Shari Wynd, DC, MASc, BASc

Shari Wynd is a PhD student of Biomedical Engineering in the Faculty of Kinesiology, under the supervision of Dr. Greg Kawchuk DC, PhD. Her academic career began several years ago, when she enrolled in Kinesiology at York University. During her Bachelor of Science degree at York, she became very interested in biomechanics and research. When she completed her bachelors degree, she decided to pursue a second undergraduate degree in engineering (BASc) at University of Toronto. As her engineering degree progressed, she became involved in research, and earned Heart and Stroke Foundation and Natural Sciences and Engineering Research Council scholarships to work every summer in the Centre for Biomaterials Research.

During these summers, her focus was on characterizing the mechanical properties of biomaterials used to construct cardiovascular devices. Her fourth year engineering research project titled "The development of a biaxial testing apparatus for characterizing planar collagenous biomaterials" earned her a Centennial Thesis Award of Excellence. She continued her academic career at University of Toronto, earning her Masters in Engineering (MASc). The focus of her Master's degree was the development of "engineered" biomaterials. Work from her Master's thesis has been published in the Journals of Biomedical Materials Research, Biomaterials, and Biomechanics.

Shortly after graduation from her Master's degree, she became interested in applying her theoretical knowledge of biomechanics to clinical problems. Since both her mother and father are physicians, she was naturally encouraged to pursue a career in medicine; however, she had other plans. She applied to the Canadian Memorial Chiropractic College (CMCC) in Toronto, and in 1998 began her formal training to be a chiropractor. She financed her education by working full-time as a climbing instructor at a local climbing gym. As her chiropractic degree came to completion, she was encouraged by her clinical supervisors Drs. van der Velde and Harris to return to research and complete her training as an academic. As luck would have it, Dr. Greg Kawchuk, from the University of Calgary had recently presented some of his ongoing research to the students of CMCC. Shari realized this was a research opportunity of a lifetime. Not only would she be returning to school to do research, but she would be doing this research in a city close to the mountains so that she could also continue climbing.

After completing her Chiropractic Board Examinations June 2002, Shari moved out west to practice chiro-

practic and to continue her academic career. She currently practices part-time in Calgary in association with Dr. Drew Oliphant. She began her PhD in the Faculty of Kinesiology, Biomedical Engineering Graduate program at the University of Calgary with Dr. Kawchuk that same year. She is now in her second year of her doctorate program in which has been funded by the Alberta Provincial CIHR Training Program in Bone and Joint Health.

Her research is focused on determining if forces generated by cervical manipulation effect the integrity of the vertebral artery. Her overall goal is to provide an understanding of how pre-existing pathological lesions of the vertebral artery are affected by manipulation. Her research involves the following projects:

1 *The development of an animal model of a vertebral artery injury that can be directly interrogated through minimally invasive imaging techniques*. Angiographic balloons inserted into the vertebral arteries have been used to create pathological lesions in the vertebral artery. These lesions can be created when the balloons are over-inflated and translated within the vessel. The resulting lesions take the form of either an aneurysm or intimal tear. Injuries can then be visualized using a novel diagnostic tool known as Intra-vascular Ultrasound (IVUS). This tool is normally used to visualize the coronary arteries during interventional cardiology procedures, but has proven to be very useful in characterizing the vertebral artery pre- and post-injury. Work from this study has been accepted for upcoming publication in the Journal of Manipulative Physiological Therapeutics.

2 *The development of a robotic testing system capable of delivering accurate and repeatable cervical spine manipulations to the animal model.* Assessing spinal kinematics *in vitro* is made difficult due to problems reproducing the complex interactions between motion segments. While many sophisticated systems have been used to approximate these conditions, they have well-known limitations. The project that Shari is involved with at University of Calgary proposes an *in vivo* testing system that takes kinematic recordings of spinal motion obtained *in vivo* then applies those same motions to an *in vitro* preparation – much like flight simulators that replay actual flight data. Ultimately, the testing method will use a parallel robotic system to apply *in vivo* spinal movements to multiple spinal segments. This work will create a better understanding of the mechanisms of vertebral artery injury, and ultimately allow for the development of safety criteria and more diagnostically accurate pre-manipulative screening.

Currently, Dr. Wynd is preparing for her upcoming candidacy examinations, after which she will be focusing on collecting experimental data. When her PhD is complete, she hopes to remain involved in chiropractic research and education. She also plans to remain clinically active as part of an interdisciplinary team of healthcare providers, providing best evidence-based chiropractic care to her patients.

"I would like to thank the Alberta Provincial CIHR Training Program in Bone and Joint Health for their generous support of my academic program. The CCPA, CIHR and CCA have also contributed funds towards this project and their generosity is greatly appreciated. As PhD students, we never operate in a vacuum. Our research ideas come from the intellectual interactions we have on a daily basis within our research groups and with our colleagues and supervisors. For this reason, I gratefully acknowledge Dr. Kawchuk and his research group for their encouragement and sound advice during my academic career so far as well as all of my associates at University of Calgary whom I've interacted with these past two years. I look forward to continuing my research over the next few years as I work towards the completion of my PhD."