

UNIVERSITY OF WISCONSIN-LA CROSSE

Graduate Studies

THE EFFECTS OF KINESIO<sup>®</sup> TAPE ON STRENGTH AND ACTIVATION OF THE  
MIDDLE DELTOID MUSCLE

A Manuscript Style Thesis Submitted in Partial Fulfillment of the Requirements for the Degree  
of Human Performance

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College of Science and Health  
Human Performance, Athletic Training Concentration


May, 2010

THE EFFECTS OF KINESIO<sup>®</sup> TAPE ON THE STRENGTH AND ACTIVATION OF THE  
MIDDLE DELTOID MUSCLE

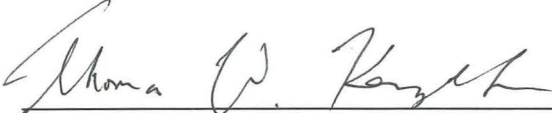
By Jillian Thompson

We recommend acceptance of this thesis in partial fulfillment of the candidate's requirements for the degree of Human Performance, Applied Sport Science

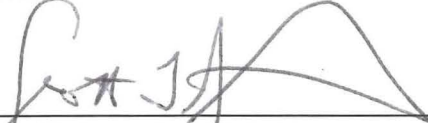
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## ABSTRACT

Thompson, J.M. The effects of kinesio<sup>®</sup> tape on strength and activation of the middle deltoid muscle. MS in Human Performance, May of 2010, 46pp. (M. Gibson)

**Context:** Kinesio<sup>®</sup> Tape (KT) is widely used in athletics and other settings regardless of a lack of strong evidence based support for its uses. There is a need for research on KT and it's affects on torque and muscle activation of the middle deltoid. **Objective:** To examine the effects of KT on facilitation or inhibition of the middle deltoid muscle as measured by torque and muscle activation. **Design:** Randomized, repeated measures design with 3 conditions. **Setting:** Human movement and physiology laboratory.

**Participants:** Twenty-Five volunteers (fourteen women, eleven men) between the ages of 19 and 24 participated. Participants had no history of surgery to the upper body and no history of upper body injury within 12 months prior to testing. **Interventions:** Three conditions were investigated including Kinesio<sup>®</sup> taped (KTC), sham taped (LTC), and control taped (UTC). Three concentric and three eccentric contractions were performed through 90 degrees of motion in shoulder abduction against an isokinetic dynamometer (CYBEX) during each condition. **Main Outcome Measures:** Average and peak torque measurements were taken from best effort of 3 maximal concentric and eccentric contractions. Average and peak activation of the middle deltoid during best effort trials were measured using surface electromyography (EMG). **Results:** No difference in peak EMG between conditions was found ( $p=0.806$ ). There was also no significant difference between conditions found in average EMG ( $p=0.566$ ), peak torque ( $p=0.640$ ), or average torque ( $p=0.115$ ). **Conclusions:** KT had no influence on torque production or muscle

activation during dynamic muscle contraction of the middle deltoid. These findings may have implications for the use of KT on patients and athletes for the purpose of muscle facilitation or inhibition.

**Key Words:** Muscle Facilitation, Therapeutic Taping

## ACKNOWLEDGMENTS

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## INTRODUCTION

Kinesio<sup>®</sup> Tape (KT) is an elastic, cotton tape with a heat activated, acrylic based adhesive. It is latex free and has been reported to stretch 40%-60% of its resting length.<sup>1,2</sup> Kenzo Kase D.C. developed the tape in 1973; introducing it to the USA in 1995. Since its inception as a tool for clinical use, KT has gained acceptance in the world of athletics and has been used by many high profile athletes in professional soccer, Major League Baseball, National Football League, and several of the athletes that competed in the 2008 Summer Olympics and Paralympics.<sup>1</sup> Regardless of its popularity in athletics, 85% of KT applications are considered to be non-athletic uses.<sup>1</sup> Among other things, KT has claimed to decrease pain and edema, improve circulation and lymphatic flow, and have a facilitation or inhibition effect on weakened muscle, depending on its application.<sup>1-4</sup>

Pain and edema reduction were reported by Zajt-Kwiatkowska et al<sup>5</sup> in a series of case studies on subjects with varying injuries. However, no description of the method used to measure pain was provided and edema was measured in the study by visual appearance. Decreased pain as well as increased cervical range of motion was observed by Gonzalez-Iglesias et al<sup>6</sup> with the use of KT on subjects with whiplash associated disorders. The authors indicated, however, that the differences seen may have been too small to be clinically significant. Although it is theorized that KT may improve circulation and lymphatic flow, it appears that no research has been made readily available to support these claims. Facilitation and inhibition of muscle has been a claim made by the Kinesio<sup>®</sup> Taping Association with very little supportive research. Hsu et al<sup>7</sup> used hand held dynamometry and electromyography (EMG) to examine the effects of KT

on the scapular rotators during scaption. They reported increases in muscle activation of the lower trapezius but not in the other scapular rotators tested. The reported increases in activation were only observed from 30 to 60 degrees of the lowering phase of scaption. To the best of our knowledge, this has been the only research other than the current study that evaluated changes in both strength and muscle activation with KT use.

KT has been used in clinical settings with seemingly increasing popularity despite little evidence supporting its use. This may present a problem for health care professionals using KT on their patients. In the athletic setting, one-on-one interaction between an athletic trainer and an athlete is important but restricted by the demands of treating several athletes within an allotted amount of time. Therefore, time should be used effectively to reach rehabilitation goals. For this reason, it is important that specific techniques and taping products be studied to determine their efficacy. Previous research of the effects of KT on outcome measures and methods of data collection have varied widely. Because of this, conclusive judgment of the efficacy of KT use towards specific goals is difficult. Application of KT for facilitation or inhibition of muscle should be investigated to allow health care professionals using the taping technique to be confident that clinical time is used most efficiently. As a result, the purpose of this study was to investigate the effects of KT on the middle deltoid muscle as measured by torque production and muscle activation. Our hypothesis was that KT would have no significant effect on torque or activation of the middle deltoid muscle during concentric or eccentric shoulder abduction.

## METHODS

### Participants

Twenty-five healthy individuals (age =  $21.5 \pm 1.6$  years, height =  $171.3 \pm 8.6$  cm, body mass =  $70.5 \pm 11.2$  kg) volunteered for this study (Table 1). Eleven participants were male, fourteen were female. Inclusion criteria were 18 to 25 years of age, no previous history of surgery to the upper body, and no previous history of upper body injury within 12 months prior to testing. Past experience with upper body resistance training was also required so that participants had some experience in performing a maximal voluntary contraction. All participants read and signed an informed consent form approved by the Institutional Review Board of the University of Wisconsin-La Crosse.

<b>Mean and SD</b>	
Age (yrs)	$21.5 \pm 1.6$
Height (cm)	$171.3 \pm 8.6$
Body Mass (kg)	$70.5 \pm 11.2$

Table 1. Participant demographic information (mean and standard deviation).

### Design

We used a randomized, repeated measures design to investigate the effects of one taping condition, one sham taping condition and one control condition on the concentric and

eccentric shoulder torque and muscle activation of the middle deltoid. The testing session included a warm-up, a practice session, and testing of all three conditions. Prior to tape application, the participants performed an upper body warm-up of pushups against a wall. The warm-up was complete when the participant felt warm and ready to perform maximal effort contractions. An electromyography (EMG) electrode was then secured over the middle deltoid muscle and three maximal voluntary isometric contractions (MVIC) were performed to normalize the EMG data. Each condition was then applied to the dominant shoulder and tested separately. Dominance was reported by the participant as either left or right. If the participant was not sure of shoulder dominance, the shoulder used for writing was selected. The order of conditions was randomized between participants and at least five minutes of rest were provided between conditions. Each testing condition included three concentric and three eccentric shoulder abduction movements at 50% effort as practice; followed by 30 seconds of rest and three additional concentric and eccentric movements at maximal effort. The dependant variables were peak and average torque (N-m) as well as peak and average muscle activation (%MVIC) during each movement. These measurements were recorded during the three maximal effort movements for each condition. Statistical analysis was performed on the best effort of the three movements in each condition based on peak torque production.

### **Instrumentation**

We placed a surface Ag/AgCl bar electrode (DE 2.1, Delsys, Inc., Boston, MA) with an interelectrode distance of 1cm parallel to the muscle fibers of the middle deltoid midway

between the acromion process and the deltoid tuberosity. Electrode size was 1cm x 1mm. A ground electrode was placed over the middle third of the ipsilateral clavicle. Prior to electrode placement, the skin was cleansed using alcohol and abraded using fine sand paper. EMG data from the surface electrode were captured at 1000 Hz using Data Pac 2k2 (Run Technology, Mission Viejo, CA, USA). The EMG electrode and fiber optic goniometer (s700 Joint Angle Shape Sensor, Measureand, Inc, Fredericton, NB, Canada) was interfaced into a Bagnoli 4 amplifier (Delsys, Inc, Boston, MA, USA). System bandwidth was 20-450 Hz with a gain of 1000 for the surface electrode. EMG signal was notch filtered at 60 Hz and processed via a root mean square technique using a 10 ms window within Data Pac 2k2. These data were then exported and further processed within an Excel spreadsheet (Microsoft Office Excel 2007). Torque data were measured using an isokinetic dynamometer (Cybex Norm with HUMAC™/Windows® Software, Computer Sports Medicine, Inc., Stoughton, MA) and were synchronized to the EMG collection computer based on the goniometer. The goniometer was affixed to the dynamometer arm to record its movement. The point at which the goniometer recorded a change in angle greater than one degree constituted the beginning of the isokinetic test. The tape used for the Kinesio® taped condition (KTC) was beige Kinesio® Tex Gold tape (Kinesio Holding Corporation, Albuquerque, NM). The tape used for the sham taped condition (LTC) was Leukotape® P (BSN Medical Ltd, Pinetown, South Africa).

### **Procedures**

All testing and procedures for each participant were completed within one session lasting approximately one hour. Participants were asked to refrain from performing any upper

body resistance training for 24 hours prior to testing. Participants performed an upper body warm-up of pushups against a wall until they felt warm and ready to perform maximal contractions. The EMG electrode was applied to the skin in the manner previously described. The EMG electrode remained in place throughout testing of all three conditions. Participants were placed side-lying on their non-dominant side facing away from the isokinetic dynamometer. The axis of rotation of the dynamometer was aligned with the most medial point of the spine of the scapula of the dominant shoulder and a pillow was placed under the head for cervical alignment and comfort. A padded attachment of the isokinetic dynamometer was secured to the dominant arm just above the elbow and below the insertion of the middle deltoid muscle. The participant was asked to confirm comfort throughout the range of motion of shoulder abduction (Figure 1).

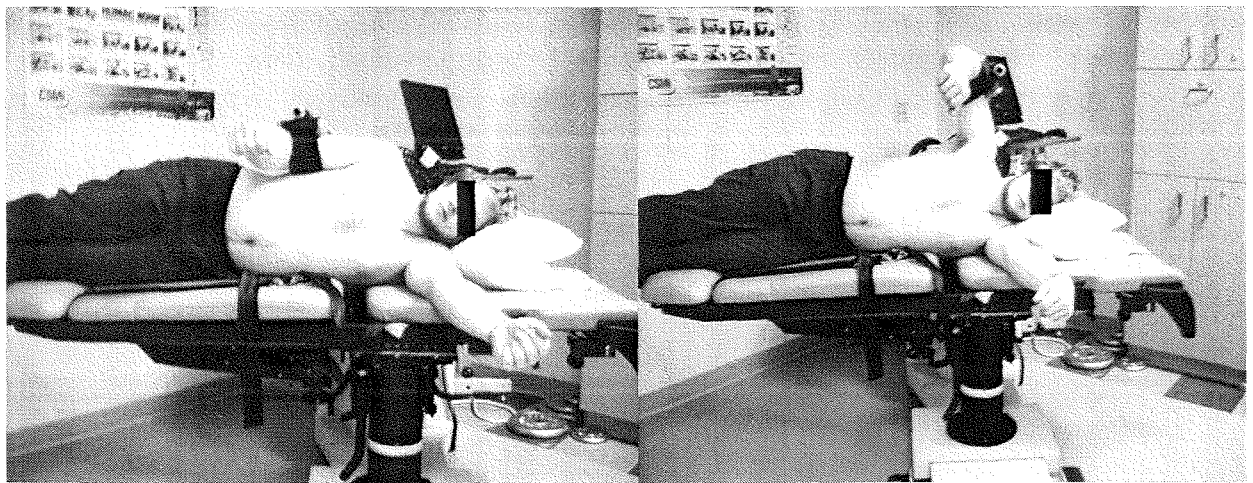


Figure 1. Participant Positioning on Isokinetic Dynamometer.

The isokinetic machine was used to secure the shoulder at zero degrees of abduction for the collection of MVIC. The participant performed three MVIC trials each

lasting a five second duration. After MVIC was performed, the participant was removed from the isokinetic dynamometer and received one of the three conditions. All conditions were applied by the same Certified Kinesio<sup>®</sup> Taping Practitioner (CKTP). The Kinesio<sup>®</sup> Taped condition (KTC) was applied as recommended for deltoid application by the Kinesio<sup>®</sup> Taping Association (Figure 2).<sup>1,2,4,8</sup> The tape was measured for proper length against the shoulder of the participant and cut into a 'Y' strip. The 3 cm anchor was applied over the insertion of the deltoid with no tension. Each tail of the 'Y' strip was then applied with 15%-25% tension, following along the anterior and posterior deltoid muscles. As the anterior and posterior tails were applied, the participant was positioned into horizontal abduction/external rotation and horizontal adduction/internal rotation, respectively. The last 3 cm of each tail were applied without tension with the anterior tail ending at the lateral clavicle and the posterior tail ending at the lateral edge of the spine of the scapula. If needed, the tails were trimmed to ensure proper application. The heat activated adhesive of the KT was activated by the CKTP performing a rubbing motion along the length of the application. The sham taped condition (LTC) was applied in a similar manner to the KTC though two strips were used to replicate a similar pattern to the KTC (Figure 3). Positioning of the participant as well as tension applied during tape application was the same for both KTC and LTC. The control condition (UTC) had no tape application and the shoulder was left bare with exception of the EMG electrode. All participants received each condition, though the order in which they were received was randomized and at least five minutes of rest were provided between conditions.

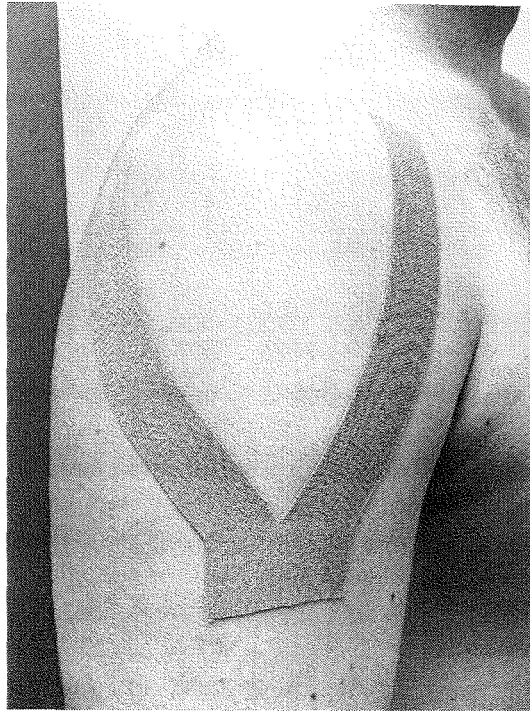


Figure 2. Kinesio<sup>®</sup> Taping (KTC) Tape Application.

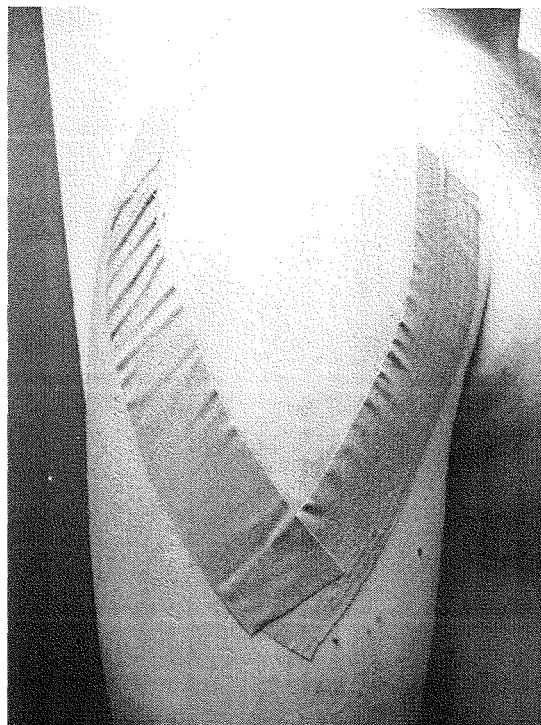


Figure 3. Leukotape™ Condition (LTC) Tape Application.

The following procedures were repeated for each condition. The participant was repositioned as described for the MVIC collection and, again, asked to confirm comfort throughout shoulder abduction range of motion. After the participant expressed understanding of the task, they performed a practice trial at 50 percent effort followed by 30 seconds of rest. The test trial was then performed with maximal effort. The shoulder abduction task included three concentric and three eccentric shoulder abduction movements at  $60^{\circ}\cdot\text{s}^{-1}$  through 0-90 degrees of range of motion. The concentric and eccentric phases of the test were alternating. Figures 4 and 5 show representative graphs of isokinetic torque, EMG, and position data of one participant. The participant was removed from the isokinetic dynamometer and instructed to sit up and rest for 5 minutes prior to the next condition.

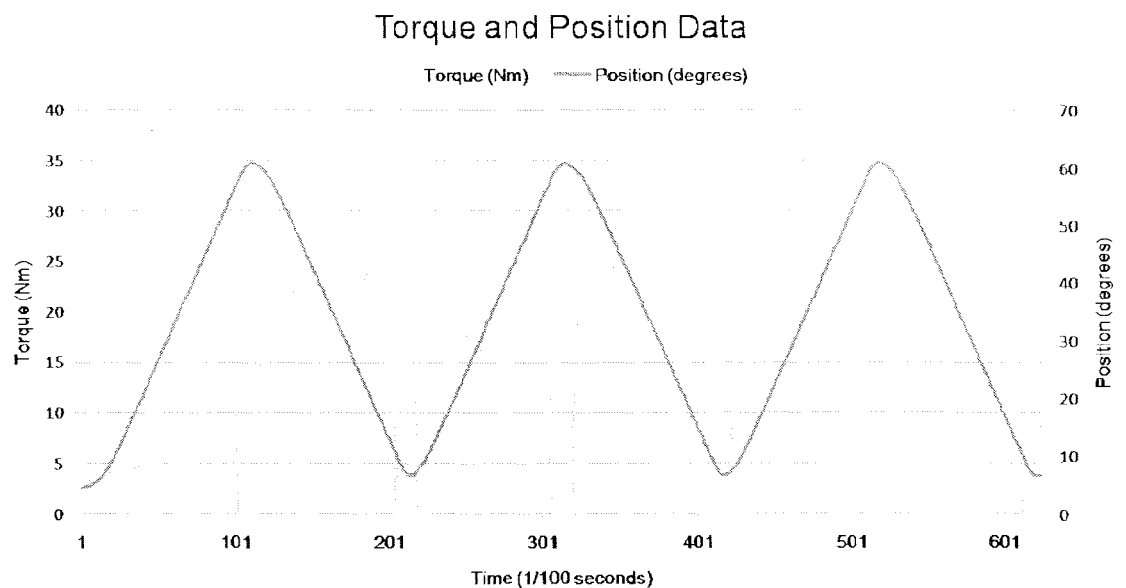


Figure 4. Torque and position representative data. Torque and position over time from one representative participant.

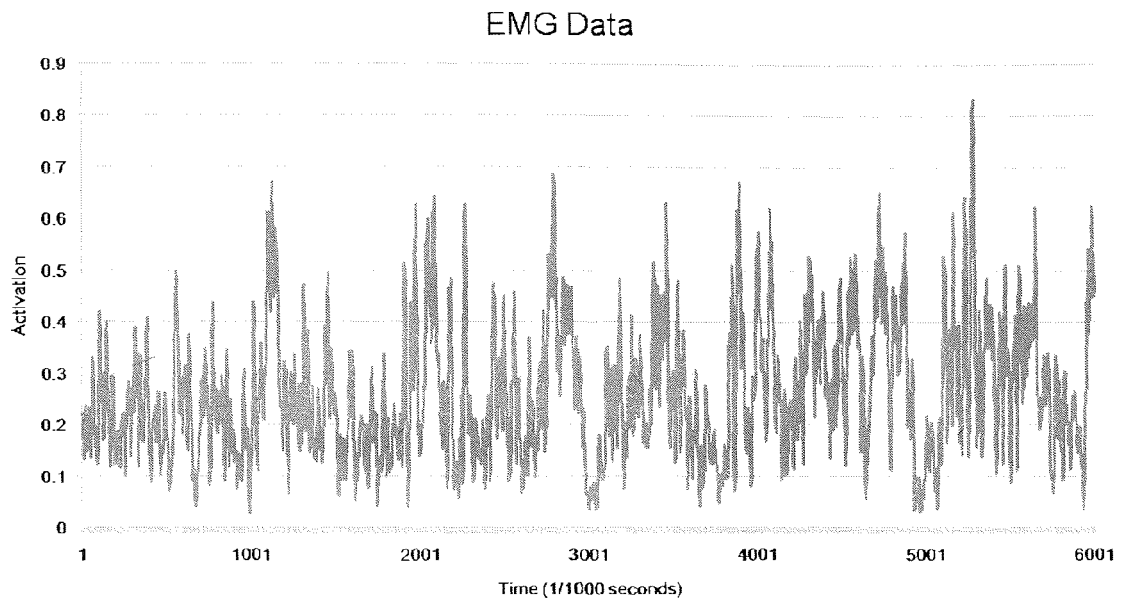


Figure 5. EMG representative data. Muscle activation over time from one representative participant.

## RESULTS

Four separate two-way repeated measures analysis of variance (RMANOVA) tests were used to assess differences in peak torque, peak muscle activation, average torque, and average muscle activation between conditions. Alpha was set to 0.05. Statistical data were analyzed using SPSS (Version 17.0 for Windows; SPSS Inc, Chicago, IL). There was no difference in peak muscle activation between conditions ( $P=0.806$ ). In addition, there was no difference in average muscle activation between conditions ( $P=0.566$ ), peak torque between conditions ( $P=0.640$ ), or average torque between conditions ( $P=0.115$ ) (Figure 6A-D).

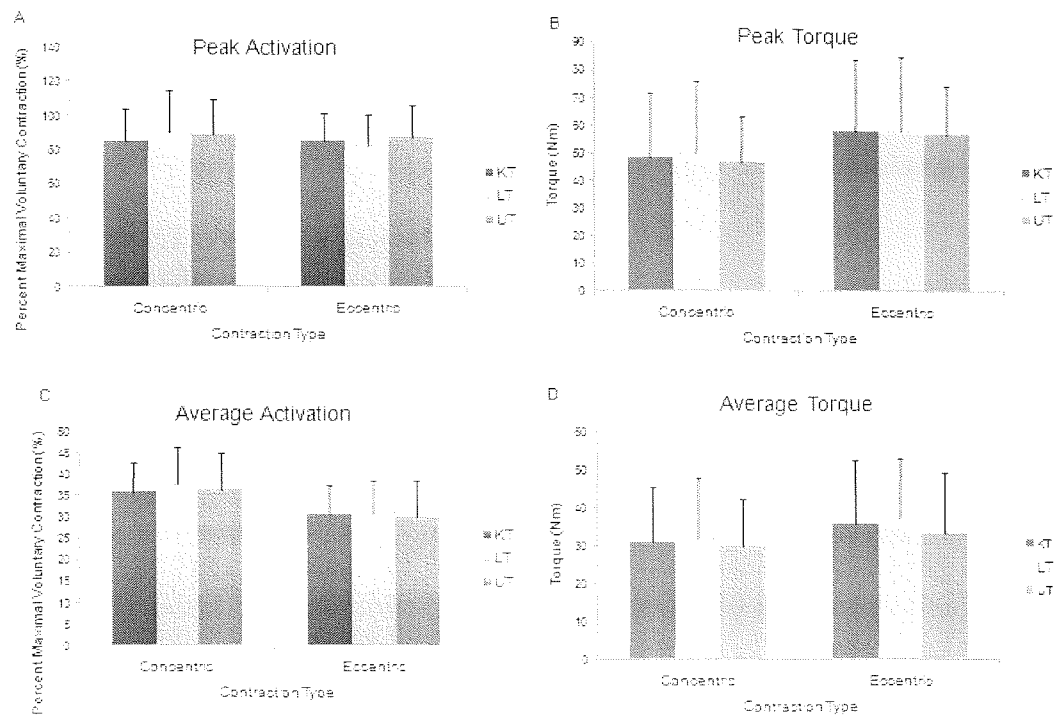


Figure 6. Representative graphs of the results. No differences observed in (A. Peak activation,  $P=0.806$ ), (B. Peak Torque,  $P=0.64$ ), (C. Average Activation,  $P=0.566$ ), or (D. Average Torque,  $P=0.115$ ) between conditions during concentric or eccentric contractions of the middle deltoid muscle.

## DISCUSSION

In contrast to many of the rigid tapes previously studied, KT is highly elastic and has been designed specifically for, among other things, the facilitation or inhibition of muscle. Despite the claims made by the Kinesio<sup>®</sup> Taping association, limited research on the effects of KT has been made available. Some studies have focused on the use of KT for specific injuries. Zajt-Kwiatkowska et al<sup>5</sup> supported the use of KT on several sport related injuries including ankle sprains, lateral epicondylitis of the elbow, inflammation of the long head of the biceps brachii, front and lateral compartment syndrome of the lower leg, and plantar fasciitis. These authors reported decreased pain and visible edema

reduction in all injured subjects. However, this study has significant flaws. There was no reference to the number of injured participants involved in the study or details on any additional therapeutic treatments concurrently received. There was also no reference to the tools used to measure pain and edema.

González-Iglesias et al<sup>6</sup> studied the effects of KT on patients with whiplash-associated disorders. Participants' baseline pain level and cervical range of motion were recorded prior to receiving one of two conditions. Half of the participants received KT application over the cervical spine while the other half received a more minimal placebo KT taping pattern applied with no tension. Pain level and range of motion were measured immediately after tape application and again after 24 hours of wearing the tape. The results indicated that participants who received the true KT application had significantly improved pain and range of motion compared to those who received the placebo KT application. Although statistically significant, the authors stated that the improvements to pain level and cervical range of motion were small enough that they may not be clinically significant. Thelan et al<sup>9</sup> observed improved abduction range of motion in their study of KT and its effects on shoulder pain and disability. Participants were assigned into one of two groups to receive either the true KT application or a placebo KT application with no known or intended therapeutic effect. Measurements were taken immediately after tape application, as well as three and six days post application. Measurements included pain free range of motion, pain intensity (via a visual analogue scale), and pain and disability (via a shoulder pain and disability index). The authors observed significant improvement in pain free abduction range of motion which diminished by day three of wearing the KT application. No other differences were

observed between groups. Yasukawa et al<sup>10</sup> investigated the use of KT in 15 children with weakened muscles due to neurological or orthopedic conditions and/or spinal cord injuries. Function was measured using the Melbourne Assessment of Upper Limb Function which included evaluation of various upper body activities of daily living. The authors observed improved upper extremity function with the use of KT. There was no control group in the study and all participants received additional care specific to their injury or condition. This study, however, also had some limitations. The tape was applied by a certified Kinesio<sup>®</sup> taping practitioner but the methods of the tape application were not described and may have been different for each participant. Also, the Melbourne Assessment was designed for use in neurological disorders but the authors used it on participants with varying conditions and injuries. While some of the previous research has described some improvement of pain,<sup>5, 6</sup> function<sup>10</sup>, range of motion,<sup>6,9</sup> and edema absorption<sup>5</sup> with the use of KT, there has been little research on muscle facilitation and inhibition effects of KT.

Hsu et al<sup>7</sup> studied the effects of KT on strength and muscle activation of the scapular rotators in baseball players with impingement syndrome. Isometric strength of the lower trapezius was measured using a handheld dynamometer. Muscle activation of the upper trapezius, lower trapezius, and serratus anterior was measured using an eight-lead EMG system. These measurements were taken while performing a scaption task before and after application of either KT or placebo tape. The authors reported that KT significantly increased muscle activation of the lower trapezius during 30-60 degrees of range of motion. There was no significant difference in strength between groups. To the best of

our knowledge, this study is the only research, other than the current study, on KT and its effects on muscle strength and activation.

The current study was intended to assess differences in torque and muscle activation between three conditions. In contrast to Hsu et al<sup>7</sup>, we recruited healthy volunteers as participants in our study and used an isokinetic dynamometer to assess torque as opposed to a hand held dynamometer. We used the isokinetic dynamometer because, unlike a hand held device, it could provide effective stabilization and the task could be controlled to decrease compensation with other muscles. We assessed the effects of KT on the middle deltoid muscle during shoulder abduction as opposed to the scapular rotators during scaption. This allowed us to assess a single muscle that could be easily located, was superficial, and had a single action. Use of the middle deltoid instead of the scapular rotators also allowed easier isolation of the muscle. Shoulder abduction was ideal for this study because participants could be easily instructed in performance of the action and it is familiar to those with experience in upper body resistance training.

Our results showed no change in torque production with KT application during concentric and eccentric shoulder abduction. There was also no change in peak or average muscle activation of the middle deltoid with KT application during concentric and eccentric shoulder abduction. These results imply that, compared to sham tape and no tape application, there was no facilitation or inhibition effect of KT on middle deltoid muscle. Statistical power of the study was .66 which is not ideal<sup>11</sup>. However, the power of the study relative to the size of the *P*-values suggests it is reasonable to assume that a type II error was not made.

Although there is limited research on KT, the results of the current study are in agreement with research on other taping applications. Several studies have been completed on rigid tape applications regarding facilitation and inhibition effects on muscle. Most tape applications studied in the past have used white inelastic athletic tape or Leuko<sup>®</sup> tape. Ng<sup>12</sup> examined the hypothesis that patellar taping could inhibit the vastus lateralis (VL) and/or facilitate the vastus medialis obliquus (VMO) to allow earlier activation of the VMO relative to the VL. The onset of muscle activation after perturbation in healthy participants and the effects of patellar taping on muscle activation in the fatigued quadriceps were measured. There were no differences found between conditions in relative time to onset of VMO and VL activation. Parsons and Gilleard<sup>13</sup> measured time to onset of muscle activation with patellar taping of asymptomatic subjects during stair stepping. Delayed onset of muscle activation was observed in both VL and the VMO during stair ascent but no changes were observed during stair descent.

It has been theorized that a rigid tape applied over a muscle with tension perpendicular to the muscle fibers would inhibit the muscle and, in contrast, a rigid tape with tension pulled parallel to the muscle fibers would facilitate the muscle.<sup>14,15</sup> Previous research, however, has not been able to conclusively support these hypotheses. Cools et al<sup>16</sup> examined the effects of a taping procedure pulled across the muscle belly of the upper trapezius during abduction and forward flexion of the shoulder. They observed no significant difference in muscle activation of the upper trapezius with the inhibition tape application. Alexander et al<sup>14</sup> similarly observed no significant change of triceps surae excitability with white athletic tape inhibition application as measured by H reflex amplitude. The H reflex is a spinal reflex used to measure muscle excitability.

Ironically, an inhibitory effect of the facilitation taping procedure on the H reflex amplitude was observed in their investigation. Janwantanakul and Gaogasigam<sup>15</sup> examined the effects of inhibition and facilitation applications of white athletic tape on the anterior thigh during a stair stepping task. All subjects received three conditions; facilitation, inhibition, and no taping. Using EMG activity of the VL and VMO, they observed no difference in activation of the VL and VMO with taping. In contrast to the findings of Janwantanakul and Gaogasigam<sup>15</sup>, Persson and Caulfield<sup>17</sup> observed decreased activation of the VL in healthy participants after application of tape to the anterior thigh. The authors chose to use an elastic tape as the control and rigid tape as the inhibition condition for the study. The inhibition taping procedure manipulated the skin to cause a rolled effect. VL inhibition was not different between the control and the inhibition tape during a stair stepping task. It was suggested that the application of tape to the VL may have an inhibition effect regardless of the application procedure.

## CONCLUSIONS

As indicated by the studies represented above, previous research has not largely supported the use of tape for the intended facilitation and inhibition of muscle. Although there appears to be some support shown for the use of tape to alter muscle activation, change in strength or torque production of the muscle has been less supported. We measured muscle activation as well as torque production under three conditions. Our findings do not appear to support the use of KT for the goal of facilitation or inhibition of healthy muscle in shoulder abduction. Further research is required to determine the effects of KT on facilitation and inhibition of muscle weakened by injury or disease. In

particular, the facilitation or inhibition effects of KT applied directly over injured muscle would be a beneficial direction for further research.

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APPENDIX A

ATTACHMENT A – APPLICATION FOR UNIVERSITY IRB REVIEW

**ATTACHMENT A - APPLICATION FOR UNIVERSITY IRB REVIEW**

(All submissions must be typewritten)

Date 10/16/2009

1. a. Principal Investigator/Project Director (if thesis or undergraduate research project, student's name):  
Jillian Thompson
- b. Applicant Status: (Check all that apply)
- Faculty
  - Academic Staff
  - Graduate Student
  - Undergraduate Student
- c. Investigator/Project Director Local Address:  
119 10th st S, Apt A2, La Crosse, WI 54601
- d. Investigator/Project Director Local Telephone # 608-513-5106  
E-mail: jthompson.jill@students.uwlax.edu

2. a. Title of Proposed Project: The Effects of Kinesio Tape on Strength and Activation of the Middle Deltoid Muscle
- b. Project Period: Begin Date: 12/1/09 End Date: 6/1/10
- c. If a student project of any type, Faculty Advisor's Name, Department, and Phone:  
Name: Mark Gibson Signature: [Signature]  
Department: ESS Phone #: 608-789-8190 E-Mail: gibson.mark@uwlax.edu

\* Names and Signatures of Thesis Committee Members:

Thomas Kernozek

Name

[Signature]

Signature

Scott Doberstein

Name

[Signature]

Signature

3. If the researcher believes his/her project may be reviewed under expedited procedures (p. 6-9) and/or falls within the exemptible category, (p.4-5) please check the appropriate box(es) below
- Expedited
  - Exemptible
- a. If expedited, please indicate the number(s) of the categories listed on pages (6-9) 4
- b. If exemptible, please indicate the number(s) of the categories listed on pages (4-5) \_\_\_\_\_
4. By signing this application, I agree to comply with any decisions made by the University of Wisconsin-La Crosse IRB in regard to the above named research project, and or the standards of professional ethics in my field of study.

[Signature]  
Signature

10/15/09  
Date

The IRB has reviewed the above research project and has determined that:

1. \_\_\_\_\_ APPROVAL IS GRANTED -as submitted or as modified per attached (check one)
- a. the protocol does not contain procedures which place human subjects at risk, or
  - b. the protocol contains procedures which place human subjects at minimal but acceptable risk, or
  - c. the protocol contains or is likely to contain procedures that may place human subjects at greater than minimal risk; however, the risk(s) are outweighed by the sum of the anticipated benefits of the research.

2. \_\_\_\_\_ APPROVAL NOT GRANTED
- The following IRB members participated in this review:

\_\_\_\_\_

On behalf of the board:

\_\_\_\_\_ IRB Chairperson or Coordinator Signature \_\_\_\_\_ Date

APPENDIX B  
IRB NARRATIVE STATEMENT

## IRB Narrative Statement

### 1. Purpose of Proposed Research:

The purpose of the proposed research is to investigate the effects of Kinesio® Tape(KT) on the strength and muscular activation of the middle deltoid muscle. The research project will begin December 1, 2009 and will end June 1, 2010. KT is an elastic therapeutic tape able to stretch up to 140% of its original length. It is a latex free, cotton tape with an acrylic based adhesive which is heat-activated by rubbing the tape after application. KT is designed for several uses, including pain relief, improved circulation and lymphatic drainage, and inhibition or facilitation of muscle.

Each subject will complete their participation during a single testing session. The testing session will consist of a 5 minute upper body warm-up using an upper body ergometer (aka Arm Bike). After the warm-up, the skin over the deltoid muscle of the subject will be cleaned with an alcohol swab and lightly abraded over a small area with a piece of fine sand paper. A surface EMG electrode will be applied to the abraded area directly over the middle deltoid muscle. A ground electrode will be placed over the clavicle. At this time one of three taping conditions will be applied to the skin over the deltoid muscle. The three conditions are *Taped*, *Sham Taped*, and *Not Taped*. During the *Taped* condition, KT will be applied in a 'Y' shape around the middle deltoid muscle. There will be a 2 inch base of tape without tension applied over the insertion of the deltoid muscle. The tails of the 'Y'-shaped tape application will be applied with a tension of 15-25%. During the *Sham Taped* condition, white athletic tape will be applied in the same pattern as the *Taped* condition. The Sham Tape will be applied without any tension to the tape during application. There will be no tape or clothing contacting the skin over the deltoid muscle during the *Not Taped* condition. After application of the taping condition the subject will perform 3 sets of maximal concentric and eccentric shoulder abduction contractions. These will be performed using a Cybex Isokinetic Dynamometer which will be adjusted to fit each subject. The Cybex is a machine used to provide controlled resistance to movement at a specific speed. For this study the rate will be set to 60°/sec. This procedure will be repeated for all three taping conditions for each subject. There will be at least 5 minutes of rest between each taping condition.

### 2. Subject Population and Rationale for Use:

There will be 25-35 healthy, college aged (18-25 years of age) subjects with recent experience in upper body resistance training. They will be both male and female subjects with no previous personal experience with KT. All subjects will be volunteers for participation in the research project. They will not have had any upper body injury or surgery within the 12 months prior to testing. This population was chosen for several different reasons. The subjects will be healthy to control for varying severity of injury that may be seen in injured subjects. The subjects will have recent experience with upper body resistance training because they will have a better understanding of the directions to maximally contract. They may also be more motivated or willing to perform a true maximal contraction. Also, by choosing to use college aged subjects, the research will better represent one common population of patients and athletes that receive KT as treatment for injury. While KT can be used in pediatrics and geriatrics, it is often used with young adults as an adjunct to an injury rehabilitation program.

### 3. Vulnerable Populations

Not applicable.

#### **4. Informed Consent**

Voluntary informed consent will be obtained from the subjects when they arrive at the testing session before they begin participation. Each subject will be given an informed consent form to read and sign. It will be made clear that participation is voluntary and informed consent may be withdrawn at any time without penalty to the subject.

#### **5. Description of Procedures to Ensure Confidentiality:**

The data collected and results of the research will contain no identifying features that can trace back to the subject. Any personal information used during scheduling of the testing sessions will be destroyed after data collection. The collected data will include only information directly related to the stated purpose of the research project. Only those directly involved with the research and collection of data will be present at the time of data collection.

#### **6. Anticipated Risks and/or Inconveniences:**

During testing, the patients will be stabilized and secured to the Cybex Isokinetic Dynamometer using several Velcro straps. Due to the nature of this procedure, some subjects may have feelings of claustrophobia during data collection. The subjects will be encouraged to inform the researcher if these feelings develop so that the straps can be removed from the subject and, if needed, the subject will be discontinued from participation in the research project. The subjects may experience slight discomfort or muscle soreness following the testing procedures. Some minor skin irritation may occur due to the application and removal of tape. The taping procedures used will be applied directly to the skin. Because of this, subjects with known allergies to latex or adhesives will be asked not to participate. The approximate amount of time required for participants is one hour.

#### **7. Description of Procedures to Minimize Potential Risk:**

Prior to participation in the research project, the subjects will be made aware of the restraining nature of the Cybex Isokinetic Dynamometer. If they are concerned that they may have claustrophobic feelings while using the Isokinetic dynamometer they will be encouraged to reconsider participation in the research project. The subjects will also be made aware of the use of products with latex as well as adhesives. If the subject has had poor reactions to adhesives and products containing latex in the past, or if they have a known allergy to latex or adhesives they will be asked not to participate in the research project. The upper body warm-up prior to testing will help to reduce any risk of injury or muscle soreness after data collection. The researcher will also be able to provide first aid if needed and will have ice available to the subject upon request.

#### **8. Description of Anticipated Benefits:**

The results of this research may benefit both allied healthcare professionals and their patients. It may provide evidence that KT should not be used to facilitate muscular contraction. This would be beneficial because the time spent using KT could be used, instead, for implementing other therapeutic tools in the rehabilitation program that may be more beneficial to the goals of treatment. There will be no benefits to the subject as a result of the research project.

APPENDIX C  
INFORMED CONSENT FORM

# The Effects of Kinesio® Tape on Strength and Activation of the Middle Deltoid Muscle

## Informed Consent Form

### Purpose and Procedure:

- The purpose of the study is to compare types of tape and their effects on strength and muscle activation.
- Participation in the study will involve a short upper-body warm up and a series of maximal shoulder abduction contractions. There will be both concentric and eccentric contractions performed.
- The maximal contractions will be performed against the resistance of an Isokinetic Dynamometer which involves being stabilized and secured using Velcro straps.
- During data collection, two different types of tape will be applied to the bare skin of the shoulder/upper arm.
- One surface EMG electrode will be applied over the middle deltoid and a ground electrode will be placed on the collarbone. These will measure the muscle activity in the deltoid muscle of the shoulder/upper arm.
- Skin preparation for the EMG electrode will include cleaning with an alcohol wipe and lightly abrading the skin with fine sand paper.
- The time commitment will be one testing session that will last about one hour.
- The testing session will take place in the Human Movement and Physiology Laboratory in room 3026 of the Health Science Center.
- The study is being conducted by the researcher with intent to publish the results.

### Potential risks:

- Some people have feelings of claustrophobia while using an isokinetic Dynamometer. ***People that have experienced problems with claustrophobic feelings in the past are encouraged to consider this before choosing to participate in the study.*** The decision to withdraw or refuse participation in the study may be made at any time without penalty.
- Some muscle soreness may occur after participation in the study. Ice will be available upon request and the researcher will be able to provide first aid if needed.
- There may be some skin irritation from the application and removal of the tape. ***People with known latex allergies or that have had poor reactions to latex, products with latex, or adhesives are asked not to participate in the study.***

### Possible Benefits:

- There will be no direct benefit to the subject for participating in the research study.
- The results of the study may benefit health care professionals and their patients by allowing for more informed decisions about some of the taping procedures used in rehabilitation and the treatment of injuries.

### Alternative procedures:

- There are no alternative procedures to this study. The choice to participate or not participate belongs entirely to the participant. Participation is totally voluntary.

**Rights and Confidentiality:**

- Participation in the study is completely voluntary.
- There will be no penalty or loss of benefits with refusal to participate or withdrawal from the study at any time, for any reason.
- The data collected will have no identifying information attached.
- Any personal information used for communication and scheduling will be kept confidential and separate from data collected.

**Costs to the subject:**

- Participants are responsible for their own transportation to and from the testing session.
- There will be no compensation provided for participation in the study.

For questions regarding the information found on this form or about the research study please contact:

**Primary Investigator**

Jillian Thompson ATC, LAT  
 119 10<sup>th</sup> st S, Apt A2  
 La Crosse, WI 54601  
 608-513-5106  
[thompson.jill@students.uwlax.edu](mailto:thompson.jill@students.uwlax.edu)

Or

**Faculty Research Advisor**

Mark Gibson MEd, AT, PT  
 Mitchell Hall, Room 0135  
 La Crosse, WI 54601  
 608-785-8190  
[gibson.mark@uwlax.edu](mailto:gibson.mark@uwlax.edu)

Questions regarding the protection of human subjects may be addressed to Dr. Kim Vogt, Chair of the UW-La Crosse Institutional Review Board for the Protection of Human Subjects, (608) 785-8458.

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Participant Signature

Date

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Investigator Signature

Date

APPENDIX D

NIH CERTIFICATE OF COMPLETION



APPENDIX E  
IRB LETTER OF APPROVAL

UNIVERSITY of WISCONSIN  
**LA CROSSE**

To: Jillian Thompson

From: Bart Van Voorhis, Coordinator  
Institutional Review Board (IRB) for the  
Protection of Human Subjects

Date: November 13, 2009

Re: **RESEARCH PROTOCOL SUBMITTED TO IRB**

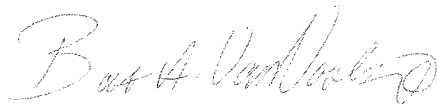
The IRB Executive Committee has reviewed your proposed research project:  
*"The effects of Kinesio Tape on Strength and Activation of the Middle Deltoid Muscle"*

Because your research protocol will place human subjects at minimal risk, it **has been approved under the expedited review category in accordance with 45CFR46, 46.110(a)(b).**

Since you are not seeking federal funding for this research, the review process is complete and you may proceed with your project. Remember to provide participants a copy of the consent form and to keep a copy for your records. Consent documentation and IRB records should be retained for at least 3 years after completion of the project.

Please note that this approval is for a one year period only, from the date of this letter. If the project continues for more than 12 months, an IRB renewed approval must be requested. This renewal should be applied for at least one month prior to your one year expiration.

Good luck with your project!



cc: IRB File  
Mark Gibson, Faculty Advisor

**Graduate Studies and Research & Sponsored Program**  
220 Morris Hall, University of Wisconsin-La Crosse  
1725 State Street, La Crosse, WI 54601  
Phone (608)785-8124 and (608) 785-8007  
An affirmative action/equal opportunity employer

APPENDIX F

RSEL GRANT APPLICATION ATTACHMENT B: PROJECT BUDGET SUMMARY

SHEET

**UNIVERSITY OF WISCONSIN-LA CROSSE**  
**OFFICE OF UNIVERSITY GRADUATE STUDIES**  
**Attachment B: Project Budget Summary Sheet**  
**Graduate Student RSEL Grant Application**

**Project Title** The Effects of Kinesio Tape on Strength and Activation of the Middle Deltoid Muscle

**Name of Student Applicant(s)** Jillian Thompson, ATC, LAT

**Name of Graduate Faculty Advisor** Mark Gibson, MEd, MS, ATC, LAT, PT

**Department** Exercise and Sport Science

**I. Supplies & Services**

A. Consumable supplies (itemize and justify succinctly)

One 103' bulk roll of Kinesio® Tex Tape Gold (Taped condition) \$ 65.00

One 12 count box of 1" Medco Pro-Trainer® Ultra Athletic Tape (Sham Taped condition) \$ 12.00

One box of alcohol prep pads skin prep prior to tape application \$ 5.00

One 40 count case of 1 ¼" Valuetrode® Electrodes for use as ground electrodes \$ 50.00

One 60 count box of Delsys 2-slot Adhesive Skin Interface for EMG electrodes \$ 35.00

B. Duplicating, postage, communications, etc. (itemize and justify succinctly)

\_\_\_\_\_ \$

\_\_\_\_\_ \$

C. Other (describe, itemize and justify succinctly)

Registration for Kinesio® Taping Seminars 1,2, and 3 Located in Orland Park, IL. \$ 625.00

Kinesio® Taping Certification Exam \$ 99.00

**Supplies & Services Subtotal**

**\$891.00**

**II. Travel Expenses** (only to conduct proposed project and not for travel to conferences, symposia, or exhibits)

A. Transportation (describe arrangements and justify succinctly)  
Personal vehicle mileage reimbursement \$.485 per mile \$566.00

B. Lodging (describe arrangements and justify succinctly)  
Lodging costs for 3 nights at Comfort Inn and Conference Center,  
8800 West 159<sup>th</sup> st, Orland Park, IL. \$89.00 per night. \$267.00

Travel Expenses Subtotal \$833.00  
(Requesting \$700.00)

TOTAL FUNDING REQUESTED (not to exceed \$1,600) \$1591.00

APPENDIX G

RSEL GRANT APPLICATION ATTACHMENT C4: ARGUMENT FOR THE  
REQUEST OF TRAVEL FUNDS

#### **Attachment C4: Argument for the request of travel funds**

Knowledgeable application of Kinesio® Tape requires training through three certified Kinesio® Taping seminars (KT1, KT2, and KT3) taught by a Certified Kinesio® Taping Instructor. Certification in the taping technique may then be achieved through the completion of a certifying exam. The researcher's completion of the three courses and the certifying exam is critical to the successful completion of the research project because it will ensure proper application of Kinesio® Tape. This is important because tape application by a Certified Kinesio® Taping Practitioner will increase the chance for accurate data collection and decrease reviewers' abilities to discard the research as invalid due to inaccurate or impractical taping procedures. Travel expenses are not being requested through a professional travel grant because the researcher will be traveling in order to obtain information and training related to an individual graduate research project.

The KT1, KT2, and KT3 courses will be hosted by Elucidate Consulting Inc. and will have a registration fee of \$625.00. The certifying exam is provided online by the Kinesio Taping Website and will have a fee of \$99.00. The courses will take place on October 1-2, 2009 and November 6, 2009 at the Comfort Inn and Conference Center, 8800 West 159<sup>th</sup> st, Orland Park, IL 60462. To attend these courses the researcher will be required to make two round trips to Orland Park, IL. It is 292 miles from La Crosse, WI to Orland Park, IL; adding up to 1168 miles overall. The UW-La Crosse reimbursement rate for personal vehicle transportation is \$.485 per mile. Cost to be reimbursed for transportation is \$566.00.

A standard non-smoking room at the Comfort Inn and Conference Center in Orland Park, IL costs \$89.00 per night. The researcher will be spending the nights of September 30<sup>th</sup>, October 1<sup>st</sup>, and November 5<sup>th</sup> at the hotel for a total of three nights and \$267.00.

The travel expenses as described and explained above come to a total of \$833.00. The amount requested for travel expenses is \$700.

The additional 'other' expenses as described and explained above come to a total of \$724.00.

These figures may be checked using the following resources:

- Elucidate Consulting  
10704 Gabrielle Ln  
Orland Park, IL 60462  
Office: 708-567-1486  
Fax: 708-286-6462
- Elastic Therapeutic Taping. Therapeutic Taping KTA-Education. Available at: URL:  
<http://www.kinesiotaping.com/kta-education.php>. Accessed 11 October 2009.
- Comfort Inn & conference Center: Welcome. Available at: URL:  
<http://www.georgios.com/comfort/index.shtml>. Accessed 11 October 2009.
- Comfort Inn & Conference Center  
8800 West 159<sup>th</sup> st  
Orland Park, IL 60462  
Phone: 708-406-1100  
Fax: 708-406-1105  
[info@comfortinngeorgios.com](mailto:info@comfortinngeorgios.com)

APPENDIX H

RSEL GRANT APPLICATION ATTACHMENT D: NARRATIVE

## Attachment D: Narrative

### 1. Statement of the Problem and Significance of the Project

Athletic trainers and other allied health care professionals use taping techniques with their patients for several reasons. Those reasons range from reinforcing the stability of a joint, limiting joint movement, and/or increasing circulation and lymphatic drainage through an injury site. A commonly used, though not extensively researched, purpose for using tape on a patient is to alter muscle activity to facilitate<sup>1</sup> or inhibit<sup>2</sup> muscle depending on its application<sup>3,4</sup>.

Tape applications for muscular inhibition and/or facilitation studied in the past have used rigid white athletic tape or leukotape. Kinesio® Tape (KT) is another type of tape less studied. In contrast to the rigid tapes previously used it is an elastic therapeutic tape able to stretch up to 140% of its resting length. It is a cotton tape with an acrylic based adhesive which is heat-activated. KT is designed for several uses, including pain relief, improved circulation and lymphatic drainage, and inhibition or facilitation of muscle<sup>5,6</sup>.

There is very little research on KT and it is being applied clinically for the stated intended uses regardless of the need for scholarly support. KT has been shown to be beneficial in decreasing pain and increasing pain free range of motion in patients with whiplash-associated disorders<sup>7</sup>. Kt has also been shown to increase pain free range of motion but not pain intensity in patients diagnosed with rotator cuff tendonitis/impingement<sup>8</sup>. To the best knowledge of the examiner there is currently no published scholarly research on the inhibition and facilitation effects of KT on muscle. This presents a problem because health care professionals using tape on their patients rely on its effectiveness as a tool. They spend precious one-on-one time applying tape because they believe it will serve the purpose it is meant to depending on the technique and type of tape used. Lin and Whitney<sup>9</sup> make reference to the time that is spent applying tape to football and basketball players alone. It is important that specific techniques and taping products be studied and either found effective or ineffective. While decreased pain and absorption of edema has been found among a small sample size of various injuries with KT application<sup>10</sup>, there has been little research on facilitation effects of KT on muscles. It is important

for this application of KT to be investigated so that the allied health care professionals using the tape can be confident in its efficacy towards the intended use and also so that clinical time can be used most efficiently towards benefitting the patient and their needs. If KT is shown to have no effect on muscle facilitation it would be wise for allied health care professionals to seek other forms of therapy to achieve some of their patients' rehabilitation goals. Previous research has not largely supported the use of tape for inhibition and facilitation of muscle.

Previously, it has been thought that a rigid tape applied over a muscle with tension perpendicular to the muscle fibers would inhibit the muscle and, in contrast, a rigid tape with tension pulled parallel to the muscle fibers would facilitate the muscle<sup>3,4</sup>. Previous research, however, has not been able to conclusively support these hypotheses. Cools et al<sup>11</sup>, examined the effects of an inhibition taping procedure on the upper trapezius during abduction and forward flexion of the shoulder. They observed no significant difference in muscle activation of the upper trapezius with inhibition tape application. Alexander et al<sup>3</sup>, similarly observed no significant change of triceps surae excitability with inhibition tape application as measured by H reflex amplitude. They did, however, observe an inhibitory effect of the facilitation taping procedure on the H reflex amplitude of the triceps surae. Janwantanakul and Gaogasigam<sup>4</sup> examined the effects of inhibition and facilitation tape applied to the anterior thigh during a stair stepping task. Using EMG activity of the vastus lateralis (VL) and vastus medialis obliquus (VMO), they observed no significant effects of the taping procedures on activation of the VL and VMO.

McConnell<sup>12</sup> described a taping procedure that would place a stretch on the lateral structures of the knee and improve patellar tracking. It has been hypothesized that McConnell's taping procedure inhibited the (VL) and/or facilitated the (VMO) to allow earlier activation of the VMO relative to the VL. Ng<sup>1</sup> used onset of muscle activation after perturbation to measure the effects of patellar taping on the muscle activation in the fatigued quadriceps. There were no differences in time to onset of activation observed between taping conditions. Parsons and Gilleard<sup>13</sup>, however, observed significantly delayed onset of muscle activation in both the VL and the VMO during a stair ascent task. These findings were attributed to either a response to mechanical

change caused by the tape, or a change in motor unit threshold or recruitment due to cutaneous stimulation from the tape.

Research on the effects of tape on inhibition and facilitation/inhibition of muscle is very limited. This is especially true when referring to KT and its applications. While there has been research published on KT, it has been predominantly case studies focused on pain, range of motion<sup>7,8</sup>, and edema absorption<sup>10</sup>. Research is needed on the effects of KT on facilitation/inhibition of muscle over which it is applied. This will allow health care professionals to make more educated decisions about the therapies utilized during the rehabilitation of their patients.

## **2. Objectives**

The objective of the research project is to prove that KT has no significant facilitation effect on the muscles for which it is applied. If activation of the middle deltoid muscle remains the same or increases while peak torque remains the same or lessens with KT application, it can be interpreted that KT application for muscle facilitation does not actually facilitate muscle contraction.

## **3. Research Project Methods**

### **Participants**

There will be 25 to 35 healthy college aged participants. They will be both male and female with no previous experience with KT. They will not have had any upper extremity injury or surgery within the 12 months prior to testing. The participants will be student volunteers from UW-La Crosse. They will be active individuals with recent experience in upper body resistance training. They will be asked to refrain from any upper body resistance training for 24 hours prior to testing. The names and telephone numbers of the volunteers will be used only for the study and will be disposed of upon study completion. All participants will be given the opportunity to ask questions about the study before signing an informed consent form. Before the study begins, it will be approved through the UW-La Crosse IRB.

### **Method**

Peak torque of shoulder abduction will be measured by a Cybex Isokinetic Dynamometer (CID). The CID will be adjusted to fit each subject. The same adjustment settings for each subject will be used for all three taping conditions. Muscle activation will be measured using surface electromyographic (EMG) electrodes. An electrode will be placed over the middle deltoid muscle. A separate ground electrode will be placed over the clavicle. The surface electrodes will be applied prior to application of the 1<sup>st</sup> taping condition and will not be removed between taping conditions. The three taping conditions will be *Taped*, *Sham Taped*, and *Not Taped*. The tape used for the *Taped* condition will be 2 inch wide, tan colored Kinesio® Tex Gold Tape. It will be split down the center leaving 2 inches at the end to act as an anchor. The length of the tape will be determined based on the size of each participant. The tape will be applied to each subject as recommended for a weakened middle deltoid muscle<sup>5,14,15</sup>. The tape used for the *Sham Taped* condition will be 1 inch white athletic tape. The tape will be applied, without tension, in the same pattern as in the *Taped* condition. There will be no tape or clothing contacting the skin over the deltoid muscle during the *Not Taped* condition. After a brief upper body warm-up the subjects will perform 3 sets of maximal concentric and eccentric shoulder abduction at 60°/sec in the CID for each taping condition. There will be at least 5 minutes between each taping condition to decrease likelihood of fatigue. An electric goniometer will be fixed to the CID arm and will act to correlate the timing between CID and EMG measures.

#### **4. Detailed Budget Explanation**

- Consumable Supplies
  - One 103' bulk roll of Kinesio® Tex Tape Gold. **Cost: \$65.00.** This tape will be used during the *Taped* condition. Buying in this quantity ensures that there will be enough tape to complete the project and allows for a price of \$.63/ft. If bought in smaller quantities the price of the tape would be \$.91/ft.
  - One 12 count box of 1 inch Medco Pro-Trainer® Ultra Athletic Tape. **Cost: \$12.00.** This will be the tape applied during the *Sham Taped* condition.

- One box of alcohol prep pads. **Cost: \$5.00.** The alcohol prep pads will be used to prepare the skin for electrode placement and tape application.
- One 40 count case of 1 ¼ inch Valuetrode® Electrodes. **Cost: \$50.00.** These will be used as ground electrodes for the surface EMG.
- One 60 count box of Delsys 2-slot Adhesive Skin Interface. **Cost: \$35.00.** These will be used to adhere the EMG electrodes to the skin over the middle deltoid muscle.
- Education necessary for successful research project completion
  - Kinesio® Taping Seminars 1,2,and 3 Located in Orland Park, IL. **Cost: \$625.00.** These courses are required to be eligible for certification of Kinesio® Tape Practitioner.
  - Kinesio® Taping Certification Exam. **Cost: \$99.00.** Certification is needed to demonstrate the competence of the researcher to correctly apply KT.
- Travel
  - Transportation. **Cost: \$566.** One way mileage from La Crosse, WI to Orland Park, IL is 292 miles. Round trip is 584 miles. The researcher will be required to make two round trips for a total of 1168 miles. The University reimbursement rate for personal vehicle transportation is \$0.485 per mile. This comes to \$566.00.
  - Lodging at Comfort Inn and Conference Center 8800 West 159<sup>th</sup> st, Orland Park, IL. Cost: \$89.00 per night. Lodging will be needed for 3 nights which will come to a total of **\$267.00.** This is the hotel in which the KT1, KT2 and KT3 courses will be held.
  - Actual travel cost to the researcher will be \$833.00. **Requested amount is \$700.00.**

## 5. Final Products and Dissemination

The end product of the research project is going to be a publishable original research manuscript. The target journal for publication of the research project is the Journal of Athletic Training. The research project will be seen by many people if published by the target journal, especially those within the profession of athletic training and those with similar interests. The research project will also be presented by the researcher at the UWL Research and Creativity Day of Celebration in April, 2010.

APPENDIX I  
RSEL GRANT LETTER OF APPROVAL

UNIVERSITY *of* WISCONSIN  
**LA CROSSE**

November 20, 2009

Jillian Thompson

Dear Jillian:

On behalf of the Graduate Council and Office of University Graduate Studies, I am pleased to inform you that your research grant proposal entitled "***The effects of Kinesio Tape on Strength and Activation of the Middle Deltoid Muscle***" has been funded for **\$795.00**. **The council split the proposed budget in half because some of the budgeted items have already been completed. Please note: Funding from this source will not be available for any work already completed.** Please email your acceptance or non-acceptance of this award to [gradstudies@uwlax.edu](mailto:gradstudies@uwlax.edu), **no later than one week from the date of this letter**. If you accept the grant award and have completed Module 1 of the Responsible Conduct of Research Program, funds will be **transferred to your academic department**. You may process expenditures starting January 15, 2010. We hope that the accounts will be set up by then.

Your faculty research advisor is being informed about this grant award and will assist you in charging expenses in your academic department.

UW-L has chosen the Responsible Conduct of Research (RCR) Program, created by the Center on Materials and Devices for Information Technology Research, as our ethical training tool for all students who receive a UW-L research grant. This online training **must be completed by November 30, 2009** or your grant money will not be released. More information can be found at this link:  
[www.uwlax.edu/grants/pages/compliances/RCR.htm](http://www.uwlax.edu/grants/pages/compliances/RCR.htm).

If your research involves the use of human subjects in any way you must receive written approval from the UW-L Institutional Review Board before any subjects can be solicited or any data can be collected. "A Researcher's Guide for Submission of Protocols", IRB forms and other IRB information is available on the web at [www.uwlax.edu/grants/pages/compliances/irb.htm](http://www.uwlax.edu/grants/pages/compliances/irb.htm). Your IRB protocol and related forms (not your entire research proposal) should be delivered to 220 Morris Hall. You will receive written notification concerning your protocol from the IRB. Please be aware that the funding you have received may not be used to pay subjects for their participation in the study.

As stated in the graduate student research grant guidelines, **you must submit a final summary report of your research to the Office of University Graduate Studies (220 Morris Hall) two weeks prior to your graduation.** You also have an obligation to share your research in a campus sponsored presentation event. Please refer to the guidelines for specifics regarding your obligation for the presentation and report submission at [www.uwlax.edu/graduate](http://www.uwlax.edu/graduate). **Please also be sure to acknowledge the source of funding. The suggested statement is as follows: "The partial funding received for this work from UW-L resources is gratefully acknowledged."**

Congratulations on a job well done, and good luck with your research project.

Sincerely,



Vijendra K. Agarwal, Ph.D.  
Associate Vice Chancellor for  
Academic Affairs

c: Mark Gibson, Faculty Advisor

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