

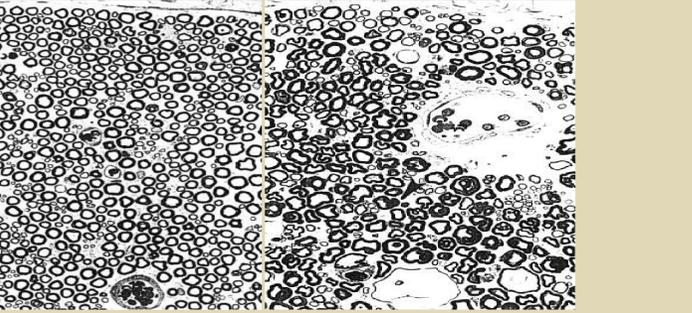
Neural Injury Model

Kayla Schaefer
Urology Department

Summary

Urinary incontinence (UI), as defined by the International Continence Society (ICS), is "the complaint of any involuntary leakage of urine". It is more common in women than in men and may affect women of all ages (Agency for Health Care Policy and Research, 1996). UI is most common among women after childbirth. However, studies have found that this problem is affecting physically fit female athletes. A prior UROP student that worked under Dr. Timm discovered through a survey that there was a higher occurrence in urinary leakage problems among the gopher women athletes compared to a control group at the same age. It has been suggested there is a correlation between UI and physical activity. Studies note that females participating in exercises with more repetitive and impact movements have a higher UI. At this point it is not understood if UI occurs during physical activity or as a result of tissue fatigue/injury.

Dr. Timm's team has been researching urinary leakage problems and the nervous system to discover the reason for the problem. It has been hypothesized that nerve compression is the contributing factor. Nerve conduction studies are a useful way to evaluate nerve functioning and identify any abnormalities. Previous studies found that applied pressure for different amounts and durations can cause damage to the nerve and result in atypical functioning.



Above are before and after light micrographs of a transverse section of a nerve which compression was applied to. As you can see there are noticeable results; the myelin has thinned and the perineurium has thickened.

Objective

The project's goal is to research the effects of compression on the functional status of peripheral nerves in terms of conduction velocities. The central hypothesis behind the proposed research is conduction velocity of nerves is affected by the intensity, duration and repetitive times of compression. The 1st primary hypothesis is that acute crushing with added weight and duration will inhibit nerve fibers from activating, resulting in a slower conduction velocity. The 2nd hypothesis is that repetitive compression on a nerve will lead to slower conduction velocities and longer recovery periods. Through research we would like to prove that female athletes have higher frequencies of urinary leakage due to the compression on their peripheral nervous system.

UNIVERSITY OF MINNESOTA
Driven to Discover™

Materials and Methods

Our hypothesis will be tested through nerve compression and conduction velocity tests. Nerve stimulation will be conducted by two subdermal needle electrodes that are placed 5cm apart. These will also record the nerve velocity. The posterior femoral cutaneous nerve will have a pressure of 5g applied. Additional 5g weights will be applied to the nerve incrementally until the nerve conduction velocity decreases.

Outlook

Finding the cause of UI would be a tremendous breakthrough. Finding the cause is essential for finding the cure. Proper precautions or treatment can be developed for women athletes. However, this could not only have an impact on women athletes but the estimated 13 million US adults suffering from UI.

Work Cited

Cardozo, L.Griffiths, Rosier, Ulmsten, Victor, Wein, and Standardisation Sub-committee of the International Continence Society. (2002) *Neurourol Urodyn* 21(2): 167-78.
Agency for Health Care Policy and Research. (1996) Overview: Urinary Incontinence in Adults, Clinical Practice Guideline Update. Agency for Health Care Policy and Research, Rockville, MD. <http://www.ahrq.gov/clinic/uioverview.htm>
David Peterson and Barbara Shapiro. Electromyography and Neuromuscular Disorders, 1998. <http://ovidsp.tx.ovid.com/sp-2.3/ovidweb.cgi?WebLinkFrameset=1&S=A+Model+of+Chronic+Nerve+Compression+in+the+Rat>
"Steiger, M, Erdman, A.G. and Timm, G.W. Survey Study Comparing Incontinence in Young Elite Female Athletes and an Age Match Control Population. Proc of the National Conference on Undergraduate Research (NCUR), UNC Asheville, NC. 2006."