

GUNTER P SIEGMUND, PhD PEng
DIRECTOR OF RESEARCH, SENIOR ENGINEER

EDUCATION

Doctor of Philosophy, Biomechanics, School of Human Kinetics, University of British Columbia, 2001.
Bachelor of Applied Science (Honours), Mechanical Engineering, University of British Columbia, 1986.

PROFESSIONAL STATUS

Registered Professional Engineer
Association of Professional Engineers and Geoscientists of British Columbia, Registration No. 16388.
Professional Engineers Ontario, License No. 100089362

PROFESSIONAL ASSOCIATIONS

Society for Neuroscience (SFN), since 1999.
International Society of Biomechanics (ISB), since 1998.

SCHOLARLY ACTIVITIES

Editorial Board, Journal of Forensic Biomechanics, 2010 – 2012.
Editorial Board, Journal of Whiplash & Related Disorders, 2001 – 2008.
Session Chair, Slips, Trips and Falls International Conference, 2017.
Co-Chair, Traumatic Brain Injury I & II, and Brain Injury Mechanics, 7th World Congress of Biomechanics, 2014.
Scientific Committee, Moderator and Panelist, World Congress on Neck Pain, 2008.
Chair, Impact Biomechanics I & II, 4th World Congress on Biomechanics, 2002.
Faculty and Reviewer, World Congress on Whiplash-Associated Disorders, 1999.
Peer Reviews for the following academic journals: Accident Analysis and Prevention, Advanced Engineering Materials, Annals of Biomedical Engineering, Archives of Physical Medicine and Rehabilitation, Biomechanics and Modeling in Mechanobiology, Biomedical Engineering OnLine, BMC Musculoskeletal Disorders, Chaos, Clinical Anatomy, Clinical Biomechanics, Clinical Neurophysiology, Dental Traumatology, Ergonomics, Epidemiologic Reviews, European Spine Journal, European Journal of Applied Physiology, Experimental Brain Research, Gait & Posture, Human Movement Science, Journal of Applied Biomechanics, Journal of Biomechanical Engineering, Journal of Biomechanics, Journal of Concussion, Journal of the Mechanical Behavior of Biomedical Materials, Journal of Motor Behavior, Journal of Neurophysiology, Journal of Neurotrauma, Journal of Occupational and Environmental Medicine, Journal of Physiology, Journal of Sports Engineering and Technology, Journal of Sports Sciences, Journal of Testing and Evaluation, Journal of the Mechanical Behavior of Biomedical Materials, Journal of Visualized Experiments, Journal of Whiplash & Related Disorders, Medical & Biological Engineering & Computing, Medical Science Monitor, Medicine & Science in Sports & Exercise, Nature Scientific Reports, Neuroscience Letters, Neuroscience Research, Public Library of Science (PLoS ONE), Safety Science, Scandinavian Journal of Medicine and Science in Sports, Spine, Traffic Injury Prevention.
Peer Reviews for the following conferences: International Research Council on the Biomechanics of Impact, Society of Automotive Engineers World Congress, Stapp Car Crash Conference.
Grant Reviews for Natural Sciences and Engineering Research Council (NSERC), Canadian Institute for Health Research (CIHR), Mathematics of Information Technology and Complex Systems (Mitacs), Southern Consortium for Injury Biomechanics (SCIB), Neurological Foundation of New Zealand, and Albert Einstein Society.

PROFESSIONAL EXPERIENCE

MEA FORENSIC ENGINEERS & SCIENTISTS

Director of Research, Senior Engineer, 1986 to present
Conducts technical investigations and research into the biomechanics of injury. Involved in over 3500 technical investigations related to motor vehicle collisions, bicycle collisions, pedestrian impacts, and slip and fall accidents. Biomechanical analyses consist of reviews of medical records and images, and assessments of injury mechanics,

applied loads, and the casual relationship between the applied loads and injury. Research activities focus on the biomechanics of injury caused by motor-vehicle collisions and slip and fall accidents. Qualified as an Expert Witness in the Supreme Courts of British Columbia, Alberta, and the Yukon, the Ontario Superior Court of Justice, the Superior Courts of California, Washington State and Alaska, the Provincial Court of British Columbia, the Ontario Court of Justice, and the Coroner's Courts of British Columbia and Manitoba.

SCHOOL OF KINESIOLOGY, UNIVERSITY OF BRITISH COLUMBIA, VANCOUVER, BC

Adjunct Professor, 2001 to Present

Conducts research into the biomechanical and neurophysiological factors related to injury. Co-supervises graduate students working on injury related topics.

RESEARCH ACTIVITIES

EXTRA-MURAL GRANTS AND CONTRACTS

Principal Investigator: Engineering approaches to preventing or mitigating whiplash injuries. Natural Sciences and Engineering Research Council (NSERC) Discovery Grant, \$200,000, September 2018 – August 2023. Goal: to better understand i) how females and males interact with car seats during rear-end crashes, and ii) whether a seat that can adapt to its occupant and the crash severity can control how an occupant responds during a rear-end crash.

Co-Investigator: Wearable head impact sensors for estimation of brain strain. Natural Sciences and Engineering Research Council (NSERC) Collaborative Research and Development Grant, \$32,000, September 2016 – August 2018. Goal: to quantify the time-dependent accuracy of a wearable sensor's kinematic output and brain strains predicted by those kinematics relative to the kinematics and brain strains obtained from reference sensors.

Co-Investigator: Kinematics and muscle activation of the cervical spine during impending head first impacts in motor vehicle rollovers. Canadian Institute for Health Research (CIHR), \$486,030, May 2015 – April 2020. Goal: to quantify the intervertebral alignment and neck muscle activity immediately preceding a head first impact during a dynamic rollover event.

Principal Investigator: Gender differences in neck biomechanics relevant to whiplash injury. Natural Sciences and Engineering Research Council (NSERC) Discovery Grant, \$105,000, April 2009 – Mar 2014. Goal: to identify anatomical and biomechanical factors that explain the increased risk of whiplash injury in females compared to males.

Co-Investigator: Rear end impacts - Injury prevention through new concepts in seat design. Auto21 Network of Centres of Excellence. \$469,800, April 2012 – March 2015. Principal Investigator: Dr. Douglas Romilly (University of British Columbia). Goal: to continue development of an active seat designed to mitigate/prevent whiplash injuries.

Co-Investigator: Prevention: Reducing occupant injury in rear end collisions. Auto21 Network of Centres of Excellence. \$334,745, April 2009 – March 2012. Principal Investigator: Dr. Douglas Romilly (University of British Columbia). Goal: to develop an active seat designed to mitigate/prevent whiplash injuries.

Co-Investigator: Defining cervical facet kinematics for combined shear, compression & axial pre-torque of vertebral motion segments; Japan Automobile Research Institute, US\$70,000, Mar 2006 – Dec 2006. Principal Investigator: Dr. Beth Winkelstein (University of Pennsylvania). Goal: to quantify the cervical intervertebral motion and facet capsular strain for loading that simulates a head-turned posture during a rear-end collision.

Mentor: Gender-specific neck musculoskeletal parameters for analysis of whiplash injury. New Investigator Training Award for Unintentional Injury, Violence Related Injury, Injury Biomechanics, and Acute Injury Care Research; CDC – National Center for Injury Prevention and Control, US\$99,173, September 2005 – August 2006. Principal Investigator: Dr. Anita Vasavada (Washington State University). Goal: to characterize geometrical differences in vertebrae and muscles between size-matched males and females and 50th percentile males, and to determine if gender-specific biomechanical models are needed to analyze whiplash injury.

Co-Investigator: Neuromuscular control of the head and neck in paraplegic spinal cord injured subjects. BC Neurotrauma Fund and ICORD, \$50,000, May 2004 – April 2005. Principal Investigator: Dr. Tim Inglis (University of British Columbia). Goal: to quantify the neck muscle responses of low and high thoracic SCI patients and control subjects exposed to whiplash perturbations, and to determine whether seat design changes can enhance the SCI patient response.

Co-Supervisor: Neuromuscular control of the head and neck in whiplash injury. Canadian Institute for Health Research (CIHR), \$110,000, April 2004 – March 2006. Michael Smith Foundation for Health Research, \$78,000, April 2004 – March 2006. Fondation Chiropratique du Québec, \$12,000, April 2004 – March 2005. Post-Doctoral Fellow: Dr. Jean-Sébastien Blouin; Other Co-Supervisor: Dr. Tim Inglis (University of British Columbia). Goal: to document the integrity of the cervicocollic, vestibulocollic, vestibulospinal and propriospinal reflexes in whiplash patients and control subjects.

Co-Investigator: Biomechanical analysis of the neck musculature in whiplash injury. Whitaker Foundation, US\$239,325, May 2003 – April 2006. Principal Investigator: Dr. Anita Vasavada (Washington State University). Goal: to use biomechanical models of the male and female necks to evaluate muscle and ligament strains due to imposed whiplash kinematics and to analyze the dynamic function of neck muscles in whiplash.

Project Manager: Crash test evaluation of low-velocity whiplash-injury risk. Insurance Corporation of British Columbia, \$100,000, February – August 2003. Goal: to better quantify the relationship between vehicle damage and the potential for neck injury in rear-end collisions by measuring the dynamic response of a BioRID dummy in 20 different vehicles.

Principal Investigator: The effect of subject awareness in assessing the probability of slip and fall accidents. Workers' Compensation Board of British Columbia, \$69,118, September 2002 – August 2004. Goal: to quantify the difference between unexpected and expected slips leading to fall-related injuries so that laboratory experiments and tribometer measurements can be properly applied to real slip and fall accidents.

Principal Investigator: The role of neck muscle response in whiplash injuries. Physical Medicine Research Foundation, \$6,028, August 1999 – July 2000. Goal: to determine how subject awareness affects the neck muscle responses of seated human subjects exposed to simulated rear-end collisions.

Project Manager: The effect of cellular phone use on critical decision-making while driving. Insurance Corporation of British Columbia, \$149,093, August 1999 – May 2000. Goal: to evaluate the effect of cellular phone use on vehicle operator's ability to respond to traffic lights, within-lane obstacles and left-turning vehicles.

Principal Investigator: Identification of injury mechanisms in low-speed rear-end automobile impacts. Science Council of British Columbia, \$163,578, February 1996 – January 1997. Goal: to quantify the kinematic, kinetic, neuromuscular, and symptomatic responses of male and female human subjects exposed to controlled rear-end collisions at multiple severities.

Co-Manager: Fatigued-driver identification study. Insurance Corporation of British Columbia, \$103,715, December 1993 – December 1994. Goal: to determine whether vehicle-based measures (steering wheel, accelerator and vehicle movements) correlate to physiological fatigue measures (electroencephalography, heart rate and wakefulness) and to identify parameters that could be used for detecting fatigued long-haul truck drivers.

ONGOING INTRA-MURAL PROJECTS

Helmet performance: currently studying i) the impact attenuation performance of motorcycle, bicycle and sport helmets over wide range of impact severities, and ii) how well head impact severity can be predicted from the residual deformation of helmet liners.

Whiplash injury: currently studying i) the superficial and deep muscle responses to whiplash perturbations, ii) how startle affects habituation to whiplash perturbations, and iii) the neck muscle reflexes under different collision directions and head-on-trunk orientations.

GRADUATE STUDENT SUPERVISION

Co-Supervisor

Jean-Sébastien Blouin, Post-Doctoral Fellow, UBC School of Human Kinetics. Neuromuscular control of the head and neck in whiplash injury. April 2004 – March 2006.

Samanthi Goonetilleke, Post-Doctoral Fellow, UBC School of Human Kinetics. Do our reflexes exacerbate whiplash injury? Quantifying the effect of multifidus muscle activation on cervical facet capsule strain. July 2011 – May 2012.

Harrison Brown, MSc, UBC School of Human Kinetics. Development and assessment of an objective balance assessment system. September 2010 – September 2013.

Robyn Newell, PhD, UBC Department of Mechanical Engineering. Kinematics and muscle activation of the cervical spine during vehicle rollover accidents. September 2008 – May 2014.

Patrick Forbes, Post-Doctoral Fellow, UBC School of Human Kinetics, The interaction of self-generated head movements and vestibular neck reflexes. July 2014 – November 2016.

Alex Rebchuk, MSc, UBC School of Kinesiology, Investigating impact exposure and functional neurological status in collegiate football players. September 2012 – June 2016.

Hannah Gustafson, PhD Student, UBC Department of Mechanical Engineering. Axial validation of a human head and neck finite element model. September 2010 – September 2016.

Daniel Mang, PhD Student, UBC School of Kinesiology. Seat-human interface: Optimizing car seat properties to the individual for injury prevention. May 2010 – Present.

Jason Fice, PhD Student, UBC School of Kinesiology, Neck muscle activity and whiplash injury. September 2012 – Present.

Harrison Brown, PhD Student, UBC School of Kinesiology. Impairment of vestibular function following concussive injury. October 2013 – Present.

M'Beth Schoenfeld, MSc Student, UBC Department of Mechanical Engineering. Cervical intervertebral kinematics and neck muscle response during simulated dynamic rollover crashes. January 2016 – July 2018.

Emma Woo, MSc student, UBC School of Kinesiology. Vestibular mechanisms underlying adolescent idiopathic scoliosis. May 2016 – July, 2018.

Manju Sivam, MSc Student, University of Alberta, Department of Mechanical Engineering. Error analysis in a wearable head impact sensor for estimating brain strain. January 2017 – Present.

Loay Al-Salehi, PhD Student, UBC Department of Mechanical Engineering. Neck muscle and intervertebral dynamics in rollover crashes – Full six degree of freedom simulations with human subjects. September 2017 – Present.

Thesis/Defense Committee Member

Tamika Heiden, PhD Student, UBC School of Human Kinetics. The effect of subject awareness in assessing the probability of slip and fall accidents. September 2002 – August 2004.

Amy Saari, MAsc, UBC Department of Mechanical Engineering. Spinal cord deformation during axial impact injury of the cervical spine. Spring, 2007.

Liyang Zheng, PhD Candidate, Washington State University. Sex differences in human neck musculoskeletal biomechanics. September 2007 – April 2011.

Daniel Mang, MSc, UBC School of Human Kinetics. Using acoustic stimuli to inhibit the startle response triggered by whiplash collisions: Implications for injury prevention. September 2007 – April 2010.

Julianne Schmidt, PhD Student, University of North Carolina at Chapel Hill, Department of Interdisciplinary Human Movement Science. The role of the cervical musculature, visual function, and anticipation in mitigating head impact severity in football. March 2012 – May 2013.

Alessa Rae Lennon, MA student, University of North Carolina at Chapel Hill, Department of Exercise and Sport Science. Measurement of head impact biomechanics: A comparison of the Head Impact Telemetry System and X2 Biosystem xPatch. March 2014 – April 2015.

Enora Le Flao, PhD Student, Auckland University of Technology. Head impact monitoring in sport: Development of new methods for analysis of acceleration signals. June 2017 – Present.

AWARDS & HONORS

Bertil Aldman Memorial Lecture, IRCOBI Conference, 2018.

Best Student Paper, Stapp Car Crash Conference, 2001.

Natural Sciences and Engineering Research Council (NSERC) Post Graduate Scholarship B, 1999 – 2001.

University of British Columbia Grant Supplement Award, 1999 – 2001.

Finalist, Clinical Biomechanics Award, International Society of Biomechanics, 1999.

International Travel Scholarship, International Society of Biomechanics, 1999.

Mary E. Simpson Scholarship, 1998.

Science Council of British Columbia GREAT Scholarship, 1997 – 2001.

Natural Sciences and Engineering Research Council (NSERC) Post Graduate Scholarship A, 1997 – 1999.

J. William Hudson Service Scholarship, 1985.

Charles A. and Jane C.A. Banks Foundation Scholarship, 1984.

University of British Columbia Scholarship, 1984.

University of British Columbia Scholarship, 1983.

Norman MacKenzie Alumni Scholarship, 1981.

Province of British Columbia Scholarship, 1981.

George Hodgins Scholarship, 1981.

PUBLICATIONS**PEER-REVIEWED JOURNALS**

Kroeker SG, Özkul MC, DeMarco AL, Bonin SJ, Siegmund GP (in review). Density variation in the expanded polystyrene (EPS) foam of bicycle helmets and its influence on impact performance. Submitted to the Journal of Biomechanical Engineering.

Siegmund GP (in press). Letter to the Editor regarding Fewster et al. (2019) Characterizing trunk muscle activations during simulated low-speed rear impact collisions, *Traffic Injury Prevention*. doi: [10.1080/15389588.2019.1655554](https://doi.org/10.1080/15389588.2019.1655554).

Whyte T, Stuart CA, Mallory A, Ghajari M, Plant DJ, Siegmund GP, Cripton PA (2019). A review of impact testing methods for headgear in sports: Considerations for improved prevention of head injury through research and standards. *Journal of Biomechanical Engineering* 141. 070803. doi: 10.1115/1.4043140

Siegmund GP, Brault JR, Svensson MY, Elliott JM, Kullgren A (2019). Letter to the Editor Regarding "A comprehensive review of low-speed rear impact volunteer studies and a comparison to real-world outcomes" by Cormier et al. *Spine* 44(2), pp. e133. doi: 10.1097/BRS.0000000000002931.

Newell RS, Blouin JS, Street J, Cripton PA, Siegmund GP (2018). The neutral posture of the human cervical spine is not unique. *Journal of Biomechanics* 80, pp. 53-62. doi: 10.1016/j.jbiomech.2018.08.012

Fice JB, Blouin JS, Siegmund GP (2018). Head postures during naturalistic driving. *Traffic Injury Prevention* 19(6), pp. 637-643. doi: 10.1080/15389588.2018.1493582.

Forbes PA, Fice JB, Siegmund GP, Blouin JS (2018). Electrical vestibular stimuli evoke robust muscle activity in deep and superficial neck muscles in humans. *Frontiers in Neurology* 9:535. doi: 10.3389/fneur.2018.00535.

Fice JB, Siegmund GP, Blouin JS (2018). Neck muscle biomechanics and neural control. *Journal of Neurophysiology* 120(10), pp. 361-371. doi: 10.1152/jn.00512.2017.

Elkin BS, Gabler LF, Panzer MB, Siegmund GP (2018). Brain tissue strains vary with head impact location: A possible explanation for increased concussion risk in struck versus striking football players. *Clinical Biomechanics* 64, pp. 49-67. doi: 10.1016/j.clinbiomech.2018.03.021.

Bonin SJ, Gardiner JC, Onar-Thomas A, Asfour SS, Siegmund GP (2017). The effect of motorcycle helmet fit on predicting head impact kinematics from residual liner crush. *Accident Analysis and Prevention* 106, pp. 315-326. doi: 10.1016/j.aap.2017.06.015.

DeMarco AL, Good CA, Chimich DD, Bakal JA, Siegmund GP (2017). Age has a minimal effect on the impact performance of field-used bicycle helmets. *Annals of Biomedical Engineering* 45(8), pp. 1974-1984. doi: 10.1007/s10439-017-1842-4

Gustafson HM, Melnyk AD, Siegmund GP, Cripton PA (2017). Damage identification on vertebral bodies during compressive loading using digital image correlation. *Spine* 42(22), pp. e1289-1296. doi: 10.1097/BRS.0000000000002156.

Schmidt JD, Guskiewicz KM, Mihalik JP, Blackburn JT, Siegmund GP, Marshall SW (2017). Reply to Letter to the Editor. *Clinical Journal of Sport Medicine* 27(3), e32-e33. doi: 10.1097/JSM.0000000000000336.

Elkin BS, Elliott JM, Siegmund GP (2016). Whiplash injury or concussion? A possible biomechanical explanation for concussion symptoms in some individuals following a rear-end collision. *Journal of Orthopaedic & Sports Physical Therapy* 46, pp. 874-885. doi: 10.2519/jospt.2016.7049.

Bonin SJ, Luck JF, Bass CR, Gardiner JC, Onar-Thomas A, Asfour SS, Siegmund GP (2016). Dynamic response and residual helmet liner crush using cadaver heads and standard headforms. *Annals of Biomedical Engineering* 45(3), pp. 656-667. doi: 10.1007/s10439-016-1712-5.

Schmidt JD, Guskiewicz KM, Mihalik JP, Blackburn JT, Siegmund GP, Marshall SW (2016). Head impact magnitude in American high school football. *Pediatrics* 138(2), e20154231. doi: 10.1542/peds.2015-4231.

Gustafson H, Siegmund G, Cripton P (2016). Comparison of strain rosettes and digital image correlation for measuring vertebral body strain. *Journal of Biomechanical Engineering*, 138(5), 054501. doi: 10.1115/1.4032799.

Blouin JS, Brown HJ, Héroux ME, Inglis JT, Siegmund GP (2016). Motor unit territories in the medial gastrocnemius muscle: Different results, different conclusion (Reply to Letter to the Editor). *Journal of Physiology* 594, pp. 1955. doi: 10.1113/JP272017

DeMarco AL, Chimich DD, Gardiner JC, Siegmund GP (2016). The impact response of traditional and BMX-style bicycle helmets at different impact severities. *Accident Analysis and Prevention* 92, pp. 175-183. doi: 10.1016/j.aap.2016.03.027.

Kroeker SG, Bonin SJ, DeMarco AL, Good CA, Siegmund GP (2016). Age does not affect the material properties of expanded polystyrene liners in field-used bicycle helmets. *Journal of Biomechanical Engineering*, 138(4), 041005, pp. 1-9. doi: 10.1115/1.4032804.

Walton DM, Elliott J, Lee J, Loh E, MacDermid J, Schabrun S, Siqueira WL, Corneil BD, Aal B, Birmingham T, Brown A, Cooper L, Dickey JP, Dixon SJ, Fraser D, Gati J, Gloor G, Good G, Holdsworth D, McLean SA, Millard W, Miller J, Sadi J, Seminowicz DA, Shoemaker JK, Siegmund G, Versteegh T, Wideman TH (2016). Research priorities in the field of post-traumatic pain and disability: Results of a transdisciplinary consensus-generating workshop. *Pain Research and Management*, 1859434. doi: 10.1155/2016/1859434

Siegmund GP, Guskiewicz KM, Marshall SW, DeMarco AL, Bonin SJ (2015). Laboratory validation of two wearable sensor systems for measuring head impact severity in football players. *Annals of Biomedical Engineering* 44(4), pp. 1257-1274. doi: 10.1007/s10439-015-1420-6.

Heroux ME, Brown HJ, Inglis JT, Siegmund GP, Blouin JS (2015). Motor units in the human medial gastrocnemius muscle are not spatially localized or functionally grouped. *Journal of Physiology*, 593(16), pp. 3711-3726. doi: 10.1113/JP270307.

Forbes PA, Siegmund GP, Schouten AC, Blouin JS (2015). Task, muscle and frequency dependent vestibular control of posture. *Frontiers in Integrative Neuroscience* 8, 94. doi: 10.3389/fnint.2014.00094.

Schmidt JD, Guskiewicz KM, Mihalik JP, Blackburn JT, Siegmund GP, Marshall SW (2015). Does visual performance influence head impact severity among high school football athletes? *Clinical Journal of Sport Medicine*, 25(6), pp. 494-501. doi: 10.1097/JSM.000000000000143.

Olafsdóttir JM, Brodin K, Blouin JS, Siegmund GP (2014). Dynamic spatial tuning of cervical muscle reflexes to multi-directional seated perturbations. *Spine*, 40(4), pp. E211-219. doi: 10.1097/BRS.0000000000000721.

Mang DWH, Siegmund GP, Brown HJ, Goonetilleke SC, Blouin JS (2014). Loud pre-impact tones reduce the cervical multifidus muscle response during rear-end collisions: A potential method for reducing whiplash injuries. *The Spine Journal*, 15(1), pp. 153-161. doi: 10.1016/j.spinee.2014.08.002

Forbes PA, Siegmund GP, Happee R, Schouten AC, Blouin JS (2014). Vestibulocollic reflexes in the absence of head postural control. *Journal of Neurophysiology* 112(7), pp. 1692-1702.

Schmidt JD, Guskiewicz KM, Mihalik JP, Blackburn JT, Siegmund GP, Marshall SW (2014). The influence of cervical muscle characteristics on head impact biomechanics in football. *American Journal of Sports Medicine* 42(9), pp. 2056-2066.

Siegmund GP, Guskiewicz KM, Marshall SW, DeMarco AL, Bonin SJ (2014). A headform for testing helmet and mouthguard sensors that measure head impact severity in football players. *Annals of Biomedical Engineering* 42(9), pp. 1834-1845.

Fice JB, Siegmund GP, Blouin JS (2014). Prediction of three dimensional maximum isometric neck strength. *Annals of Biomedical Engineering* 42(9), pp. 1846-1852.

Newell R, Siegmund GP, Blouin JS, Street J, Crompton PA (2014). Cervical vertebral realignment when voluntarily adopting a protective neck posture. *Spine* 39(15), pp. E885-893.

Mang DWH, Siegmund GP, Blouin JS (2014). Whiplash evokes descending muscle recruitment and sympathetic responses characteristic of startle. *Journal of the Canadian Chiropractic Association* 58(2), pp. 109-118.

Brown HJ, Siegmund GP, Guskiewicz KM, van den Doel K, Cretu E, Blouin JS (2014). Development and validation of an objective balance error scoring system (oBESS). *Medicine & Science in Sports & Exercise*, 46(8), pp. 1610-1616.

Forbes PA, Dakin CJ, Geers AM, Vlaar MP, Happee R, Siegmund GP, Schouten AC, Blouin JS (2014) Electrical vestibular stimuli to enhance vestibulo-motor output and improve subject comfort. *PLoS ONE* 9(1):e84385.

Newell R, Blouin JS, Street J, Cripton P, Siegmund GP (2013). Neck posture and muscle activity are different when upside down: A human volunteer study. *Journal of Biomechanics* 46, pp. 2837-2843.

Forbes PA, Dakin CJ, Vardy A, Happee R, Siegmund GP, Schouten AC, Blouin JS (2013). Frequency response of vestibular reflexes in neck, back and lower limb muscles. *Journal of Neurophysiology* 110, pp. 1869-1881.

Zheng L, Siegmund G, Ozyigit G, Vasavada A (2013). Sex-specific prediction of neck muscle volume. *Journal of Biomechanics* 46, pp. 899-904.

Carlsson A, Siegmund GP, Linder A, Svensson MY (2012). Motion of the head and neck of female and male volunteers in rear impact car-to-car impacts. *Traffic Injury Prevention* 13, pp. 378-387.

Mang D, Siegmund GP, Inglis JT, Blouin JS (2012). The startle response during whiplash: a protective or harmful response? *Journal of Applied Physiology* 113, pp. 532-540.

Curatolo M, Bogduk N, Ivancic PC, McLean SA, Siegmund GP, Winkelstein B (2011). The role of tissue damage in whiplash-associated disorders: Discussion paper 1. *Spine* 36, pp. S309-315.

Siegmund GP (2011). What occupant kinematics and neuromuscular responses tell us about whiplash injury. *Spine* 36, pp. S175-179.

DeMarco AL, Chimich DD, Gardiner JC, Nightingale RW, Siegmund GP (2010). The impact response of motorcycle helmets at different impact severities. *Accident Analysis & Prevention* 42, pp. 1778-1784.

Siegmund GP, Flynn J, Mang DW, Chimich DD, Gardiner JC (2010). Utilized friction when entering and exiting a dry and wet bathtub. *Gait & Posture* 31, pp. 473-478.

Powers CM, Blanchette MG, Brault JR, Flynn J, Siegmund GP (2010). Validation of walkway tribometers: Establishing a reference standard. *Journal of Forensic Science* 55, pp. 366-370.

Hedenstierna S, Halldin P, Siegmund GP (2009). Neck muscle load distribution in lateral, frontal, and rear-end impacts: a three-dimensional finite element analysis. *Spine* 34, pp. 2626-2633.

Siegmund GP, Winkelstein BA, Ivancic PC, Svensson MY, Vasavada A (2009). The anatomy and biomechanics of acute and chronic whiplash injury. *Traffic Injury Prevention* 10, pp. 101-112.

Siegmund GP, Blouin JS (2009). Head and neck control varies with perturbation acceleration but not jerk: Implications for whiplash injuries. *Journal of Physiology* 587(Pt 8), pp. 1829-1842.

Linder A, Carlsson A, Svensson MY, Siegmund GP (2008). Dynamic response of female and male volunteers in rear impacts. *Traffic Injury Prevention* 9, pp. 592-599.

Siegmund GP, Davis MB, Quinn KP, Hines E, Myers BS, Ejima S, Ono K, Kamiji K, Yasuki T, Winkelstein BA (2008). Head-turned postures increase risk of cervical facet capsule injury during whiplash. *Spine* 33, pp. 1643-1649.

Siegmund GP, Blouin JS, Carpenter MG, Brault JR, Inglis JT (2008). Are cervical multifidus muscles active during whiplash and startle? An initial experimental study. *BMC Musculoskeletal Disorders* 9: 80.

Siegmund GP, Blouin JS, Inglis JT (2008). Does startle explain the exaggerated first response to a transient perturbation? *Exercise and Sport Sciences Reviews* 36, pp. 76-82.

Vasavada AN, Danaraj J, Siegmund GP (2008). Head and neck anthropometry, vertebral geometry and neck strength in height-matched men and women. *Journal of Biomechanics* 41(1), pp. 114-121.

Blouin JS, Inglis JT, Carpenter MG, Siegmund GP (2007). Neural control of superficial and deep neck muscles in humans. *Journal of Neurophysiology* 98(2), pp. 920-928.

Vasavada AN, Brault JR, Siegmund GP (2007). Musculotendon and fascicle strains in anterior and posterior neck muscles during whiplash injury. *Spine* 32, pp. 756-765.

Powers CM, Stefanou MA, Tsai Y-J, Brault JR, Flynn J, Siegmund GP (2007). Assessment of walkway tribometer readings in evaluating slip resistance: A gait-based approach. *Journal of Forensic Science* 52, pp. 400-405.

Siegmund GP, Blouin JS, Brault JR, Hedenstierna S, Inglis JT (2007). Electromyography of superficial and deep neck muscles during isometric, voluntary and reflex contractions. *Journal of Biomechanical Engineering* 129, pp. 66-77.

- Blouin JS, Siegmund GP, Inglis JT (2006). Interaction of acoustic startle and habituated neck postural responses in seated subjects. *Journal of Applied Physiology*, 102(4), pp. 1574-1586.
- Blouin JS, Inglis JT, Siegmund GP (2006). Startle responses elicited by whiplash perturbations. *Journal of Physiology* 573.3, pp. 857-867.
- Blouin JS, Inglis JT, Siegmund GP (2006). Auditory startle alters the response of human subjects exposed to a single whiplash-like perturbation. *Spine* 31(2), pp. 146-154.
- Heiden TL, Sanderson DJ, Inglis JT, Siegmund GP (2006). Adaptations to normal human gait on potentially slippery surfaces: the effects of awareness and prior slip experience. *Gait & Posture*, 24(2), pp. 237-246.
- Siegmund GP, Heiden TL, Sanderson DJ, Inglis JT, Brault JR (2006). The effect of subject awareness and prior experience on tribometer-based predictions of slip probability. *Gait & Posture* 24(1), pp. 110-119.
- Siegmund GP, Heinrichs BE, Chimich DD, Lawrence JM (2005). Variability in vehicle and dummy responses in rear-end collisions. *Traffic Injury Prevention* 6, pp. 267-277.
- Siegmund GP, Chimich DD, Heinrichs BE, DeMarco AL, Brault JR (2005). Variations in occupant response with seat belt slack and anchor location during moderate frontal impacts. *Traffic Injury Prevention* 6, pp. 38-43.
- Siegmund GP, Heinrichs BE, Chimich DD, DeMarco AL, Brault JR (2005). The effect of collision pulse properties on seven proposed whiplash injury criteria. *Accident Analysis and Prevention* 37, pp. 275-285.
- Siegmund GP (2004). Whiplash injury: Vehicle, seat, occupant and tissue responses. *Journal of Whiplash & Related Disorders* 3(2), pp. 21-35.
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- Powers CM, Blanchette MG, Brault JR, Flynn J, Siegmund GP (2008). Validation of walkway slip resistance measurements: A gait based approach. North American Congress of Biomechanics, Ann Arbor, MI, August 5-9, 2008.
- Siegmund GP, Winkelstein BA, Ivancic PC, Svensson MY, Vasavada A, Jakobsson L (2008). Theories of neck injury mechanisms related to motor vehicle crashes. World Congress on Neck Pain, Los Angeles, CA, January 20-22, 2008.
- Blouin JS, Siegmund GP (2008). Occupant muscle and kinematic response to varying collision acceleration and jerk. World Congress on Neck Pain, Los Angeles, CA, January 20-22, 2008.
- Carlsson A, Linder A, Svensson M, Siegmund G (2008). Dynamic response of female and male volunteers in rear impacts. World Congress on Neck Pain, Los Angeles, CA, January 20-22, 2008.
- Vasavada AN, Daranaj J, Siegmund GP (2008). Gender differences in neck geometry and strength in height-matched subjects. World Congress on Neck Pain, Los Angeles, CA, January 20-22, 2008.
- Siegmund GP, Blouin JS (2007). Postural responses to seated perturbations are graded to acceleration, not jerk. 37th Annual Meeting, Society for Neuroscience, Abstract 411.13, San Diego, CA, November 3-7, 2007.
- Siegmund GP, Davis MB, Quinn KP, Hines E, Myers BS, Ejima S, Ono K, Kamiji K, Yasuki T, Winkelstein BA (2007). Cervical facet capsule response to whiplash loading with a rotated head posture. 35th International Workshop on Human Subjects for Biomechanical Research, San Diego, CA, October 28, 2007.
- DeMarco AL, Gardiner JC, Wilkinson CC, Hassan EA, Siegmund GP (2007). Predicting motorcycle helmet impact severity from residual crush damage. 35th International Workshop on Human Subjects for Biomechanical Research, San Diego, CA, October 28, 2007.
- Siegmund GP (2007). Neck muscle neuromechanics and whiplash: How crash pulse characteristics affect neck muscle responses. 4th International Whiplash Trauma Congress, Miami, FL, October 26-27, 2007.
- Vasavada AN, Daranaj J, Siegmund GP (2007). Female necks are not uniformly scaled versions of male necks. American Society of Biomechanics Annual Conference, San Francisco, CA, August 22-25, 2007.
- Siegmund GP, Blouin JS, Carpenter MG, Brault JR, Inglis JT (2006). Cervical multifidus muscle activity during whiplash and startle responses. 34th International Workshop on Human Subjects for Biomechanical Research, Dearborn, MI, November 5, 2006.
- DeMarco AL, Chimich DD, Gardiner JC, Nightingale RW, Siegmund GP (2006). Motorcycle helmet impact response: Comparison of helmet type and impact severity. 34th International Workshop on Human Subjects for Biomechanical Research, Dearborn, MI, November 5, 2006.
- Siegmund GP, Blouin JS, Brault JR, Carpenter MG, Inglis JT (2006). Cervical multifidus muscles respond to whiplash perturbations and acoustic startle. 36th Annual Meeting, Society for Neuroscience, Abstract 656.4, Atlanta, GA, October 14-18, 2006.
- Blouin JS, Carpenter MG, Inglis JT, Siegmund GP (2006). Role and neural control of the neck muscles during multi-directional isometric contractions. 36th Annual Meeting, Society for Neuroscience, Abstract 353.5, Atlanta, GA, October 14-18, 2006.

Siegmund GP, Blouin JS, Brault JR, Hedenstierna S, Inglis JT (2006). Superficial and deep neck muscle activity during isometric, voluntary and reflex contractions (Abstract 5132). *Journal of Biomechanics* 39, pp. S147. 2006 World Congress on Biomechanics, Munich, Germany.

Siegmund GP, Blouin JS, Brault JR, Inglis JT (2006). A startling perspective on whiplash. 3rd International Whiplash Trauma Congress, Portland, OR, June 1-2, 2006.

Vasavada AN, Brault JR, Siegmund GP (2006). Musculotendon and fascicle strains in anterior and posterior neck muscles during whiplash injury. 3rd International Whiplash Trauma Congress, Portland, OR, June 1-2, 2006.

DeMarco AL, Chimich DD, Siegmund GP (2006). Brain injuries and airbags: the effect of a seatbelt (BIO2006-157544). ASME 2006 Summer Bioengineering Conference, Amelia Island, FL, June 21-25, 2006.

Blouin JS, Inglis JT, Siegmund GP (2005). Auditory startle alters the response of human subjects exposed to a single whiplash-like perturbation. 35th Annual Meeting, Society for Neuroscience, Abstract 56.13, Washington, DC, November 12-16, 2005.

Siegmund GP, Heiden TL, Sanderson DJ, Inglis JT (2005). Interlimb transfer of gait adaptations following a slip. 35th Annual Meeting, Society for Neuroscience, Abstract 864.14, Washington, DC, November 12-16, 2005.

Siegmund GP, Blouin JS, Brault JR, Hedenstierna S, Inglis JT (2005). Electromyography of superficial and deep neck muscles during isometric, voluntary and reflex contractions. 33rd International Workshop on Human Subjects for Biomechanical Research, Washington, DC, November 8, 2005.

Powers CM, Stefanou MA, Tsai YJ, Brault JR, Siegmund GP (2005). Assessing the use of subjective ranking of walkway surfaces to evaluate the risk of human slip potential. 19th Annual International Occupational Ergonomics and Safety Conference, Las Vegas, June 27-29, 2005.

Powers CM, Stefanou MA, Tsai YJ, Brault JR, Siegmund GP (2005). Assessment of walkway tribometer readings in evaluating slip resistance: A gait based approach. 19th Annual International Occupational Ergonomics and Safety Conference, Las Vegas, June 27-29, 2005.

Siegmund GP, Heiden TL, Sanderson DJ, Inglis JT, Brault JR (2005). Subject awareness and prior slip experience affect different aspects of normal human gait. 19th Annual International Occupational Ergonomics and Safety Conference, Las Vegas, June 27-29, 2005.

Heiden TL, Sanderson DJ, Inglis JT, Siegmund GP (2004). Experience, rather than knowledge, of a slip induces gait adjustments. 34th Annual Meeting, Society for Neuroscience, Abstract 415.10, San Diego, CA, October 23-28, 2004.

Blouin JS, Siegmund GP, Inglis JT (2004). Acoustic startle reverses habituation of the seated neck postural responses. 34th Annual Meeting, Society for Neuroscience, Abstract 873.17, San Diego, CA, October 23-28, 2004.

Huys R, Daffertshofer A, Beck P, Sanderson D., Siegmund G (2004). Locomotion-respiration coupling – an account of the underlying dynamics. *Journal of Applied Physiology* 96, pp. 2341-2342.

Brault JR, Gardiner JC, Chimich DD, Siegmund GP (2004). Biomechanical determinants of injuries from low-level falls. 56th Annual Meeting of the American Academy of Forensic Sciences, Dallas, TX, February 16-21, 2004.

Siegmund GP, Chimich DD, Heinrichs BE, DeMarco AL, Brault JR (2003). Occupant response during moderate frontal impacts varies with seat belt slack and anchor location. Presented at the 31st International Workshop on Human Subjects in Biomechanics Research, San Diego, CA, October 26, 2003.

Bent LR, Inglis JT, Siegmund GP (2003). Anticipatory postural adjustments and focal movements are coupled when evoked by startle. 33rd Annual Meeting, Society for Neuroscience, Abstract 70.18, New Orleans, LA, November 8-12, 2003.

Vasavada AN, Brault JR, Siegmund GP (2003) Neck muscle strains in whiplash injury. 2003 Annual Fall Meeting of the Biomedical Engineering Society, Nashville, TN, October 1-4, 2003.

Siegmund GP, Heinrichs BE, Chimich DD, DeMarco AL, Brault JR (2002). The effect of collision pulse properties on whiplash kinematics and kinetics. In: Proc. of 30th International Workshop on Human Subjects in Biomechanical Research. Washington DC: US Department of Transportation, National Highway Traffic Safety Administration, November 9, 2002.

Siegmund GP, Sanderson DJ, Inglis JT (2002). Auditory blink reflex distinct from startle response in orbicularis oculi. 32nd Annual Meeting, Society for Neuroscience, Abstract 667.9, Orlando, FL, November 2-7, 2002.

Siegmund GP, Sanderson DJ, Inglis JT (2002). Reflex responses graded to both perturbation acceleration and velocity. Fourth World Congress of Biomechanics, Calgary, AB, August 4-9, 2002.

Vasavada AN, Brault JR, Siegmund GP (2002). Neck muscle strains in whiplash injury. Fourth World Congress of Biomechanics, Calgary, AB, August 4-9, 2002.

Myers BS, Winkelstein BA, Chung EK, Nightingale RW, Siegmund GP (2002). Cervical spine facet capsular ligament strain in midsagittal and three dimensional whiplash-like loading. Fourth World Congress of Biomechanics, Calgary, AB, August 4-9, 2002.

Chimich DD, Heinrichs BE, Brault JR, DeMarco AL, Siegmund GP (2002). Head restraint position affects occupant response in rear-end collisions. Fourth World Congress of Biomechanics, Calgary, AB, August 4-9, 2002.

Siegmund GP, Hunt MA, Inglis JT, Sanderson DJ (2001). Changes in onset latency during the transition to a startle response. 31st Annual Meeting, Society for Neuroscience, Abstract 303.10, San Diego, CA, November 10-15, 2001.

Siegmund GP, Sanderson DJ, Myers BS, Inglis JT (2001). Awareness alters the muscle and kinematic responses of human subjects to whiplash perturbations. Brain and Spine Biomechanics Session, Annual Fall Meeting of the Biomedical Engineering Society, Durham, NC, October 4-7, 2001.

Siegmund GP, Sanderson DJ, Inglis JT (2001). Neck muscle response to high jerk perturbations in seated humans. Sensation and Movement International Symposium, Cairns, Australia, September 3-6, 2001.

Siegmund GP, Inglis JT, Myers BS, Sanderson DJ (2001). Neck muscle response and head kinematics of human subjects adapt to multiple whiplash exposures. International Congress on Whiplash Associated Disorders, Berne, Switzerland, March 8-10, 2001.

Siegmund GP, Heinrichs BE (2001). The Neck Injury Criterion (NIC) correlates better with collision acceleration than speed change. International Congress on Whiplash Associated Disorders, Berne, Switzerland, March 8-10, 2001.

Siegmund GP, Sanderson DJ, Inglis JT (2000). Readiness to perform a ballistic head movement sculpts the acoustic startle response of neck muscles. 30th Annual Meeting, Society for Neuroscience, Abstract 64.9, New Orleans, LA.

Brault JR, Siegmund GP, Wheeler JB (1999). Muscle response and whiplash injury biomechanics. In: Proc of The International Society of Biomechanics XVIIth Congress, pg. 323. Finalist for the ISB Clinical Biomechanics Award, Calgary, AB.

Siegmund GP, Brault JR, Wheeler JB (1999). The relationship between clinical and kinematic responses from human subject testing in rear-end automobile collisions. In: Proc of Traffic Safety and Auto Engineering Stream of the World Congress on Whiplash-Associated Disorders, pp. 182-207, Vancouver, BC.

Siegmund GP, Wheeler JB, Brault JR (1998). Volume changes in the human cervical spinal canal between the neutral and retracted head positions. In: Proc of Whiplash '98 Symposium, Phoenix, AZ, November 5-6, 1998.

Brault JR, Siegmund GP, Wheeler JR (1998). Whiplash injury biomechanics: Cervical electromyographic response and influence on whiplash dynamics. In: Proc of Whiplash '98 Symposium, Phoenix, AZ, November 5-6, 1998.

Brault JR, Smith TA, Wheeler JB, Siegmund GP (1998). Cervical muscle response to rear-end automobile collisions: Implications for injury. In: Proc. of 3rd North American Congress on Biomechanics, pp. 347-348, Waterloo, ON.

Edwards M, Siegmund GP, Moore KS, Tiessen DA, Sanderson DJ, McKenzie D (1998). Ventilation and locomotion coupling in collegiate male rowers. Canadian Journal of Applied Physiology 23(5), pg. 478. Canadian Society of Exercise Physiology Annual Meeting, Fredericton, NB.

Brault JR, Wheeler JB, Siegmund GP, King DJ (1996). Human subject protection in low-speed rear-end automobile testing. In: Proc. of 24th International Workshop on Human Subjects in Biomechanical Research, pp. 141-152. Washington DC: US Department of Transportation, National Highway Traffic Safety Administration, November 3, 1996.

OTHER PUBLICATIONS

El Maach I, Siegmund GP (2008). Injury biomechanics – Addressing issues of injury causation. Claims Canada, April/May, pp 26-9.

DeMarco A, Wilkinson C, Siegmund G (2007). The right helmet helps. Canadian Insurance, August, 112(9), pp. 30-33.

Chimich D, Siegmund G (2003). Injury biomechanics: A tool for personal injury cases. Canadian Insurance, October, pp. 40-42.

Siegmund GP (2001). The reflex response of human neck muscles to whiplash-like perturbations. Doctoral dissertation, University of British Columbia.

Siegmund GP (1998). Biomechanics of traumatic brain injury. A review of the scientific literature on traumatic brain injury in humans. Richmond, BC: MEA Forensic Engineers & Scientists.

King DJ, Siegmund GP (1994). Fatigued driver identification study. Analysis of 17 truck drivers to identify vehicle-based criteria to detect driver fatigue. Vancouver, BC: Insurance Corporation of British Columbia.

King DJ, Siegmund GP (1992). The effect of dynamic brake failure on the braking performance of a BC Transit trolley bus. Vancouver, BC: BC Transit Corporation.

LECTURES AND PRESENTATIONS

January 29, 2019 – Walkway tribometer measurements – Results of the tribometer workshop. ASTM F13 Research Subcommittee Meeting, Houston, TX.

September 12, 2018 – Soft tissue neck injuries and other important things. Bertil Aldman Memorial Lecture (Invited), International Research Council on the Biomechanics of Injury (IRCOBI), Athens, Greece.

June 26, 2018 – Variance in walkway tribometer measurements – An update. ASTM F13 Research Subcommittee Meeting, San Diego, CA.

June 6, 2018 – Concussion Litigation – A biomechanical view. A co-presentation with Sandra Corbett, Q.C., Annual General Meeting & Conference, Canadian Defense Lawyers, Toronto, ON.

January 22, 2018 – Variance in walkway tribometer measurements. ASTM F13 Research Subcommittee Meeting, New Orleans, LA.

November 19, 2016 – Whiplash Injury. Keynote speaker. 21st Annual Scientific Conference of the Spine Research Institute of San Diego, Coronado, CA.

June 16, 2015 – Validity of head impact sensors. Invited lecture for iCORD Trainee Symposium, International Collaboration on Repair Discoveries, Faculty of Medicine, University of British Columbia, Vancouver, BC.

March 10, 2015 – Directional sensitivities in head impact sensors. Symposium on Head Acceleration Measurement Sensors, Virginia Tech, Blacksburg, VA.

November 24, 2014 – Biomechanics of whiplash injury. Lecture for MECH 436/536 Fundamentals of Injury Biomechanics, Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

November 13, 2014 – Laboratory validation of head impact sensors for football. Shirtsleeves Technical Meeting, ASTM F08.53 Headgear Subcommittee, New Orleans, LA.

October 24-26, 2014 – Invited speaker, Biomechanics of whiplash injury, Alberta Biomedical Engineering Conference, Banff, AB.

November 14, 2013 – Headform repeatability on the linear impactor. Shirtsleeves Technical Meeting, ASTM F08.53 Headgear Subcommittee, Jacksonville, FL.

October 11, 2013 – Bioengineering evidence of tissue damage after whiplash injury. 8th Congress of the European Federation of IASP Chapters (EFIC). Florence, Italy.

March 8, 2013 – Introduction to biomechanics, head and neck injuries. Washington Defense Trial Lawyers Seminar on the Analysis of Motor Vehicle Claims. Seattle, WA.

February 28, 2013 – The secret science of car seats. Secret Science Café. Vancouver, BC.

June 9, 2012 – Forensic biomechanics. Organizer of the Forensic Biomechanics session at the Canadian Society of Biomechanics conference, Vancouver, BC, June 7-9, 2012.

May 27, 2011 – The anatomy and biomechanics of acute and chronic whiplash injury. Research 2011, Chiropractic BC, Burnaby, BC.

April 6, 2011 – The anatomy and biomechanics of acute and chronic whiplash injuries. Lecture for MECH 436 – Fundamentals of Injury Biomechanics, Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

March 31, 2011. Injury biomechanics - Addressing issues of injury causation. Lecture for HKIN 352, School of Human Kinetics, University of British Columbia, Vancouver, BC.

February 19-20, 2011 - What do the occupant kinematics and neuromuscular responses tell us about whiplash injury? 2011 Whiplash Symposium – How to Lessen the Transition to Chronicity, The Centre of Clinical Research Excellence in Spinal Pain, Injury and Health, University of Queensland, Brisbane, Australia.

February 8, 2011 - Slipping, Tripping and Falling on Stairs, Steps and Slopes. Canadian Defense Lawyers, Toronto, ON.

October 29, 2010 – Injury biomechanics - Addressing issues of injury causation. Ontario Trial Lawyers Association, Fall Conference, Toronto, ON.

May 14, 2010 – Biomechanics of slips & falls. Ontario Insurance Adjusters Associations, Provincial Claims Conference, Hamilton, ON.

April 8, 2010 – Forensic biomechanics. Lecture for MECH 436 – Fundamentals of Injury Biomechanics, Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

April 1, 2010. Forensic engineering & injury biomechanics. Lecture for HKIN 352, School of Human Kinetics, University of British Columbia, Vancouver, BC.

March 27-28, 2009 – The anatomy and biomechanics of whiplash injury. The Essential Soft Tissue Injury Conference, Trial Lawyers Association of British Columbia, Vancouver, BC.

March 26, 2009. Forensic engineering & injury biomechanics. Lecture for HKIN 352, School of Human Kinetics, University of British Columbia, Vancouver, BC.

January 30, 2008 – Injury Biomechanics. Ontario Insurance Adjusters Association, Professional Development & Claims Conference, Toronto, ON.

April 5, 2007 – Forensic engineering & injury biomechanics. Lecture for HKIN 352 – Mechanical Properties of Tissues: from Myosin to Movement, School of Human Kinetics, University of British Columbia, Vancouver, BC.

November 2, 2006 – Whiplash injury – Vehicle seat, occupant & tissue responses. Biomechanics 435/535 lecture, Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

March 31, 2006 - The biomechanics of whiplash: The latest evidence surrounding soft tissue injuries. The Essential Soft Tissue Injury Conference, Trial Lawyers Association of British Columbia, Vancouver, BC.

November 25, 2005 – Accident Reconstruction Fundamentals. Judicial Justices Fall 2005 Seminar, Vancouver, BC.

October 31, 2005 – Whiplash injury - Vehicle seat, occupant & tissue responses. Biomechanics 435/535 lecture, Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

October 17, 2005 – Forensic engineering & Injury biomechanics, Mech 410/550 lecture, Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

September 14, 2005 – Slip & Fall Biomechanics. Alberta Civil Trial Lawyers Association. Webex presentation to ACTLA members.

March 5-6, 2005 – Tissue injuries in whiplash. Whiplash, Spinal Trauma and the Personal Injury Case Seminar, Adler Giersch, Seattle, WA.

February 25-26, 2005 – Neck muscle neuromechanics and whiplash injury. 2nd International Whiplash Trauma Congress, Spinal Injury Foundation, Breckenridge, CO.

November 24, 2004 – Whiplash injury - Vehicle seat, occupant & tissue responses. Biomechanics 435/535 lecture, Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

November 18, 2004 – Forensic Engineering. Mech 2 lecture, Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

May 13, 2004 – Slip & Fall and Tribometers. BC School Safety Association Expert Panel on Floor Slips. Vancouver, BC.

March 6-7, 2004 – Whiplash injury - Vehicle seat, occupant & tissue responses. Whiplash, Spinal Trauma and the Personal Injury Case Seminar, Adler Giersch, Seattle, WA.

October 9-10, 2003 - What human subject testing can tell us about whiplash injury. International Whiplash Trauma Congress, Spinal Injury Foundation, Denver, CO.

September 26-27, 2003 - Spinal cord injury - Environment and devices. Workshop on the Biomechanical Aspects of Spinal Cord Injury, Peter Wall Institute for Advanced Studies, University of British Columbia, Vancouver, BC.

June 20-22, 2003 - Whiplash injury - Vehicle seat, occupant & tissue responses. International Spinal Trauma Conference, American Chiropractors Association, Chicago, IL.

March 28-29, 2003 - The sheer complexity of whiplash injury. The Essential Soft Tissue Injury Conference. Trial Lawyers Association of British Columbia, Vancouver, BC.

March 27, 2003 - The role of biomechanics in personal injury cases. Admissibility of Forensic and Demonstrative Evidence for Insurance Claims, a legal seminar organized by Insight Information Co., Toronto, ON.

February 7, 2003 - Injury biomechanics. Personal Injury Cases: Winning with Experts. Continuing Legal Education. Vancouver, B.C.

February 6, 2003 - The neurophysiology and biomechanics of whiplash injury. Spring Seminar Series, Department of Biological Systems Engineering and VCAPP, Programs in Bioengineering and Neuroscience. Washington State University, Pullman, WA.

February 3, 2003- Forensic injury biomechanics. Seminar Series. Department of Mechanical Engineering, University of British Columbia, Vancouver, BC.

October 15-16, 2001 - Injury biomechanics & personal injury litigation. The Soft Tissue Injury Seminar. Alberta Civil Trial Lawyers Association, Calgary and Edmonton, AB.

May 4, 2001 - Injury biomechanics. Continuing Legal Education, Personal Injury Conference. Vancouver, BC.

March 30-31, 2001 - Injury biomechanics. The Essential Soft Tissue Injury Conference. Trial Lawyers Association of British Columbia, Vancouver, BC.

May 12, 2000 - Injury biomechanics. Continuing Legal Education, Personal Injury Conference. Vancouver, BC.

November 12, 1999 - Cervical spine muscle response during whiplash. North American Whiplash Trauma Congress, BC Chiropractors Association. Victoria, BC.

November 2, 1999 - Low speed impacts: Vehicle and human response. Canadian Bar Association (Alberta). Calgary, AB.

August 24, 1999 - Biomechanics and brain injury. ICBC Head Injury Unit. North Vancouver, BC.

August 12, 1999 - Forensic Biomechanics Forum, International Society of Biomechanics, Calgary, AB.

May 7, 1999 - Proving pain. Continuing Legal Education, Personal Injury Conference. Vancouver, BC.

November 18-19, 1998 - Low speed impacts: Vehicle and human response. BC Trial Lawyer Soft Tissue Injury Seminar (Continuing Legal Education). Vancouver, BC and Victoria, BC.

May 6, 1998 - Occupant and vehicle response to low-speed rear-end collisions. Grand Rounds, Department of Orthopaedics, Vancouver Hospital & Health Sciences Centre, University of British Columbia. Vancouver, BC.

February 18, 1998 - The kinematic and clinical response to whiplash. City-wide Rounds, Department of Physical Medicine and Rehabilitation, Faculty of Medicine, University of British Columbia. Vancouver, BC.

January 29, 1998 - The kinematics of whiplash. Graduate Seminar Series, School of Human Kinetics, University of British Columbia. Vancouver, BC.

October 6-7, 1997 - Analysis of low-speed impacts, Vehicle and human response. Alberta Civil Trial Lawyers Association. Calgary, AB and Edmonton, AB.

August 18-22, 1997 - Human response to low-speed rear-end collisions. High-speed & Low-speed Impact Seminar, Richmond, BC.

August 19-20, 1996 - Human subject testing in low-speed impacts. Low-Speed Collision TopTec, Society of Automotive Engineers Professional Development Program, Richmond, BC.

March 14, 1996 - Long-haul truck driver fatigue. Pacific Traffic Safety Association, Justice Institute of British Columbia, New Westminster, BC.

January 19, 1996 - Long-haul truck driver fatigue. Seminar for the Occupational Hygiene Programme, Faculty of Graduate Studies, University of British Columbia, Vancouver, BC.

July 21-22, 1995 - Minor impact investigations: Basic fundamentals and applications of collision test data. Southwest Association of Technical Accident Investigators seminar on Low-Speed Impacts, Phoenix, AZ.

May 10, 1995 - Low-speed impacts. Washington Association of Technical Accident Investigators, Seattle, WA.

August 8-9, 1994 - Staged collisions: Roles of bumpers, estimating impact severity, and injury potential. Low-Speed Rear Impact Collision TopTec, Society of Automotive Engineers Professional Development Program, Irvine, CA.

August 1992 - Low-speed impact demonstration. Canadian Association of Traffic Accident Investigation and Reconstruction, Annual Meeting, Kelowna, BC.

February, 1991 - Seat belt use and effectiveness. Seminar for ICBC Adjusters, Southwest Marine Drive Claim Centre, Vancouver, BC.

TRAINING AND PROFESSIONAL DEVELOPMENT

June 3, 2019 – ASTM Committee Meeting – F13 Pedestrian/Walkway Safety and Footwear, Denver, CO.

January 28, 2019 – ASTM Committee Meeting – F13 Pedestrian/Walkway Safety and Footwear, Houston, TX.

September 12-14, 2018 – International Research Council on Biomechanics of Injury (IRCOBI), Athens, Greece.

June 25, 2018 – ASTM Standards Development Meeting of Committee F13 – Pedestrian/Walkway Safety and Footwear, San Diego, CA.

January 22, 2018 – ASTM Standards Development Meeting of Committee F13 – Pedestrian/Walkway Safety and Footwear, New Orleans, LA.

November 4, 2017 – Core Competency Module for Sex and Gender in Biomedical Research, CIHR Institute of Gender and Health. Completed online.

September 13-15, 2017 – International Research Council on Biomechanics of Injury, Antwerp, Belgium.

September 12, 2017 – Workshop on Safety of Automated Vehicles, Antwerp, Belgium.

June 15, 2017 – Slips, Trip, and Falls International Conference, Toronto Rehabilitation Institute, University Health Network, Toronto, ON.

June 14, 2017 – ASTM Standards Development Meeting of Committee F13 – Pedestrian/Walkway Safety and Footwear, Toronto, ON.

January 31, 2017 – ASTM Standards Development Meeting of Committee F13 – Pedestrian/Walkway Safety and Footwear, West Conshohocken, PA.

January 30, 2017 – Workshop on Multifactorial Analysis of Slip and Fall Events: Implications for Forensic and Safety Professionals. West Conshohocken, PA.

November 7-9, 2016 – 60th Stapp Car Crash Conference, Washington, DC.

November 6, 2016 – 44th International Workshop on Human Subjects for Biomechanical Research, Washington, DC.

September 14-16, 2016 – International Research Council on Biomechanics of Injury, Malaga, Spain.

September 13, 2016 – Workshop on Crash Reconstruction, Malaga Spain.

June 3-4, 2016 – Northwest Biomechanics Symposium, Vancouver, BC.

November 9-11, 2015 - 59th Stapp Car Crash Conference, New Orleans, LA.

November 8, 2015 – 43rd International Workshop on Human Subjects for Biomechanical Research, New Orleans, LA.

September 9-11, 2015 - International Research Council on Biomechanics of Injury, Lyon, France.

September 8, 2015 – Concussion Workshop, Lyon, France.

July 6, 2015 – Building Code Overview, Ontario Society of Professional Engineers, Mississauga, ON.

November 13, 2014 - ASTM Standards Development Meetings of Committee F08 – Sports Equipment and Facilities, New Orleans, LA.

November 10-12, 2014 – 58th Stapp Car Crash Conference, San Diego, CA.

November 9, 2014 – 42nd International Workshop on Human Subjects for Biomechanical Research, San Diego, CA.

October 24-26, 2014 - Alberta Biomedical Engineering Conference, Banff, AB.

July 6-9, 2014 – 7th World Congress of Biomechanics, Boston, MA.

June 11, 2014 – Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, Course on Research Ethics (TCPS 2: CORE). Completed online.

May 27-28, 2014 – AUTO21 Conference, Niagara Falls, ON.

May 16-17, 2014 – Northwest Biomechanics Symposium, Salem, OR.

November 13-15, 2013 - ASTM Standards Development Meetings of Committee F08 – Sports Equipment and Facilities, Jacksonville, FL.

November 11-13, 2013 – 57th Stapp Car Crash Conference, Orlando, FL.

November 10, 2013 – 41st International Workshop on Human Subjects for Biomechanical Research, Orlando, FL.

October 9-11, 2013 – 8th Congress of the European Federation of IASP Chapters (EFIC). Florence, Italy.

May 22-23, 2013 – AUTO21 Conference, Toronto, ON.

November 14-16, 2012 - ASTM Standards Development Meetings of Committee F08 – Sports Equipment and Facilities, Atlanta, GA.

November 13, 2012 - Symposium on the Mechanism of Concussion in Sports, Atlanta, GA

October 29-31, 2012 – 56th Stapp Car Crash Conference, Savannah, GA.

October 28, 2012 - 40th International Workshop on Human Subjects for Biomechanical Research, Savannah, GA.

September 12-14, 2012 – International Research Council on the Biomechanics of Injury (IRCOBI) conference, Dublin, Ireland.

September 11, 2012 – Pedestrian and Cyclist Injury Workshop, Dublin, Ireland.

September 10, 2012 - ISN Workshop on Biomechanical Experiments with Human Subjects, Dublin, Ireland.

June 7-9, 2012 – Canadian Society of Biomechanics conference, Vancouver, BC.

November 7-9, 2011 – 55th Stapp Car Crash Conference, Dearborn, MI.

November 6, 2011 - 39th International Workshop on Human Subjects for Biomechanical Research, Dearborn, MI.

September 24, 2011 – Not “Just A Concussion”, Brain Research Centre, Vancouver, BC

November 13-17, 2010 – Society for Neuroscience, 40th Annual Meeting, San Diego, CA.

November 3-5, 2010 – 54th Stapp Car Crash Conference, Phoenix, AZ.

November 2, 2010 - 38th International Workshop on Human Subjects for Biomechanical Research, Phoenix, AZ.

February 22-27, 2010 – 62nd Annual Scientific Meeting of the American Academy of Forensic Sciences, Seattle, WA.

November 2-4, 2009 – 53rd Stapp Car Crash Conference, Savannah, GA.

November 1, 2009 – 37th International Workshop on Human Subjects for Biomechanical Research, Savannah, GA.

May 25-28, 2009 – Combined Automotive Parts Manufacturers' Association (APMA) and AUTO21 Conference, Hamilton, ON.

November 3-5, 2008 – 52nd Stapp Car Crash Conference, San Antonio, TX.

November 2, 2008 - 36th International Workshop on Human Subjects for Biomechanical Research, San Antonio, TX.

January 20-22, 2008 - World Congress on Neck Pain, Los Angeles, CA.

October 29-31, 2007 – 51st Stapp Car Crash Conference, San Diego, CA.

October 28, 2007 - 35th International Workshop on Human Subjects for Biomechanical Research, San Diego, CA.

October 26-27, 2007 - 4th International Whiplash Trauma Congress, Miami, FL.

May 9, 2007 – Bloodstain Pattern Analysis Seminar, Vancouver, BC.

November 6-8, 2006 - 50th Stapp Car Crash Conference, Dearborn, MI.

November 5, 2006 – International Workshop on Human Subjects for Biomechanical Research, Dearborn, MI.

July 29 – August 4, 2006 – 5th World Congress of Biomechanics, Munich, Germany.

June 6, 2006 - Tribometer Workshop, sponsored by the ASTM Committee F-13 on Pedestrian/Walkway Safety and Footwear, Pasadena, CA.

June 1-2, 2006 – 3rd International Whiplash Trauma Congress, Portland, OR.

May 12-13, 2006 – Northwest Biomechanics Symposium, Vancouver, BC.

November 12-16, 2005 - Society for Neuroscience, 35th Annual Meeting, Washington, DC.

November 9-11, 2005 - 49th Stapp Car Crash Conference, Washington, DC.

November 8, 2005 – 33rd International Workshop on Human Subjects for Biomechanical Research, Washington, DC.

June 27-29, 2005 - 19th Annual International Occupational Ergonomics and Safety Conference, Las Vegas, NV.

February 25-26, 2005 – 2nd International Whiplash Trauma Congress, Breckenridge, CO.

November 1-3, 2004 - 48th Stapp Car Crash Conference, Nashville, TN.

October 31, 2004 – 32nd International Workshop on Human Subjects for Biomechanical Research, Nashville, TN.

October 23-28, 2004 - Society for Neuroscience, 34th Annual Meeting, San Diego, CA.

October 27-29, 2003 - 47th Stapp Car Crash Conference, San Diego, CA.

October 26, 2003 - 31st International Workshop on Human Subjects for Biomechanical Research, San Diego, CA.

October 9-10, 2003 - International Whiplash Trauma Congress, Denver, CO.

September 26-27, 2003 - Workshop on the Biomechanical Aspects of Spinal Cord Injury, Vancouver, BC.

June 29, 2003 - Tribometer Workshop, sponsored by the ASTM Committee F-13 on Pedestrian/Walkway Safety and Footwear, Pasadena, CA.

- June 28, 2003 - Symposium on the Biomechanics of Slip and Fall, sponsored by the ASTM Committee F-13 on Pedestrian/Walkway Safety and Footwear, Pasadena, CA.
- June 20-22, 2003 - International Spinal Trauma Conference, Chicago, IL.
- November 10-12, 2002 - 46th Stapp Car Crash Conference, Jacksonville, FL.
- November 9, 2002 - 30th International Workshop on Human Subjects for Biomechanical Research, Jacksonville, FL.
- August 4-9, 2002 - 4th World Congress of Biomechanics, Calgary, AB.
- November 14-16, 2001 - 45th Stapp Car Crash Conference, San Antonio, TX.
- November 13, 2001 - 29th International Workshop on Human Subjects for Biomechanical Research, San Antonio, TX.
- November 11, 2001 - Society for Neuroscience, 31st Annual Meeting, San Diego, CA.
- September 3-6, 2001 - Movement and Sensation, International Symposium, Cairns, Australia.
- March 8-10, 2001 - International Congress on Whiplash-Associated Disorders, Berne, Switzerland.
- November 9, 2000 - 10th Injury Prevention through Biomechanics Symposium, Atlanta, GA.
- November 6-8, 2000 - 44th Stapp Car Crash Conference, Atlanta, GA.
- November 5, 2000 - Society for Neuroscience, 30th Annual Meeting, New Orleans, LA.
- November 4, 2000 - The principles and practice of modern light microscopy. A short course presented in conjunction with the Society for Neuroscience Annual Meeting.
- October 25-27, 1999 - 43rd Stapp Car Crash Conference, San Diego, CA.
- October 24, 1999 - 27th International Workshop on Human Subjects for Biomechanical Research, San Diego, CA.
- October 22-23, 1999 - Electromyography: Fine-wire techniques, Motion Analysis Laboratory, Children's Hospital, San Diego, CA.
- August 8-13, 1999 - International Society of Biomechanics XVIIth Congress, Calgary, AB.
- February 7-11, 1999 - Invited Faculty, Session Chair, and Reviewer for the World Congress on Whiplash Associated Disorders, Vancouver, BC.
- November 8, 1998 - Society for Neuroscience, 28th Annual Meeting, Los Angeles, CA.
- November 5-6, 1998 - Whiplash '98 Symposium, Phoenix, AZ.
- November 3-4, 1998 - 42nd Stapp Car Crash Conference, Phoenix, AZ.
- September 16-18, 1998 - International IRCOBI Conference on the Biomechanics of Impact, Göteborg, Sweden.
- September 15, 1998 - Committee meeting: Recommended practices for the proper use the proposed Neck Injury Criterion (NIC), chaired by Dr. O. Boström, Göteborg, Sweden.
- September 15, 1998 - Whiplash-associated disorders. A short course on whiplash, including epidemiology, injury biomechanics, seat design and other safety systems, occupant modeling, and injury criteria. Department of Injury Prevention, Chalmers University of Technology, Göteborg, Sweden.
- November 15, 1997 - 25th International Workshop on Human Subjects for Biomechanical Research, Lake Buena Vista, FL.
- November 13-14, 1997 - 41st Stapp Car Crash Conference, Lake Buena Vista, FL.
- November 4-6, 1996 - 40th Stapp Car Crash Conference, Albuquerque, NM.
- November 3, 1996 - 24th International Workshop on Human Subjects for Biomechanical Research, Albuquerque, NM.
- October 6-9, 1996 - 40th Annual Conference of the Association for the Advancement of Automotive Medicine, Vancouver, BC.

August 22-24, 1996 - 9th Biennial Conference of the Canadian Society of Biomechanics, Simon Fraser University, Burnaby, BC.

August 21, 1996 - Principles of surface and intramuscular electromyography collection and analysis. A short course presented in conjunction with the 9th Biennial Conference of the Canadian Society of Biomechanics, Simon Fraser University, Burnaby, BC.

August 21, 1996 - The biomechanics of ligaments and kinematics of joints. A short course presented in conjunction with the 9th Biennial Conference of the Canadian Society of Biomechanics, Simon Fraser University, Burnaby, BC.

February 26-29, 1996 - International Congress and Exposition, Society of Automotive Engineers, Detroit MI.

November 13-15, 1995 - International Truck & Bus Meeting & Exposition, Society of Automotive Engineers, Winston-Salem, NC.

November 11-12, 1995 - Accidental Injury: Biomechanics and Prevention, School of Medicine, University of California, San Diego, CA.

November 8-10, 1995 - 39th Stapp Car Crash Conference, San Diego, CA.

June 21-22, 1995 - PC-Crash Workshop, 2-day course on accident simulation and reconstruction software.

March 15-17, 1995 - Annual Intelligent Transportation Society (ITS) America conference, Washington, DC.

June 14-16, 1993 - Canadian Multidisciplinary Road Safety Conference VIII, Saskatoon, SK.

November 7-8, 1993 - 37th Stapp Car Crash Conference, San Antonio, TX.

April 7-9, 1992 - Commercial Vehicle Air Brakes Course (theory only). North Shore Driving School, Vancouver, BC.

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