Ian C. Smith, PhD

Contact Information

Email: icsmith@ucalgary.ca
Phone: +1-403-220-2070
Fax: +1-519-897-5985

Current Positions

CIHR Postdoctoral Fellow
Dr. Walter Herzog's Lab Group
Human Performance Lab
University of Calgary

Sessional Laboratory Instructor
Health and Physical Education
Mount Royal University

Research Interests

Multi-scale investigations of muscle structure and contractile function in health, disease, and aging, and in response to interventions.

Publication Metrics

Published & Accepted Articles: 42
10 as 1st Author

Conference Abstracts: 57
22 as 1st Author

Mean Journal Impact Factor: 3.095

Journal Quartile Scores: 22 Q1, 20 Q2

Citations: 661

h-index: 15

i-10 Index: 22

Education

PhD Kinesiology 2014
Work Physiology Specialization
University of Waterloo
Waterloo, Ontario, Canada
Supervisor: Dr. A. Russell Tupling, PhD

MSc Applied Health Sciences 2007
Brock University
St. Catharines, Ontario, Canada
Supervisor: Dr. Rene Vandenboom, PhD

BSc Kinesiology 2005
Pre-Health Professions Option
Chemistry Minor
University of Waterloo
Waterloo, Ontario, Canada

Major Grants & Awards

Postdoctoral $310,750 awarded

Canadian Institutes of Health Research Postdoctoral Fellowship 2017-2020

Alberta Innovates: Health Solutions Postgraduate Fellowship 2015-2017

PhD $134,250 awarded

Governor General's Academic Gold Medal (Doctoral Graduate in highest standing at the University of Waterloo) 2014

Natural Sciences and Engineering Research Council of Canada Post Graduate Scholarship Doctoral Award 2009-2012

MSc $17,500 awarded

Canadian Institutes of Health Research Canada Graduate Scholarship Masters Award 2006-2007

Expanded List of Awards, Honours, and Distinctions

2017-2020 **Canadian Institutes of Health Research Postdoctoral Fellowship**

$40000 + $5000 Research Account per annum (University of Calgary)

2017 **Office of the Vice President (Research) Postdoctoral Research Award**

$5000 Research Account (University of Calgary)

2016 **Office of the Vice President (Research) Postdoctoral Research Award**

$5000 Research Account (University of Calgary)

2016 **Roger Jackson Centre Postdoctoral Leadership Award**

$0 (University of Calgary, Voted by Faculty of Kinesiology Staff and Faculty Members)

2015-2017 **Alberta Innovates: Health Solutions Postgraduate Fellowship**

$50000 + $5000 Career Development Allowance per annum (University of Calgary)

2015 **Natural Sciences and Engineering Research Council CREATE Travel Award**

$750 (University of Calgary)

2014 **Governor General's Gold Medal**

Doctoral Graduate in highest standing at the University of Waterloo

2013 **Certificate in Student Leadership** (University of Waterloo)

2012 **Canadian Institutes of Health Research Institute Community Support Travel Award**

$1000 (University of Waterloo)

2011 **Canadian Society for Exercise Physiology Graduate Student Award Finalist**

$250 (University of Waterloo)

2009-2012 **Natural Sciences and Engineering Research Council of Canada Post Graduate Scholarship Doctoral Award**

$21000 per annum (University of Waterloo)

2008-2012 **University of Waterloo President's Graduate Scholarship**

$10000 per annum (University of Waterloo)

2008-2009 **Ontario Graduate Scholarship**

$15000 (Declined) (University of Waterloo)

2007-2008 **Ontario Graduate Scholarship**

$15000 (University of Waterloo)

2006-2007 **Canadian Institutes of Health Research Canada Graduate Scholarship Masters Award**

$17500 (Brock University)

2005 **Natural Sciences and Engineering Research Council of Canada Undergraduate Summer Research Award**

	$4500 (University of Waterloo)
2001-2005	**Dean's Honor List** (University of Waterloo)
2001	**Applied Health Sciences Dean's Entrance Scholarship**
	$1000 (University of Waterloo)

Published & Accepted Refereed Articles as First Author (10)

(Supervised/co-supervised students underlined)

2019:

10. **Smith IC**, Vandenboom R, Tupling AR. Caffeine attenuates contraction-induced diminutions of the intracellular calcium transient in mouse lumbrical muscle *ex vivo*. *Can J Physiol Pharmacol* 97(5):429-435 DOI: 10.1139/cjpp-2018-0658

    Impact Factor: 2.210; Quartile Score: 2

2018:

9. **Smith IC**, Ali J, Power GA, Herzog W. The sag response in human muscle contraction *European Journal of Applied Physiology* 118(5):1063-1077 DOI: 10.1007/s00421-018-3840-0

    Impact Factor: 2.401; Quartile Score: 1

2017:

8. **Smith IC**, Vandenboom R, and Tupling AR. (2017) Contraction-induced enhancement of relaxation during high force contractions of fast twitch mouse muscle. *Journal of Experimental Biology* 220(Pt 16):2870-2873 DOI: 10.1242/jeb.158998

    Impact Factor: 2.914; Quartile Score: 1

7. Cuenca-Fernández F*, **Smith IC***, Jordan MJ, MacIntosh BR, López-Contreras G, Arellano R, and Herzog W. (2017) Non-localized postactivation performance enhancement (PAPE) effects in trained swimmers: a pilot study. *Appl Physiol Nutr Metab* 42(10):1122-1125 DOI: 10.1139/apnm-2017-0217.

    ***Co-1st author**

    Impact Factor: 3.455; Quartile Score: 2

2016:

6. **Smith IC**, Bellissimo C, Herzog W, and Tupling AR. (2016) Can inorganic phosphate explain sag during unfused tetanic contractions of skeletal muscle? *Physiol Rep* 4(22):e13043. DOI: 10.14814/phy2.13043 (18 pages)

    Impact Factor: NA; Quartile Score: 2

2015:

5. **Smith IC**, Vigna C, Levy AS, Denniss SG, Rush JW, and Tupling AR. (2015) The effects of buthionine sulfoximine treatment on contractility and SERCA pump function in diaphragm muscle from adult and middle aged rats *Physiol Rep* 3(9):e12547, DOI: 10.14814/phy2.12547 (13 pages)

    Selected as an Editor's Choice Feature Publication

    Impact Factor: NA: Quartile Score: 2

2014:

4. **Smith IC**, Vandenboom R, and Tupling AR. (2014) Juxtaposition of the changes in intracellular calcium and force during staircase potentiation at 30 and 37°C. *J Gen Physiol* 144(6): 561-570 DOI: 10.1085/jgp.201411257

   Impact Factor: 4.788; Quartile Score: 1

2013:

3. **Smith IC**, Bombardier E, Vigna C, and Tupling AR. (2013) ATP consumption by sarcoplasmic reticulum Ca^{2+} pumps accounts for 40-50% of resting metabolic rate in mouse fast and slow twitch skeletal muscle. *PLoS One.* 8(7):e68924 (11 pages) DOI: 10.1371/journal.pone.0068924

   Impact Factor: 2.806; Quartile Score: 1

2. **Smith IC**, Gittings W, Huang J, McMillan EM, Quadrilatero J, Tupling AR, and Vandenboom R. (2013) Potentiation in mouse lumbrical muscle without myosin light chain phosphorylation: Is resting calcium responsible? *J Gen Physiol.* 141(3):297-308 DOI: 10.1085/jgp.201210918

   Impact Factor: 4.778; Quartile Score: 1

2010:

1. **Smith IC**, Huang J, Quadrilatero J, Tupling AR, and Vandenboom R. (2010) Posttetanic potentiation in *mdx* muscle. *J Muscle Res Cell Motil*. 31(4):267-77 DOI: 10.1007/s10974-010-9229-2

   Impact Factor: 2.052; Quartile Score: 2

Published & Accepted Refereed Articles as Co-Author (32)

(Supervised/co-supervised students underlined)

2018:

32. Collins KHM, Herzog W, MacDonald GZ, Reimer RA, Rios JL, **Smith IC**, Zernicke RF, Hart DA. Obesity, Metabolic Syndrome, and Musculoskeletal Disease: Common Inflammatory Pathways Suggest a Central Role for Loss of Muscle Integrity *Frontiers in Physiology* 9:112 DOI: https://doi.org/10.3389/fphys.2018.00112 Invited Review Article (25 Pages)

    Impact Factor: 4.134; Quartile Score: 1

31. Vorobej K, Mitchell AS, **Smith IC**, Donath S, Tupling AR, and Quadrilatero J. (2018) The effect of ARC ablation on skeletal muscle morphology and apoptotic signaling during aging *Exp Gerontol* 101:69-79 DOI: 10.1016/j.exger.2017.10.018

    Impact Factor: 3.340; Quartile Score: 2

2017:

30. Powers K, Joumaa V, Jinha A, Moo EK, **Smith IC**, Nishikawa K, Herzog W. (2017) Titin force enhancement following active stretch of skinned skeletal muscle fibres *Journal of Experimental Biology* 220(Pt 17):3110-3118. DOI: 10.1242/jeb.153502

    Impact Factor: 2.914; Quartile Score: 1

29. Collins KH, Hart DA, **Smith IC**, Issler A, Reimer RA, Seerattan, RA, Rios JL, and Herzog W. (2017) Acute and chronic changes in rat soleus muscle after high-fat high-sucrose diet. *Physiol Rep* 5(10):e13270 DOI: 10.14814/phy2.13270 (10 pages)

    Impact Factor: NA; Quartile Score: 2

28. Green HJ, Ranney, D, Kyle, N, Lounsbury, D, **Smith IC**, Stewart, R, Thomas, MM, Tick, H, Tupling AR. (2017) Neuromuscular manifestations of work-related myalgia in women specific to extensor carpi radialis brevis *Can J Physiol Pharmacol* 95(4): 404-419 DOI:10.1139/cjpp-2016-0080

    Impact Factor: 2.210; Quartile Score: 2

2016:

27. Collins KH, Paul HA, Hart DA, Reimer RA, **Smith IC**, Rios JL, Seerattan RA, and Herzog W. (2016) High fat, high sucrose diet rapidly alters muscle integrity, inflammation and gut microbiota in male rats. *Scientific Reports* 6:37278 DOI: 10.1038/srep37278 (10 Pages)

    Impact Factor: 4.259; Quartile Score: 1

26. Fajardo VA, **Smith IC,** Bombardier E, Chambers PJ, Quadrilatero J, and Tupling AR. (2016) Diaphragm assessment in mice overexpressing phospholamban in slow-twitch type I muscle fibres *Brain and Behavior* Apr 22 6:6(e00470). DOI: 10.1002/brb3.470 (10 pages)

    Impact Factor: 2.243; Quartile Score: 2

2015:

25. Green HJ, Ranney D, Burnett M, Iqbal S, Kyle N, Lounsbury D, Ouyang J, Tupling AR, **Smith IC**, Stewart R, and Tick H. (2015) Cellular properties of extensor carpi radialis brevis and trapezius muscles in healthy males and females. *Can J Physiol Pharmacol* 93(11): 953-966 DOI: 10.1139/cjpp-2014-0549

    Impact Factor: 2.210; Quartile Score: 2

24. Fajardo VA, Bombardier E, McMillan E, Tran K, Wadsworth BJ, Gamu D, Hopf A, Vigna C, **Smith IC**, Bellissimo C, Michel RN, Tarnopolsky MA, Quadrilatero J, and Tupling AR. (2015) Phospholamban overexpression causes centronuclear myopathy with progressive fibrosis and core formation in mice. *Dis Model Mech* 8(8):999-1009 DOI: 10.1242/dmm.020859

    Impact Factor: 4.691; Quartile Score: 1

23. Mitchell AS, **Smith IC**, Gamu D, Donath S, Tupling AR, and Quadrilatero J. (2015) Functional, morphological, and apoptotic alterations in skeletal muscle of ARC deficient mice. *Apoptosis* 20(3): 310-326 DOI:10.1007/s10495-014-1078-9

    Impact Factor: 3.833; Quartile Score: 1

2014:

22. Green HJ, Ranney D, Burnett M, Galvin P, Lounsbury D, Ouyang J, **Smith IC**, Stewart R, Tick H, and Tupling AR (2014) Preliminary observations on high energy phosphates and metabolic pathway and transporter potentials in extensor carpi radialis brevis and trapezius muscles of women with work-related myalgia. *Can J Physiol Pharmacol* 92(11):953-60 DOI: 10.1139/cjpp-2014-0218

    Impact Factor: 2.210; Quartile Score: 2

21. Green HJ, Ranney D, Burnett M, Galvin P, Kyle N, Lounsbury D, Ouyang J, **Smith IC**, Stewart R, Tick H, and Tupling AR. (2014) Excitation-contraction coupling properties in women with work-related myalgia: a preliminary study. *Can J Physiol Pharmacol* 92(6):498-506. DOI: 10.1139/cjpp-2014-0029

    Impact Factor: 2.210; Quartile Score: 2

20. Gamu D, Bombardier E, **Smith IC**, Fajardo VA, and Tupling AR. Sarcolipin provides a novel muscle-based mechanism for adaptive thermogenesis. (2014) *Exercise and Sport Sciences Reviews.* 42(3):136–142 DOI: 10.1249/JES.0000000000000016 (Review Article)

    Impact Factor: 4.259; Quartile Score: 1

19. Green HJ, Ranney D, Burnett M, Galvin P, Kyle N, Iqbal S, Lounsbury D, Ouyang J, **Smith IC**, Stewart R, Tick H, and Tupling AR. (2014) A pilot study to determine whether differences exist in histochemical properties between the trapezius and extensor carpi radialis brevis muscles in women with work-related myalgia. *Can J Physiol Pharmacol.* 92(4):315-323 DOI: 10.1139/cjpp-2013-0301

    Impact Factor: 2.210; Quartile Score: 2

2013:

18. Vandenboom R, Gittings W, **Smith IC**, Grange RW, and Stull JT. (2013) Myosin phosphorylation and force potentiation in skeletal muscle: Evidence from animal models. *J Mus Res Cell Motil.* 34(5-6):317-332 DOI: 10.1007/s10974-013-9363-8 (Review Article)

    Impact Factor: 2.052; Quartile Score: 2

17. Bombardier E, **Smith IC**, Gamu D, Fajardo VA, Vigna C, Sayer RA, Gupta SC, Bal NC, Periasamy M, and Tupling AR. (2013) Sarcolipin trumps β-adrenergic receptor signaling as the favored mechanism for muscle-based diet-induced thermogenesis. *FASEB J.* 27(9):3871-3878 DOI: 10.1096/fj.13-230631

    Impact Factor: 5.498; Quartile Score: 1

16. Bombardier E, **Smith IC**, Vigna C, and Tupling AR. (2013) Ablation of sarcolipin decreases the energy requirements for Ca^{2+} transport by sarco(endo)plasmic reticulum Ca^{2+}-ATPases in resting skeletal muscle. *FEBS Letters* 2013 587(11):1687-1692 DOI: 10.1016/j.febslet.2013.04.019

    Impact Factor: 3.519; Quartile Score: 1

15. Green HJ, Burnett M, Carter S, Jacobs I, Ranney D, **Smith I**, and Tupling S. (2013) Role of exercise duration on metabolic adaptations in working muscle to short-term moderate-to-heavy aerobic-based cycle training. *Eur J Appl Physiol.* 113(8):1965-1978 DOI: 10.1007/s00421-013-2621-z

    Impact Factor: 2.567; Quartile Score: 1

14. Green HJ, Burnett M, Jacobs I, Ranney D, **Smith I**, and Tupling S. (2013) Adaptations in muscle metabolic regulation require only a small dose of aerobic-based exercise. *Eur J Appl Physiol.* 113(2):313-24 DOI: 10.1007/s00421-012-2434-5

    Impact Factor: 2.567; Quartile Score: 1

2012:

13. Green HJ, Batada A, Cole B, Burnett ME, Kollias H, McKay S, Roy B, Schertzer JD, **Smith IC**, and Tupling S. (2012) Muscle cellular properties in the ice hockey player: a model for investigating overtraining? *Can J Physiol Pharmacol*. 90(5):567-578 DOI: 10.1139/y2012-017

    Impact Factor: 2.210; Quartile Score: 2

12. Green HJ, Burnett M, Kollias H, Ouyang J, **Smith I**, and Tupling S. (2012) Can increases in capillarization explain the early adaptations in metabolic regulation in human muscle to short-term training? *Can J Physiol Pharmacol*. 90(5):557-566 DOI: 10.1139/y2012-013

Impact Factor: 2.210; Quartile Score: 2

2011:

11. Green HJ, Burnett M, Kollias H, Ouyang J, **Smith I,** and Tupling S. (2011) Malleability of human skeletal muscle sarcoplasmic reticulum to short-term training. *Appl Physiol Nutr Metab* 36(6):904-12 DOI: 10.1139/h11-114

    Impact Factor: 3.455; Quartile Score: 2

10. Green HJ, Duhamel TA, **Smith IC**, Rich SM, Thomas MM, Ouyang J, and Yau JE. (2011) Muscle fatigue and excitation-contraction coupling responses following a session of prolonged cycling. *Acta Physiol (Oxf)* 203(4):441-55 DOI: 10.1111/j.1748-1716.2011.02335.x

    Impact Factor: 4.867; Quartile Score: 1

9. Green HJ, Burnett M, Kollias H, Ouyang J, **Smith I**, and Tupling S. (2011) Association of peak aerobic power with capillary density but not oxidative potential in human vastus lateralis muscle. *Can J Physiol Pharmacol.* 89(11):819-27 DOI: 10.1139/Y11-079

    Impact Factor: 2.210; Quartile Score: 2

8. Gittings W, Huang J, **Smith IC**, Quadrilatero J, and Vandenboom R. (2011) The effect of skeletal myosin light chain kinase gene ablation on the fatigability of mouse fast muscle. *J Muscle Res Cell Motil*. 31(5-6):337-48 DOI: 10.1007/s10974-011-9239-8

    Impact Factor: 2.052; Quartile Score: 2

7. Green HJ, Duhamel TA, **Smith IC**, Rich SM, Thomas MM, Ouyang J, and Yau JE. (2011) Muscle metabolic, enzymatic and transporter responses to a session of prolonged cycling. *Eur J Appl Physiol*. 111(5):827-37 DOI: 10.1007/s00421-010-1709-y

    Impact Factor: 2.567; Quartile Score: 1

2010:

6. Green HJ, Batada A, Cole B, Burnett ME, Kollias H, McKay S, Roy B, Schertzer J, **Smith IC**, and Tupling S. (2010) Cellular responses in skeletal muscle to a season of ice hockey. *Appl Physiol Nutr Metab*. 35(5):657-70 DOI: 10.1139/H10-060

    Impact Factor: 3.455; Quartile Score: 2

2009:

5. Green HJ, Bombardier E, Burnett ME, **Smith IC**, Tupling SM, and Ranney DA. (2009) Time-dependent effects of short-term training on muscle metabolism during the early phase of exercise. *Am J Physiol Regul Integr Comp Physiol*. 297(5):R1383-91 DOI: 10.1152/ajpregu.00203.2009

    Impact Factor: 2.982; Quartile Score: 1

4. Green HJ, Burnett ME, **Smith IC**, Tupling SM, and Ranney DA. (2009) Failure of hypoxia to exaggerate the metabolic stress in working muscle following short-term training. *Am J Physiol Regul Integr Comp Physiol*. 297(3):R593-604 DOI: 10.1152/ajpregu.91035.2008

    Impact Factor: 2.982; Quartile Score: 1

2007:

3. Duhamel TA, Green HJ, Stewart RD, Foley KP, **Smith IC**, and Ouyang J. (2007) Muscle metabolic SR Ca^{2+}-cycling responses to prolonged cycling, with and without glucose supplementation. *J Appl Physiol.* 103(6):1986-98 DOI: 10.1152/japplphysiol.01440.2006

Impact Factor: 3.351; Quartile Score: 1

2. Stewart RD, Duhamel TA, Foley KP, Ouyang J, **Smith IC**, and Green HJ. (2007) Protection of muscle membrane excitability during prolonged cycle exercise with glucose supplementation. *J Appl Physiol*. 103(1):331-9 DOI: 10.1152/japplphysiol.01170.2006

   Impact Factor: 3.351; Quartile Score: 1

1. Green HJ, Duhamel TA, Foley KP, Ouyang J, **Smith IC**, and Stewart RD. (2007) Glucose supplements increase human muscle in vitro Na^+-K^+-ATPase activity during prolonged exercise. *Am J Physiol Regul Integr Comp Physiol*. 293(1):R354-62 DOI: 10.1152/ajpregu.00701.2006

   Impact Factor: 2.982; Quartile Score: 1

Invited Talks (9)

2019 Poznan University of Physical Education, Department of Neurobiology (Poland; July 10)
History dependent changes in summation properties of human skeletal muscle

2018 Poznan University of Physical Education, Department of Neurobiology (Poland; Sept 5)
Sag in muscle contraction: the search for mechanisms

2018 Brock University, Faculty of Applied Health Sciences, (Canada; May 11)
Biochemical and molecular control of muscle contraction and relaxation – implications for obesity and muscle function

2018 University of Calgary Human Performance Lab (Canada; March 8)
Tales of mice and men… and some frogs: are there differences in the way our muscles relax?

2015 University of Calgary 3 Minutes/3 Slides (Canada; Nov 24)
Trapezius myalgia: what a pain in the neck

2015 University of Calgary Human Performance Lab (Canada; Nov 19)
Mysteries of muscle contraction: a tenable mechanism for sag

2014 Canadian Society for Exercise Physiology (Canada; Oct 23)
Cellular, molecular and functional characteristics in disordered muscle
Symposium: Fatigue and pain-associated muscle disorders: implications to work and sport.

2014 University of Calgary, Human Performance Lab (Canada; June 12)
The role of cytosolic calcium during force potentiation in mouse lumbrical muscle

2013 University of Calgary; Dr. Walter Herzog Lab Group (Canada; Sept 26)
Calcium handling and passive stiffness during potentiation of mouse lumbrical muscle

Prepared Drafts

(Supervised/co-supervised students underlined)

Smith IC, Adam H, Herzog W. A brief contraction has complex effects on summation of twitch pairs in human adductor pollicis (Frontiers Physiol)

Smith IC, Celichowski J. Force declines during unfused tetanic contractions: A new look at sag with perspectives on human muscle. *Eur J Appl Physiol (Invited Review; Proposal Accepted – Final submission scheduled for Fall 2019)*

Kryściak K, **Smith IC**, Drzymała-Celichowska H, Celichowski J. Initial force production is enhanced by prior contraction followed by a 3-minute rest period in fast fatigue resistant motor units of the rat medial gastrocnemius. *J Electromyogr Kines*

Conference Abstracts (57)

(Supervised/co-supervised students underlined)

2019:

57. Kryściak K, Drzymała-Celichowska H, **Smith IC**, Celichowski J. (2019) The influence of resistanceendurance, strength, and vibration training on sag in unfused tetanic contractions of fast motor units. 14th International Congress of the Polish Neuroscience Society. 28-30.08.2019 Katowice, Poland. Poster Presentation.
56. **Smith IC**, Onasch F, Herzog W. (2019) Summation properties are improved by a preceding contraction and intervening rest period. Rocky Mountain Muscle Symposium (July 27-29) Oral Presentation. 4th Rocky Mountain Muscle Symposium Abstract Book p 56.
55. Kuang C, **Smith IC**, Herzog W. (2019) Do chemically skinned skeletal muscle fibres behave isovolumetrically when stretched? Webber Academy Science Fair, Calgary Alberta. *** Silver Medal winner**, selected to advance to city-wide fair (student declined due to scheduling conflict)
54. **Smith IC**, Sawatsky A, Herzog W. (2019) Relaxation is not accelerated by prior contraction in plantaris muscle of *Rana pipiens* assessed *in situ*. *XXVII Congress of the International Society for Biomechanics Abstract Book* July 31- Aug 4, Calgary AB. Poster Presentation.

2018:

53. Collao N, **Smith IC**, Herzog W. (2018) Length-dependent effects of inorganic phosphate on contractile function of permeabilized rabbit skeletal muscle fibres. *VIII Congreso Ciencias del Ejercicio* Dec 14-15 Santiago de Chile Podium Presentation ***Won Presentation Award**
52. **Smith IC**, MacDonald GZ, Ostertag C, Herzog W. (2018) Contractile function of vastus intermedius fibres from young rats on a high-fat, high-sucrose diet. Aug 30-Sept 3 Poster Presentation *J Muscle Res Cell Motil* 47th European Muscle Conference in Budapest, Hungary Abstracts. pp:21 DOI: https://doi.org/10.1007/s10974-018-9500-5
51. Joumaa V, **Smith IC**, Fukutani A, Leonard TR, Ma W, Irving TC, Herzog W. (2018) Equatorial and meridional x-ray reflections after active stretch and shortening in skeletal muscle, *European Muscle Conference,* Aug 30-Sept 3 Poster Presentation *J Muscle Res Cell Motil* 47th European Muscle Conference in Budapest, Hungary Abstracts. pp:22 DOI: https://doi.org/10.1007/s10974-018-9500-5
50. Collao N, **Smith IC**, Herzog W. (2018) Effects of inorganic phosphate on the force-calcium relationship at different sarcomere lengths in permeabilized rabbit psoas fibres. II Congreso Internacional Asociacion Chilena de Ciencias del Movimiento (ACCM), Aug 2-4, 2018, Santiago de Chile. Podium Presentation
49. Joumaa V, **Smith IC**, Fukutani A, Leonard TR, Ma W, Irving TC, Herzog W. (2018) Evidence for Actin Filament Structural Changes after Active Shortening in Skinned Muscle Bundles. *Biophysical J* 114(3):135a

2017:

48. **Smith IC**, Ali J, Power GA, Herzog W. (2017) The sag response in human adductor pollicis muscle *European Muscle Conference*, September 19-22 Poster Presentation. *J Muscle Res Cell Motil* 38:339–398. P1-3. DOI: 10.1007/s10974-017-9490-8
47. Ostertag C, **Smith IC**, MacDonald GZ, Herzog W. (August 23, 2017) High fat high sucrose diet and young rat muscle function. 11th Annual Biomedical Engineering Undergraduate Summer Research Symposium. Podium Presentation. *Journal of Undergraduate Research in Alberta.*

Vol 7 No 01 (2019): Special edition 2018-19. Pages 11-12. https://journalhosting.ucalgary.ca/index.php/jura/issue/view/5148

46. Ostertag C, **Smith IC**, MacDonald GZ, Herzog W. (August 16, 2017) Diet-induced obesity and rat muscle function. Poster Presentation. Heritage Youth Researcher Summer Program Open House.

45. **Smith IC**, Ali J, Power GA, Herzog W. (2017) Sag is dependent on muscle length and the inter-pulse interval of stimulation in human adductor pollicis muscle June 15-16. Podium Presentation. *Exercise Neuroscience Group Meeting 2017 Abstract Book*. Page 36.

2016:

44. Cuenca-Fernández F, **Smith IC**, Arellano R. (2016) Squat jump and jumping push-up performance of trained swimmers immediately before and after resistance exercise. Podium Presentation. *XI World Congress of Performance Analysis of Sport.*

43. **Smith IC,** Bellissimo C, Herzog W, Tupling AR. (2016) The fibre-type dependence of sag during unfused tetanic contractions can be explained by fibre-type dependent differences in cytosolic inorganic phosphate concentration. European Muscle Conference. September 2-6. Poster Presentation. *J Muscle Res Cell Motil* 1:47-136. DOI: 10.1007/s10974-016-9457-1

42. Holash RJ, **Smith IC**, Herzog W, MacIntosh BR. (2016) Increased occupation of sarcomeric calcium buffers reduces required calcium release for similar troponin-c binding of subsequent activation. European Muscle Conference September 2-6 Poster Presentation. *J Muscle Res Cell Motil* 1:47-136. DOI: 10.1007/s10974-016-9457-1

41. Issler AM*, Collins KH, Seerattan RA, **Smith IC**, Hart DA, Herzog W. (2016) Diet-induced obesity does not compromise soleus muscle integrity. 10th Annual Biomedical Engineering Conference. Podium Presentation. *** Won Presentation Award**

40. Issler AM, Collins KH, Seerattan RA, **Smith IC**, Hart DA, Herzog W. (2016) Soleus muscle integrity is conserved with diet-induced obesity in rats. McCaig Institute Summer Student Research Symposium. *McCaig Institute Summer Student Research Symposium Abstract Booklet* Page 31. Podium Presentation.

39. **Smith IC**, Herzog W, Tupling AR. (2016) The viscosity of relaxed skeletal muscle increases following disruption of the short range elastic component. Podium Presentation. *Canadian Society for Biomechanics* July 21 (19-22) *Canadian Society for Biomechanics Abstract Book* Page 35*.*

38. **Smith IC**, O'Reilly JJ, Collins KH, Sawatsky A, Herzog W. (2016) The effects of a high fat, high sugar diet on the contractile properties of permeabilized rat vastus intermedius fibres. Poster Presentation. *Canadian Society for Biomechanics* July 21 (19-22) *Canadian Society for Biomechanics Abstract Book* Page 213.

37. Collins KH, Sawatsky A, Hart DA, **Smith IC**, Herzog W. (2016) The rat soleus muscle maintains structural and functional integrity with diet-induced obesity. Podium Presentation. *Canadian Society for Biomechanics* July 21 (19-22) *Canadian Society for Biomechanics Abstract Book* Page 39*.*

36. Collins KH, Hart DA, Paul HA, Reimer RA, **Smith IC**, Rios JL, Seerattan RA, Herzog W. (2016) Short-term high fat-sucrose metabolic challenge results in compromised muscular integrity, alterations in gut microbiota and oxidative stress. 3rd Annual McCaig Musculoskeletal Diseases Symposium (May 6). Podium Presentation.

35. Joumaa V, **Smith IC**, Leonard TR, Antipova OA, Irving TC, Herzog W. (2016) Effect of active shortening and stretching on lattice spacing and cross-bridge binding in skinned muscle fibres. *Biophysical Journal* 110(3):301a. Poster Presentation.

2015:

34. Borthwick MJ, Aurka S, Collins KH, Sawatsky A, **Smith IC**, Herzog W. (2015) Diet induced obesity may affect the force-velocity relationship in rat soleus. 16th Annual Alberta Biomedical Engineering Conference. Nov 6-8. Podium Presentation. http://www.ucalgary.ca/bme/files/bme/bme-conference-2015-program-long-final-from-mk.pdf

33. Aurka S, Collins KH, Sawatsky A, Borthwick MJ, **Smith IC**, Herzog W. (2015) The effects of diet induced obesity on the force-length relationship in rat soleus. Markin Undergraduate Student Research Program in Health & Wellness Symposium. Sept 25, University of Calgary. Poster Presentation.

32. **Smith IC**, Herzog W, Tupling AR. (2015) The effects of pre-activation Ca^{2+} on the activation of skinned rabbit psoas fibres. Poster Presentation. *Applied Physiology, Nutrition, and Metabolism* 40(9(Supplement 1)):S1-S69. 10.1139/apnm-2015-0359

31. Ali J, **Smith IC**, Power GA, Herzog W. (2015) Sag properties of human adductor pollicis muscle. 9th Annual Biomedical Engineering & NSERC CREATE Undergraduate Summer Research Symposium. *Journal of Undergraduate Research in Alberta* 5(1) Podium Presentation.

30. O'Reilly JJ, **Smith IC**, Collins KH, Sawatsky A, Herzog W. (2015) Functional effects of diet induced obesity on permeabilized rat muscle fibres. Oral Presentation. 9th Annual Biomedical Engineering & NSERC CREATE Undergraduate Summer Research Symposium. *Journal of Undergraduate Research in Alberta* 5(1) Podium Presentation.

29. Aurka S, Collins KH, Sawatsky A, Borthwick MJ, **Smith IC**, Herzog W. (2015) The effects of diet induced obesity on the force-length relationship in rat soleus. Oral Presentation. 9th Annual Biomedical Engineering & NSERC CREATE Undergraduate Summer Research Symposium. *Journal of Undergraduate Research in Alberta* 5(1) Podium Presentation.

28. Borthwick MJ*, Collins KH, Sawatsky A, Aurka S, **Smith IC**, Herzog W. (2015) The effects of diet induced obesity on the force-velocity relationship in rat soleus. Oral Presentation. 9th Annual Biomedical Engineering & NSERC CREATE Undergraduate Summer Research Symposium. *Journal of Undergraduate Research in Alberta* 5(1) Podium Presentation. ***Won Presentation Award**

27. **Smith IC**, Power GA, Fortuna R, Herzog W. (2015) Shortening-induced force depression in human adductor pollicis during fatigue. *XXV Congress of the International Society for Biomechanics Abstract Book*: 1939-1940 Poster Presentation

26. **Smith IC** and Herzog W. (2015) The effects of titin degradation on passive stiffness properties of skinned rabbit psoas fibers during osmotic compression. *Biophysical Journal* 108(2 Supplement 1):p591a DOI: http://dx.doi.org/10.1016/j.bpj.2014.11.3222 Poster Presentation.

2014:

25. Gamu D, Wadsworth BJ, Bombardier E, **Smith IC**, and Tupling AR (2014) Dual ablation of phospholamban and sarcolipin enhance skeletal muscle contractility. Poster presentation. *Applied Physiology, Nutrition, and Metabolism* 39(S1):S1-S48 10.1139/apnm-2014-0270

24. Fajardo VA, **Smith IC**, Bombardier E, McMillan E, Quadrilatero J, and Tupling AR. (2014) Assessment of SERCA function, muscle contractility, and muscle remodeling in the diaphragm muscles of phospholamban overexpressing mice. Podium Presentation. *Applied Physiology, Nutrition, and Metabolism* 39(S1):S1-S48 10.1139/apnm-2014-0270

2013:

23. **Smith IC** and Tupling AR (2013) Interactions of temperature and Ca^{2+} during staircase potentiation in mouse lumbrical muscle. Canadian Society for Exercise Physiology National Conference. Toronto, Ontario October 16-19. Poster Presentation. *Applied Physiology, Nutrition, and Metabolism* 38(10): 1003-1091, 10.1139/apnm-2013-0299
22. Wadsworth BJ, **Smith IC,** Mitchell AS, Ng D, Quadrilatero J, Tupling AR (2013). Apoptosis repressor with caspase recruitment domain (ARC) ablation facilitates a slow twitch contractile phenotype in skeletal muscle. Canadian Society for Exercise Physiology National Conference. Toronto, Ontario October 16-19. Poster Presentation *Applied Physiology, Nutrition, and Metabolism* 38(10): 1003-1091, 10.1139/apnm-2013-0299
21. **Smith IC**, Vandenboom R, and Tupling AR (May 17, 2013). Force potentiation in the absence of myosin regulatory light chain phosphorylation is concurrent with elevations in resting cytosolic Ca^{2+}. Muscle Health Awareness Day, York University. Poster Presentation
20. **Smith IC**, Vandenboom R, and Tupling AR. (May 2013) Activity-induced enhancement of twitch force and kinetic rates without myosin regulatory light chain phosphorylation are mediated by elevations in resting cytosolic calcium. Applied Health Sciences Graduate Student Conference, University of Waterloo. Podium Presentation.

2012:

19. **Smith I**, Gittings W, Tupling R, and Vandenboom R. (Dec 2012) Assessment of the intracellular calcium transient using high and low affinity fluorescent indicators in potentiated mouse lumbrical muscle. *The Physiologist*. 55(6): C53. Poster Presentation
18. Fajardo VA, Bombardier E, Mariani RM, **Smith IC**, Wadsworth BJ, and Tupling AR (Dec 2012) Phospholamban overexpression causes irregular distribution and size of slow-twitch and fast-twitch fibres in mouse soleus and diaphragm. *The Physiologist*. 55(6):C52. Poster Presentation
17. **Smith IC**, Gittings W, Tupling AR, and Vandenboom R. (May 25, 2012) Basal cytosolic Ca^{2+} is elevated during posttetanic potentiation, but Ca^{2+} transients are not altered. Muscle Health Awareness Day, York University. Poster Presentation

2011:

16. **Smith IC**, Gittings W, Tupling AR, and Vandenboom R (2011). The intracellular calcium transient is not altered during posttetanic potentiation of mouse lumbrical muscle. Canadian Society for Exercise Physiology National Conference. Quebec City, Quebec. October 19-22. Podium Presentation. Graduate Student Award Finalist. *Appl Physiol Nutr Metab* 36:(S2):S352
15. Bombardier E, **Smith IC**, Gamu D, Trinh A, and Tupling AR (2011) Propranolol exacerbates obesity while diminishing glucose intolerance induced by a high fat diet in SLNKO mice. Canadian Society for Exercise Physiology National Conference. Quebec City, Quebec. October 19-22. Podium Presentation. *Appl Physiol Nutr Metab* 36:(S2):S304
14. **Smith I**, Bombardier E, Bloemberg D, Vigna C, Quadrilatero J, and Tupling AR. (May 27, 2011) Fibre type specific distribution of SERCA1a, SERCA2a and phospholamban in

human vastus lateralis. Muscle Health Awareness Day, York University. Poster Presentation – Poster Presentation Awards Finalist

13. Gittings W, Huang J, **Smith IC**, Quadrilatero J, and Vandenboom R (May 27, 2011). The effect of skeletal myosin light chain kinase gene ablation on the fatigability of mouse fast muscle. Muscle Health Awareness Day, York University. Poster Presentation
12. Mangan G, Bombardier E, Vigna C, **Smith IC**, Gamu D, Tupling AR (2011) Effects of sarcolipin ablation on metabolic efficiency and endurance exercise performance. Ontario Exercise Physiology Conference, Barrie, Ontario, Jan 28-30. Podium Presentation.

2010:

11. **Smith IC**, Bombardier E, Norris SM, Vigna C, Sayer RA, and Tupling AR. (2010) The energetic cost of Ca^{2+} transport in resting skeletal muscle is reduced following high-fat feeding. *Appl Physiol Nutr Metab.* 35(S1):S97. Podium Presentation.
10. Tupling AR, Bombardier E, Norris SM, Vigna C, **Smith IC**, Sayer RA, and Trinh A. (2010) Sarcolipin ablation decreases the energy requirements for Ca^{2+} transport by sarco(endo)plasmic reticulum Ca^{2+}-ATPases in resting skeletal muscle. *Appl Physiol Nutr Metab.* 35(S1):S104 Podium Presentation.
9. **Smith IC**, Vigna C, Levy AS, Denniss SG, Rush JW, and Tupling AR. (2010) The effects of buthionine sulfoximine on diaphragm contractility and SERCA function in aged rats. Ontario Exercise Physiology Conference, Barrie, Ontario, Jan 29-31. Podium Presentation.

2009:

8. Bombardier E, Norris SM, **Smith IC**, Vigna C, and Tupling AR. (2009) Metabolic cost of calcium handling under basal conditions in mouse fast and slow twitch skeletal muscle. *Appl Physiol Nutr Metab.*34(6):1121 Podium Presentation.
7. **Smith IC**, Vigna C, Levy AS, Denniss SG, Rush JW, and Tupling AR. (2009) The effects of buthionine sulfoximine on diaphragm contractility and SERCA function in aged rats. International Biochemistry of Exercise Conference *Appl Physiol Nutr Metab.* 34(6) 1157 Poster Presentation.

2008:

6. **Smith IC,** Tupling AR, and Vandenboom R. (2008) Force potentiation in the *mdx* mouse. *Appl Physiol Nutr Metab* 33(S1): S93. Canadian Society for Exercise Physiology National Conference. Banff, Alberta. October 15-18. Podium Presentation.

2007:

5. **Smith IC**, Norris SM, Sayer RA, and Tupling AR. (2007) A novel method for quantifying oxidative muscle metabolism ex-vivo. *Appl Physiol Nutr Metab* 32(Supplement S1): S84. Canadian Society for Exercise Physiology National Conference. London, Ontario. November 14-17. Poster Presentation.

2006:

4. McCloy, R, Bombardier E, Vigna C, **Smith IC**, Vandenboom R and Tupling AR. (2006) The intact mouse lumbrical muscle: A novel model for studying whole muscle contractility and Ca^{2+} handling. Ontario Exercise Physiology Conference, Barrie, Ontario, Jan 27-29. Podium Presentation.
3. Duhamel TA, Stewart RD, Foley KP, **Smith IC**, Ouyang J, Green HJ, and Sharratt MT. (2006) Effects of exercise and glucose supplementation on sarcoplasmic reticulum (SR) Ca^{2+}-

handling properties in human skeletal muscle. *Med Sci Sports Exerc*. 38(5): S16. Podium Presentation.

2. Stewart RD, Duhamel TA, Foley KP, **Smith IC,** and Green HJ. (2006) Muscle mechanical properties during prolonged exercise to fatigue with and without glucose supplementation. *Med Sci Sports Exerc*. 38(5): S37-38. Podium Presentation.

1. Green HJ, Duhamel TA, Foley KP, Ouyang J, **Smith IC** and Stewart RD. (2006) Glucose supplements increase human muscle Na^+-K^+-ATPase activity during prolonged exercise. *Med Sci Sports Exerc*. 38(5): S91. Podium Presentation.

Published Theses (2)

2014 Smith IC. The role of cytosolic calcium in potentiation of mouse lumbrical muscle. PhD Thesis. Department of Kinesiology, University of Waterloo, Waterloo Ontario, Canada

2007 Smith IC. Force potentiation in the *mdx* mouse. MSc Thesis. Faculty of Applied Health Sciences, Brock University, St. Catharines, Ontario, Canada.

Other Refereed Contributions (3)

2013 **Invited Video Summary of Article - Smith IC**, Gittings W, Huang J, McMillan EM, Quadrilatero J, Tupling AR and Vandenboom R. Potentiation in mouse lumbrical muscle without myosin light chain phosphorylation: Is resting calcium responsible? *J Gen Physiol*

2013 **Cover Image** *J Gen Physiol* 141(3)

2010 **Cover Image** *J Muscle Res Cell Motil* 31(4)

International Collaborations

Dr. Tom Irving
Director, Biophysics Collaborative Access Team (BioCAT)
Advanced Photon Source, Argonne National Laboratory
Illinois Institute of Technology
Chicago, Illinois, USA
Scope: Elucidating history-dependent changes to the molecular structure of skeletal muscle using low-angle x-ray diffraction patterns

Dr. Jan Celichowski
Professor, Department Head, Neurobiology
Poznań University of Physical Education
Poznań, Poland
Scope: Elucidating mechanisms of sag responses during contractions of single motor units in rat

Dr Sang-Hoon Yeo
Lecturer in Biomechanics / Motor Control
School of Sport, Exercise and Rehabilitation Sciences
University of Birmingham
Birmingham, United Kingdom
Scope: Testing mechanical models of muscle during active stretch and shortening

Teaching and Mentorship Experience

Supervised and Co-Supervised Student Projects

High School (2)

2018-2019 Connie Kuang - Independent Project - Webber Academy at University of Calgary

2017 Curtis Ostertag - HYRS Program, Springbank Community High School at University of Calgary

Undergraduate (8)

2019 Helen Adam – Visiting Scholar, Technical University of Munich at University of Calgary

2016 Anthony Issler - Undergraduate Summer Student, University of Calgary

2015-2016 Jahaan Ali - Undergraduate Summer Student, Queen's University at University of Calgary

2015 Jennifer J. O'Reilly - Undergraduate Summer Student, University of Calgary

2015 Myles Borthwick - Undergraduate Summer Student, University of Calgary

2015 Sudeepta Aurka - Undergraduate Summer Student, University of Calgary

2013-2014 Brennan J. Wadsworth - Honours Thesis Project, University of Waterloo

2012-2013 Denise Ng - Honours Thesis Project, University of Waterloo

MSc (1)

2018 Nicolás Collao-Alonso - Visiting Scholar, Emerging Leaders in the Americas Program. Universidad de Concepción at University of Calgary.

PhD (1)

2016 Francisco Cuenca-Fernandez - Visiting Student, University of Granada at University of Calgary

Courses Taught

2019 Fall Mount Royal University, Calgary, Alberta, Canada

Sessional Laboratory Instructor PHYL 3514 501 & PHYL 3514 503 Exercise Physiology

Guest Lectures

2019 Electromyography of force-length and force-velocity relationships of knee extensor muscles

MSc and PhD level class; University of Calgary, Calgary, Alberta

2019 Manuscripts: Preparation to Publication

4th Year Honours Kinesiology undergraduate level class; University of Calgary, Calgary, Alberta

2010-2014 Regulation of skeletal muscle contraction
MSc and PhD level class; University of Waterloo, Waterloo, Ontario

2013 Force Potentiation
2nd year undergraduate class. University of Waterloo, Waterloo, Ontario

2011 Enzyme kinetics in exercise physiology
4th year undergraduate class; Wilfred Laurier University, Waterloo, Ontario

2006 Obesity and Strategies for Weight Management
3rd year undergraduate class; Brock University, St. Catharines, Ontario

Teaching Assistantships

2012 Lab Demonstrator; 2nd year undergraduate class
Statistical Techniques Applied to Kinesiology
University of Waterloo, Waterloo, Ontario

2009 Marking Assistant; 3rd year undergraduate class
Head and Neck Injuries
University of Waterloo, Waterloo, Ontario

2006 Lab Demonstrator; 3rd year undergraduate class
Physical fitness appraisal, health assessment, exercise prescription and lifestyle counseling
Brock University; St. Catharines, Ontario

2005 Lab Demonstrator; 2nd year undergraduate class
Concepts and practical testing skills in exercise physiology
Brock University; St. Catharines, Ontario

Other Teaching Experience

2014- Kinesiology Open House Station Design and Presentation
Electromyography and Ultrasound Imaging
University of Calgary, Calgary AB; Human Performance Lab
Designed EMG-controlled toy vehicle and EMG acoustics stations
Presented stations demonstrating EMG and ultrasound imaging principles

2011-2014 Workshop Facilitator; Office of Organizational & Human Development
University of Waterloo, Waterloo ON; Student Leadership Program
Leading workshops on credibility, communication, and creativity

2009, 2011 Kinesiology Lab Days Instructor
University of Waterloo, Waterloo ON; High school outreach program
Lab demonstrator for blood pressure and predictive maximum aerobic exercise capacity

Academic Service and Professional Activity

Administration

2018-2019 Kinesiology Postdoctoral Group Debate Committee
Human Performance Lab, University of Calgary

2017-2018 Kinesiology Postdoctoral Group 3 Minutes 3 Slides Organization Committee
Human Performance Lab, University of Calgary

2015-2017 Organizer and Moderator of the Weekly Musculoskeletal Biomechanics Seminar Series
Human Performance Lab, University of Calgary

Examination Committee Membership

2016 External Examiner MSc Stephen Morris, Brock University (April 4)

2016 External Examiner MSc Joshua Bowslaugh, Brock University (January 21)

Journal Review Activities

Applied Physiology Nutrition and Metabolism - 3 papers

BMC Musculoskeletal Disorders - 1 paper

Journal of Aging and Physical Activity - 1 paper

Journal of Applied Physiology – 1 paper

Journal of Biomechanics - 1 paper
Journal of Nutritional Biochemistry – 1 paper
Journal of Muscle Research and Cell Motility – 1 paper
Journal of Physiology – 1 paper
Journal of Undergraduate Research in Alberta - 2 papers
Open Access Journal of Sports Medicine - 1 paper
Physiological Reports – 1 paper
PLoS One - 1 paper

Conference Review Activities

International Society of Biomechanics 2019
World Congress of Biomechanics 2018

Professional Memberships, Past and Present

American College of Sports Medicine
Biophysical Society
Canadian Society for Biomechanics
Canadian Society for Exercise Physiology
European Society for Muscle Research
International Society for Biomechanics