Oh H, Huang DW, Katz GE, **Miller RH**, and Reggia JA (2015). A neural architecture for performing actual and mentally simulated movements during self-intended and observed bimanual arm reaching movements. *International Journal of Social Robotics*, in press (DOI: 10.1007/s12369-014-0276-5).
26. Graham RB, Smallman CLW, **Miller RH**, and Stevenson JM (2015). A dynamical systems analysis of assisted and unassisted anterior and posterior hand-held load carriage. *Ergonomics* **58**(3), 480–491.

25. **Miller RH**, Edwards WB, and Deluzio KJ (2015). Energy expended and knee joint load accumulated when walking, running, or standing for the same amount of time. *Gait & Posture* **41**(1), 326–328.
24. Brandon SCE, **Miller RH**, Thelen DG, and Deluzio KJ (2014). Selective lateral muscle activation in subjects with moderate medial knee osteoarthritis does not unload medial knee condyle. *Journal of Biomechanics* **47**(6), 1409–1415.
23. **Miller RH** (2014). A comparison of muscle energy models for simulating human walking in three dimensions. *Journal of Biomechanics* **47**(6), 1373–1381.
22. **Miller RH**, Edwards WB, Brandon SCE, Morton AM, and Deluzio KJ (2014). Why don't most runners get knee osteoarthritis? A case for per-unit-distance loads. *Medicine & Science in Sports & Exercise* **46**(3), 572–579.
21. Hobara H, Baum BS, Kwon HJ, Linberg A, Wolf EJ, **Miller RH**, and Shim JK (2014). Amputee locomotion: lower extremity loading using running-specific prostheses. *Gait & Posture* **39**(1), 386–390.
20. Hobara H, Baum BS, Kwon HJ, **Miller RH**, Ogata T, Kim YH, and Shim JK (2013). Amputee locomotion: spring-like leg behavior and stiffness regulation using running-specific prostheses. *Journal of Biomechanics* **46**(14), 2483–2489.
19. Russell EM, **Miller RH**, Umberger BR, and Hamill J (2013). Lateral wedges alter mediolateral load distributions at the knee joint in obese individuals. *Journal of Orthopaedic Research* **31**(5), 665–671.
18. **Miller RH**, Brandon SCE, and Deluzio KJ (2013). Predicting sagittal plane biomechanics that minimize the axial knee joint contact force during walking. *Journal of Biomechanical Engineering* **135**(1), 011007.
17. Gillette JC, Stevermer CA, **Miller RH**, Edwards WB, and Schwab CV (2012). Lower extremity joint moments during carrying tasks in children. *Journal of Applied Biomechanics* **28**(2), 156–164.
16. **Miller RH**, Umberger BR, and Caldwell GE (2012). Sensitivity of maximum sprinting speed to characteristic parameters of the muscle force-velocity relationship. *Journal of Biomechanics* **45**(8), 1406–1413.
15. **Miller RH**, Umberger BR, and Caldwell GE (2012). Limitations to maximum sprinting speed imposed by muscle mechanical properties. *Journal of Biomechanics* **45**(6), 1092–1097.
14. **Miller RH**, Umberger BR, Hamill J, and Caldwell GE (2012). Evaluation of the minimum energy hypothesis and other potential optimality criteria for human running. *Proceedings of the Royal Society B: Biological Sciences* **279**(1733), 1498–1505.
13. John D, **Miller RH**, Kozey-Keadle SL, Caldwell GE, and Freedson PS (2012). Biomechanical examination of the plateau phenomenon in ActiGraph vertical activity counts. *Physiological Measurement* **33**(2), 219–230.
12. Hasson CJ, **Miller RH**, and Caldwell GE (2011). Contractile and elastic ankle joint muscular properties in young and older adults. *PLoS ONE* **6**(1), e15953.
11. Hamill J, Russell EM, Gruber AH, and **Miller RH** (2011). Impact characteristics in shod and barefoot running. *Footwear Science* **3**(1), 33–40.
10. **Miller RH** and Caldwell GE (2011). Practical lessons on running and jumping from computer simulations. *Track & Cross Country Journal* **1**(1), 38–48.
9. **Miller RH**, Chang R, Baird JL, Van Emmerik REA, and Hamill J (2010). Variability in kinematic coupling assessed by vector coding and continuous relative phase. *Journal of Biomechanics* **43**(13), 2554–2560.

8. Gillette JC, Stevermer CA, **Miller RH**, Meardon SA, and Schwab CV (2010). The effects of age and type of carrying task on lower extremity kinematics. *Ergonomics* **53**(3), 355–364.
7. Hamill J, Russell EM, Gruber AH, **Miller RH**, and O'Connor KM (2009). Extrinsic foot muscle forces when running in varus, valgus and neutral shoes. *Footwear Science* **1**(3), 153–161.
6. **Miller RH**, Caldwell GE, Van Emmerik REA, Umberger BR, and Hamill J (2009). Ground reaction forces and lower extremity kinematics when running with suppressed arm swing. *Journal of Biomechanical Engineering* **131**(12), 124502.
5. **Miller RH** and Hamill J (2009). Computer simulation of the effects of shoe cushioning on internal and external loading during running impacts. *Computer Methods in Biomechanics & Biomedical Engineering* **12**(4), 481–490.
4. **Miller RH**, Gillette JC, Derrick TR, and Caldwell GE (2009). Muscle forces during running predicted by gradient-based and random search static optimisation algorithms. *Computer Methods in Biomechanics & Biomedical Engineering* **12**(2), 217–225.
3. Hamill J, **Miller RH**, Noehren B, and Davis IS (2008). A prospective study of iliotibial band strain in runners. *Clinical Biomechanics* **23**(8), 1018–1025.
2. **Miller RH**, Meardon SA, Derrick TR, and Gillette JC (2008). Continuous relative phase variability during an exhaustive run in runners with a history of iliotibial band syndrome. *Journal of Applied Biomechanics* **24**(3), 262–270.
1. **Miller RH**, Lowry JL, Meardon SA, and Gillette JC (2007). Lower extremity mechanics of iliotibial band syndrome during an exhaustive run. *Gait & Posture* **26**(3), 407–413.

### Book Chapters

2. Van Emmerik REA, **Miller RH**, and Hamill J (2014). Dynamical systems methods for the analysis of movement coordination. In: Robertson DGE, Caldwell GE, Hamill J, Kamen G, and Whittlesey SN (eds.), *Research Methods in Biomechanics* (2<sup>nd</sup> ed. pp. 291–316). Champaign, IL: Human Kinetics.
1. Hamill J, Gruber AH, and **Miller RH** (2012). Footwear effects on running kinematics. In: Goonetilleke RS (ed.), *The Science of Footwear* (pp. 457–474). Boca Raton, FL: CRC Press.

### Invited Conference Presentations

8. **Miller RH** (2015). Consequences of mechanical loading on human health. 25<sup>th</sup> Congress of the International Society of Biomechanics, Glasgow, Scotland, July 12–16, 2015.
7. **Miller RH** and Hamill J (2014). Optimal footfall patterns for cost minimization in running. 7<sup>th</sup> World Congress on Biomechanics, Boston, MA, July 6–11, 2014.
6. **Miller RH** (2014). Time traveling with forward dynamics. 7<sup>th</sup> World Congress on Biomechanics, Boston, MA, July 6–11, 2014.
5. **Miller RH** (2014). Modeling age-related changes in muscle efficiency: effects on gait. American College of Sports Medicine 61<sup>st</sup> Annual Meeting, Orlando, FL, May 27–31, 2014.
4. **Miller RH** (2014). Humans as equations: clinical applications for predicting musculoskeletal motion. American College of Sports Medicine 61<sup>st</sup> Annual Meeting, Orlando, FL, May 27–31, 2014.
3. **Miller RH**, Edwards WB, Morton AM, and Deluzio KJ (2013). Why don't runners get knee osteoarthritis? Peak and cumulative joint loads in human gait. American College of Sports Medicine 60<sup>th</sup> Annual Meeting, Indianapolis, IN, May 29–June 1, 2013.

2. **Miller RH** (2012). Gait biomechanics and the prevention of knee osteoarthritis. *9<sup>th</sup> Annual Orthopaedic Care Conference*, Kingston, ON, October 26, 2012.
1. **Miller RH**, Umberger BR, and Caldwell GE (2010). Theoretical analysis of limitations to maximum sprinting speed imposed by muscle mechanical properties. *American Society of Biomechanics 34<sup>th</sup> Annual Meeting*, Providence, RI, August 18–21, 2010.

### Conference Presentations

64. Kiernan D, Shim JK, and **Miller RH** (2015). Vertical ground reaction force magnitudes and rates not positively correlated with running injury. *American Society of Biomechanics 39<sup>th</sup> Annual Meeting*, Columbus, OH, August 5-8, 2015.
63. Chu E, Park YS, Lim YT, Koh K, Kim JM, Kwon HJ, **Miller RH**, and Shim JK (2015). Association of spinal deformity and pelvic tilt with gait asymmetry in adolescent idiopathic patients: ground reaction force investigation. *American Society of Biomechanics 39<sup>th</sup> Annual Meeting*, Columbus, OH, August 5-8, 2015.
62. Kwon HJ, Koh K, Hobara H, Chu E, Kim S, **Miller RH**, and Shim JK (2015). The effect of shoe heel elevation angle on strike pattern. *American Society of Biomechanics 39<sup>th</sup> Annual Meeting*, Columbus, OH, August 5-8, 2015.
61. Koh K, Kwon HJ, **Miller RH**, and Shim JK (2015). Intra-auditory integration in a constant force production task. *American Society of Biomechanics 39<sup>th</sup> Annual Meeting*, Columbus, OH, August 5-8, 2015.
60. Ehtemam F, Sapp RM, Hagberg JM, and **Miller RH** (2015). Energy substrate use during walking as a function of step rate. *American Society of Biomechanics 39<sup>th</sup> Annual Meeting*, Columbus, OH, August 5-8, 2015.
59. Krupenevich RL and **Miller RH** (2015). Knee joint moments during single-leg forward hopping. *American Society of Biomechanics 39<sup>th</sup> Annual Meeting*, Columbus, OH, August 5-8, 2015.
58. **Miller RH**, Krupenevich RL, Pruziner AL, Wolf EJ, and Schnall BL (2015). Knee kinetics and contact forces of the intact limb in amputee walking. *American Society of Biomechanics 39<sup>th</sup> Annual Meeting*, Columbus, OH, August 5-8, 2015.
57. Gruber AH, **Miller RH**, Umberger BR, Murphy SP, and Hamill J (2015). Modeling parameters to calculate realistic inverse dynamics muscular activity in running. *25<sup>th</sup> Congress of the International Society of Biomechanics*, Glasgow, Scotland, July 12–16, 2015.
56. **Miller RH** and Ehtemam F (2015). Testing model-based conclusions on the optimal control of human movement using formal statistical analyses. *25<sup>th</sup> Congress of the International Society of Biomechanics*, Glasgow, Scotland, July 12–16, 2015.
55. Gentili RJ, Oh H, Huang DW, Katz GE, **Miller RH**, and Reggia JA (2014). Towards a unified neural architecture that unites self-intended and imitated reaching performance. *IEEE Engineering in Medicine & Biology Society 36<sup>th</sup> Annual Conference*, Chicago, IL, August 26–30, 2014.
54. Edwards WB and **Miller RH** (2014). An immediate bone remodeling response is necessary to prevent second metatarsal stress fractures in runners. *International Calgary Running Symposium*, Calgary, AB, August 14–17, 2014.
53. **Miller RH**, Edwards WB, and Deluzio KJ (2014). Knee joint loading and energy expenditure when walking, running, or standing for the same amount of time. *International Calgary Running Symposium*, Calgary, AB, August 14–17, 2014.
52. Caldwell GE, Hasson CJ, and **Miller RH** (2014). Age-related changes in muscle mechanical properties. *7<sup>th</sup> World Congress on Biomechanics*, Boston, MA, July 6-11, 2014.

51. Hamill J, **Miller RH**, Freedman-Silvernail J, and Gruber AH (2014). Does changing footfall pattern reduce running-related injury? *7<sup>th</sup> World Congress on Biomechanics*, Boston, MA, July 6-11, 2014.
50. Ehtemam F, Sapp RM, and **Miller RH** (2014). Decision-making: cost analysis of step rate preference in treadmill walking. *7<sup>th</sup> World Congress on Biomechanics*, Boston, MA, July 6-11, 2014.
49. Deluzio KJ, Brandon SCE, and **Miller RH** (2013). A computational model for investigating compensatory strategies used by subjects with knee osteoarthritis. *14<sup>th</sup> National Congress of the Italian Society of Clinical Movement Analysis*, Pisa, Italy, September 26-28, 2013.
48. Kiernan D, Koh K, Kwon HJ, **Miller RH**, and Shim JK (2013). Sensitivity of vertical ground reaction force parameters in normal and amputee running to filter design. *American Society of Biomechanics 37<sup>th</sup> Annual Meeting*, Omaha, NE, September 4-7, 2013.
47. **Miller RH**, Ackermann M, and van den Bogert AJ (2013). Revisiting the prediction of walking mechanics and energetics in three dimensions by minimum metabolic cost. *American Society of Biomechanics 37<sup>th</sup> Annual Meeting*, Omaha, NE, September 4-7, 2013.
46. Gruber AH, Umberger BR, **Miller RH**, and Hamill J (2013). The relationship between achilles tendon moment arm length and rate of oxygen consumption in natural rearfoot and forefoot runners. *American College of Sports Medicine 60<sup>th</sup> Annual Meeting*, Indianapolis, IN, May 29-June 1, 2013.
45. **Miller RH** (2012). Why do humans walk the way we do? Evidence from dynamic simulations. *American Society of Biomechanics 36<sup>th</sup> Annual Meeting*, Gainesville, FL, August 15-18, 2012.
44. **Miller RH**, Brandon SCE, and Deluzio KJ (2012). Discriminating between knee osteoarthritis severity levels in walking using only force platform data. *American Society of Biomechanics 36<sup>th</sup> Annual Meeting*, Gainesville, FL, August 15-18, 2012.
43. Brandon SCE, **Miller RH**, Thelen DG, and Deluzio KJ (2012). Knee osteoarthritis subjects activate muscles to unload medial condyle. *17<sup>th</sup> Biennial Conference of the Canadian Society for Biomechanics*, Burnaby, BC, June 6-9, 2012.
42. **Miller RH**, Brandon SCE, and Deluzio KJ (2012). Predicting sagittal plane kinematics that minimize the knee joint contact force. *17<sup>th</sup> Biennial Conference of the Canadian Society for Biomechanics*, Burnaby, BC, June 6-9, 2012.
41. **Miller RH** and Caldwell GE (2012). Antagonism and the metabolic cost of simulated human locomotion. *17<sup>th</sup> Biennial Conference of the Canadian Society for Biomechanics*, Burnaby, BC, June 6-9, 2012.
40. **Miller RH** and Deluzio KJ (2012). Muscle mechanical properties should be considered when predicting knee joint loading with static optimization. *17<sup>th</sup> Biennial Conference of the Canadian Society for Biomechanics*, Burnaby, BC, June 6-9, 2012.
39. John D, **Miller RH**, Kozey-Keadle SL, Caldwell GE, and Freedson PS (2012). Why do ActiGraph vertical activity counts level off? A new perspective. *American College of Sports Medicine 59<sup>th</sup> Annual Meeting*, San Francisco, CA, May 29-June 2, 2012.
38. **Miller RH** and Deluzio KJ (2011). Are running and sprinting different gait modes? Evidence from forward dynamics simulations. *American Society of Biomechanics 35<sup>th</sup> Annual Meeting*, Long Beach, CA, August 10-13, 2011.
37. **Miller RH**, Umberger BR, Kent-Braun JA, and Caldwell GE (2011). Virtual aging of the muscular system and its effects on running biomechanics. *American Society of Biomechanics 35<sup>th</sup> Annual Meeting*, Long Beach, CA, August 10-13, 2011.
36. **Miller RH**, Umberger BR, and Caldwell GE (2011). Optimality criteria for human running investigated by forward dynamics simulations. *29<sup>th</sup> International Conference on Biomechanics in Sports*, Porto, Portugal, June 27-July 1, 2011.

35. Gruber AH, **Miller RH**, Van Emmerik REA, and Hamill J (2010). Does running speed alter lower extremity segment coordination? *6<sup>th</sup> World Congress on Biomechanics*, Singapore, August 1–6, 2010.
34. Hamill J, Gruber AH, Russell EM, **Miller RH**, and Van Emmerik REA (2010). Does changing footfall pattern alter running performance? *6<sup>th</sup> World Congress on Biomechanics*, Singapore, August 1–6, 2010.
33. **Miller RH** and Caldwell GE (2010). The effect of antagonism on the calculation of muscle model parameters. *16<sup>th</sup> Biennial Conference of the Canadian Society for Biomechanics*, Kingston, ON, June 9–12, 2010.
32. Gruber AH, **Miller RH**, Russell EM, Van Emmerik REA, and Hamill J (2010). Alterations in joint kinematics and ground reaction forces with running speed. *American College of Sports Medicine 57<sup>th</sup> Annual Meeting*, Baltimore, MD, June 2–5, 2010.
31. **Miller RH**, Umberger BR, and Caldwell GE (2010). Effects of history dependence on the mechanics and energetics of the Hill muscle model. *American College of Sports Medicine 57<sup>th</sup> Annual Meeting*, Baltimore, MD, June 2–5, 2010.
30. Russell EM, **Miller RH**, and Hamill J (2010). Walking with obesity: differences in muscle function. *American College of Sports Medicine 57<sup>th</sup> Annual Meeting*, Baltimore, MD, June 2–5, 2010.
29. Gillette JC, Stevermer CA, **Miller RH**, Edwards WB, and Schwab CV (2009). Lower extremity joint moments during carrying tasks in children. *American Society of Biomechanics 33<sup>rd</sup> Annual Meeting*, State College, PA, August 26–29, 2009.
28. Gruber AH, Russell EM, **Miller RH**, Chang R, and Hamill J (2009). Segment coordination response to alterations in foot strike pattern. *American Society of Biomechanics 33<sup>rd</sup> Annual Meeting*, State College, PA, August 26–29, 2009.
27. Hasson CJ, **Miller RH**, Foulis SA, Kent-Braun JA, and Caldwell GE (2009). Application of musculoskeletal models to aging: obtaining subject-specific measures of muscle volume using MRI. *American Society of Biomechanics 33<sup>rd</sup> Annual Meeting*, State College, PA, August 26–29, 2009.
26. **Miller RH**, Russell EM, Gruber AH, and Hamill J (2009). Foot-strike pattern selection to minimize muscle energy expenditure during running: a computer simulation study. *American Society of Biomechanics 33<sup>rd</sup> Annual Meeting*, State College, PA, August 26–29, 2009.
25. **Miller RH**, Umberger BR, and Caldwell GE (2009). Muscle forces in the lower limb predicted by static and dynamic optimization. *American Society of Biomechanics 33<sup>rd</sup> Annual Meeting*, State College, PA, August 26–29, 2009.
24. Van Emmerik REA, **Miller RH**, and Hamill J (2009). Dynamical systems approach to movement coordination. *27<sup>th</sup> International Conference on Biomechanics in Sports*, Limerick, Ireland, August 17–21, 2009.
23. Russell EM, Gruber AH, **Miller RH**, O'Connor KM, Van Emmerik REA, and Hamill J (2009). Wedged footwear perturbations affect lower extremity coordination dynamics. *27<sup>th</sup> International Conference on Biomechanics in Sports*, Limerick, Ireland, August 17–21, 2009.
22. Hamill J, Russell EM, Gruber AH, **Miller RH**, and O'Connor KM (2009). Extrinsic foot muscle forces when running in varus, valgus and neutral shoes. *9<sup>th</sup> Biennial Footwear Biomechanics Symposium*, Stellenbosch, South Africa, July 10–12, 2009.
21. Hamill J, **Miller RH**, Gruber AH, and Russell EM (2009). Extrinsic foot muscle forces during running with different footfall patterns. *22<sup>nd</sup> Congress of the International Society of Biomechanics*, Cape Town, South Africa, July 5–9, 2009.
20. **Miller RH**, Umberger BR, Hamill J, and Caldwell GE (2009). Dynamic optimization of maximum-effort human sprinting. *American Society of Mechanical Engineers Summer Bioengineering Conference*, Lake Tahoe, CA, June 17–21, 2009.

19. **Miller RH**, Caldwell GE, and Kent-Braun JA (2008). Fatigue in a Hill-based muscle model of human tibialis anterior. *American Physiological Society Intersociety Meeting: The Integrative Biology of Exercise V*, Hilton Head, SC, September 24–27, 2008.
18. Hamill J, **Miller RH**, Noehren B, and Davis IS (2008). A prospective study on iliotibial band syndrome. *11<sup>th</sup> Annual International Conference on Foot Biomechanics & Orthotic Therapy*, Vancouver, BC, October 24–26, 2008.
17. Edwards WB, Sealine BJ, **Miller RH**, Gillette JC, and Derrick TR (2008). Static optimization of muscle forces during drop landings: a comparison of cost functions. *4<sup>th</sup> North American Congress on Biomechanics*, Ann Arbor, MI, August 5–9, 2008.
16. Hasson CJ, **Miller RH**, and Caldwell GE (2008). Determination of subject-specific mechanical properties of individual ankle joint muscles. *4<sup>th</sup> North American Congress on Biomechanics*, Ann Arbor, MI, August 5–9, 2008.
15. **Miller RH**, Caldwell GE, Van Emmerik REA, Hamill J, and Umberger BR (2008). Does restraining arm motion alter ground reaction forces during running? *4<sup>th</sup> North American Congress on Biomechanics*, Ann Arbor, MI, August 5–9, 2008.
14. **Miller RH** and Hamill J (2008). Computer simulation of internal structural loading: application to overuse running injuries. *4<sup>th</sup> North American Congress on Biomechanics*, Ann Arbor, MI, August 5–9, 2008.
13. **Miller RH**, Hasson CJ, and Caldwell GE (2008). Subject-specific force-length parameters of the ankle plantarflexors in young adults. *4<sup>th</sup> North American Congress on Biomechanics*, Ann Arbor, MI, August 5–9, 2008.
12. **Miller RH**, Umberger BR, and Caldwell GE (2008). Optimal control solutions for a simple model of human jumping. *American Society of Mechanical Engineers Summer Bioengineering Conference*, Marco Island, FL, June 25–29, 2008.
11. Gillette JC, Stevermer CA, **Miller RH**, and Schwab CV (2008). Effects of asymmetric carrying tasks on lower extremity kinematics in farm children. *National Institute for Farm Safety International Meeting*, Lancaster, PA, June 22–26, 2008.
10. Russell EM, **Miller RH**, and Hamill J (2008). Stride length influences knee joint moments and contact forces during walking in obese women. *American College of Sports Medicine 55<sup>th</sup> Annual Meeting*, Indianapolis, IN, May 28–31, 2008.
9. Hamill J, **Miller RH**, Noehren B, and Davis IS (2007). Strain in the iliotibial band: a cause of injury? *44<sup>th</sup> Annual Technical Meeting of the Society of Engineering Science*, College Station, TX, October 21–24, 2007.
8. Hamill J, **Miller RH**, Noehren B, and Davis IS (2007). A strain model of the iliotibial band. *25<sup>th</sup> International Conference on Biomechanics in Sports*, Ouro Preto, Brazil, August 23–27, 2007.
7. **Miller RH**, Caldwell GE, and Derrick TR (2007). Determining vertical ground reaction forces without a force platform using a mass-spring-damper model. *American Society of Biomechanics 31<sup>st</sup> Annual Meeting*, Palo Alto, CA, August 22–25, 2007.
6. **Miller RH**, Gillette JC, and Derrick TR (2007). Sensitivity of muscle force predictions during overground running to choice of optimization algorithm. *American College of Sports Medicine 54<sup>th</sup> Annual Meeting*, New Orleans, LA, May 31–June 3, 2007.
5. Meardon SA, **Miller RH**, Derrick TR, and Gillette JC (2006). Lower extremity coupling variability during an exhaustive run in individuals with iliotibial band syndrome. *American Society of Biomechanics 30<sup>th</sup> Annual Meeting*, Blacksburg, VA, September 6–9, 2006.

4. **Miller RH** and Battaglia F (2006). A novel computational approach for modeling stent reconstruction of an aortic bifurcation. *American Society of Mechanical Engineers Joint US-European Fluids Engineering Division Summer Meeting*, Miami, FL, July 17–20, 2006.
3. Meardon SA, Gillette JC, Stevermer CA, **Miller RH**, Derrick TR, Schwab CV, and Freeman SA (2006). Age and condition related differences during carrying tasks in farm youth. *American College of Sports Medicine 53<sup>rd</sup> Annual Meeting*, Denver, CO, May 30–June 2, 2006.
2. **Miller RH**, Lowry JL, and Gillette JC (2006). Prediction of iliotibial band strain during running. *American College of Sports Medicine 53<sup>rd</sup> Annual Meeting*, Denver, CO, May 30–June 2, 2006.
1. **Miller RH**, Battaglia F, and Olsen MG (2005). A computational and experimental investigation of flow in an intracranial side-wall aneurysm. *American Society of Mechanical Engineers Fluids Engineering Division Summer Meeting*, Houston, TX, June 19–23, 2005.

### Invited Lectures

6. **Miller RH** (2014). Minding your step: consequences of joint loading in human gait. *University of Calgary*, Calgary, AB, March 20, 2014.
5. **Miller RH** (2014). Joint loading during locomotion and implications for health, injury, and chronic disease. *Walter Reed National Military Medical Center*, Bethesda, MD, January 24, 2014.
4. **Miller RH** (2012). New questions on the mechanics, energetics, and motor control of human walking. *University of Maryland*, College Park, MD, March 26, 2012.
3. **Miller RH** (2012). Curiosity and clinically motivated questions on the biomechanics of human walking. *University of Massachusetts*, Amherst, MA, February 15, 2012.
2. **Miller RH** (2011). Optimality criteria for predictive simulations of human running. *Queen's University*, Kingston, ON, February 9, 2011.
1. **Miller RH** (2010). Computer simulation of human running. *Mount Holyoke College*, Holyoke, MA, April 12, 2010.

### Awards & Honors

- 2015 **International Society of Biomechanics** Promising Scientist Award
- 2012 **Journal of Biomechanics** Top 25 Hottest Articles of the Year citation (#22)
- 2010 **American Society of Biomechanics** Young Scientist Pre-Doctoral Award
- 2010 **American College of Sports Medicine** Biomechanics Interest Group Student Research Award
- 2005 **Iowa State University** Graduate College Teaching Excellence Award
- 2003 **Iowa State University** Premium for Academic Excellence
- 2003 **Iowa State University** Graduation with Distinction

## Grants & Funding<sup>1</sup>

### Pending

4. *The elite athlete as a model for the impact of mechanical loading on human knee joint health*. **Source:** University of Maryland (Division of Research Tier 1). **Funding:** \$50,000, July 2015 – July 2016 (one year). **Role:** PI
3. *Optimal control modeling of human walking*. **Source:** Klingenstein Fund, Inc. (Klingenstein-Simons Fellowship Award in the Neurosciences). **Funding:** \$225,000, July 2015 – July 2018 (three years). **Role:** PI

<sup>1</sup>All funding amounts listed are direct costs unless otherwise noted.



2. *Amputee locomotion: role of running-specific prosthesis in amputee health.* **Source:** National Institutes of Health (NICHD R01). **Funding:** \$1,000,000, Sep 2015 – Sep 2019 (four years). **Role:** co-I
1. *Evaluation of biomechanical and physiological responses to running prosthesis with and without a heel.* **Source:** Department of Defense (CDMRP OPORA Level 1). **Funding:** \$322,400, May 2015 – May 2017 (two years). **Role:** co-I

### Active

10. *Evaluation of knee joint health in Service Members with unilateral lower extremity trauma.* **Source:** Center for Rehabilitation Sciences Research (Bridge Funding Program). **Funding:** \$182,226 sub-award, Jun 2015 – Jun 2019 (four years). **Role:** PI
9. *Effects of a chocolate milk product on mild traumatic brain injury in youth and collegiate athletes.* **Source:** Maryland Technology Enterprise Institute (MIPS Phase II). **Funding:** \$69,373, Aug 2014 – Aug 2015 (one year). **Role:** co-I

### Completed

8. *Joint loading and knee osteoarthritis risk in lower limb amputees.* **Source:** University of Maryland (Summer Research & Scholarship Award). **Funding:** \$9,000, Jun 2014 – Aug 2014 (two months). **Role:** PI
7. *Biomechanics and motor control of human locomotion in the prevention of chronic disease.* **Source:** Arch & Sole Podiatry Center (private donation). **Funding:** \$2,000, Aug 2013 – Aug 2014 (one year). **Role:** PI
6. *Statistical models for establishing a control data set for biomechanical gait analysis.* **Source:** Natural Sciences & Engineering Research Council (Engage Grant). **Funding:** C\$25,000, Jan 2013 – Jun 2013 (six months). **Role:** co-I
5. *Integrating OpenSim with high-performance computing to predict optimal walking gaits.* **Source:** National Center for Simulation in Rehabilitation Research (Visiting Scholars Program). **Funding:** \$1,500, Jul 2012 (one week). **Role:** PI [**declined; unable to make travel dates**]
4. *Neuromuscular contribution to contact forces in knee osteoarthritis subjects.* **Source:** National Center for Simulation in Rehabilitation Research (Pilot Projects Program). **Funding:** \$5,000, Apr 2011 – Apr 2012 (one year). **Role:** co-I
3. *Training program in bone and joint health technologies.* **Source:** Queen's University (HMRC-CREATE Postdoctoral Fellowship). **Funding:** C\$80,000, Jan 2011 – Jan 2013 (two years). **Role:** postdoctoral fellow
2. *Insights into human running through computer simulations.* **Source:** University of Massachusetts (Graduate School Fellowship). **Funding:** \$12,500, Sep 2008 – Jun 2009 (nine months). **Role:** predoctoral fellow
1. *A subject-specific musculoskeletal model of the iliotibial tract.* **Source:** American Society of Biomechanics (Graduate Student Grant-in-Aid). **Funding:** \$863, Aug 2007 – Aug 2008 (one year). **Role:** PI

## Teaching & Mentoring at University of Maryland

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### Courses Taught<sup>1</sup>

- 2015–pres **KNES 689P** Mechanical Analysis of Human Movement (taught 1x)
- 2014–pres **KNES 289W** The Cybernetic Human (taught 1x)
- 2014–pres **KNES 689Z** Skeletal Muscle Mechanics, Energetics, and Control (taught 1x)
- 2013–pres **KNES 402** Biomechanics of Sport (taught 2x)
- 2013–pres **KNES 300** Biomechanics of Human Motion (taught 2x)

### Doctoral Students Supervised

- 2015–pres Jessica Hunter
- 2014–pres Rebecca Krupenevich
- 2013–pres Farzad Ehtemam

### Masters Students Supervised

- 2013–pres **Edward Chu**  
Thesis: *Neuromechanical control of leg stiffness in one-legged hopping due to fatigue*  
Next Position: Doctoral Student at University of Maryland
- 2013–pres **Dovin Kiernan**  
Thesis: *Can biomechanical parameters predict lower limb injury in running?*  
Next Position: Research Engineering Intern at New Balance Inc.

### Undergraduate Honors Students Supervised

- 2013–2014 **Aryeh Esterson**  
Thesis: *An in-depth analysis of human walking*  
Next Position: Research Assistant at Kennedy Krieger Institute

## Service

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### Professional Memberships

- 2013–pres BADER Consortium Affiliate
- 2010–pres International Society of Biomechanics (ISB)
- 2007–pres American Society of Biomechanics (ASB)
- 2006–pres American College of Sports Medicine (ACSM)
- 2004–2011 American Society of Mechanical Engineers (ASME)

### Professional Service

- 2014 Selection Committee, ASB Young Scientist Pre-Doctoral Award
- 2014–pres Abstract reviewer, ACSM Annual Meeting
- 2013–pres Mentor, ASB Graduate Student Mentoring Program
- 2012–pres Abstract reviewer, ASB Annual Meeting
- 2010–pres Associate Editor, *Track & Cross Country Journal*
- 2008–pres Reviewer for various journals (about 8 manuscripts/year)

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<sup>1</sup>At UMD, 100- through 400-level courses are undergraduate courses, 400-level electives can be taken for graduate credit, and 600-level courses are graduate courses. Most departments do not have 500-level courses.

### *Departmental Service*

- 2014–pres Member, Graduate Research Initiative Project Committee
- 2014–pres Faculty panel, Physical Cultural Studies Graduate Student Conference
- 2013–pres Student advisor, Summer Training & Research Program
- 2013–pres Student advisor, Kinesiology Undergraduate Honors Program
- 2013–pres Member, Standing Committee on Undergraduate Appeals
- 2013–pres Member, Human Performance Committee
- 2013 Member, Faculty Search Committee (Human Motor Neuroscience)
- 2012–pres Member, Graduate Program & Admissions Committee

### *University Service*

- 2015 Poster judge, Public Health Research @ Maryland Day
- 2013–pres Member, Admissions Committee, Neuroscience & Cognitive Science Program
- 2013–pres Injury consultation and biomechanical analysis, Department of Intercollegiate Athletics
- 2013–pres Member, Innovation & Technology Advisory Committee, School of Public Health
- 2013 Networking roundtable convener, Public Health Research @ Maryland Day

Last updated: May 30, 2015  
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