Profile

Bruce P Symons, DC

Bruce P. Symons, DC is a PhD student under the supervision of Walter Herzog at the Human Performance Lab, Faculty of Kinesiology, University of Calgary. Bruce was originally born in Hong Kong, but his family immigrated to Vancouver, BC during his early teens. He received a BSc in Zoology from the University of British Columbia in 1986, and was determined to become the next Jacques Cousteau. This career path ended quickly, and he relocated to Calgary, where he received a technical diploma in Chemical Engineering and Biotechnology from the Southern Alberta Institute of Technology. Since he was advised that he did not have good enough hand-eye coordination to be a lab technician, he entered graduate studies at the University of Calgary. In 1992, he completed a Masters degree in Medical Science (specialization: Neuroscience) at the Faculty of Medicine under the supervision of Samuel Weiss. His graduate thesis research focused on the role of excitatory amino acid neurotransmitters in stem cell-based neuroregeneration in the mouse brain. Poised to enter medical school and/or a PhD program, he suffered a complete lumbar disc prolapse and was introduced to chiropractic. Under the care and mentorship of Dr. David Lawson, DC he entered CMCC and graduated in 1997. He returned to Calgary to practice, but felt drawn towards research. He began a number of research trials in association with Walter Herzog at the University of Calgary in 1998, which culminated in them formalizing their relationship into a PhD program in September 2000. Since then, Bruce has been published in a number of journals including the Archives of Physical Medicine and Rehabilitation, JCCA, JMPT, Manual Medicine and Spine. He has also co-authored a book chapter with Walter Herzog.

Bruce's PhD thesis work is an investigation of the biomechanics of various structures in the neck during cervical spinal manipulative treatment (cSMT), such as the cervical discs, ligaments and muscles. However, current issues were more focused on the vertebral artery, and his research evolved into an examination of the biomechanics of the verterbal artery (VA) during cSMT. It is anticipated that he will complete his PhD in 2005.

Bruce's research projects have been diverse, since there have been a number of ongoing studies on different topics at the Human Performance Lab. His actual thesis research involves the following 4 topics:

1 Quantification of the forces and strains experienced by the VA during cSMT. A preliminary version of this study has been completed and was published in JMPT (October 2002). In this study, pairs of match-head sized ultrasound crystals were sewn onto the VA of cadavers.

Based on the speed of sound between each crystal pair, elongations of the VA could be calculated at high resolution. The VA was then dissected out and stretched on a materials testing machine until mechanical failure occurred. The results indicated that the VA undergoes approximately 6% elongation during upper cervical cSMT, but undergoes mechanical failure at 39–62% elongation. To our knowledge, this research has never been performed elsewhere. However, this study has been criticized for the small sample size (6 VAs from 5 cadavers) and the fact that the head position and manipulative forces were not measured.

2 An investigation into possible histopathological damage at the molecular level to the VA during repeated elongations at 5-10% strain. VAs will be removed from cadaveric specimens per project (1) described above, and stretched on this materials testing machine for 10–10,000 repetitions. The VAs will then be processed and assessed by a medical pathologist blinded to the procedure. This study is currently under investigation. To our knowledge, this research has never been performed elsewhere.

3 A precise description of the position of the head and neck relative to the shoulders during cSMT. An array of electromagnetic sensors affixed to a swimmers cap will be worn by volunteers during cSMT. The sensors can report the precise position of the head in all three dimensions at high temporal resolution. This project is currently at the preliminary planning stage pending technical issues. To our knowledge, this research has never been performed elsewhere.

4 Based on the three-dimensional head position technology described above in project (3), the experiments involving the strain experienced by the VA in project (1) will be repeated while measuring the exact location of the head and neck in space. In addition, a pressure transducer pad will be used to directly measure the input forces from the chiropractor's hand. This will replicate the study previously reported, and also add new data to ensure that a "typical" cSMT is performed. This project will be dependent on the outcome of the previous studies described above.

5 In terms of postdoctoral research, one anticipated project is the development of a 50th percentile, "phantom" neck that approximates the human cervical spine. Based on the methods developed in prior studies, elongations experienced by the phantom VA will be quantified during various neck positions and during cSMT. The flow characteristics of a viscous fluid similar to blood can also be assessed through the phantom VA. By varying the direction and force of the manipulative impulse, it is hoped that data from this research can be used to develop a premanipulative head positioning and cSMT protocol that minimizes strain to the VA.