

## **Progress Report: Infraspinatus Activation in People with and without Rotator Cuff Tendinopathy (PI: Harrington)**

### *1. Summary of accomplishments in the past year:*

Subject recruitment and data collection has continued over the past year at Arcadia University and Einstein Health System (Dr. Sweitzer's clinical practice). To date, 19 subjects with tendinopathy and 13 control subjects have successfully completed the protocol, one subject with RCT did not have evaluable data due to a technical error with the system and one subject was not included in analyses due to insufficient pain profile. In the past year, more than 30 subjects have undergone physical screening and subjects that met entrance criteria for rotator cuff tendinopathy (RCT) have been consented and completed study procedures (n=3). Recruitment in the past year is behind the projected recruitment timeframe in part due to a change in scheduling at Albert Einstein Health Network (secondary study site) resulting in decreased patient census at Dr. Sweitzer's office over a 6-month period due to a change in the electronic medical record system. Additionally, the research PI who supported the project from July-December 2014 resigned due to relocation. A new research assistant was hired in Spring 2015.

This project supported at R01 application that was funded (Karduna, McClure - Neurophysiology of Weakness and Exercise in Rotator Cuff Tendinopathy (1R01AR063713-01A1)) which will also lead to improved recruitment based upon infrastructure being developed for multi-study recruitment at Arcadia University and surrounding clinical practices. A No-Cost Extension request form is included for your review.

### *2. Provide a one-paragraph summary of results or abstract suitable for posting on the Orthopaedic Section website.*

Nineteen subjects with rotator cuff tendinopathy (RCT) completed infraspinatus voluntary activation (VA) testing procedures resulting in 17 evaluable subjects (mean age  $29.7 \pm 8.4$  years). Mean VA across subjects with RCT (for the best trial for each subject) was 0.82 (range 0.26-1.0) with no significant differences in mean isometric external rotation strength between sides (for 10/17 subjects, the involved limb was also the dominant arm). Preliminary analyses demonstrate lower VA values for subjects with RCT compared to age and sex-matched control subjects and that there is a potential relationship between VA, shoulder satisfaction, and function (using the PSS). Further data are needed to examine these relationships statistically, as well as the potential contribution of pain catastrophization to VA failure in patients with shoulder pain.

### *3. Attach a list of your publications published or accepted during the past year, or currently being written. Send reprints when available. List presentations made and abstracts accepted for presentation based on this work. Indicate with an asterisk (\*) those publications supported by Orthopaedic Section funding.*

The following presentation was supported by this grant:

\* Harrington AT, Fliss T, Gherardi K, Senese M, Stackhouse S, McClure P. Reliability of Voluntary Activation Testing of the Infraspinatus in Healthy Adults. Presented at the APTA Combined Sections Meeting; San Diego, CA; January 2013- Orthopaedic Section.

Previous and ongoing work in the lab related to the current project:

Publications:

Stackhouse SK, Eisennagel A, Eisennagel J, Lenker H, McClure PW, Sweitzer B. Experimental pain inhibits infraspinatus activation during isometric external rotation. *J Shoulder Elbow Surg* ; 2013 Apr;22(4):478-84

McClure P, Sweitzer B, Frederick K, Leemann E, Schieber A, Serino M, Taylor H, Stackhouse S. The effect of experimental shoulder pain on muscle activation at remote sites. (Accepted, pending revision: *Journal of Electromyography and Kinesiology*)

The following manuscripts are in preparation:

\* Harrington AT, Fliss T, Gherardi K, Senese M, Stackhouse SK, McClure PW. Reliability of voluntary activation testing of the infraspinatus in healthy adults.

\* Harrington AT, Epsy K, Frankel A, Henriod M, Stackhouse SK, McClure PW. Validation of deltoid muscle voluntary activation. Manuscript to be submitted to *Journal of Shoulder and Elbow Surgery*.

4. Provide a budget, using the original approved budget. Indicate total funds spent to date per major categories. If there was > 25% deviation (greater or less spent) of use of funds for any of the budget category, please BRIEFLY indicate the rationale.

<b>EXPENSE CATEGORY</b>	<b>Planned Budget for Year 3 (July 2014-June 2015)</b>	<b>Expenses in Year 3</b>	<b>Projected Expenditures in Year 4 (NCE)</b>
<b>Personnel</b>	<b>3554</b>	<b>3034</b>	<b>593</b>
<b>Equipment and Supplies</b>	<b>873*</b>	<b>564</b>	<b>309</b>
<b>Subject Honorarium</b>	<b>1400</b>	<b>150</b>	<b>1250</b>
<b>Total</b>	<b>5827</b>	<b>3748</b>	<b>2152</b>

*\* An additional equipment charge posted between the time of the last report and the budget for the past year (\$376) resulting in the annual budget of 5827 vs. the 6203 included in last year's report*

Deviations were noted in the Personnel and Subject Honorarium categories over the past year, which reflects our current progress toward recruitment. Recruitment efforts have increased using a multi-study recruitment approach through Arcadia and the hiring of a new research assistant following the resignation of the research PT. The remaining personnel funds will be used to complete statistical analyses and manuscript preparation. The subject honorarium deviation reflects recruitment as well as the inclusion of subjects who opted not to receive the honorarium (University policy requires that the subject provides a social security number for tracking for tax purposes and some opted not to receive payment) and some lab personnel served as control subjects and opted not to receive the honorarium. We request that the Orthopaedic Section allow us to use these funds to increase recruitment efforts and to allow for the payment of additional subjects for participation in the event we need to replace some subjects due to attrition or unanticipated technical equipment errors. Additionally, subanalyses of pain catastrophization and pain level as predictors of VA may require additional subjects. In the event that these subjects are not needed, we would return the honorarium funds to the Section at the end of the NCE year.

*5. Objectives for the next year:*

In the next year, we plan to complete subject recruitment, data collection and data analysis. We anticipate submitting an abstract in May 2016 for consideration for presentation at the APTA Combined Sections Meeting in February 2017. We are in process of submitting the reliability manuscript and plan to submit a manuscript on the complete data set from the present grant in the fourth quarter of 2015.