

Profile – Dr. Greg Lehman, MSc, DC



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Gregory Lehman BKin, MSc, DC is currently a part-time Assistant Professor in the Graduate Studies and Education Department at the Canadian Memorial Chiropractic College as well as being in private practice in Kingston, Ontario. He began his work at CMCC as a Research Associate in 2000 when he was awarded a CMCC Infrastructure Grant to develop his research program. Upon graduation from CMCC in 2003 he became an Assistant Professor where his primary tasks were to continue an exercise and clinical biomechanics research program as well as teaching a Graduate level course in Research In-

strumentation. Dr. Lehman has published more than 18 peer reviewed publications, supervised more than 50 undergraduate students and was recently awarded the OCA's Professional Service Award for Research in Chiropractic in 2006.

Before attending CMCC as an undergraduate student in 1999, Dr. Lehman completed his Master of Science in Kinesiology from the University of Waterloo under the supervision of Dr. Stuart McGill. Dr. Lehman was funded at this time by a Natural Sciences and Engineering Research (NSERC – \$35,800) graduate scholarship. At the time of the award it may have been the first of such grants to fund a Master's student pursuing Chiropractic research. In 1998 Greg successfully defended his thesis entitled "The influence of spinal manipulative therapy on lumbar spinal range of motion and associated trunk muscle EMG." This study was later published in the journal *Clinical Biomechanics*. During his time at the University of Waterloo Greg worked as the Clinic Scientist within the UW-CMCC Chiropractic Research Clinic. His work at the clinic produced an additional 5 research publications in the journals, *Physical Therapy* and *JMPT*. Two themes of research emerged from his work at the University of Waterloo: Exercise Biomechanics and Clinical Biomechanics with a particular emphasis on electromyographical investigations into trunk muscle function.

While working at CMCC Dr. Lehman's research has focused on using electromyography to evaluate both rehabilitation exercises and clinical tests to identify abnormal function (e.g. the prone leg extension, feedforward response of the transversus abdominis). Dr. Lehman's exercise biomechanics research has investigated a number of exercise truisms and myths. In general his work has documented how modifications to exercises (grip widths, hand positions, unstable surfaces) influence the muscle activation levels of the involved muscles. A predominant theme has documented how the addition of Swiss balls influence

muscle activation levels during a variety of rehabilitation exercises. A number of peer reviewed publications have been generated from these studies in the journals of BMC Dynamic Medicine, Chiropractic and Osteopathy, Journal of Strength and Conditioning Research and Manual Therapy. The primary aim of documenting the electromyographic activity of muscles during rehabilitation exercises is to improve our knowledge of muscle function and ultimately exercise prescription for performance enhancement, injury prevention and injury treatment. If muscle activation levels are unknown then the “dosage” of those exercises is unknown without which makes scientific prescription and progression of exercise therapy guesswork.

The second stream of research focuses primarily on muscle activation timing. Two publications investigated the validity of a “normal” muscle firing profile during the performance of the prone leg extension test. This work was published in 2004 in BMC Musculoskeletal Disorders with a follow up study in Chiropractic and Osteopathy (2006). The findings suggested that contrary to popular clinical practice there was no consistent firing pattern of the posterior muscles during this task.

Future and current work at CMCC will further explore the two research areas of quantifying rehabilitation exercise “dosage” and assessing the function of the neuromusculoskeletal system with electromyographic muscle onset timing studies. Returning to his roots of quantify-

ing the effects of spinal manipulation, Dr. Lehman’s future planned projects aim to determine the influence of various therapies (spine manipulation, stretching, soft tissue therapy) on the reflexive and feedforward timing responses of the cervical, lumbar and limb musculature. A possible outcome of this research may permit the identification of individuals (possibly asymptomatic) who may best respond to spinal manipulative therapy. Related studies using similar protocols aim to investigate imposed alterations to the muscular system (i.e. muscular fatigue, prolonged stretching, injury) on measures of distal and proximal joint reflexive stability and kinematics.

Dr. Lehman has been fortunate to work with great mentors and facilitators of his research through the years including but not limited to Dr. Stu McGill, Dr. Sil Mior, Dr. Jean Moss, Dr. Kim Humphreys, Dr. Judy Wallen and Dr. Howie Vernon. He has also had the opportunity to supervise and mentor more than 50 undergraduate students at the CMCC working with him to produce biomechanics research and is grateful for their contributions.

Dr. Lehman aims to continue and develop his research program through grant seeking and the forming of research collaborations with other institutions and individuals. He is always interested in speaking with clinicians and experienced practitioners to develop research projects that are both formed by clinical practice and can, in turn, inform and improve clinical practice.

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