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# THE EFFECTS OF CRYOTHERAPY ON ECCENTRIC PEAK TORQUE RECOVERY AFTER AN INTENSE ECCENTRIC EXERCISE

by

Michelle Nicole Peluaga

Bachelor of Science in Sports Injury Management
University of Nevada, Las Vegas
2003

A thesis submitted in partial fulfillment
of the requirements for the

**Master of Science Degree in Kinesiology**
**Department of Kinesiology and Nutrition Sciences**
**School of Allied Health Sciences**
**Division of Health Sciences**

**Graduate College**
**University of Nevada, Las Vegas**
**August 2008**

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# Thesis Approval

The Graduate College
University of Nevada, Las Vegas

August 22nd, 2008

The Thesis prepared by

Michelle Nicole Peluaga

**Entitled**

The Effects of Cryotherapy on Eccentric Peak Torque Recovery after an Intense Eccentric Exercise

is approved in partial fulfillment of the requirements for the degree of

Master of Science in Kinesiology

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*Examination Committee Member*

*Examination Committee Member*

*Graduate College Faculty Representative*

ABSTRACT

**The Effects of Cryotherapy on Eccentric Peak Torque Recovery after an Intense Eccentric Exercise**

by

Michelle Nicole Peluaga

Dr. Mack D. Rubley, Examination Committee Chair
Associate Professor of Kinesiology and Nutrition Sciences
University of Nevada, Las Vegas

This study investigated the effects of a 45-minute cryotherapy application post-exercise repeated daily for 3-days on the recovery of the quadriceps after inducing DOMS. Results showed eccentric mean PT was greater at baseline than 24-hours after eccentric exercise. Knee AROM, joint line, 5cm, and 10cm girth measurements resulted in no differences. However, 15cm and 20cm sites revealed baseline values being lower than 48-hours.

Tenderness at VMO post-treatment resulted in a difference with the initial application being lower than 24-hours. The 15cm site pre-exercise and post-treatment resulted in differences where baseline was lower than 24 and 48-hours. Post-exercise revealed the treated limb was lower than the untreated at 48-hours. The 20cm site at all time points resulted in baseline value being less than 24 and 48-hours. In conclusion, there were no differences between treated and untreated limbs with once daily 45-minute application of cryotherapy in reducing signs and symptoms of DOMS.

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"UNICORNS…Let's Ride!!!"

# CHAPTER 1

## INTRODUCTION

### The Problem

Cryotherapy, a cold modality that results in heat withdrawal when applied to the body is the most common modality used in the treatment of acute musculoskeletal injury.[1] As cryotherapy causes a decrease in tissue temperature, local metabolism in those tissues will also decrease.[1] This is significant because the application of cryotherapy may diminish secondary injury (hypoxic or enzymatic).[1-5] Secondary injury is defined as the process of living cells on the periphery of the primary injury dying or bursting during the cleanup and repair processes or being deprived of oxygen.[1,4,5] Merrick has shown in an animal model that the immediate application of cryotherapy will diminish the magnitude of secondary injury.[6] Dolan et al. have shown the immediate application of cryotherapy diminished the volume of edema that forms.[7] Therefore, the most important goal in acute injury care is to decrease secondary injury. This goal can be achieved with cryotherapy, thus facilitating faster recovery following acute traumatic injury.[1,6,8]

Knight[1] defined acute injury as any event that impairs tissue structure or function. Acute injury may occur with forceful eccentric muscle actions during exercise, resulting in the following signs and symptoms: pain, swelling, decrease range of motion, and strength loss. It has been argued that eccentric exercise-induced muscle damage may lead to ultra-structural changes within skeletal muscle(s) caused by mechanical stress.[6] This

exercise-induced damage has been suggested to stimulate an acute injury model.[8-10] This acute injury caused by excessive eccentric loading during exercise in muscle tissue causes a development of delayed on-set muscle soreness (DOMS).[8,11-13] It is believed that the signs and symptoms of DOMS will peak 24-72 hours post exercise[10,14-24] and subside within 5-7 days.[8,22,23] Symptoms of DOMS include point tenderness (pain), swelling, decreased range of motion (ROM), and a decrease in strength.[12,13,18,19,25,26] Each of these symptoms are similar to an acute injury.

Many authors quantify DOMS with the assessment of pain in the affected muscle, [14-25,27-32] limb girth measurements to assess swelling, ,[10,16,19,23,24,28,29,32,33] joint ROM,[10,16-19,24,28,29,32] and strength measurements of the affected muscle.[10,16-19,21,23,24,27-30,32,33] Previous investigations for treatments to reduce the symptoms of DOMS have included electrical stimulation[24] and cryotherapy.[9,20,24,28-30,32-39] The investigation of the impact of cryotherapy, has focused on the application prior to strength testing,[9,34,36-39] between sets,[35] and post intense eccentric exercise [20,24,28-30,32,33] that induce DOMS.

Strength measurements with cryotherapy application either pre- or post-exercise are inconclusive with some studies showing no difference, [24,30,33,36,37] others an increase, [32,34] while others a decrease[9,38,39] in strength being reported following treatment. The effects of cryotherapy on increasing active ROM following DOMS were inconclusive.[20,24,29] Cryotherapy's impact on DOMS associated with pain are also inconclusive from no differences with treatment[29,30,39] and decrease[24] in pain being reported. Girth measurements may increase due to swelling with the acute injury[1] however with DOMS it was inconclusive whether or not the application of cryotherapy

diminishes swelling following DOMS inducing eccentric exercise as measured by limb girth.[30,33]

To date, many of these studies may have been flawed because: 1) strength testing was done immediately after cryotherapy application, 2) application was delayed 24 to 48 hours thus allowing secondary injury to occur, 3) the duration of the cryotherapy treatment was inappropriate to treat deep muscle tissue, and/or 4) pain assessments were taken with subjects applying pressure to themselves or by the investigator's thumb which was lacking in control. Most of these studies that may have been flawed were multiple day studies[9,20,24,28-30,32,33,35,36,38,39] with 2 studies being a single day study.[34,37] Therefore, the purpose of this study was to investigate the effects of an immediate 45 minute cryotherapy application repeated once daily for 3 days post DOMS inducing eccentric exercise on the recovery of the function of the quadriceps muscles. Quadriceps muscle recovery was quantified by measuring mean eccentric peak torque (PT), active range of motion (AROM), limb girth and pain (applied using a standard force).

## Hypothesis

The hypotheses are that the application of cryotherapy post exercise will decrease the magnitude of DOMS symptoms 24, 48, and 72 hours after intense exercise: 1) facilitate the recovery of quadriceps PT, 2) decrease pain experience during palpation of the thigh, 3) diminish increased quadriceps girth measurements as a result of swelling, and 4) restore knee AROM to pre-test values, sooner than without cryotherapy.

## Limitations

Some limitations of this study included the following: 1) participants may not put forth 100% effort in maximum eccentric strength testing or training, 2) the magnitude of

tissue cooling in the quadriceps was not measured, and 3) individual reactions to eccentric loading may vary.

# CHAPTER 2

## LITERATURE REVIEW

### Major Concepts in Cryotherapy on Muscle Soreness Research:

### Secondary Injury

With an acute injury there is primary injury, i.e. trauma caused by direct compression or a stretching or shearing force, which results in ultra-structural changes in muscle and connective tissue, or/both nerves and blood vessels.[1] In 1976, Knight introduced the theory of secondary injury for acute injuries.[4] Secondary injury is the process of living cells on the periphery of the primary injury dying or bursting during the cleanup and repair processes.[1,4,5] Knight's[4] original paper only discussed secondary injury as being hypoxic. Cells require energy to function, but with injury surviving cells around the area of injury may be deprived of oxygen causing the body's metabolism to switch from aerobic to anaerobic, which cannot be sustained for a long duration, causing living cells to die without replenishment of energy and oxygen.[1]

Secondary injury is not only hypoxic but also enzymatic, resulting from enzymes designed to digest debris that are released from lysosomes of dead and dying cells.[1,6] This may damage the membrane of healthy cells and their cellular proteins leading to cell death of initially uninjured cells.[1,6] In this paper, secondary injury refers to both hypoxic and enzymatic injury resulting from primary injury.

The main reason for the application of cryotherapy during acute injury is to decrease secondary injury,[1] thereby decreasing pain, swelling, and muscle spasms.[1,4-6,40] By applying cryotherapy a decrease in metabolism occurs to the area decreasing oxygen demand, allowing living cells on the periphery to remain unharmed.[1,4,6]

## Cryotherapy

Cryotherapy is any substance that decreases the temperature of the tissue(s) being treated.[1-4,40-44] In 1976, Knight[4] discovered the benefits of applying this modality to an acute musculoskeletal injury. The most common applications of cryotherapy are in the form of a crushed ice bag, an ice massage or a cold water immersion.

When ice is used to treat acute injury the main goal is to prevent further injury by decreasing secondary injury to injured area.[1-4,40-44] Cryotherapy may cause a decrease in temperature thus decreasing blood flow and reducing muscle spasms.[3,45-51] The decrease in blood flow in healthy subjects is caused by the vasoconstriction of the vessels.[1,3,4,44] Without this decrease in blood flow, metabolism to the injured area is not decreased, thus allowing dying cells to consume the oxygen needed for living cells on the periphery of the injured area.[1,2,4,43] Following injury, damaged cells in the injured area - and those cells that lyse and burst - release chemicals (this is also seen in intense eccentric exercise causing DOMS)[52] informing the body that the cell(s) have been damaged.[1,4,43] This causes a cascade of chemically induced events that allow for an increase in cell permeability, hence increasing edema and swelling in the injured area[1,2,4,43] therefore, causing pain. To review: an injury occurs, releasing chemicals in the body, causing an increase in cell permeability, increasing protein/damage, increasing edema formation and

decreasing oxygen supplied to healthy cells. This causes a shift from aerobic to anaerobic metabolism, which in turn shifts the cells' osmotic balance causing it to burst.

In the current literature on cryotherapy there is evidence that cryotherapy decrease the effects of secondary injury when applied acutely.[1,2,4,43] In animal studies cryotherapy application decreased the accumulation of limb volume[7,46] and decreased mitochondrial injury that occurs during secondary injury.[5] The decreased swelling with cryotherapy can reduce pain and muscle spasms, the reduction of muscle spasms comes from a decrease in nerve conduction velocity and pain.[1,4]

Application of cryotherapy has shown to increase muscle strength, in non-DOMS related studies these studies usually performed one set at sub-maximal strength over 3-8 repetition.[9,37-39,53,54] In a study conducted by Denegar et al.[24] cryotherapy was applied 48 hours post-exercise while Paddon-Jones et al.[30] applied cryotherapy immediately following DOMS-inducing exercise. Both studies showed that post-exercise cryotherapy application had no effect on strength outcomes.[24,30] Kimura et al.[36] however, showed that there was no effect on PT with a 30-minute application of cryotherapy prior to exercise, but it did increase total eccentric work. Verducci's[35]study showed that 3-minute interval cryotherapy between sets caused an increase in muscle endurance. Denegar et al.[24] had a decrease in muscle soreness following a 20-minute application of cryotherapy to healthy uninjured subjects 48 hours after the DOMS-inducing exercise bout. Studies that did not produce DOMS have shown a decrease in muscle strength with testing immediately following cryotherapy treatment.[9,37-39,53,54] This decrease in strength may be due to strength testing subjects immediately following cryotherapy, which has been shown to

decrease metabolism,[1,4,41,43,50,51] blood flow,[46-51] and nerve conduction velocity[3,40] to the area, and therefore, possibly effecting muscular strength.

Cryotherapy application causes a rapid decline on skin surface and a more gradual decline with deep tissues.[55,56] Jutte et al.[56] noticed decline in tissue temperature of 27°C at skin surface and 8°C at 2 cm subadipose tissue.[56] Adipose tissue can affect the efficacy of the cryotherapy treatment, with thick adipose causing less of a decrease in tissue temperature.[57,58] With persons having greater adipose tissue thickness longer treatment time are required.

If adipose thickness has an impact on tissue temperature, then inadequate application times may allow tissue to re-warm faster with exercise post cryotherapy application. Myrer et al.[59] showed that with exercise post cryotherapy application there was a greater increase in tissue temperature.[59] Long et al.[60] showed that cryotherapy application post exercise caused a greater decrease in tissue temperature at skin surface than 1cm and 2cm subadipose.[60] The question as to when should we apply cryotherapy pre or post exercise to individuals for the greatest benefit should be assessed.

There are many discrepancies in the literature regarding **mode**, **when** to apply, and the appropriate **duration** of cryotherapy application. Starting with the **mode**; stated earlier there are three common ways of administering cryotherapy: 1) ice bag,[5,9,35,47-49,55-66] 2) ice massage,[7,29-31,33,34,36-39,53,54,63,65,67-71] and 3) cold water immersion.[20,28,32] Myrer et al.[57,63] in their investigations revealed that ice bag with compression has a greater decrease in tissue temperature than ice alone[63] and cold water immersion.[63] Plus ice bags last longer and can draw four times as much heat from the body than other forms.[43] The possible reasons for ice bags and compression causing a greater decrease in tissue

temperatures may be due to a greater conduction between the ice bag and the skin; compression may secondarily decrease blood flow.[41,43,44] Ice bags have also been shown to cause a greater decrease in tissue temperature over chemical frozen pack.[66] In areas of odd shapes such as the ankle, elbow, and hand, cold immersion may be a more appropriate modality choice, since this may have better conduction. As to the **when** of cryotherapy application, it is suggested that the application occur within 5-10 minutes post-injury.[1,2,43,46]

Historically, cryotherapy has been applied for as little as 3-minutes[35] to as much as 45-minutes.[53] The appropriate **duration** for cryotherapy treatment should depend on adipose thickness, location of injury, the form of treatment, and patient sensitivity.[1,2,43,44] Application of cryotherapy for acute injury care should be between 20-45[2,43,44] minutes with thicker tissues such as the quadriceps receiving longer durations every 1-2 hours in order to maintain decreased metabolism.[1,43] With cryotherapy application subjects are going to have pain, burning, tingling, and then numbness occurring usually within 5 minutes of the application.[44,71] With repeated bouts of cryotherapy the sensation of pain will decrease.[70,72] Also, with a colder modality the decrease in pain sensation occurs more rapidly in repeat bouts.[70] Some discomfort is expected with cryotherapy especially with the initial bouts, just be cautious of persons with hypersensitivity. Hypersensitivity although rare may occur with these conditions: 1) cold uticaria, which causes hives with cold application, 2) cold hemoglobinuria, free hemoglobin in the urine, 3) Raynaud's phenomenon, excessive vasoconstriction causing cyanosis, or 4) vasospastic disorders, the vessels in the body do not dilate properly.[45]

The effects of cryotherapy on acute injury decreases temperature, blood flow, pain, muscle spasms, secondary injury and increase tissue stiffness and viscosity. Cryotherapy being widely used for the acute musculoskeletal injuries, may have other benefits as a recovery modality after training and competitions.[42]

## Eccentric Muscle Action

Eccentric muscle action is the lengthening of the muscle by a resistance greater than the torque produced by the muscle.[11,16,17,26,30] When studying the effects of exercise-induced muscle damage that produce DOMS, investigators use eccentric exercise performed on an isokinetic dynamometer,[15,19,24,29,36,37,52,73,74] isotonic eccentric exercise sustained for several seconds,[16-18,27,30,32,75] step test with one leg constantly performing concentric muscle action and the other performing eccentric muscle action,[14,21] or downhill running.[25] Eccentric muscle actions have a greater peak torque production (strength) than concentric muscle actions.[11,26,37] This increase in the production of force could be one of the reasons why eccentric exercises are commonly employed for exercise-inducing muscle damage.

With eccentric exercises, there has been a noticeable decrease in muscle strength immediately following the exercise bout.[10,14,17-19,21,23,30,32,73,75] Other symptoms that occur after intense eccentric exercise are muscle tenderness,[10,14-16,19,21,23,25,32,74,75] decrease in ROM,[10,16-19,24,29,32] and an increase in girth measurements of the muscle that performed the eccentric exercise.[10,16,19,29,30,32] Unique to the quadriceps subjects that perform intense eccentric exercise they have experienced a feeling of weakness and instability after exercise.[14,21] These symptoms are only observed after exercises involving eccentric muscle action. These symptoms may be diminished with the application of cryotherapy.

Possible reasons/theories for some of these symptoms following eccentric muscle action are injury to the muscle fiber from forceful lengthening of the muscle.[11,26,76] This injury to the muscle immediately following eccentric muscle action can be caused by the disruption or damage of the sarcomeres being over-stretched and/or microtears within the cells membrane.[26,76] The disruption and/or damage following intense eccentric muscle actions trigger the muscles into a remodeling phase allowing the muscle to hypertrophy.[26] The symptoms that occur due to damage of the muscle after intense novel eccentric exercise is often referred to as DOMS.

## Delayed On-set Muscle Soreness

In 1902, Hough[77] discovered this phenomenon of delayed on-set muscle soreness, better known as DOMS. In his observation, he noticed that subjects developed pain and tenderness in his muscle hours and days after the initial exercise bout, peaking 24-48 hours post-exercise.[77] The interesting fact is that still over 100 years after this initial study, the cause and how to best prevent DOMS and it's symptoms, remains unknown.

DOMS can be defined as pain due to an acute injury to skeletal muscle causing decreased ROM, a decrease in strength, increase in pain localized to the musculotendinous junction of the muscle belly, and an increase in circumference caused from swelling or edema formation following unaccustomed eccentric exercise.[8,11,12,22,26,76-78] These symptoms of DOMS peak 24-48 hours after the unaccustomed exercise and subside within 7-10 days. [8,11,12,22,26,76-78]

The literature that is present today agree that heavy unaccustomed eccentric exercise leads to an increase in muscle pain,[10,14-24,27,29,31,32,75] increased circumference of the muscle being stressed,[10,16,19,29,30,32,33] a decrease in active range of motion

(AROM),[10,14,17-20,23,28,29,32] and a loss of strength[16-19,21,23,27-32,73] following exercise, all of which peaks 24-48 hours post-exercise. But whether there is a greater increase in pain at the musculotendinous junction or belly of the muscle following intense eccentric exercise is still debated. Paddon-Jones et al.[30] and Cleak and Eston[23] revealed that pain increase was equal between the musculotendinous junction and the belly of the muscle acutely, whereas Baker et al.[25] had a greater increase in pain at the belly of the muscle which developed DOMS. Whether pain occurs at the musculotendinous junction or muscle belly, we do know that there is an increase in pain in the muscle when DOMS occurs.

There are several theories as to why and how DOMS occurs.[8,11,76] The elevation of exercise intensity or unaccustomed exercise can be accompanied by increase in tension in contractile elastic elements causing structural and physical damage, increased metabolism in waste accumulation, increase temperature causing structural damage or altered neural control producing spasms eliciting pain.[8,11,76]

Cheung et al.[78] breaks these DOMS-causing concepts down even further into possible mechanisms as to why this soreness may occur: 1) The lactic acid theory states that accumulation of lactic acid causes noxious stimulus and perceived pain being delayed; 2) The muscle spasm theory states that increased muscle activity during rest after eccentric exercise, leads to compressed local blood vessels, causing ischemia; 3) The connective tissue damage theory states that stretched-induced and strain damage to the connective tissue and collagen degradation; 4) The muscle damage theory states that disruption of contractile component may cause microscopic lesions disrupting the sarcomere, which leads to a decrease in motor unit recruitment during eccentric actions, stimulating nociceptors; 5) The inflammation theory is the edema formation caused by

secondary injury; and 6) The enzyme efflux theory states that calcium accumulates in injured muscles following sarcolemma damage.[78] These possible theories for the cause of DOMS are similar to an acute musculoskeletal injury; therefore using cryotherapy may decrease the symptoms of DOMS.[1,24,78]

A phenomenon associated with DOMS is the "repeat bout effect" or RBE, which is the second bout of DOMS inducing exercise causing fewer symptoms than the initial bout of eccentric exercise.[12,15,16,75]

## Repeat Bout Effect

The "repeat bout effect" (RBE) is a phenomenon only seen in eccentric exercise resulting in muscle damage.[12,27,52,75] Symptoms resulting from a bout of muscle damaging eccentric exercise include, pain, strength loss, and muscle tenderness; a repeat bout of the same eccentric exercise causing minimal sensation of these symptoms is an RBE.[12] Only muscles that are eccentrically lengthened result in the RBE phenomenon with the second bout of exercise as compared to a muscle that is concentrically shortened.[52] Several studies have investigated this phenomenon. Smith et al.[27] concluded after the second bout of eccentric exercise 4 days post initial bout caused some soreness, but a second bout 13 days post initial bout produced no soreness.[27,75] Nosaka and Clarkson[16] noted that with a second bout of exercise 3 and 6 days post the initial bout, muscle soreness was no different than baseline. So when performing intense eccentric exercise 9 days after the initial bout the RBE that occurred allowed the subject to have high exercise intensity with minimal to no soreness.

McHugh et al.[12] discussed three theories that may explain the RBE phenomenon: neural theory, connective tissue theory, and cellular theory. 1) Neural theory: exercise-

induced damage involves eccentric exercise, which initiates high threshold motor units recruitment of fast-twitch muscle fibers that are more susceptible to damage with excessive stress;[12] 2) Connective tissue theory: A mechanical failure of myofilaments or structural failure occurs caused by repetitive tensile stress.[12] The passive lengthening of the muscle while increasing force production (as seen in eccentric exercise) causes muscle stiffness.[12] Mechanism for this stiffness include edema formation, contractile resistance to passive ROM or changes in mechanical properties of the connective tissue caused by the injury;[12] 3) Cellular theory: forcible detachment of crossbridges or "popping" of sarcomeres, causing a greater strength deficit at short muscle lengths and the RBE may cause a adaptation in the sarcomeres, so only the strongest or more adaptive sarcomeres survive.[12] The figure below describes these theories in adaptation and how they may aid in this RBE phenomenon (Figure. 1). The inclusion of the RBE is important to this study in that the RBE only occurs with eccentric exercise and to account for this effect some studies state that RBE can occur in as little as 2 days post the initial exercise bout.[27,52] This effect in untrained individuals was considered in the design of the study by allowing a 48 hour period between the first and second familiarization days. Also the methods allowed for a total of 5 days between the second familiarization day and day 1 of testing (pre-test). According to Mair et al.[75] the RBE can last up to 13 days following the initial bout of exercise. With untrained individuals some soreness may be reported even with the familiarization procedures.

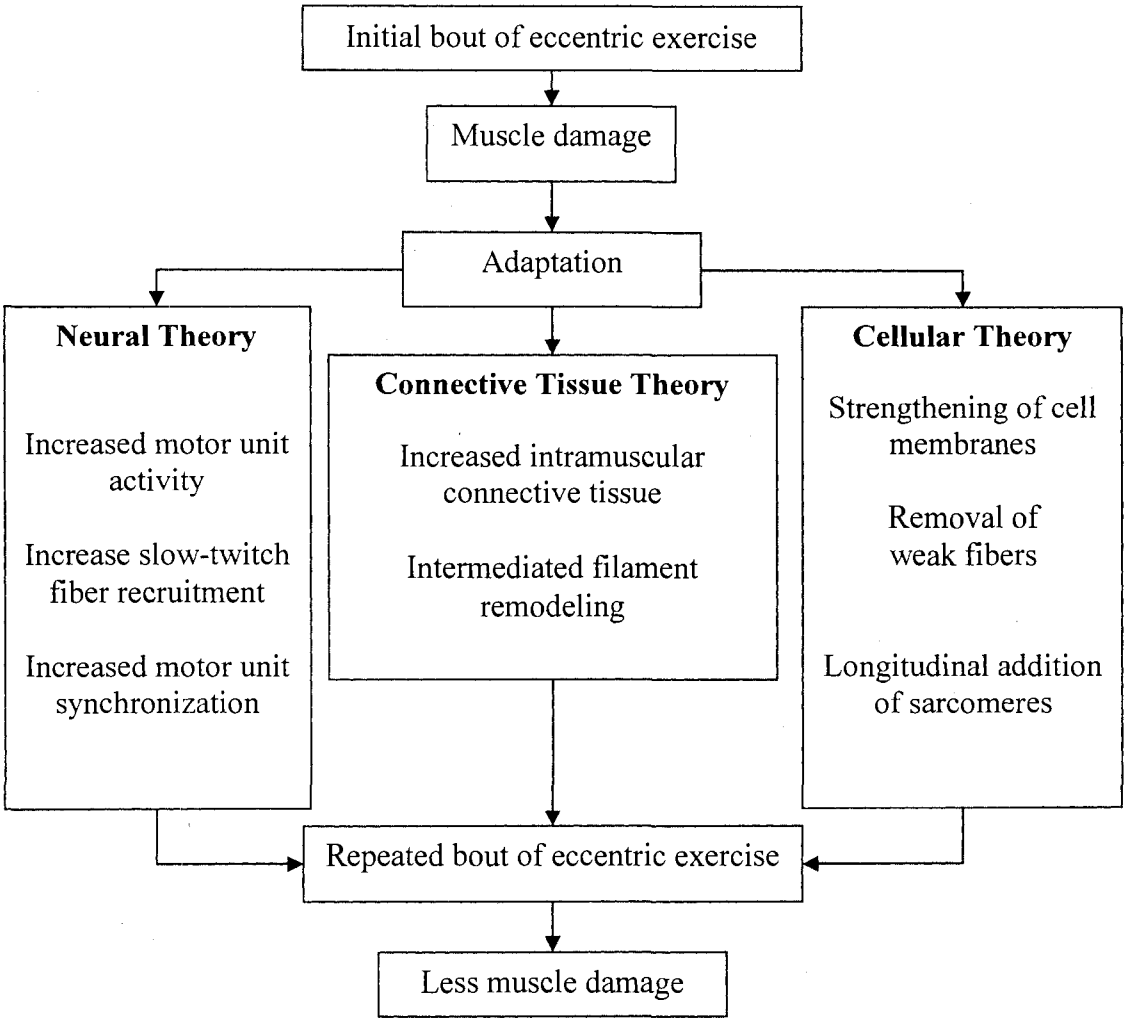


Figure 1. Potential mechanisms which may explain the repeat bout effect (RBE). Reproduced with permission from *Sports Medicine.* March 1999; 27(3):157-170.

## Summary

The use of cryotherapy with acute musculoskeletal injury causes a decrease in pain, swelling, secondary injury, and muscle spasms. Secondary injury causes healthy cells on the periphery of the initial injury to die by lyses or bursting. DOMS is similar to an acute injury in that it causes similar signs and symptoms of secondary injury. Increases in swelling, pain, and secondary injury occur, with decreases in strength and

ROM also occurs. Therefore, in a controlled setting we used DOMS inducing exercise to study the effects of cryotherapy on diminishing the negative effects of DOMS.

# CHAPTER 3

# METHODOLOGY

## Design

This study was a 2(treatment) x 4 (test) repeated measures design with the following independent variables: treatment (Ice/No Ice) and test time (4 days). The dependent variables were quadriceps mean peak eccentric torque (PT), muscle pain with palpation, knee flexion active range of motion (AROM), and thigh circumference (girth) measurements.

## Description of Subjects

Subjects whom participated in this study were 16 healthy adults (8 male and 8 female, age 26.81 ± 1.22 years, height 168.32 ± 2.22 cm, and weight 72.71 ± 3.89 kg) that had not undergone lower body weight training or had injury to the knee joint or surrounding musculature in the past six months and were not hypersensitive or allergic to ice. The subjects came from the general student population.

## Instrumentation

An isokinetic dynamometer was used (Biodex System 3, Biodex Medical Systems, Shirley, New York) to measure peak torque of the quadriceps. A modified Borg scale of perceived pain was used to determine the discomfort/tenderness of the quadriceps during palpation. To ensure all subjects had the same amount of force applied during palpation, 50N of force was applied using a Force Dial algometer (FDN 200;

Wagner Instruments, Greenwich, Connecticut) with a 1.5 cm compression plate. A goniometer (Sammons Preston Rolyan, Bolingbrook, Illinois) was used to assess AROM about the knee joint and a Medco tape measure (Medco, Tonawanda, New York) was used to measure circumference (girth) of the quadriceps. A 12"x 24" ice bag (Cramer Products Inc., Gardner, Kansas) filled with enough crushed ice to cover 2/3 of the subject's quadriceps of the treatment leg after testing or exercise was concluded. This was held in place by an 18' x 6" elastic wrap (Hartmann-Conco Inc., Rock Hill, South Carolina) applied over the quadriceps.

## Protocol

The week prior to testing, subjects were instructed to reported to the Athletic Training Research labratory on 2 occasions seperated by 48 hours and 72 hours prior to testing for familiarization. This ensured all subjects where familiar with all testing and data collection procedures. Subjects practiced isokinetic concentric/eccentric knee extension exercises on the Biodex for 4 sets at 60 deg*sec$^{-1}$: 1) consisting of 2 maximal effort repetitions for initial quadriceps mean PT, 2) 10 repetitions at 25% of their initial maximum quadriceps mean PT, 3) 5 repetitions at 75% of their initial maximum quadriceps mean PT and 4) 3 maximal repetitions for both limbs. After familiarization, subjects reported back to the lab the following week for testing and treatment on 5 consecutive days (Table 1). Subjects were verbally instructed by the investigators to refrain from taking any oral analgesics (e.g., Ibuprofen or Aspirin), stretching, messaging, or placing hot or cold packs on the quadriceps to aid in the relief of the discomfort from the exercise.

Table 1. Daily Protocol Schedule.

| Wednesday | Friday | Monday | Tuesday | Wednesaday | Thursday | Friday |
|---|---|---|---|---|---|---|
| Familiarization | Familiarization | Baseline | DOMS Inducing Day | 24 hours Post-DOMS | 48 hours Post-DOMS | 72 hours Post-DOMS |
| • 4 sets<br>2 maximum repetitions<br>10 repetitions at 25% of initial max<br>5 repetitions at 75% of initial max<br>3 maximum repetitions | • 4 sets<br>2 maximum repetitions<br>10 repetitions at 25% of initial max<br>5 repetitions at 75% of initial max<br>3 maximum repetitions | • Day 1<br>Measurements (AROM, girth, pain pre-exercise)<br>3 maximal eccentric contractions<br>Pain measurements post-exercise | • Day 2<br>Measurements (AROM, girth, pain pre-exercise)<br>8 sets of 10 maximal eccentric contractions with 60 seconds rest between each set<br>Pain measurements post-exercise<br>45-minute ice bag application directly on the skin covering 2/3 of the quadriceps<br>Pain measurements post-treatment | • Days 3<br>Measurements (AROM, girth, pain pre-exercise)<br>3 maximal eccentric contractions<br>Pain measurements post-exercise<br>45-minute ice bag application directly on the skin covering 2/3 of the quadriceps<br>Pain measurements post-treatment | • Days 4<br>Measurements (AROM, girth, pain pre-exercise)<br>3 maximal eccentric contractions<br>Pain measurements post-exercise<br>45-minute ice bag application directly on the skin covering 2/3 of the quadriceps<br>Pain measurements post-treatment | • Day 5<br>Measurements (AROM, girth, pain pre-exercise)<br>3 maximal eccentric contractions<br>Pain measurements post-exercise |

Prior to the beginning of testing on each of the 5 consecutive test days, subjects warmed-up to achieve 65% of their target HR (220-age*0.65) for 5 minutes on a treadmill (Precor model C966, Precor Inc., Woodinville, Washington). Subject's knee AROM was then assessed with a goniometer (Figure. 2). The fulcrum of the goniometer was placed over the lateral epicondyle, the proximal arm was aligned with the greater trochanter, and the distal arm was aligned with the lateral malleolus and fibular head.[79] Girth measurements were taken at the knee joint line and then 5 cm, 10 cm, 15 cm, and 20 cm above the joint line (Figure. 3).[80] Measurements were taken three times at each of the above designated sites then averaged to ensure accuracy (days 1-5). Subjects were

asked to give their level of pain (discomfort/tenderness) with palpation (perpedicular force of 50N)[14] of the quadriceps, investigator used the Force Dial algometer and a modified Borg's scale for perceived pain. Subjects gave the investigator the number that corresponded to their pain level. Palpation pain sites included the belly of the VMO, and sites 5 cm, 10 cm, 15 cm, and 20 cm above the joint line (which were the same sites used for girth) (Figure. 4). Pain was assessed pre-exercise, post-exercise (days 1-5) and post treatment (days 2-4). The same investigator administered all measurements and palpation.

Figure 2. Knee AROM Measurement

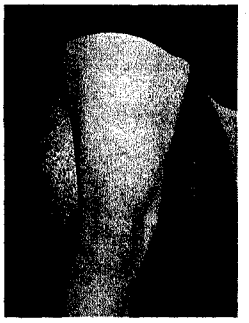

Figure 3. Girth Measurement Sites.

Subjects performed all testing and training seated in the Biodex dynamometer chair. The upper body and lower body were secured with a lap belt and two crossing shoulder straps. The chair was positioned so that the hip was in an 80° position, while the knee joint was aligned with the axis of rotation of the dynamometer shaft. The knee attachment of the dynamometer was adjusted so that it was proximal to the medial malleoli. Subject positioning in the Biodex was set according to the manufacturer

guidelines (Figure. 5). The dynamometer was set to the isokinetic setting with eccentric contraction mode at 60 deg*sec$^{-1}$ (all testing and exercise were performed at this speed).

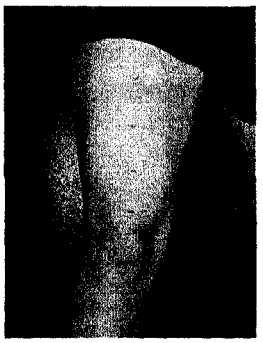

Figure 4. Sites for Pain with Palpation.

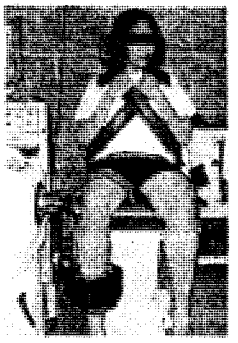

Figure 5. Biodex Setup.

During day 1 (pre-test), subjects performed 3 maximum eccentric contractions. During day 2 (exercise day) of testing, subjects performed 8 sets of 10 maximal eccentric contractions which was used to induce DOMS.[28] Between each set, a 60 seconds rest interval was given, similar to previous studies that induced DOMS.[9,15,28-30,74] After completion of these sets, an ice bag held in place with an elastic wrap applied to the pre-selected quadriceps for 45-minutes.[1,2,43,44,53,64] Both legs were tested, but only the pre-selected leg received the cryotherapy treatment. The testing protocol was the same as testing day 1 (3 maximal eccentric contractions) on days 3 through 5. Following exercise on day 2 and testing on days 3 and 4, the pre-selected quadriceps received the 45-minute ice bag application. Table 2 below demonstrated the counter balancing of the limb and treatment order for testing.

Table 2. Subject Testing Order.

| Limb | Treatment | Subjects | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
|---|---|---|---|---|---|---|---|
| R vs L | Ice/No Ice | 1,5,9,13 | Pre-Test | Exercise | Test | Test | Test |
| L vs R | Ice/No Ice | 2,6,10,14 | Pre-Test | Exercise | Test | Test | Test |
| R vs L | No Ice/Ice | 3,7,11,15 | Pre-Test | Exercise | Test | Test | Test |
| L vs R | No Ice/Ice | 4,8,12,16 | Pre-Test | Exercise | Test | Test | Test |

## Data Analysis

Eccentric mean peak torque was normalized to body weight by dividing peak torque by body weight. Then peak torque, range of motion (ROM), thigh girth, and point tenderness data were collected during the 5 days of this experiment.

## Statistical Analysis

A factorial repeated measures ANOVA ($\alpha = .05$ and Bonferroni adjustment for multiple comparisons) was used for all data reduction were analyzed across treatment (ice vs. no ice), time (day 1, day 3, day 4, and day 5), and treatment by time interaction. Main effects were analyzed using the paired T-test when appropriate.

# CHAPTER 4

## RESULTS

Analysis of eccentric peak torque resulted in statistically significant differences for time ($F_{1.97, 29.48} = 4.480$, and $p = .020$), where quadriceps mean peak torque at day 1 ($3.14 \pm 0.16$ Nm/BW) was greater than day 3 ($2.62 \pm 0.16$ Nm/BW) which is 24 hours post-intense eccentric exercise ($p = .029$). Day 4 ($2.43 \pm 0.18$ Nm/BW), and day 4 ($2.79 \pm 0.19$ Nm/BW) were not statistically different from day 1, day 3, and each other. There were no statistical differences for treatment ($F_{1.00, 15.00} = .001$, $p = .979$) or treatment by time interaction ($F_{3.00, 45.00} = 1.742$, $p = .172$) as seen in table 3.

**Table 3.** Quadriceps Eccentric Mean Peak Torque with Standard Deviation

| | Treated | Untreated |
|---|---|---|
| Day 1 | 3.09 ± 0.87 Nm/BW | 3.19 ± 0.95 Nm/BW |
| Day 3 | 2.6 ± 0.85 Nm/BW | 2.64 ± 1.01 Nm/BW |
| Day 4 | 2.52 ± 0.98 Nm/BW | 2.35 ± 1.05 Nm/BW |
| Day 5 | 2.78 ± 1.06 Nm/BW | 2.79 ± 1.07 Nm/BW |

Knee range of motion (ROM) analysis resulted in no statistical significance for any data at treatment ($F_{1.00, 15.00} = .405$, $p = .534$), time ($F_{1.162, 17.44} = 2.408$, $p = .136$), or treatment by time interaction ($F_{3.00, 45.00} = .561$, $p = .993$). See table 4 for recorded values.

**Table 4.** Mean Knee Flexion Active Range of Motion with Standard Deviation

| | Treated | Untreated |
|---|---|---|
| Day 1 | 138.35 ± 9.19° | 138.01 ± 9.75° |
| Day 3 | 133.69 ± 9.94° | 133.29 ± 11.53° |
| Day 4 | 122.40 ± 37.39° | 121.75 ± 36.29° |
| Day 5 | 133.86 ± 15.06° | 133.63 ± 13.88° |

The analysis of thigh girth measurements taken at knee joint line, 5, and 10 cm resulted in no significant differences, while those at 15 and 20 cm above joint line did, as seen in table 5. Data analyzed at knee joint line were not significant for treatment ($F_{1.00, 15.00} = .070$, $p = .795$), time ($F_{3.00, 45.00} = 1.037$, $p = .385$), nor treatment by time interaction ($F_{3.00, 45.00} = .56$, $p = .644$). Girth measurements at 5 cm above joint line measurements were not significant for treatment ($F_{1.00, 15.00} = .286$, $p = .601$), time ($F_{3.000, 45.000} = 2.409$, $p = .079$), nor was there a treatment by time interaction ($F_{3.00, 45.00} = .314$, $p = .815$). At 10 cm girth site, none of the measurements had statistical significance for treatment ($F_{1.00, 15.00} = 1.349$, $p = .264$), time ($F_{2.17, 32.59} = .718$, $p = .506$), or the treatment by time interaction ($F_{3.00, 45.00} = .858$, $p = .471$).

There were statistical significances found at 15 cm above joint line for time ($F_{3.00, 45.00} = 7.415$, $p \leq .001$) and treatment by time interaction ($F_{3.00, 45.00} = 2.827$, $p = .049$), but there was no statistical significance for treatment ($F_{1.00, 15.00} = 4.330$, $p = .055$). Time analysis revealed statistical differences from day 1 (50.61 ± 1.52 cm) to day 4 (51.184 ± 1.54 cm, $p = .001$). Day 1 values were lower than day 4 values. Since the data were statistically significant for treatment by time interaction a paired T-test was used for 15 cm above joint line limb girth.

**Table 5.** Girth Measurements with Standard Deviation

| | | Treated | Untreated |
|---|---|---|---|
| Knee Jt Line | | | |
| | Day 1 | 37.42 ± 3.47 cm | 37.26 ± 3.00 cm |
| | Day 3 | 37.38 ± 3.28 cm | 37.31 ± 3.16 cm |
| | Day 4 | 37.38 ± 3.21 cm | 37.42 ± 2.95 cm |
| | Day 5 | 37.48 ± 3.42 cm | 37.47 ± 3.21 cm |
| 5 cm | | | |
| | Day 1 | 39.87 ± 4.29 cm | 39.99 ± 4.40 cm |
| | Day 3 | 39.90 ± 4.26 cm | 40.04 ± 4.52 cm |
| | Day 4 | 40.13 ± 4.29 cm | 40.15 ± 4.36 cm |
| | Day 5 | 40.13 ± 4.44 cm | 40.18 ± 4.47 cm |
| 10 cm | | | |
| | Day 1 | 45.30 ± 5.83 cm | 45.03 ± 5.58 cm |
| | Day 3 | 45.40 ± 5.47 cm | 45.23 ± 5.53 cm |
| | Day 4 | 45.53 ± 5.22 cm | 45.20 ± 5.43 cm |
| | Day 5 | 45.35 ± 5.68 cm | 45.40 ± 5.33 cm |
| 15 cm | | | |
| | Day 1 | 51.01 ± 6.48 cm | 50.21 ± 5.70 cm |
| | Day 3 | 51.03 ± 6.26 cm | 50.70 ± 6.19 cm |
| | Day 4 | 51.43 ± 6.25 cm | 50.94 ± 6.06 cm |
| | Day 5 | 51.23 ± 6.29 cm | 51.02 ± 5.86 cm |
| 20 cm | | | |
| | Day 1 | 55.23 ± 6.20 cm | 54.95 ± 6.54 cm |
| | Day 3 | 55.69 ± 6.31 cm | 55.43 ± 6.55 cm |
| | Day 4 | 55.97 ± 6.88 cm | 55.76 ± 6.77 cm |
| | Day 5 | 55.46 ± 6.31 cm | 55.50 ± 6.61 cm |

Day 1 values in the treated (51.01 ± 1.62 cm) limb were greater than the untreated (50.21 ± 1.43 cm) limb ($t_{15.00}$ = 2.471, p = .026) and day 4 values in the treated (51.43 ± 1.56 cm) limb were again greater than the untreated (50.94 ± 1.51 cm) limb ($t_{15.00}$ = 2.291, p = .037). However, the 15 cm superior to joint line girth measurement for day 3 ($t_{15.00}$ = 1.686, p = .112) and day 5 ($t_{15.00}$ = .756, p = .461) were not statistically significant.

No statistical significance were seen at girth site 20 cm superior to joint line for treatment ($F_{1.00, 15.00}$ = .806, p = .383) or treatment by time interaction ($F_{3.00, 45.00}$ = .726, p

= .542), however time resulted in a statistically significant difference ($F_{3.00, 45.00} = 4.848$, $p = .005$). Where day 1 (55.09 ± 1.59 cm) and day 4 (55.87 ± 1.70 cm) were statistically different ($p = .027$). Day 1 girth was less than girth measurements on day 4.

Pain measurements were taken pre-exercise, post-exercise, and post-treatment for all pain sites (VMO, 5cm, 10cm, 15cm, and 20cm above joint line) as seen in table 6.

The measurements for point tenderness at the VMO site during the pre-exercise time point, the treatment ($F_{1.00, 15.00} = .011$, $p = .916$), time ($F_{3.00, 45.00} = 1.274$, $p = .295$), and treatment by time interaction ($F_{3.00, 45.00} = .706$, $p = .554$) analyses all resulted in no significant differences. The point tenderness assessment at the VMO site immediately post-exercise again resulted in no significant differences for treatment ($F_{1.00, 15.00} = .685$, $p = .421$), time ($F_{2.15, 32.24} = 1.326$, $p = .281$), or the treatment by time interaction ($F_{3.00, 45.00} = .847$, $p = .475$) analysis. In addition treatment data resulted in no significant differences at the VMO site post-treatment ($F_{1.00, 15.00} = .000$, $p = 1.000$).

Point tenderness data at the VMO site during the post-treatment assessment resulted in statistically significant differences for time ($F_{2.00, 30.00} = 4.650$, $p = .017$) and treatment by time interaction ($F_{1.405, 21.072} = 6.072$, $p = .015$). Point tenderness at the VMO site was different after the initial treatment with cryotherapy on the day 2 (1.45 ± .30) and day 3 (2.42 ± .44) post-eccentric exercise ($p = .012$). To further analyze the treatment by time interaction a paired T-test was used for the simple main effects analysis.

**Table 6.** Recorded Pain Measurement Values for All Site with Standard Deviation

| *Borg Precieved Pain Pre-Exercise Value* | | |
|---|---|---|
| **Pre-Exercise** | **Treated** | **Untreated** |
| VMO Pre-Ex | | |
| Day 1 | 2.16 ± 1.93 | 2.06 ± 2.02 |
| Day 2 | * | * |
| Day 3 | 2.69 ± 1.98 | 2.88 ± 1.86 |
| Day 4 | 2.72 ± 1.87 | 2.56 ± 0.1.82 |
| Day 5 | 2.13 ± 0.1.95 | 2.13 ± 0.1.88 |
| 5 cm Pre-Ex | | |
| Day 1 | 0.94 ± 0.89 | 0.88 ± 1.01 |
| Day 2 | * | * |
| Day 3 | 0.91 ± 0.97 | 1.00 ± 0.93 |
| Day 4 | 1.03 ± 0.99 | 1.00 ± 1.00 |
| Day 5 | 0.84 ± 0.93 | 0.78 ± 1.00 |
| 10 cm Pre-Ex | | |
| Day 1 | 1.09 ± 1.19 | 0.88 ± 0.97 |
| Day 2 | * | * |
| Day 3 | 1.50 ± 1.25 | 1.69 ± 1.39 |
| Day 4 | 1.56 ± 1.20 | 1.72 ± 1.85 |
| Day 5 | 1.16 ± 1.11 | 1.31 ± 1.33 |
| 15 cm Pre-Ex | | |
| Day 1 | 1.66 ± 1.75 | 1.22 ± 1.38 |
| Day 2 | * | * |
| Day 3 | 2.63 ± 1.45 | 2.78 ± 1.47 |
| Day 4 | 3.31 ± 1.49 | 3.56 ± 1.97 |
| Day 5 | 2.75 ± 1.60 | 2.63 ± 1.67 |
| 20 cm Pre-Ex | | |
| Day 1 | 1.75 ± 1.65 | 1.84 ± 1.76 |
| Day 2 | * | * |
| Day 3 | 3.25 ± 1.34 | 3.69 ± 1.66 |
| Day 4 | 4.19 ± 1.68 | 4.41 ± 2.55 |
| Day 5 | 3.59 ± 2.38 | 4.09 ± 2.60 |

| *Borg Precieved Pain Post-Exercise Value* | | |
|---|---|---|
| **Post-Exercise** | **Treated** | **Untreated** |
| VMO Post-Ex | | |
| Day 1 | 1.91 ± 0.1.55 | 1.97 ± 1.44 |
| Day 2 | * | * |
| Day 3 | 2.63 ± 2.15 | 2.47 ± 1.53 |
| Day 4 | 2.19 ± 1.82 | 1.91 ± 1.93 |
| Day 5 | 2.00 ± 2.21 | 2.00 ± 2.18 |
| 5 cm Post-Ex | | |
| Day 1 | 1.13 ± 1.28 | 1.06 ± 0.98 |
| Day 2 | * | * |
| Day 3 | 0.91 ± 0.90 | 0.91 ± 0.92 |
| Day 4 | 0.81 ± 0.93 | 0.94 ± 0.96 |
| Day 5 | 0.78 ± 0.93 | 0.75 ± 1.01 |
| 10 cm Post-Ex | | |
| Day 1 | 1.06 ± 1.09 | 1.06 ± 1.15 |
| Day 2 | * | * |
| Day 3 | 1.13 ± 0.79 | 1.41 ± 1.27 |
| Day 4 | 1.38 ± 1.53 | 1.38 ± 1.30 |
| Day 5 | 0.97 ± 0.87 | 1.22 ± 1.17 |
| 15 cm Post-Ex | | |
| Day 1 | 1.38 ± 1.62 | 1.34 ± 1.41 |
| Day 2 | * | * |
| Day 3 | 1.91 ± 1.04 | 2.41 ± 1.40 |
| Day 4 | 2.44 ± 1.31 | 2.94 ± 1.39 |
| Day 5 | 1.88 ± 1.13 | 2.44 ± 1.55 |
| 20 cm Post-Ex | | |
| Day 1 | 1.63 ± 2.02 | 1.84 ± 2.17 |
| Day 2 | * | * |
| Day 3 | 2.88 ± 1.36 | 3.13 ± 1.67 |
| Day 4 | 3.63 ± 1.78 | 3.94 ± 1.73 |
| Day 5 | 3.34 ± 1.90 | 3.75 ± 2.32 |

| *Borg Precieved Pain Post-Treatment Value* | | |
|---|---|---|
| **Post-Treatment** | **Treated** | **Untreated** |
| VMO Post-Tx | | |
| Day 1 | * | * |
| Day 2 | 1.19 ± 1.47 | 1.72 ± 1.26 |
| Day 3 | 2.50 ± 2.06 | 2.34 ± 1.54 |
| Day 4 | 2.38 ± 2.27 | 2.00 ± 1.82 |
| Day 5 | * | * |
| 5 cm Post-Tx | | |
| Day 1 | * | * |
| Day 2 | 0.78 ± 0.97 | 0.72 ± 0.73 |
| Day 3 | 1.00 ± 1.13 | 0.94 ± 0.89 |
| Day 4 | 0.81 ± 1.01 | 0.81 ± 0.95 |
| Day 5 | * | * |
| 10 cm Post-Tx | | |
| Day 1 | * | * |
| Day 2 | 0.94 ± 1.22 | 0.91 ± 1.04 |
| Day 3 | 1.41 ± 1.17 | 1.38 ± 1.40 |
| Day 4 | 1.19 ± 1.21 | 1.38 ± 1.52 |
| Day 5 | * | * |
| 15 cm Post-Tx | | |
| Day 1 | * | * |
| Day 2 | 1.47 ± 2.07 | 1.16 ± 1.09 |
| Day 3 | 2.50 ± 1.62 | 2.28 ± 1.39 |
| Day 4 | 2.88 ± 1.75 | 2.97 ± 2.07 |
| Day 5 | * | * |
| 20 cm Post-Tx | | |
| Day 1 | * | * |
| Day 2 | 1.31 ± 1.34 | 1.78 ± 1.69 |
| Day 3 | 3.09 ± 1.99 | 3.06 ± 1.65 |
| Day 4 | 3.69 ± 2.41 | 3.88 ± 2.53 |
| Day 5 | * | * |

* No data collected on these days.

No statistical significances were found between the treated and untreated limb. Day 1of the VMO point tenderness resulted in no differences post-treatment between the treated (1.19 ± .37) and untreated (1.72 ± .32) limb ($t_{15.00}$ = -1.622, p = .126), and Day 3 ($t_{15.00}$ = .639, p = .533) between the treated (2.50 ± .51) and the untreated (2.34 ± .38) limb. The treated (2.38 ± .58) and untreated ( 2.00 ± .45) limb had no differences in point tenderness on day 4 as a result of the cryotherapy ($t_{15.00}$ = 1.464, p = .164).

Analysis of the pre-exercise point tenderness at 5 cm superior to the joint line site resulted in no significant differences for treatment ($F_{1.00, 15.00}$ = .031, p = .863), time ($F_{2.17, 32.54}$ = .591, p = .573) or treatment by time interaction ($F_{1.41, 21.22}$ = .247, p = .706). Analysis of the post-exercise pain at 5 cm superior to joint line resulted in no differences

for treatment ($F_{1.00, 15.00} = 0.50$, $p = .827$), time ($F_{1.62, 24.32} = 1.332$, $p = .278$), or for the treatment by time interaction ($F_{1.34, 20.07} = .672$, $p = .464$). Also, no statistical significance occurred in any of the data for point tenderness immediately following cryotherapy application at 5 cm superior to the joint line for treatment ($F_{1.00, 15.00} = .149$, $p = .705$), time ($F_{2.00, 30.00} = .961$, $p = .394$), and treatment by time interaction ($F_{2.00, 30.00} = .063$, $p = .939$).

Analysis of the pre-exercise point tenderness at the measurement site 10 cm superior to joint line resulted in no significant differences for treatment ($F_{1.0, 15.0} = .487$, $p = .496$), time ($F_{1.7, 25.9} = 2.384$, $p = .118$) or treatment by time interaction ($F_{3.0, 45.0} = .771$, $p = .516$). The analysis of post-exercise point tenderness at the measurement site 10 cm superior joint line analysis resulted in no differences for treatment ($F_{1.0, 15.0} = 2.442$, $p = .139$), time ($F_{3.0, 45.0} = .973$, $p = .414$), or for treatment by time interaction ($F_{3.0, 45.0} = .791$, $p = .505$). Also, no statistical significance occurred in any of the variables for post-treatment point tenderness at the measurement site 10cm superior joint line treatment ($F_{1.0, 15.0} = .039$, $p = .847$), time ($F_{2.0, 30.0} = 2.180$, $p = .131$), and treatment by time interaction ($F_{2.0, 30.0} = .346$, $p = .711$).

The point tenderness site at 15 cm superior to joint line at the pre-exercise time point resulted in no differences for treatment ($F_{1.00, 15.00} = .034$, $p = .855$) or treatment by time interaction ($F_{3.00, 45.00} = 1.301$, $p = .286$). However, there were statistical differences for time ($F_{1.99, 29.79} = 7.595$, $p = .002$). Day 1 ($1.44 \pm .37$) point tenderness was lower than day 3 ($2.70 \pm .34$) post-intense eccentric exercise ($p = .016$) and day 1 point tenderness was lower than day 4 ($3.43 \pm .40$) post-intense eccentric exercise ($p = .011$). Also, the point tenderness at the 15 cm superior to joint line site measured pre-exercise was highest

on day 4 (3.43 ± .40) than day 5 (2.69 ± .36) it appears point tenderness peaked around the 48 hour time point.

Analysis of the post-exercise point tenderness at the 15 cm site for treatment ($F_{1.00, 15.00} = 10.281$, $p = .006$) and time ($F_{3.00, 45.00} = 4.749$, $p = .006$) were statistically different, but treatment by time interaction did not occur ($F_{3.00, 45.00} = 2.644$, $p = .061$). Treatment analysis resulted in the treated limb (1.90 ± .23) being lower than the untreated limb (2.28 ± .28) suggesting that cryotherapy application aided in maintaining baseline point tenderness values ($p = .006$). Analysis of the day 1 (1.36 ± .37) values were significantly lower than 48 hours (2.69 ± .32) post-intense eccentric exercise value ($p = .022$).

Analysis of the post-treatment pain site 15 cm superior to joint line resulted in no differences for treatment ($F_{1.00, 15.00} = .305$, $p = .589$) or treatment by time interaction ($F_{2.00, 30.00} = .559$, $p = .578$). However, there were statistical differences for time ($F_{2.00, 30.00} = 8.498$, $p = .001$). Point tenderness at the 15 cm site measured post-treatment on day 1 (1.31 ± .36) was lower than day 3 (2.40 ± .35) following intense eccentric exercise ($p = .024$). Day 1 values were also lower than day 4 (2.92 ± .45, $p = .013$), during the post-treatment point tenderness assessment.

The point tenderness site 20 cm superior to joint line at pre-exercise time point resulted in no differences for treatment ($F_{1.00, 15.00} = 1.291$, $p = .274$), and there were no occurrence of treatment by time interaction ($F_{2.20, 33.03} = .416$, $p = .682$). However the time data were statistically different ($F_{1.75, 26.27} = 8.498$, $p = .002$), pre-exercise resulted in day 1 (1.80 ± .40) values being less than either day 3(3.47 ± .36) or day 4 (4.30 ± .48) post-intense eccentric exercise ($p = .008$, $p = .005$).

Analysis of the point tenderness site 20 cm superior to joint line post-exercise data resulted in no significant difference for treatment ($F_{1.00, 15.00} = 2.945$, $p = .107$) or treatment by time interaction ($F_{2.25, 38.67} = .099$, $p = .924$), but time data resulted in a statistical differences ($F_{2.10, 31.52} = 7.987$, $p = .001$). Day 1 ($1.73 \pm .50$) values were lower compared to day 3 ($3.00 \pm .37$, $p = .044$) and day 4 ($3.78 \pm .41$) values following intense-eccentric exercise ($p = .014$).

Point tenderness analysis at site 20 cm superior to joint line at the post-treatment time point resulted in no differences occurring for treatment ($F_{1.00, 15.00} = .526$, $p = .479$) or treatment by time interaction ($F_{2.00, 30.00} = .754$, $p = .479$). However, time again was statistically different ($F_{2.00, 30.00} = 10.081$, $p \leq .001$). Day 1 ($1.55 \pm .36$) values were statistically lower compared to both day 3 ($3.08 \pm .43$) and day 4 ($3.78 \pm .57$) values ($p = .026$, $p = .004$).

# CHAPTER 5

## DISCUSSION AND CONCLUSION

The present study investigated whether the application of cryotherapy would decrease the effects of delayed onset muscle soreness. To investigate this question eccentric mean peak torque, knee joint ROM, thigh girth measurements, and point tenderness were assessed. The results revealed that there were no significant difference between the treated and the untreated limb (except at 15 cm above joint line post-exercise pain), suggesting that a once daily application of cryotherapy may not affect the symptoms of DOMS.

### Eccentric Mean Peak Torque

The quadriceps eccentric mean peak torque decrease was observed from day1 to day 3 post-intense eccentric exercise and remained low at day 4 and day 5. The fall in torque production peaked during day 4 post-intense exercise, which is similar to previously published literature.[17,19,21,23,24,27-29,32,52,74] However, there were no differences between the treated and untreated limb. In studies by Ruiz et al.[9] and Maattacola et al.[39] strength diminished after application of cryotherapy. These two studies strength tested their subjects immediately following the cryotherapy application. This differs from the present study since no differences were seen between treated and untreated limbs and our subjects were strength tested prior to the cryotherapy application. Kimura et al.[36] found that there was no impact on force production. There is still uncertainty whether the

application of cryotherapy may decrease strength and force production. R.B. Armstrong[76] suggested that injury to the muscle may be a reason for the decrease in force production. The muscle injury may be a disruption of the myofilament structures, loss of intramuscular proteins into the plasma, or sarcolemma damage that temporarily reduce force production.[76] Knight et al.[2] suggested that with trauma that disrupts the muscle cells cryotherapy should be applied immediately following the traumatic event, and repeated frequently to maintain a decreased metabolism in the area and thus decreasing the effects of secondary injury.

Cryotherapy cannot impact the muscle healing directly; however, it can have an impact on muscle cell metabolism, and secondary injury[2]. Based upon the results of this study it appears that the once daily application, does not reduce edema formation without repeated application. Thus, it is conjectured that a single cryotherapy application will decrease the muscle cells metabolism for a short period of time, however the treatment effects are negated by an increase in cell metabolism with further muscle activity. To maintain the effects of the cryotherapy treatment, repeated bouts are apparently necessary. Dolan et al.[7] found that with a 30 minute on and 30 minute off cycle cryotherapy application reduced edema formation in the treated limb, but edema did still form. The once daily treatment of cryotherapy may not have had lasting enough benefits and may explain why there was no difference in the treated and untreated leg.

## Range of Motion

Unlike previous studies[16,17,19,20,23,24,28,29,32], the present study resulted in no differences of ROM about the knee joint after intense-eccentric exercise were observed. Previous studies[16,17,19,20,23,24,28,29,32] had a decrease in ROM after a DOMS inducing

exercise which peaked 48 hours post-exercise. A possible reason for this discrepancy in a decrease in ROM may be due to the fact that we investigated the ROM of the knee rather than the elbow as in many of the previous studies[16,17,19,20,23,24,28,29,32] With the disruption of the muscle tissues, pain and edema formation may occur, thus causing the swelling and pain of the stretching muscle to limit ROM. With the application of cryotherapy to reduce edema formation and pain, ROM may be maintained. Also, the present research may suggest that active ROM was less affected by DOMS than passive ROM or that subjects are more apprehensive about having investigators move their arm or allowing gravity to extend their arm, thus affecting ROM of the upper extremity more than the lower extremity. However since there was so much variability on day 4 in the AROM measurements, it is likely that the subjects were apprehensive to full flex the knee. Regardless, this variability appears to be equal in both the treatment and control conditions.

## Girth Measurements

The girth of a muscle has been known to increase with DOMS.[19,29,32,33] However these studies have all focused on the upper extremity (biceps or forearm musculature) and all girth measurements were taken at the largest section or mid-belly of the muscle. The present study looked at the joint line, musculotendinous (MT) junction (sites 5 cm and 10 cm above joint line), and mid-belly (15 cm and 20 cm above joint line) sites. The joint line and MT sites were investigated were due to the fact that Bryne et al.[11] suggested that damage to the series elastic components may cause an inflammatory reaction, causing edema formation. The edema accumulation would be easily measured at the joint line. Girth measurement did not increase at joint line, 5cm or 10 cm above joint line, but like

the previous studies[19,29,32,33] there was an increase in the mid-belly sites. This increase peaked 48 hours (day 4) post-intense eccentric exercise which was in accordance to previous studies.[19,29,32,33] The increase in swelling may have occurred from injury to the muscle caused by microtears or ultra-structural changes within the muscle belly. Even with the application of cryotherapy on the treated limb to decrease metabolism of the muscle tissues (decreasing the formation of edema, thus decreasing secondary injury[1,2]) there were no differences observed between the treated and untreated limbs. Dolan et al.[7] however in their study observed that once the cryotherapy application was taken away from the treated limb that edema started to accumulate again and when the application was on there was a reduction in edema. Therefore, an increase that was seen in the present study could have been due to the fact that girth was not measured immediately following the cryotherapy application. This may suggest that the application of cryotherapy may need to be applied more frequently than once every 24 hours.

## Point Tenderness

All subjects in this study experienced point tenderness following the intense-eccentric exercise. Point tenderness or soreness was measured at 3 different time points (pre-exercise, post-exercise, and post-treatment) on each testing day (day 1 and days 3-5 post-intense eccentric exercise), except post-treatment it was not taken at day 1 or day 5 post-intense exercise. Soreness for pre- and post-exercise time points resulted in no tenderness at the VMO, 5 cm or 10 cm above joint line. Point tenderness sites at 5 and 10 cm above the knee joint line correlated to the musculotendinous (MT) junction of the quadriceps muscle, while 15 and 20 cm corresponded to the muscle belly of the quadriceps. However like Cleak et al.[23], Newham et al.[21] and Baker et al.[25] the present

study reported greater soreness in the belly of the muscle than at the MT junction. This differs from Paddon-Jones et al.'s[30] study which reported no difference in soreness between the MT and muscle belly. The increase in the soreness at the muscle belly may be attributed by the disruption of the myofilament structures,[76] damage to the sarcolemma, [76] thus causing edema which may increase the intramuscular pressure, thus applying pressure to sensitive pain receptors.[11] At the 15 and 20 cm point tenderness sites values were greatest at day 3 and day 4 post-intense eccentric compared to day 1, but tenderness peaked at 48 hours (day 4) just as previous studies.[17,19-21,23,25,28,29,32,74]

At time point post-treatment, which immediately followed the application of cryotherapy all muscle belly sites (VMO, 15, and 20 cm above joint line), soreness was greater at 24 and 48 hours after initial cryotherapy application, peaking at 48 hours. This differs from Carman et al.[70] which showed a decrease in pain sensation after the initial day of cryotherapy with the repeated applications. Our finding may differ do to the added pressure of the algometer to the muscle, where their study applied only cold with no additional pressure or exercise prior.

## Conclusion

The conclusion of this study suggests that the once daily application of cryotherapy for 45-minute after and intense-eccentric exercise bout does not reduce the effects of DOMS. The lack of significant differences in pain reduction, ROM restoration, and edema formation suggest that the once daily application of cryotherapy every 24 hours after the exercise allowed DOMS to remain as prevalent in the treated as the untreated limb.

## Limitation and Delimitations

In this study there may have been some limitation that affected the results turn out the way they did. This study was very reliant on the effort that the subject put into their strength tests and ROM. Also, during the intense-eccentric day they were asked to give 100% with each of the 8 sets of 10 repetitions, but highly dependent of their effort and motivation. On the days following the intense-eccentric exercise bout since all subject were sore they may have been afraid to contract maximally during strength test do to their sore and stiff quadriceps. With the application of cryotherapy since all subjects had never received a cryotherapy application for that long or at all, most subjects were very hesitant and worried about the ice application. The ice application may have been on for too long for these subjects. Also with the ice not being applied every hour but every 24 hours post-intense eccentric exercise, this may have hindered the effect of cryotherapy. The limitation that using the algometer was that in some subjects a contusion appeared that may have hindered accurate pain perception of the treatment, eccentric exercise and strength.

## Implications for a Clinician

The application of cryotherapy should be applied repeatedly as in Dolan et al.[7] and Verducci's[35] studies to limit the formation of edema and thus decreasing secondary injury that may occur with the disruption of muscle cells. That with modification to the application parameters, the application of cryotherapy should be more frequently than once daily may need to be employed to decrease the signs and symptoms of DOMS. In general a clinician can inform athletes that either have not worked out or are starting a

more intense and new training regimen to start with lighter weights or easier activities and gradually increase their intensity to reduce the on-set of DOMS.

## Future Research

Future research should involve the repeated application of cryotherapy for 45 minutes on with an hour off time cycle to combat this soreness developed. Also it may be reasonable to investigate the difference in subjects who are familiar with cryotherapy application from those who are not so that the psychological aspects of the cryotherapy application are not a variable. More research on DOMS and the quadriceps should be done since there are several studies on the biceps and forearm resulting in a decrease in ROM, and increase girth but this was not seen in this study involving the quadriceps.

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# APPENDIX I

## SUBJECTS RAW DATA

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub01 | **Height:** | **166.37** | **Weight:** | 59.09 |
| **Treatment:** | RI/Lno | **Age:** | **22** | **Target HR:** | 128.7 |
| | Female | | | | |

**DAY 1:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 150.00 | 145.00 | 149.00 | | 142.00 | 141.50 | 142.00 | |
| **Average** | 148.00 | | | | 141.83 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.70 | 33.50 | 33.10 | 33.43 | 33.00 | 33.70 | 33.30 | 33.33 |
| 2" above JT Line | 36.00 | 36.00 | 36.40 | 36.13 | 36.00 | 35.90 | 35.40 | 35.77 |
| 4" above JT Line | 42.00 | 41.50 | 41.60 | 41.70 | 39.50 | 40.10 | 40.40 | 40.00 |
| 6" above JT Line | 47.00 | 47.20 | 46.70 | 46.97 | 44.70 | 45.40 | 45.20 | 45.10 |
| 8" above JT Line | 52.60 | 51.80 | 52.20 | 52.20 | 51.10 | 50.50 | 50.70 | 50.77 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 3.00 | | 3.00 | 4.00 | 3.00 | | 3.50 |
| 2" above JT Line | 2.00 | 2.00 | | 2.00 | 3.00 | 3.00 | | 3.00 |
| 4" above JT Line | 2.00 | 2.00 | | 2.00 | 3.00 | 2.00 | | 2.50 |
| 6" above JT Line | 3.00 | 2.00 | | 2.50 | 3.00 | 2.00 | | 2.50 |
| 8" above JT Line | 3.00 | 2.00 | | 2.50 | 3.00 | 2.00 | | 2.50 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 97.40 | 86.00 | 98.00 | 114.90 |
| S1/R2 | 92.70 | 88.90 | 99.70 | 118.70 |
| S1/R3 | 82.90 | 82.90 | 99.90 | 120.10 |
| **Average** | 91.00 | 85.93 | 99.20 | 117.90 |

**DAY 2:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 2.00 | 2.00 | 1.00 | 1.67 | 2.00 | 2.00 | 2.00 | 2.00 |
| 2" above JT Line | 1.00 | 2.00 | 1.00 | 1.33 | 2.00 | 2.00 | 1.00 | 1.67 |
| 4" above JT Line | 1.00 | 2.00 | 1.00 | 1.33 | 1.00 | 1.00 | 2.00 | 1.33 |
| 6" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.33 |
| 8" above JT Line | 2.00 | 2.00 | 1.00 | 1.67 | 2.00 | 2.00 | 2.00 | 2.00 |

**DAY 3:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 134.00 | 135.00 | 135.00 | | 149.00 | 138.00 | 146.00 | |
| **Average** | 134.67 | | | | 144.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 34.00 | 33.90 | 33.80 | 33.90 | 33.70 | 34.00 | 34.00 | 33.90 |
| 2" above JT Line | 36.20 | 36.00 | 36.20 | 36.13 | 35.70 | 35.70 | 35.60 | 35.67 |
| 4" above JT Line | 41.20 | 40.60 | 41.50 | 41.10 | 40.80 | 40.60 | 40.70 | 40.70 |
| 6" above JT Line | 46.60 | 47.20 | 46.30 | 46.70 | 46.10 | 46.40 | 46.70 | 46.40 |
| 8" above JT Line | 52.20 | 51.00 | 51.70 | 51.63 | 51.10 | 51.50 | 50.70 | 51.10 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 3.00 | 1.00 | 2.33 | 3.00 | 3.00 | 2.00 | 2.67 |
| 2" above JT Line | 2.00 | 2.00 | 1.00 | 1.67 | 2.00 | 2.00 | 1.00 | 1.67 |
| 4" above JT Line | 3.00 | 2.00 | 1.00 | 2.00 | 3.00 | 2.00 | 1.00 | 2.00 |
| 6" above JT Line | 3.00 | 2.00 | 1.00 | 2.00 | 4.00 | 3.00 | 2.00 | 3.00 |
| 8" above JT Line | 4.00 | 3.00 | 2.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 77.40 | 69.70 | 79.20 | 72.90 |
| S1/R2 | 64.40 | 69.80 | 82.10 | 82.90 |
| S1/R3 | 67.80 | 67.90 | 84.30 | 77.90 |
| **Average** | 69.87 | 69.13 | 81.87 | 77.90 |

**DAY 4:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 137.00 | 138.00 | 137.00 | | 140.00 | 138.00 | 137.00 | |
| **Average** | 137.33 | | | | 138.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 34.10 | 33.80 | 33.80 | 33.90 | 34.00 | 33.90 | 33.80 | 33.90 |
| 2" above JT Line | 35.90 | 35.70 | 36.20 | 35.93 | 35.70 | 36.00 | 35.50 | 35.73 |
| 4" above JT Line | 41.20 | 40.90 | 41.00 | 41.03 | 40.20 | 40.60 | 40.50 | 40.43 |
| 6" above JT Line | 46.40 | 46.30 | 46.40 | 46.37 | 46.40 | 46.10 | 46.70 | 46.40 |
| 8" above JT Line | 51.30 | 51.30 | 52.50 | 51.70 | 50.40 | 50.80 | 50.50 | 50.57 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 1.00 | 1.00 | 1.33 | 2.00 | 1.00 | 2.00 | 1.67 |
| 2" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 4" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 2.00 | 1.00 | 1.00 | 1.33 |
| 6" above JT Line | 4.00 | 2.00 | 1.00 | 2.33 | 4.00 | 3.00 | 3.00 | 3.33 |
| 8" above JT Line | 5.00 | 3.00 | 2.00 | 3.33 | 5.00 | 4.00 | 3.00 | 4.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 56.60 | 83.50 | 103.60 | 138.70 |
| S1/R2 | 74.00 | 101.30 | 108.30 | 145.30 |
| S1/R3 | 69.30 | 90.30 | 102.00 | 127.60 |
| **Average** | 66.63 | 91.70 | 104.63 | 137.20 |

**DAY 5:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 140.00 | 139.00 | 139.00 | | 139.00 | 141.00 | 139.00 | |
| **Average** | 139.33 | | | | 139.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 34.40 | 34.20 | 34.20 | 34.27 | 33.80 | 33.80 | 33.70 | 33.77 |
| 2" above JT Line | 36.00 | 36.00 | 36.20 | 36.07 | 36.10 | 36.10 | 36.00 | 36.07 |
| 4" above JT Line | 40.90 | 40.50 | 40.80 | 40.73 | 40.90 | 40.50 | 40.70 | 40.70 |
| 6" above JT Line | 47.00 | 46.40 | 46.20 | 46.53 | 46.10 | 46.30 | 46.60 | 46.33 |
| 8" above JT Line | 52.40 | 51.90 | 52.10 | 52.13 | 50.20 | 50.50 | 51.00 | 50.57 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 2.00 | | 2.00 | 3.00 | 2.00 | | 2.50 |
| 2" above JT Line | 1.00 | 1.00 | | 1.00 | 2.00 | 1.00 | | 1.50 |
| 4" above JT Line | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 |
| 6" above JT Line | 2.00 | 1.00 | | 1.50 | 3.00 | 2.00 | | 2.50 |
| 8" above JT Line | 1.00 | 3.00 | | 2.00 | 3.00 | 3.00 | | 3.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 90.20 | 88.60 | 132.10 | 139.70 |
| S1/R2 | 85.20 | 82.10 | 111.40 | 151.50 |
| S1/R3 | 74.80 | 101.10 | 135.00 | 166.30 |
| **Average** | 83.40 | 90.60 | 126.17 | 152.50 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub02 | **Height:** | 162.56 | **Weight:** | 61.36 |
| **Treatment:** | LI/Rno | **Age:** | 24 | **Target HR:** | 127 |
| | Female | | | | |

**DAY 1:**

| | Right Leg | | | | Left Leg | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 142.00 | 142.00 | 143.00 | | 142.00 | 138.00 | 140.00 | |
| **Average** | 142.33 | | | | 140.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.40 | 33.20 | 33.20 | 33.27 | 33.30 | 33.20 | 33.10 | 33.20 |
| 2" above JT Line | 36.40 | 36.40 | 36.40 | 36.40 | 36.40 | 36.60 | 36.50 | 36.50 |
| 4" above JT Line | 40.20 | 40.20 | 40.50 | 40.30 | 40.60 | 40.60 | 41.00 | 40.73 |
| 6" above JT Line | 45.20 | 46.00 | 45.40 | 45.53 | 46.00 | 46.00 | 45.40 | 45.80 |
| 8" above JT Line | 49.10 | 49.40 | 49.80 | 49.43 | 50.40 | 50.40 | 50.40 | 50.40 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 2" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 6" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 8" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | R-Leg | L-Leg | R-Leg | L-Leg |
| S1/R1 | 91.70 | 108.20 | 158.40 | 166.90 |
| S1/R2 | 106.80 | 110.00 | 162.10 | 159.70 |
| S1/R3 | 99.20 | 105.00 | 154.50 | 163.40 |
| **Average** | 99.23 | 107.73 | 158.33 | 163.33 |

**DAY 2:**

| | Right Leg | | | | Left Leg | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.17 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.17 |
| 6" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 1.00 | 0.50 | 0.50 |
| 8" above JT Line | 0.50 | 1.00 | 0.50 | 0.67 | 0.00 | 0.50 | 1.00 | 0.50 |

**DAY 3:**

| | Right Leg | | | | Left Leg | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 139.00 | 139.00 | 139.00 | | 140.00 | 137.00 | 137.00 | |
| **Average** | 139.00 | | | | 138.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.40 | 33.30 | 33.40 | 33.37 | 33.80 | 33.40 | 33.50 | 33.57 |
| 2" above JT Line | 36.60 | 36.90 | 36.70 | 36.73 | 36.80 | 36.80 | 36.90 | 36.83 |
| 4" above JT Line | 40.40 | 40.10 | 40.60 | 40.37 | 40.80 | 40.70 | 40.50 | 40.67 |
| 6" above JT Line | 45.20 | 45.50 | 45.50 | 45.40 | 45.60 | 45.90 | 46.20 | 45.90 |
| 8" above JT Line | 50.20 | 50.20 | 50.20 | 50.20 | 50.30 | 50.60 | 50.60 | 50.50 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 3.00 | 2.00 | 2.67 | 3.00 | 2.00 | 3.00 | 2.67 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.33 |
| 4" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 2.00 | 1.33 |
| 6" above JT Line | 2.00 | 2.00 | 2.00 | 2.00 | 4.00 | 2.00 | 4.00 | 3.33 |
| 8" above JT Line | 4.00 | 4.00 | 4.00 | 4.00 | 5.00 | 4.00 | 6.00 | 5.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | R-Leg | L-Leg | R-Leg | L-Leg |
| S1/R1 | 89.50 | 91.50 | 147.70 | 155.40 |
| S1/R2 | 105.90 | 115.60 | 143.30 | 164.80 |
| S1/R3 | 101.90 | 109.80 | 147.90 | 165.70 |
| **Average** | 99.10 | 105.63 | 146.30 | 161.97 |

**DAY 4:**

| | Right Leg | | | | Left Leg | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 141.00 | 142.00 | 144.00 | | 143.00 | 142.00 | 143.00 | |
| **Average** | 142.33 | | | | 142.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.30 | 33.40 | 33.30 | 33.33 | 33.30 | 33.80 | 33.30 | 33.47 |
| 2" above JT Line | 36.20 | 36.50 | 36.50 | 36.40 | 37.00 | 36.80 | 37.00 | 36.93 |
| 4" above JT Line | 40.20 | 40.50 | 40.90 | 40.53 | 40.90 | 40.70 | 41.20 | 40.93 |
| 6" above JT Line | 45.40 | 45.70 | 45.70 | 45.60 | 46.50 | 46.10 | 45.80 | 46.13 |
| 8" above JT Line | 49.50 | 49.30 | 50.20 | 49.67 | 50.20 | 50.30 | 50.00 | 50.17 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 1.00 | 1.00 | 1.33 | 1.00 | 1.00 | 3.00 | 1.67 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 1.00 | 0.00 | 0.00 | 0.33 | 1.00 | 0.00 | 1.00 | 0.67 |
| 6" above JT Line | 4.00 | 2.00 | 3.00 | 3.00 | 4.00 | 1.00 | 4.00 | 3.00 |
| 8" above JT Line | 7.00 | 4.00 | 6.00 | 5.67 | 6.00 | 3.00 | 7.00 | 5.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | R-Leg | L-Leg | R-Leg | L-Leg |
| S1/R1 | 106.00 | 99.80 | 152.90 | 169.30 |
| S1/R2 | 106.20 | 112.30 | 154.20 | 160.70 |
| S1/R3 | 105.40 | 106.30 | 145.30 | 162.70 |
| **Average** | 105.87 | 106.13 | 150.80 | 164.23 |

**DAY 5:**

| | Right Leg | | | | Left Leg | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 145.00 | 147.00 | 147.00 | | 145.00 | 145.00 | 146.00 | |
| **Average** | 146.33 | | | | 145.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.00 | 33.20 | 33.00 | 33.07 | 33.20 | 33.20 | 33.10 | 33.17 |
| 2" above JT Line | 36.20 | 35.80 | 36.30 | 36.10 | 36.50 | 36.20 | 36.40 | 36.37 |
| 4" above JT Line | 40.30 | 40.10 | 40.40 | 40.27 | 41.00 | 40.30 | 40.20 | 40.50 |
| 6" above JT Line | 45.20 | 45.30 | 44.80 | 45.10 | 45.80 | 46.10 | 46.20 | 46.03 |
| 8" above JT Line | 49.80 | 49.20 | 49.80 | 49.60 | 49.90 | 50.00 | 50.20 | 50.03 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 1.00 | | 1.50 | 2.00 | 1.00 | | 1.50 |
| 2" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 4" above JT Line | 0.00 | 1.00 | | 0.50 | 0.00 | 0.00 | | 0.00 |
| 6" above JT Line | 4.00 | 3.00 | | 3.50 | 5.00 | 2.00 | | 3.50 |
| 8" above JT Line | 8.00 | 5.00 | | 6.50 | 7.00 | 5.00 | | 6.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | R-Leg | L-Leg | R-Leg | L-Leg |
| S1/R1 | 96.70 | 107.40 | 165.40 | 178.80 |
| S1/R2 | 106.60 | 115.70 | 159.90 | 192.40 |
| S1/R3 | 98.50 | 113.30 | 147.00 | 177.90 |
| **Average** | 100.60 | 112.13 | 157.43 | 183.03 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub03 | **Height:** | 172.72 | **Weight:** | 92.27 |
| **Treatment:** | Rno/LI | **Age:** | 25 | **Target HR:** | 117 |
| | Male | | | | |

**DAY 1:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 120.00 | 120.00 | 120.00 | | 120.00 | 120.00 | 122.00 | |
| **Average** | 120.00 | | | | 120.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 41.80 | 41.80 | 41.80 | 41.80 | 41.40 | 41.50 | 41.40 | 41.43 |
| 2" above JT Line | 44.70 | 45.40 | 45.00 | 45.03 | 44.60 | 44.90 | 44.70 | 44.73 |
| 4" above JT Line | 50.80 | 50.40 | 51.00 | 50.73 | 51.30 | 51.40 | 51.70 | 51.47 |
| 6" above JT Line | 57.00 | 57.80 | 57.10 | 57.30 | 59.00 | 58.40 | 58.30 | 58.57 |
| 8" above JT Line | 62.00 | 62.80 | 62.50 | 62.43 | 63.40 | 63.40 | 63.40 | 63.40 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 1.00 | 0.50 | | 0.75 |
| 6" above JT Line | 1.00 | 0.50 | | 0.75 | 1.00 | 1.00 | | 1.00 |
| 8" above JT Line | 0.50 | 0.50 | | 0.50 | 1.00 | 1.00 | | 1.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 199.46 | 164.90 | 212.19 | 249.32 |
| S1/R2 | 219.78 | 184.28 | 198.10 | 184.28 |
| S1/R3 | 189.56 | 181.57 | 138.75 | 209.21 |
| **Average** | 202.93 | 176.92 | 183.01 | 214.27 |

**DAY 2:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.67 |
| 2" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.33 |
| 4" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.33 |
| 6" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.00 | 0.50 |
| 8" above JT Line | 1.00 | 0.50 | 0.50 | 0.67 | 0.50 | 1.00 | 0.50 | 0.67 |

**DAY 3:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 118.00 | 119.00 | 119.00 | | 124.00 | 124.00 | 126.00 | |
| **Average** | 118.67 | | | | 124.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 42.00 | 42.00 | 42.00 | 42.00 | 41.20 | 41.60 | 41.30 | 41.37 |
| 2" above JT Line | 45.00 | 45.60 | 45.60 | 45.40 | 44.50 | 44.50 | 44.20 | 44.40 |
| 4" above JT Line | 51.60 | 51.90 | 51.30 | 51.60 | 50.30 | 50.90 | 50.80 | 50.67 |
| 6" above JT Line | 59.20 | 59.00 | 58.80 | 59.00 | 57.70 | 57.70 | 57.70 | 57.70 |
| 8" above JT Line | 62.00 | 62.80 | 62.90 | 62.57 | 63.00 | 63.50 | 63.00 | 63.17 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 2.00 | 2.00 | 2.33 | 2.00 | 2.00 | 0.50 | 1.50 |
| 2" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.33 |
| 4" above JT Line | 1.00 | 0.50 | 1.00 | 0.83 | 1.00 | 1.00 | 0.00 | 0.67 |
| 6" above JT Line | 3.00 | 2.00 | 2.00 | 2.33 | 3.00 | 2.00 | 0.50 | 1.83 |
| 8" above JT Line | 3.00 | 3.00 | 2.00 | 2.67 | 3.00 | 2.00 | 0.50 | 1.83 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 132.52 | 140.51 | 176.42 | 218.83 |
| S1/R2 | 171.27 | 168.83 | 116.39 | 152.17 |
| S1/R3 | 129.13 | 145.39 | 96.21 | 145.12 |
| **Average** | 144.31 | 151.58 | 129.67 | 172.04 |

**DAY 4:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 104.00 | 106.00 | 106.00 | | 120.00 | 118.00 | 120.00 | |
| **Average** | 105.33 | | | | 119.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 41.80 | 41.40 | 41.00 | 41.40 | 41.80 | 41.60 | 41.80 | 41.73 |
| 2" above JT Line | 45.50 | 45.50 | 45.50 | 45.50 | 45.40 | 44.40 | 44.60 | 44.80 |
| 4" above JT Line | 50.00 | 50.60 | 51.00 | 50.53 | 51.60 | 51.20 | 50.80 | 51.20 |
| 6" above JT Line | 58.00 | 58.00 | 58.00 | 58.00 | 59.00 | 58.80 | 58.80 | 58.87 |
| 8" above JT Line | 63.00 | 63.00 | 63.00 | 63.00 | 63.20 | 63.80 | 63.80 | 63.60 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 1.00 | 0.50 | 0.67 |
| 2" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| 6" above JT Line | 2.00 | 2.00 | 1.00 | 1.67 | 1.00 | 1.00 | 1.00 | 1.00 |
| 8" above JT Line | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 5.01 | 142.00 | 8.27 | 213.28 |
| S1/R2 | 86.31 | 168.29 | 128.73 | 189.97 |
| S1/R3 | 135.77 | 139.02 | 112.87 | 175.88 |
| **Average** | 75.70 | 149.77 | 83.29 | 193.04 |

**DAY 5:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 120.00 | 120.00 | 122.00 | | 124.00 | 124.00 | 125.00 | |
| **Average** | 120.67 | | | | 124.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 42.10 | 42.30 | 42.20 | 42.20 | 41.70 | 41.70 | 41.50 | 41.63 |
| 2" above JT Line | 45.30 | 45.50 | 45.50 | 45.43 | 44.50 | 44.50 | 44.50 | 44.50 |
| 4" above JT Line | 51.50 | 51.20 | 51.30 | 51.33 | 50.00 | 50.00 | 51.50 | 50.50 |
| 6" above JT Line | 57.50 | 58.20 | 58.20 | 57.97 | 58.20 | 58.50 | 58.20 | 58.30 |
| 8" above JT Line | 63.20 | 63.20 | 63.20 | 63.20 | 63.00 | 63.50 | 63.30 | 63.27 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 0.50 | | 0.75 | 0.50 | 0.50 | | 0.50 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 6" above JT Line | 1.00 | 1.00 | | 1.00 | 0.50 | 0.50 | | 0.50 |
| 8" above JT Line | 1.00 | 1.00 | | 1.00 | 0.50 | 0.50 | | 0.50 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 162.74 | 198.61 | 270.86 | 326.28 |
| S1/R2 | 254.06 | 196.07 | 265.58 | 306.00 |
| S1/R3 | 278.18 | 179.40 | 261.24 | 305.96 |
| **Average** | 231.66 | 191.36 | 265.89 | 312.75 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub04 | **Height:** | **186.69** | **Weight:** | 84.09 |
| **Treatment:** | Lno/RI | **Age:** | **21** | **Target HR:** | 129.35 |
| | Male | | | | |

**DAY 1:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 130.00 | 130.00 | 129.00 | | 123.00 | 123.00 | 123.00 | |
| **Average** | 129.67 | | | | 123.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 39.90 | 39.80 | 39.90 | 39.87 | 39.00 | 39.00 | 39.00 | 39.00 |
| 2" above JT Line | 40.30 | 40.30 | 40.20 | 40.27 | 40.10 | 40.10 | 40.00 | 40.07 |
| 4" above JT Line | 45.50 | 45.50 | 45.60 | 45.53 | 44.50 | 44.60 | 44.50 | 44.53 |
| 6" above JT Line | 51.00 | 51.00 | 51.10 | 51.03 | 49.50 | 49.60 | 49.50 | 49.53 |
| 8" above JT Line | 55.50 | 55.60 | 55.50 | 55.53 | 54.60 | 54.70 | 54.60 | 54.63 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | | 1.00 | 2.00 | 2.00 | | 2.00 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 1.00 | 1.00 | | 1.00 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 1.00 | | 0.75 |
| 6" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 1.00 | | 0.75 |
| 8" above JT Line | 1.00 | 0.50 | | 0.75 | 0.50 | 1.00 | | 0.75 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 194.86 | 162.04 | 232.28 | 226.45 |
| S1/R2 | 229.57 | 198.93 | 284.62 | 290.18 |
| S1/R3 | 232.55 | 209.91 | 240.42 | 281.51 |
| **Average** | 218.99 | 190.29 | 252.44 | 266.05 |

**DAY 2:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 2" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.67 |
| 4" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| 6" above JT Line | 0.50 | 0.50 | 1.00 | 0.67 | 1.00 | 0.50 | 0.50 | 0.67 |
| 8" above JT Line | 0.50 | 0.50 | 1.00 | 0.67 | 1.00 | 1.00 | 0.50 | 0.83 |

**DAY 3:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 125.00 | 126.00 | 125.00 | | 123.00 | 123.00 | 123.00 | |
| **Average** | 125.33 | | | | 123.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 39.30 | 39.50 | 39.10 | 39.30 | 38.80 | 38.90 | 38.80 | 38.83 |
| 2" above JT Line | 40.20 | 40.10 | 40.10 | 40.13 | 40.20 | 40.20 | 40.30 | 40.23 |
| 4" above JT Line | 44.90 | 44.80 | 45.00 | 44.90 | 45.10 | 45.30 | 45.10 | 45.17 |
| 6" above JT Line | 50.10 | 50.00 | 50.00 | 50.03 | 50.00 | 49.80 | 49.90 | 49.90 |
| 8" above JT Line | 55.50 | 55.40 | 55.40 | 55.43 | 55.10 | 55.20 | 55.10 | 55.13 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 1.00 | 1.00 | 1.33 | 2.00 | 2.00 | 1.00 | 1.67 |
| 2" above JT Line | 1.00 | 1.00 | 0.50 | 0.83 | 1.00 | 1.00 | 0.50 | 0.83 |
| 4" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 3.00 | 2.00 | 1.00 | 2.00 |
| 6" above JT Line | 3.00 | 2.00 | 2.00 | 2.33 | 3.00 | 3.00 | 2.00 | 2.67 |
| 8" above JT Line | 3.00 | 3.00 | 3.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 197.30 | 148.08 | 242.45 | 168.96 |
| S1/R2 | 245.84 | 169.91 | 252.76 | 205.03 |
| S1/R3 | 197.30 | 183.33 | 216.96 | 177.77 |
| **Average** | 213.48 | 167.11 | 237.39 | 183.92 |

**DAY 4:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 122.00 | 121.00 | 121.00 | | 119.00 | 119.00 | 118.00 | |
| **Average** | 121.33 | | | | 118.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.70 | 38.60 | 38.70 | 38.67 | 39.00 | 38.90 | 39.00 | 38.97 |
| 2" above JT Line | 40.10 | 40.10 | 40.00 | 40.07 | 40.50 | 40.50 | 40.40 | 40.47 |
| 4" above JT Line | 45.40 | 45.40 | 45.50 | 45.43 | 45.00 | 45.10 | 45.10 | 45.07 |
| 6" above JT Line | 51.20 | 51.10 | 51.10 | 51.13 | 50.80 | 50.60 | 50.70 | 50.70 |
| 8" above JT Line | 55.50 | 55.50 | 55.40 | 55.47 | 55.40 | 55.60 | 55.60 | 55.53 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 2.00 | 1.00 | 1.67 | 1.00 | 2.00 | 1.00 | 1.33 |
| 2" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 4" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 6" above JT Line | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 8" above JT Line | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 170.04 | 138.18 | 179.26 | 165.03 |
| S1/R2 | 195.40 | 171.40 | 232.01 | 178.59 |
| S1/R3 | 212.35 | 156.35 | 185.23 | 189.84 |
| **Average** | 192.60 | 155.31 | 198.83 | 177.82 |

**DAY 5:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 126.00 | 125.00 | 127.00 | | 125.00 | 126.00 | 127.00 | |
| **Average** | 126.00 | | | | 126.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.90 | 39.00 | 39.00 | 38.97 | 38.80 | 38.90 | 39.00 | 38.90 |
| 2" above JT Line | 40.30 | 40.20 | 40.30 | 40.27 | 40.40 | 40.30 | 40.20 | 40.30 |
| 4" above JT Line | 45.30 | 45.50 | 45.30 | 45.37 | 45.50 | 45.60 | 45.50 | 45.53 |
| 6" above JT Line | 50.80 | 50.70 | 50.80 | 50.77 | 50.40 | 50.50 | 50.50 | 50.47 |
| 8" above JT Line | 54.40 | 54.40 | 54.40 | 54.40 | 54.80 | 54.80 | 54.80 | 54.80 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 1.00 | | 1.50 | 1.00 | 1.00 | | 1.00 |
| 2" above JT Line | 1.00 | 0.50 | | 0.75 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 1.00 | 0.50 | | 0.75 | 1.00 | 1.00 | | 1.00 |
| 6" above JT Line | 3.00 | 2.00 | | 2.50 | 3.00 | 3.00 | | 3.00 |
| 8" above JT Line | 4.00 | 4.00 | | 4.00 | 4.00 | 4.00 | | 4.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 175.47 | 168.01 | 169.23 | 183.33 |
| S1/R2 | 202.04 | 186.86 | 202.32 | 198.79 |
| S1/R3 | 164.48 | 176.01 | 188.08 | 218.86 |
| **Average** | 180.66 | 176.96 | 186.54 | 200.33 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub05 | **Height:** | **154.94** | **Weight:** | 50 |
| **Treatment:** | Rno/LI | **Age:** | **23** | **Target HR:** | 128.05 |
| | Female | | | | |

**DAY 1:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 140.00 | 140.00 | 140.00 | | 144.00 | 145.00 | 144.00 | |
| **Average** | 140.00 | | | | 144.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 34.10 | 34.10 | 34.00 | 34.07 | 33.00 | 32.90 | 33.00 | 32.97 |
| 2" above JT Line | 37.00 | 37.00 | 36.80 | 36.93 | 35.40 | 35.60 | 35.30 | 35.43 |
| 4" above JT Line | 42.00 | 42.00 | 42.00 | 42.00 | 40.30 | 40.50 | 40.40 | 40.40 |
| 6" above JT Line | 47.00 | 47.00 | 47.20 | 47.07 | 46.20 | 46.40 | 46.20 | 46.27 |
| 8" above JT Line | 41.80 | 51.80 | 51.90 | 48.50 | 51.00 | 51.00 | 51.00 | 51.00 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 2.00 | | 1.50 | 1.00 | 1.00 | | 1.00 |
| 2" above JT Line | 1.00 | 2.00 | | 1.50 | 1.00 | 2.00 | | 1.50 |
| 4" above JT Line | 1.00 | 2.00 | | 1.50 | 0.50 | 2.00 | | 1.25 |
| 6" above JT Line | 0.50 | 2.00 | | 1.25 | 0.50 | 1.00 | | 0.75 |
| 8" above JT Line | 0.50 | 2.00 | | 1.25 | 1.00 | 1.00 | | 1.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 57.36 | 54.38 | 206.11 | 182.92 |
| S1/R2 | 79.60 | 54.38 | 220.49 | 205.03 |
| S1/R3 | 74.85 | 62.38 | 233.50 | 196.08 |
| **Average** | 70.60 | 57.05 | 220.03 | 194.68 |

**DAY 2:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 0.50 | 1.00 | 1.00 | 0.83 | 0.50 | 1.00 | 2.00 | 1.17 |
| 2" above JT Line | 0.50 | 1.00 | 1.00 | 0.83 | 0.50 | 1.00 | 3.00 | 1.50 |
| 4" above JT Line | 0.50 | 1.00 | 1.00 | 0.83 | 1.00 | 1.00 | 2.00 | 1.33 |
| 6" above JT Line | 0.50 | 1.00 | 1.00 | 0.83 | 0.00 | 1.00 | 3.00 | 1.33 |
| 8" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.33 |

**DAY 3:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 140.00 | 140.00 | 140.00 | | 132.00 | 132.00 | 131.00 | |
| **Average** | 140.00 | | | | 131.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.10 | 33.20 | 33.10 | 33.13 | 32.80 | 33.00 | 32.90 | 32.90 |
| 2" above JT Line | 36.10 | 36.00 | 36.10 | 36.07 | 35.40 | 35.50 | 35.50 | 35.47 |
| 4" above JT Line | 42.50 | 42.20 | 42.20 | 42.30 | 40.50 | 40.80 | 40.50 | 40.60 |
| 6" above JT Line | 47.00 | 47.10 | 47.00 | 47.03 | 46.40 | 46.30 | 46.40 | 46.37 |
| 8" above JT Line | 53.00 | 53.10 | 53.00 | 53.03 | 51.80 | 51.70 | 51.80 | 51.77 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 1.00 | 0.50 | 1.50 | 1.00 | 1.00 | 1.00 | 1.00 |
| 2" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 0.50 | 1.00 | 1.00 | 0.83 |
| 4" above JT Line | 2.00 | 2.00 | 1.00 | 1.67 | 1.00 | 1.00 | 1.00 | 1.00 |
| 6" above JT Line | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 8" above JT Line | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 2.00 | 1.00 | 1.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 61.29 | 58.04 | 167.74 | 145.50 |
| S1/R2 | 53.97 | 62.10 | 183.06 | 163.13 |
| S1/R3 | 50.71 | 47.60 | 185.91 | 158.11 |
| **Average** | 55.32 | 55.91 | 178.90 | 155.58 |

**DAY 4:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 140.00 | 140.00 | 140.00 | | 140.00 | 140.00 | 140.00 | |
| **Average** | 140.00 | | | | 140.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.40 | 33.10 | 33.40 | 33.30 | 33.00 | 33.00 | 33.00 | 33.00 |
| 2" above JT Line | 36.40 | 36.30 | 36.40 | 36.37 | 35.40 | 35.30 | 35.30 | 35.33 |
| 4" above JT Line | 41.30 | 41.30 | 41.30 | 41.30 | 40.80 | 40.90 | 40.80 | 40.83 |
| 6" above JT Line | 47.00 | 47.00 | 47.00 | 47.00 | 46.00 | 46.20 | 46.00 | 46.07 |
| 8" above JT Line | 51.50 | 51.60 | 51.60 | 51.57 | 50.60 | 50.60 | 50.40 | 50.53 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | 0.50 | 0.83 | 0.50 | 0.50 | 1.00 | 0.67 |
| 2" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 0.50 | 0.50 | 2.00 | 1.00 |
| 4" above JT Line | 1.00 | 2.00 | 0.50 | 1.17 | 1.00 | 0.50 | 1.00 | 0.83 |
| 6" above JT Line | 3.00 | 3.00 | 1.00 | 2.33 | 2.00 | 1.00 | 2.00 | 1.67 |
| 8" above JT Line | 4.00 | 4.00 | 3.00 | 3.67 | 2.00 | 2.00 | 2.00 | 2.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 42.17 | 44.88 | 171.40 | 150.52 |
| S1/R2 | 43.26 | 43.53 | 177.50 | 154.31 |
| S1/R3 | 42.85 | 47.73 | 179.53 | 170.58 |
| **Average** | 42.76 | 45.38 | 176.14 | 158.47 |

**DAY 5:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 145.00 | 143.00 | 144.00 | | 141.00 | 142.00 | 143.00 | |
| **Average** | 144.00 | | | | 142.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.40 | 33.30 | 33.30 | 33.33 | 32.30 | 32.40 | 32.30 | 32.33 |
| 2" above JT Line | 36.10 | 36.10 | 36.00 | 36.07 | 34.80 | 34.80 | 34.80 | 34.80 |
| 4" above JT Line | 40.50 | 40.40 | 40.50 | 40.47 | 39.60 | 39.50 | 39.60 | 39.57 |
| 6" above JT Line | 46.10 | 46.20 | 46.10 | 46.13 | 45.40 | 45.40 | 45.30 | 45.37 |
| 8" above JT Line | 51.10 | 51.20 | 51.10 | 51.13 | 50.50 | 50.50 | 50.50 | 50.50 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 6" above JT Line | 1.00 | 1.00 | | 1.00 | 0.50 | 0.50 | | 0.50 |
| 8" above JT Line | 3.00 | 3.00 | | 3.00 | 1.00 | 1.00 | | 1.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 42.85 | 44.07 | 184.01 | 172.89 |
| S1/R2 | 43.93 | 48.14 | 195.54 | 187.26 |
| S1/R3 | 54.78 | 43.26 | 195.67 | 188.62 |
| **Average** | 47.19 | 45.16 | 191.74 | 182.92 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub06 | **Height:** | **169.55** | **Weight:** | 66.6 |
| **Treatment:** | LI/Rno | **Age:** | **31** | **Target HR:** | 122.85 |
| | Male | | | | |

**DAY 1:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 145.00 | 144.00 | 144.00 | | 140.00 | 140.00 | 142.00 | |
| **Average** | 144.33 | | | | 140.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 36.50 | 36.30 | 36.30 | 36.37 | 36.80 | 36.70 | 36.70 | 36.73 |
| 2" above JT Line | 38.00 | 38.00 | 38.00 | 38.00 | 37.50 | 37.40 | 37.50 | 37.47 |
| 4" above JT Line | 42.60 | 42.80 | 42.60 | 42.67 | 42.60 | 42.70 | 42.80 | 42.70 |
| 6" above JT Line | 47.70 | 47.70 | 47.60 | 47.67 | | 47.80 | 47.70 | 47.80 |
| 8" above JT Line | 51.20 | 51.10 | 51.20 | 51.17 | 51.00 | 51.00 | 51.00 | 51.00 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | | 1.00 | 0.50 | 1.00 | | 0.75 |
| 2" above JT Line | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 6" above JT Line | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 |
| 8" above JT Line | 2.00 | 1.00 | | 1.50 | 2.00 | 1.00 | | 1.50 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 201.50 | 209.50 | 310.80 | 327.34 |
| S1/R2 | 184.94 | 189.30 | 320.66 | 315.00 |
| S1/R3 | 197.70 | 167.06 | 309.30 | 321.10 |
| **Average** | 194.71 | 188.62 | 313.59 | 321.15 |

**DAY 2:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 0.50 | 1.00 | 1.00 | 0.83 | 1.00 | 1.00 | 0.00 | 0.67 |
| 2" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.33 |
| 4" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.33 |
| 6" above JT Line | 1.00 | 0.50 | 1.00 | 0.83 | 0.50 | 1.00 | 0.00 | 0.50 |
| 8" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.67 |

**DAY 3:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 137.00 | 137.00 | 135.00 | | 140.00 | 139.00 | 140.00 | |
| **Average** | 136.33 | | | | 139.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 35.90 | 36.10 | 36.10 | 36.03 | 36.40 | 36.50 | 36.40 | 36.43 |
| 2" above JT Line | 37.20 | 37.20 | 37.30 | 37.23 | 36.70 | 36.60 | 36.70 | 36.67 |
| 4" above JT Line | 42.40 | 42.20 | 42.50 | 42.37 | 42.50 | 42.50 | 42.40 | 42.47 |
| 6" above JT Line | 47.40 | 47.80 | 47.60 | 47.60 | 47.80 | 47.80 | 47.90 | 47.83 |
| 8" above JT Line | 51.40 | 51.50 | 51.40 | 51.43 | 51.00 | 51.00 | 51.20 | 51.07 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 0.50 | 1.00 | 0.83 | 0.50 | 0.50 | 0.50 | 0.50 |
| 2" above JT Line | 0.50 | 0.50 | 1.00 | 0.67 | 0.50 | 0.50 | 0.50 | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| 6" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 8" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 1.00 | 1.00 | 0.50 | 0.83 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 178.45 | 170.77 | 251.54 | 257.37 |
| S1/R2 | 168.69 | 163.67 | 247.74 | 243.00 |
| S1/R3 | 158.38 | 157.30 | 247.06 | 241.50 |
| **Average** | 168.51 | 163.91 | 248.78 | 247.29 |

**DAY 4:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 130.00 | 128.00 | 130.00 | | 135.00 | 136.00 | 135.00 | |
| **Average** | 129.33 | | | | 135.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 36.30 | 36.30 | 36.50 | 36.37 | 36.80 | 36.80 | 36.90 | 36.83 |
| 2" above JT Line | 38.20 | 38.20 | 38.30 | 38.23 | 37.80 | 37.90 | 37.80 | 37.83 |
| 4" above JT Line | 42.50 | 42.60 | 42.50 | 42.53 | 43.80 | 43.70 | 43.90 | 43.80 |
| 6" above JT Line | 48.10 | 48.00 | 48.10 | 48.07 | 48.50 | 48.50 | 48.60 | 48.53 |
| 8" above JT Line | 51.80 | 51.80 | 58.90 | 54.17 | 52.20 | 52.10 | 52.10 | 52.13 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 0.50 | | 1.25 | 0.50 | 0.50 | | 0.50 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 1.00 | 1.00 | | 1.00 |
| 6" above JT Line | 3.00 | 1.00 | | 2.00 | 1.00 | 1.00 | | 1.00 |
| 8" above JT Line | 2.00 | 1.00 | | 1.50 | 2.00 | 2.00 | | 2.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 69.43 | 154.04 | 116.75 | 224.69 |
| S1/R2 | 84.61 | 157.30 | 149.16 | 208.69 |
| S1/R3 | 109.97 | 146.04 | 177.36 | 224.69 |
| **Average** | 88.00 | 152.46 | 147.76 | 219.36 |

**DAY 5:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 130.00 | 130.00 | 131.00 | | 136.00 | 138.00 | 137.00 | |
| **Average** | 130.33 | | | | 137.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 36.70 | 36.60 | 36.70 | 36.67 | 36.80 | 36.70 | 36.80 | 36.77 |
| 2" above JT Line | 38.50 | 38.40 | 38.50 | 38.47 | 37.60 | 37.70 | 37.60 | 37.63 |
| 4" above JT Line | 43.80 | 43.90 | 43.80 | 43.83 | 43.60 | 43.60 | 43.50 | 43.57 |
| 6" above JT Line | 49.20 | 49.20 | 49.30 | 49.23 | 48.80 | 48.80 | 48.90 | 48.83 |
| 8" above JT Line | 52.80 | 52.90 | 52.90 | 52.87 | 51.60 | 51.70 | 51.60 | 51.63 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 0.50 | | 0.75 | 0.50 | 0.50 | | 0.50 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 1.00 | 0.50 | | 0.75 |
| 6" above JT Line | 1.00 | 1.00 | | 1.00 | 2.00 | 1.00 | | 1.50 |
| 8" above JT Line | 2.00 | 2.00 | | 2.00 | 2.00 | 2.00 | | 2.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 88.14 | 142.24 | 178.79 | 212.35 |
| S1/R2 | 141.43 | 150.79 | 204.08 | 242.18 |
| S1/R3 | 135.74 | 153.23 | 211.81 | 240.01 |
| **Average** | 121.77 | 148.75 | 198.23 | 231.51 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub07 | **Height:** | **168.91** | **Weight:** | 58.64 |
| **Treatment:** | Lno/Rice | **Age:** | **26** | **Target HR:** | 126.1 |
| | Female | | | | |

**DAY 1:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 146.00 | 147.00 | 146.00 | | 145.00 | 147.00 | 146.00 | |
| **Average** | 146.33 | | | | 146.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 35.00 | 35.00 | 34.80 | 34.93 | 35.20 | 35.30 | 35.20 | 35.23 |
| 2" above JT Line | 37.10 | 37.10 | 37.20 | 37.13 | 37.10 | 37.20 | 37.20 | 37.17 |
| 4" above JT Line | 40.70 | 40.70 | 40.80 | 40.73 | 41.00 | 41.10 | 41.00 | 41.03 |
| 6" above JT Line | 45.30 | 45.20 | 45.30 | 45.27 | 46.80 | 46.70 | 46.80 | 46.77 |
| 8" above JT Line | 50.50 | 50.60 | 50.50 | 50.53 | 52.20 | 52.30 | 52.20 | 52.23 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 2.00 | | 2.50 | 2.00 | 2.00 | | 2.00 |
| 2" above JT Line | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 6" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 8" above JT Line | 2.00 | 2.00 | | 2.00 | 2.00 | 2.00 | | 2.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 2.85 | 85.83 | 4.61 | 193.77 |
| S1/R2 | 79.05 | 94.41 | 175.87 | 202.18 |
| S1/R3 | 94.78 | 117.02 | 195.13 | 219.67 |
| **Average** | 58.89 | 99.09 | 125.20 | 205.21 |

**DAY 2:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 1.00 | 2.00 | 0.00 | 1.00 | 1.00 | 0.50 | 1.00 | 0.83 |
| 2" above JT Line | 0.50 | 0.50 | 0.00 | 0.33 | 0.50 | 1.00 | 0.50 | 0.67 |
| 4" above JT Line | 0.50 | 0.50 | 0.00 | 0.33 | 0.50 | 0.50 | 0.50 | 0.50 |
| 6" above JT Line | 1.00 | 0.50 | 0.50 | 0.67 | 1.00 | 0.50 | 0.50 | 0.67 |
| 8" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 2.00 | 2.00 | 2.00 | 2.00 |

**DAY 3:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 142.00 | 140.00 | 142.00 | | 142.00 | 144.00 | 142.00 | |
| **Average** | 141.33 | | | | 142.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 35.00 | 35.20 | 35.00 | 35.07 | 35.00 | 35.00 | 35.20 | 35.07 |
| 2" above JT Line | 37.40 | 37.40 | 37.50 | 37.43 | 37.40 | 37.30 | 37.40 | 37.37 |
| 4" above JT Line | 41.40 | 41.50 | 41.40 | 41.43 | 41.10 | 41.10 | 41.20 | 41.13 |
| 6" above JT Line | 46.00 | 46.00 | 46.20 | 46.07 | 46.20 | 46.30 | 46.20 | 46.23 |
| 8" above JT Line | 51.00 | 50.90 | 51.00 | 50.97 | 51.00 | 51.10 | 51.00 | 51.03 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | 0.00 | 0.67 | 1.00 | 1.00 | 1.00 | 1.00 |
| 2" above JT Line | 0.50 | 0.50 | 0.00 | 0.33 | 0.50 | 0.50 | 0.50 | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | 0.00 | 0.33 | 0.50 | 0.50 | 0.50 | 0.50 |
| 6" above JT Line | 2.00 | 1.00 | 0.50 | 1.17 | 0.50 | 0.50 | 0.50 | 0.50 |
| 8" above JT Line | 3.00 | 2.00 | 0.50 | 1.83 | 2.00 | 1.00 | 1.00 | 1.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 92.21 | 116.21 | 139.13 | 216.42 |
| S1/R2 | 99.67 | 132.21 | 142.38 | 223.33 |
| S1/R3 | 153.63 | 114.45 | 136.41 | 220.35 |
| **Average** | 115.17 | 120.96 | 139.31 | 220.03 |

**DAY 4:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 145.00 | 145.00 | 146.00 | | 145.00 | 145.00 | 146.00 | |
| **Average** | 145.33 | | | | 145.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 35.50 | 35.50 | 35.60 | 35.53 | 36.40 | 36.50 | 36.40 | 36.43 |
| 2" above JT Line | 38.30 | 38.50 | 38.40 | 38.40 | 38.40 | 38.40 | 38.30 | 38.37 |
| 4" above JT Line | 42.60 | 42.70 | 42.70 | 42.67 | 42.40 | 42.50 | 42.40 | 42.43 |
| 6" above JT Line | 47.30 | 47.20 | 47.30 | 47.27 | 48.10 | 48.30 | 48.20 | 48.20 |
| 8" above JT Line | 51.10 | 51.20 | 51.20 | 51.17 | 52.80 | 53.10 | 53.10 | 53.00 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | 0.50 | 0.83 | 0.50 | 1.00 | 1.00 | 0.83 |
| 2" above JT Line | 1.00 | 0.50 | 0.50 | 0.67 | 0.50 | 1.00 | 0.50 | 0.67 |
| 4" above JT Line | 0.50 | 1.00 | 0.50 | 0.67 | 1.00 | 1.00 | 0.50 | 0.83 |
| 6" above JT Line | 4.00 | 3.00 | 2.00 | 3.00 | 2.00 | 2.00 | 1.00 | 1.67 |
| 8" above JT Line | 6.00 | 5.00 | 3.00 | 4.67 | 3.00 | 3.00 | 2.00 | 2.67 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 55.32 | 99.67 | 169.23 | 162.45 |
| S1/R2 | 174.52 | 135.19 | 178.31 | 159.33 |
| S1/R3 | 191.60 | 160.69 | 173.43 | 191.47 |
| **Average** | 140.48 | 131.85 | 173.66 | 171.08 |

**DAY 5:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 145.00 | 146.00 | 145.00 | | 145.00 | 145.00 | 145.00 | |
| **Average** | 145.33 | | | | 145.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 35.30 | 35.20 | 35.20 | 35.23 | 36.30 | 36.30 | 36.30 | 36.30 |
| 2" above JT Line | 37.50 | 37.70 | 37.70 | 37.63 | 38.50 | 38.60 | 38.50 | 38.53 |
| 4" above JT Line | 41.80 | 41.80 | 41.90 | 41.83 | 43.30 | 43.40 | 43.40 | 43.37 |
| 6" above JT Line | 46.80 | 46.80 | 46.80 | 46.80 | 48.80 | 48.80 | 48.60 | 48.73 |
| 8" above JT Line | 51.20 | 51.20 | 51.30 | 51.23 | 53.60 | 53.70 | 53.60 | 53.63 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 6" above JT Line | 3.00 | 1.00 | | 2.00 | 1.00 | 1.00 | | 1.00 |
| 8" above JT Line | 5.00 | 3.00 | | 4.00 | 3.00 | 3.00 | | 3.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 58.71 | 85.29 | 223.60 | 281.91 |
| S1/R2 | 232.96 | 249.23 | 223.60 | 271.06 |
| S1/R3 | 237.16 | 229.30 | 219.67 | 252.89 |
| **Average** | 176.28 | 187.94 | 222.29 | 268.62 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub08 | **Height:** | **157.48** | **Weight:** | 104.55 |
| **Treatment:** | RI/Lno | **Age:** | **37** | **Target HR:** | 118.95 |
| | Female | | | | |

**DAY 1:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 124.00 | 123.00 | 124.00 | | 123.00 | 127.00 | 123.00 | |
| **Average** | 123.67 | | | | 124.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 46.00 | 46.00 | 45.90 | 45.97 | 42.20 | 42.40 | 42.40 | 42.33 |
| 2" above JT Line | 50.50 | 50.50 | 50.60 | 50.53 | 51.10 | 51.20 | 51.10 | 51.13 |
| 4" above JT Line | 61.20 | 61.40 | 61.40 | 61.33 | 59.20 | 59.00 | 59.20 | 59.13 |
| 6" above JT Line | 68.20 | 68.20 | 68.20 | 68.20 | 64.60 | 64.50 | 64.60 | 64.57 |
| 8" above JT Line | 71.50 | 71.60 | 71.60 | 71.57 | 72.60 | 72.80 | 72.60 | 72.67 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 0.50 | | 0.75 | 0.00 | 0.50 | | 0.25 |
| 2" above JT Line | 2.00 | 1.00 | | 1.50 | 1.00 | 1.00 | | 1.00 |
| 4" above JT Line | 2.00 | 2.00 | | 2.00 | 2.00 | 0.50 | | 1.25 |
| 6" above JT Line | 2.00 | 2.00 | | 2.00 | 2.00 | 1.00 | | 1.50 |
| 8" above JT Line | 4.00 | 4.00 | | 4.00 | 3.00 | 2.00 | | 2.50 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 87.87 | 71.80 | 178.86 | 159.43 |
| S1/R2 | 114.45 | 114.52 | 150.79 | 152.33 |
| S1/R3 | 120.14 | 91.18 | 171.26 | 163.39 |
| **Average** | 107.49 | 92.50 | 166.97 | 158.38 |

**DAY 2:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 1.00 | 1.00 | 0.00 | 0.67 | 0.00 | 0.50 | 1.00 | 0.50 |
| 2" above JT Line | 1.00 | 2.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 4" above JT Line | 1.00 | 2.00 | 0.00 | 1.00 | 2.00 | 0.50 | 2.00 | 1.50 |
| 6" above JT Line | 2.00 | 3.00 | 0.00 | 1.67 | 2.00 | 1.00 | 2.00 | 1.67 |
| 8" above JT Line | 4.00 | 5.00 | 0.00 | 3.00 | 3.00 | 2.00 | 3.00 | 2.67 |

**DAY 3:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 110.00 | 110.00 | 111.00 | | 105.00 | 105.00 | 105.00 | |
| **Average** | 110.33 | | | | 105.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 45.10 | 45.20 | 45.20 | 45.17 | 43.60 | 43.50 | 43.60 | 43.57 |
| 2" above JT Line | 50.60 | 50.50 | 50.40 | 50.50 | 51.50 | 51.50 | 51.40 | 51.47 |
| 4" above JT Line | 59.10 | 59.10 | 59.20 | 59.13 | 59.10 | 59.20 | 59.10 | 59.13 |
| 6" above JT Line | 67.50 | 67.50 | 67.60 | 67.53 | 66.10 | 66.00 | 66.10 | 66.07 |
| 8" above JT Line | 72.40 | 72.50 | 72.40 | 72.43 | 72.80 | 72.90 | 72.80 | 72.83 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 2.00 | 2.00 | 1.67 | 2.00 | 2.00 | 2.00 | 2.00 |
| 2" above JT Line | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| 4" above JT Line | 3.00 | 2.00 | 2.00 | 2.33 | 4.00 | 4.00 | 4.00 | 4.00 |
| 6" above JT Line | 5.00 | 3.00 | 4.00 | 4.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| 8" above JT Line | 5.00 | 5.00 | 5.00 | 5.00 | 6.00 | 6.00 | 6.00 | 6.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 43.12 | 45.56 | 111.60 | 109.29 |
| S1/R2 | 91.67 | 97.23 | 123.12 | 112.55 |
| S1/R3 | 100.48 | 97.23 | 130.99 | 123.12 |
| **Average** | 78.42 | 80.01 | 121.90 | 114.99 |

**DAY 4:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 98.00 | 102.00 | 102.00 | | 107.00 | 112.00 | 112.00 | |
| **Average** | 100.67 | | | | 110.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 44.80 | 44.70 | 44.70 | 44.73 | 42.50 | 42.60 | 42.70 | 42.60 |
| 2" above JT Line | 50.70 | 50.50 | 50.70 | 50.63 | 50.70 | 50.80 | 50.70 | 50.73 |
| 4" above JT Line | 59.50 | 59.50 | 59.60 | 59.53 | 58.80 | 58.70 | 58.70 | 58.73 |
| 6" above JT Line | 67.70 | 67.80 | 67.70 | 67.73 | 66.10 | 66.20 | 66.10 | 66.13 |
| 8" above JT Line | 74.60 | 74.70 | 74.70 | 74.67 | 73.80 | 73.70 | 73.80 | 73.77 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.33 |
| 2" above JT Line | 2.00 | 1.00 | 0.50 | 1.17 | 1.00 | 1.00 | 1.00 | 1.00 |
| 4" above JT Line | 3.00 | 3.00 | 1.00 | 2.33 | 2.00 | 2.00 | 2.00 | 2.00 |
| 6" above JT Line | 3.00 | 4.00 | 2.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 8" above JT Line | 5.00 | 5.00 | 4.00 | 4.67 | 3.00 | 5.00 | 5.00 | 4.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 28.61 | 57.09 | 61.43 | 89.63 |
| S1/R2 | 47.19 | 72.27 | 86.24 | 105.5 |
| S1/R3 | 70.51 | 78.78 | 78.51 | 111.46 |
| **Average** | 48.77 | 69.38 | 75.39 | 102.20 |

**DAY 5:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 112.00 | 112.00 | 112.00 | | 116.00 | 115.00 | 115.00 | |
| **Average** | 112.00 | | | | 115.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 45.30 | 45.40 | 45.40 | 45.37 | 43.80 | 43.70 | 43.80 | 43.77 |
| 2" above JT Line | 50.80 | 50.80 | 50.90 | 50.83 | 51.10 | 51.10 | 51.10 | 51.10 |
| 4" above JT Line | 60.10 | 60.20 | 60.10 | 60.13 | 58.10 | 58.20 | 58.20 | 58.17 |
| 6" above JT Line | 67.80 | 67.90 | 67.80 | 67.83 | 64.80 | 64.80 | 64.70 | 64.77 |
| 8" above JT Line | 71.10 | 71.20 | 71.10 | 71.13 | 72.60 | 72.70 | 72.60 | 72.63 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 |
| 2" above JT Line | 1.00 | 1.00 | | 1.00 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 1.00 | 1.00 | | 1.00 | 1.00 | 2.00 | | 1.50 |
| 6" above JT Line | 2.00 | 2.00 | | 2.00 | 2.00 | 3.00 | | 2.50 |
| 8" above JT Line | 3.00 | 3.00 | | 3.00 | 3.00 | 4.00 | | 3.50 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 46.78 | 54.10 | 99.67 | 126.65 |
| S1/R2 | 96.00 | 97.09 | 108.21 | 128.82 |
| S1/R3 | 97.90 | 105.77 | 133.29 | 122.85 |
| **Average** | 80.23 | 85.65 | 113.72 | 126.11 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub09 | **Height:** | **166.37** | **Weight:** | 79.54 |
| **Treatment:** | Rno/Lice | **Age:** | **29** | **Target HR:** | 124.15 |
| | Male | | | | |

**DAY 1:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135 | 135 | 133 | | 135 | 136 | 136 | |
| **Average** | 134.333 | | | | 135.667 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.7 | 38.8 | 38.8 | 38.767 | 37.8 | 37.6 | 37.8 | 37.733 |
| 2" above JT Line | 42.5 | 42.5 | 42.6 | 42.533 | 43.1 | 43.2 | 43.1 | 43.133 |
| 4" above JT Line | 49.8 | 49.8 | 49.9 | 49.833 | 49.5 | 49.5 | 49.4 | 49.467 |
| 6" above JT Line | 54.5 | 54.6 | 54.6 | 54.567 | 55.7 | 55.6 | 55.7 | 55.667 |
| 8" above JT Line | 58.4 | 58.4 | 58.5 | 58.433 | 58.5 | 58.5 | 58.4 | 58.467 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.00 | 0.00 | | 0.00 | 1.00 | 1.00 | | 1.00 |
| 2" above JT Line | 0.00 | 0.50 | | 0.25 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 0.50 | 1.00 | | 0.75 | 0.50 | 1.00 | | 0.75 |
| 6" above JT Line | 0.50 | 1.00 | | 0.75 | 1.00 | 2.00 | | 1.50 |
| 8" above JT Line | 1.00 | 1.00 | | 1.00 | 2.00 | 1.00 | | 1.50 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 229.03 | 225.64 | 331.41 | 320.56 |
| S1/R2 | 255.33 | 245.71 | 337.92 | 326.52 |
| S1/R3 | 215.74 | 245.98 | 307.41 | 341.58 |
| **Average** | 233.37 | 239.11 | 325.58 | 329.55 |

**DAY 2:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 2.00 | 1.17 |
| 2" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| 4" above JT Line | 1.00 | 0.50 | 0.50 | 0.67 | 1.00 | 0.50 | 1.00 | 0.83 |
| 6" above JT Line | 1.00 | 0.50 | 0.50 | 0.67 | 1.00 | 0.50 | 1.00 | 0.83 |
| 8" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 1.00 | 0.50 | 2.00 | 1.17 |

**DAY 3:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135.00 | 135.00 | 134.00 | | 134.00 | 137.00 | 136.00 | |
| **Average** | 134.67 | | | | 135.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.80 | 39.00 | 38.90 | 38.90 | 38.20 | 38.30 | 38.30 | 38.27 |
| 2" above JT Line | 43.40 | 43.30 | 43.40 | 43.37 | 42.20 | 42.30 | 42.30 | 42.27 |
| 4" above JT Line | 49.60 | 49.60 | 49.70 | 49.63 | 49.70 | 49.60 | 49.70 | 49.67 |
| 6" above JT Line | 54.90 | 55.00 | 55.00 | 54.97 | 55.40 | 55.50 | 55.40 | 55.43 |
| 8" above JT Line | 58.30 | 58.40 | 58.40 | 58.37 | 58.70 | 58.60 | 58.70 | 58.67 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.00 | 0.50 | 1.00 | 0.50 | 2.00 | 1.00 | 2.00 | 1.67 |
| 2" above JT Line | 0.50 | 0.00 | 0.50 | 0.33 | 0.50 | 0.50 | 0.50 | 0.50 |
| 4" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 6" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 1.67 |
| 8" above JT Line | 2.00 | 1.00 | 2.00 | 1.67 | 3.00 | 2.00 | 3.00 | 2.67 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 179.13 | 148.62 | 310.12 | 281.78 |
| S1/R2 | 226.45 | 241.77 | 367.34 | 309.03 |
| S1/R3 | 242.45 | 215.20 | 344.70 | 350.39 |
| **Average** | 216.01 | 201.86 | 340.72 | 313.73 |

**DAY 4:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 134.00 | 135.00 | 133.00 | | 135.00 | 135.00 | 134.00 | |
| **Average** | 134.00 | | | | 134.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 39.30 | 39.20 | 39.20 | 39.23 | 38.20 | 38.30 | 38.30 | 38.27 |
| 2" above JT Line | 42.70 | 42.80 | 42.70 | 42.73 | 42.30 | 42.40 | 42.30 | 42.33 |
| 4" above JT Line | 49.30 | 49.20 | 49.30 | 49.27 | 48.80 | 48.90 | 48.80 | 48.83 |
| 6" above JT Line | 55.70 | 55.60 | 55.60 | 55.63 | 56.50 | 56.50 | 56.50 | 56.50 |
| 8" above JT Line | 58.70 | 58.80 | 58.80 | 58.77 | 59.00 | 59.00 | 59.10 | 59.03 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.50 | 0.00 | 0.50 | 0.33 | 2.00 | 1.00 | 2.00 | 1.67 |
| 2" above JT Line | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 1.00 | 0.83 |
| 4" above JT Line | 0.50 | 1.00 | 0.50 | 0.67 | 2.00 | 1.00 | 1.00 | 1.33 |
| 6" above JT Line | 1.00 | 1.00 | 0.50 | 0.83 | 3.00 | 1.00 | 2.00 | 2.00 |
| 8" above JT Line | 1.00 | 2.00 | 1.00 | 1.33 | 3.00 | 2.00 | 3.00 | 2.67 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 139.53 | 157.57 | 285.17 | 281.64 |
| S1/R2 | 212.08 | 194.04 | 339.41 | 331.14 |
| S1/R3 | 188.08 | 171.26 | 325.03 | 366.66 |
| **Average** | 179.90 | 182.65 | 316.54 | 326.48 |

**DAY 5:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 134.00 | 133.00 | 135.00 | | 135.00 | 135.00 | 135.00 | |
| **Average** | 134.00 | | | | 135.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 39.00 | 39.00 | 39.10 | 39.03 | 38.60 | 38.60 | 38.60 | 38.60 |
| 2" above JT Line | 43.00 | 43.00 | 43.00 | 43.00 | 43.30 | 43.30 | 43.40 | 43.33 |
| 4" above JT Line | 49.10 | 49.10 | 49.20 | 49.13 | 49.60 | 49.50 | 49.50 | 49.53 |
| 6" above JT Line | 55.10 | 55.20 | 55.10 | 55.13 | 55.70 | 55.80 | 55.70 | 55.73 |
| 8" above JT Line | 58.60 | 58.60 | 58.60 | 58.60 | 58.90 | 58.90 | 58.90 | 58.90 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.00 | 0.00 | | 0.00 | 1.00 | 0.00 | | 0.50 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 |
| 4" above JT Line | 1.00 | 0.50 | | 0.75 | 1.00 | 1.00 | | 1.00 |
| 6" above JT Line | 1.00 | 1.00 | | 1.00 | 2.00 | 2.00 | | 2.00 |
| 8" above JT Line | 2.00 | 1.00 | | 1.50 | 2.00 | 3.00 | | 2.50 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 176.01 | 133.70 | 296.15 | 274.05 |
| S1/R2 | 208.01 | 177.91 | 320.15 | 344.97 |
| S1/R3 | 239.20 | 202.72 | 340.63 | 346.59 |
| **Average** | 207.74 | 171.44 | 318.98 | 321.87 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub10 | **Height:** | **156.21** | **Weight:** | 48.64 |
| **Treatment:** | LI/Rno | **Age:** | **24** | **Target HR:** | 127.4 |
| | Female | | | | |

**DAY 1:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 150.00 | 151.00 | 151.00 | | 150.00 | 150.00 | 150.00 | |
| **Average** | 150.67 | | | | 150.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.10 | 33.10 | 33.20 | 33.13 | 34.00 | 34.00 | 34.00 | 34.00 |
| 2" above JT Line | 34.10 | 34.20 | 34.10 | 34.13 | 34.10 | 34.10 | 34.10 | 34.10 |
| 4" above JT Line | 38.20 | 38.30 | 38.20 | 38.23 | 39.10 | 39.20 | 39.10 | 39.13 |
| 6" above JT Line | 43.10 | 43.20 | 43.10 | 43.13 | 44.10 | 44.20 | 44.10 | 44.13 |
| 8" above JT Line | 47.70 | 47.80 | 47.70 | 47.73 | 48.30 | 48.20 | 48.30 | 48.27 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 7.00 | 3.00 | | 5.00 | 7.00 | 3.00 | | 5.00 |
| 2" above JT Line | 0.00 | 2.00 | | 1.00 | 3.00 | 4.00 | | 3.50 |
| 4" above JT Line | 1.00 | 3.00 | | 2.00 | 4.00 | 2.00 | | 3.00 |
| 6" above JT Line | 4.00 | 5.00 | | 4.50 | 6.00 | 6.00 | | 6.00 |
| 8" above JT Line | 6.00 | 8.00 | | 7.00 | 6.00 | 7.00 | | 6.50 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 73.09 | 93.70 | 135.33 | 149.43 |
| S1/R2 | 79.05 | 100.21 | 144.01 | 156.75 |
| S1/R3 | 22.51 | 92.07 | 1.36 | 144.01 |
| **Average** | 58.22 | 95.33 | 93.57 | 150.06 |

**DAY 2:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 2.00 | 3.00 | 3.00 | 2.67 | 3.00 | 1.00 | 0.00 | 1.33 |
| 2" above JT Line | 1.00 | 2.00 | 1.00 | 1.33 | 1.00 | 1.00 | 1.00 | 1.00 |
| 4" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 1.00 | 1.00 | 1.00 | 1.00 |
| 6" above JT Line | 4.00 | 2.00 | 2.00 | 2.67 | 3.00 | 2.00 | 2.00 | 2.33 |
| 8" above JT Line | 7.00 | 2.00 | 6.00 | 5.00 | 5.00 | 4.00 | 4.00 | 4.33 |

**DAY 3:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 145.00 | 145.00 | 145.00 | | 150.00 | 148.00 | 149.00 | |
| **Average** | 145.00 | | | | 149.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.30 | 33.40 | 33.30 | 33.33 | 33.60 | 33.60 | 33.70 | 33.63 |
| 2" above JT Line | 34.30 | 34.20 | 34.30 | 34.27 | 34.00 | 34.10 | 34.10 | 34.07 |
| 4" above JT Line | 37.70 | 37.80 | 37.70 | 37.73 | 38.70 | 38.80 | 38.70 | 38.73 |
| 6" above JT Line | 42.50 | 42.50 | 42.50 | 42.50 | 43.50 | 43.50 | 43.50 | 43.50 |
| 8" above JT Line | 47.00 | 47.00 | 47.00 | 47.00 | 48.70 | 48.80 | 48.80 | 48.77 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 3.00 | 2.00 | 2.67 | 3.00 | 2.00 | 2.00 | 2.33 |
| 2" above JT Line | 1.00 | 1.00 | 2.00 | 1.33 | 0.00 | 1.00 | 3.00 | 1.33 |
| 4" above JT Line | 2.00 | 3.00 | 1.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.33 |
| 6" above JT Line | 3.00 | 2.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.67 |
| 8" above JT Line | 4.00 | 5.00 | 1.00 | 3.33 | 3.00 | 4.00 | 2.00 | 3.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 60.34 | 70.11 | 129.63 | 145.09 |
| S1/R2 | 75.94 | 91.26 | 138.18 | 141.16 |
| S1/R3 | 60.88 | 70.65 | 139.13 | 152.96 |
| **Average** | 65.72 | 77.34 | 135.65 | 146.40 |

**DAY 4:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 145.00 | 145.00 | 145.00 | | 150.00 | 150.00 | 150.00 | |
| **Average** | 145.00 | | | | 150.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.40 | 33.50 | 33.50 | 33.47 | 33.70 | 33.70 | 33.70 | 33.70 |
| 2" above JT Line | 34.00 | 34.00 | 34.00 | 34.00 | 34.00 | 34.00 | 34.10 | 34.03 |
| 4" above JT Line | 37.90 | 37.90 | 38.00 | 37.93 | 39.40 | 39.40 | 39.50 | 39.43 |
| 6" above JT Line | 42.70 | 42.80 | 42.70 | 42.73 | 44.40 | 44.40 | 44.50 | 44.43 |
| 8" above JT Line | 47.10 | 47.20 | 47.20 | 47.17 | 48.60 | 48.60 | 48.70 | 48.63 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 0.00 | 1.00 | 1.33 | 4.00 | 2.00 | 2.00 | 2.67 |
| 2" above JT Line | 2.00 | 2.00 | 1.00 | 1.67 | 2.00 | 1.00 | 0.00 | 1.00 |
| 4" above JT Line | 1.00 | 4.00 | 4.00 | 3.00 | 2.00 | 5.00 | 1.00 | 2.67 |
| 6" above JT Line | 4.00 | 5.00 | 3.00 | 4.00 | 3.00 | 4.00 | 0.50 | 2.50 |
| 8" above JT Line | 7.00 | 5.00 | 8.00 | 6.67 | 4.00 | 3.00 | 4.00 | 3.67 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 46.10 | 70.78 | 139.26 | 138.85 |
| S1/R2 | 73.90 | 79.33 | 145.36 | 143.33 |
| S1/R3 | 61.83 | 69.43 | 147.80 | 152.28 |
| **Average** | 60.61 | 73.18 | 144.14 | 144.82 |

**DAY 5:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 150.00 | 150.00 | 150.00 | | 151.00 | 152.00 | 154.00 | |
| **Average** | 150.00 | | | | 152.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 33.40 | 33.40 | 33.50 | 33.43 | 33.70 | 33.60 | 33.70 | 33.67 |
| 2" above JT Line | 33.90 | 33.90 | 33.90 | 33.90 | 34.10 | 34.10 | 34.10 | 34.10 |
| 4" above JT Line | 38.50 | 38.50 | 38.60 | 38.53 | 37.70 | 37.80 | 37.70 | 37.73 |
| 6" above JT Line | 43.20 | 43.20 | 43.20 | 43.20 | 43.90 | 43.90 | 44.00 | 43.93 |
| 8" above JT Line | 47.00 | 47.00 | 47.10 | 47.03 | 48.60 | 48.60 | 48.70 | 48.63 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 3.00 | | 3.00 | 1.00 | 2.00 | | 1.50 |
| 2" above JT Line | 0.00 | 1.00 | | 0.50 | 1.00 | 1.00 | | 1.00 |
| 4" above JT Line | 2.00 | 3.00 | | 2.50 | 1.00 | 1.00 | | 1.00 |
| 6" above JT Line | 4.00 | 3.00 | | 3.50 | 2.00 | 3.00 | | 2.50 |
| 8" above JT Line | 6.00 | 5.00 | | 5.50 | 3.00 | 4.00 | | 3.50 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 44.88 | 55.46 | 61.43 | 118.79 |
| S1/R2 | 61.02 | 56.27 | 78.78 | 107.26 |
| S1/R3 | 66.04 | 58.58 | 94.92 | 148.21 |
| **Average** | 57.31 | 56.77 | 78.38 | 124.75 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub11 | **Height:** | **165.1** | **Weight:** | 62.27 |
| **Treatment:** | Rno/Lice | **Age:** | **23** | **Target HR:** | 128.05 |
| | Female | | | | |

**DAY 1:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 155.00 | 155.00 | 155.00 | | 156.00 | 152.00 | 156.00 | |
| **Average** | 155.00 | | | | 154.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.80 | 38.90 | 38.80 | 38.83 | 38.40 | 38.50 | 38.40 | 38.43 |
| 2" above JT Line | 40.80 | 40.90 | 40.80 | 40.83 | 40.60 | 40.70 | 40.70 | 40.67 |
| 4" above JT Line | 44.20 | 44.30 | 44.20 | 44.23 | 44.00 | 44.10 | 44.10 | 44.07 |
| 6" above JT Line | 47.10 | 47.10 | 47.20 | 47.13 | 49.20 | 49.30 | 49.30 | 49.27 |
| 8" above JT Line | 51.70 | 51.80 | 51.70 | 51.73 | 52.30 | 52.40 | 52.30 | 52.33 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 4.00 | 4.00 | | 4.00 | 4.00 | 5.00 | | 4.50 |
| 2" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 6" above JT Line | 0.00 | 2.00 | | 1.00 | 4.00 | 0.00 | | 2.00 |
| 8" above JT Line | 4.00 | 4.00 | | 4.00 | 0.00 | 0.00 | | 0.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 51.39 | 45.29 | 159.74 | 108.89 |
| S1/R2 | 14.24 | 44.07 | 1.22 | 126.24 |
| S1/R3 | 53.16 | 47.87 | 176.55 | 126.11 |
| **Average** | 39.60 | 45.74 | 112.50 | 120.41 |

**DAY 2:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 6.00 | 8.00 | 3.00 | 5.67 | 6.00 | 8.00 | 5.00 | 6.33 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.00 | 0.67 |
| 4" above JT Line | 6.00 | 2.00 | 0.00 | 2.67 | 4.00 | 0.00 | 4.00 | 2.67 |
| 6" above JT Line | 4.00 | 5.00 | 3.00 | 4.00 | 6.00 | 5.00 | 8.00 | 6.33 |
| 8" above JT Line | 6.00 | 7.00 | 4.00 | 5.67 | 6.00 | 4.00 | 4.00 | 4.67 |

**DAY 3:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 150.00 | 150.00 | 150.00 | | 151.00 | 150.00 | 150.00 | |
| **Average** | 150.00 | | | | 150.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 39.30 | 39.20 | 39.20 | 39.23 | 38.50 | 38.50 | 38.60 | 38.53 |
| 2" above JT Line | 41.50 | 41.60 | 41.60 | 41.57 | 41.00 | 41.00 | 40.90 | 40.97 |
| 4" above JT Line | 44.40 | 44.40 | 44.40 | 44.40 | 45.00 | 45.00 | 45.10 | 45.03 |
| 6" above JT Line | 47.60 | 47.50 | 47.60 | 47.57 | 49.40 | 49.50 | 49.50 | 49.47 |
| 8" above JT Line | 51.90 | 51.90 | 52.00 | 51.93 | 53.40 | 53.50 | 53.40 | 53.43 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 7.00 | 5.00 | 6.00 | 6.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.00 | 0.67 |
| 6" above JT Line | 5.00 | 4.00 | 4.00 | 4.33 | 5.00 | 4.00 | 5.00 | 4.67 |
| 8" above JT Line | 7.00 | 5.00 | 5.00 | 5.67 | 5.00 | 5.00 | 6.00 | 5.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 44.75 | 30.78 | 131.80 | 103.87 |
| S1/R2 | 32.14 | 27.80 | 109.43 | 92.21 |
| S1/R3 | 32.00 | 51.26 | 103.33 | 121.63 |
| **Average** | 36.30 | 36.61 | 114.85 | 105.90 |

**DAY 4:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 150.00 | 151.00 | 152.00 | | 151.00 | 152.00 | 152.00 | |
| **Average** | 151.00 | | | | 151.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 39.70 | 39.80 | 39.70 | 39.73 | 38.50 | 38.50 | 38.50 | 38.50 |
| 2" above JT Line | 41.40 | 41.40 | 41.50 | 41.43 | 41.00 | 41.00 | 41.10 | 41.03 |
| 4" above JT Line | 43.80 | 43.90 | 43.90 | 43.87 | 44.80 | 44.80 | 44.90 | 44.83 |
| 6" above JT Line | 48.00 | 48.10 | 48.00 | 48.03 | 49.20 | 49.20 | 49.30 | 49.23 |
| 8" above JT Line | 52.40 | 52.40 | 52.40 | 52.40 | 53.70 | 53.80 | 53.80 | 53.77 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 5.00 | 7.00 | 6.00 | 6.00 | 6.00 | 7.00 | 8.00 | 7.00 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6" above JT Line | 4.00 | 2.00 | 4.00 | 3.33 | 4.00 | 2.00 | 2.00 | 2.67 |
| 8" above JT Line | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 7.00 | 4.00 | 5.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 38.51 | 46.78 | 129.36 | 125.02 |
| S1/R2 | 33.09 | 77.70 | 127.19 | 143.87 |
| S1/R3 | 42.31 | 69.16 | 150.24 | 153.36 |
| **Average** | 37.97 | 64.55 | 135.60 | 140.75 |

**DAY 5:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 154.00 | 155.00 | 154.00 | | 153.00 | 154.00 | 155.00 | |
| **Average** | 154.33 | | | | 154.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 39.20 | 39.20 | 39.20 | 39.20 | 38.00 | 38.00 | 38.10 | 38.03 |
| 2" above JT Line | 41.40 | 41.30 | 41.30 | 41.33 | 41.10 | 41.10 | 41.00 | 41.07 |
| 4" above JT Line | 44.00 | 44.00 | 44.10 | 44.03 | 44.40 | 44.40 | 44.40 | 44.40 |
| 6" above JT Line | 48.10 | 48.20 | 48.20 | 48.17 | 49.20 | 49.20 | 49.30 | 49.23 |
| 8" above JT Line | 51.70 | 51.80 | 51.80 | 51.77 | 52.30 | 52.30 | 52.40 | 52.33 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 5.00 | 8.00 | | 6.50 | 7.00 | 8.00 | | 7.50 |
| 2" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 1.00 | | 0.50 |
| 6" above JT Line | 1.00 | 5.00 | | 3.00 | 4.00 | 4.00 | | 4.00 |
| 8" above JT Line | 5.00 | 8.00 | | 6.50 | 4.00 | 8.00 | | 6.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 49.77 | 1.90 | 130.99 | 5.56 |
| S1/R2 | 29.70 | 57.90 | 130.31 | 116.07 |
| S1/R3 | 26.85 | 45.15 | 154.72 | 146.18 |
| **Average** | 35.44 | 34.98 | 138.67 | 89.27 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub12 | **Height:** | **182.88** | **Weight:** | 81.82 |
| **Treatment:** | Lno/RI | **Age:** | **25** | **Target HR:** | 126.75 |
| | Male | | | | |

**DAY 1:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 133.00 | 135.00 | 135.00 | | 134.00 | 135.00 | 135.00 | |
| **Average** | 134.33 | | | | 134.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.00 | 38.10 | 38.10 | 38.07 | 38.00 | 38.00 | 38.10 | 38.03 |
| 2" above JT Line | 39.80 | 39.80 | 39.70 | 39.77 | 39.40 | 39.50 | 39.50 | 39.47 |
| 4" above JT Line | 44.50 | 44.50 | 44.60 | 44.53 | 43.50 | 43.50 | 43.50 | 43.50 |
| 6" above JT Line | 50.10 | 50.20 | 50.10 | 50.13 | 48.80 | 48.90 | 48.80 | 48.83 |
| 8" above JT Line | 55.30 | 55.30 | 55.20 | 55.27 | 54.00 | 54.00 | 54.00 | 54.00 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 4.00 | 4.00 | | 4.00 | 4.00 | 4.00 | | 4.00 |
| 2" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 6" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 8" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 183.87 | 157.43 | 244.35 | 271.88 |
| S1/R2 | 216.01 | 218.99 | 273.37 | 264.01 |
| S1/R3 | 198.52 | 179.40 | 226.05 | 314.32 |
| **Average** | 199.47 | 185.27 | 247.92 | 283.40 |

**DAY 2:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 2.00 | 3.00 | 3.00 | 2.67 | 3.00 | 4.00 | 4.00 | 3.67 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**DAY 3:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 130.00 | 128.00 | 130.00 | | 128.00 | 127.00 | 127.00 | |
| **Average** | 129.33 | | | | 127.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.00 | 38.10 | 38.10 | 38.07 | 37.60 | 37.70 | 37.70 | 37.67 |
| 2" above JT Line | 39.90 | 39.90 | 39.90 | 39.90 | 38.90 | 38.90 | 39.00 | 38.93 |
| 4" above JT Line | 44.60 | 44.60 | 44.60 | 44.60 | 44.00 | 44.10 | 44.10 | 44.07 |
| 6" above JT Line | 50.40 | 50.40 | 50.40 | 50.40 | 49.80 | 49.80 | 49.90 | 49.83 |
| 8" above JT Line | 55.30 | 55.30 | 55.40 | 55.33 | 54.20 | 54.30 | 54.30 | 54.27 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 5.00 | 6.00 | 5.00 | 5.33 | 6.00 | 5.00 | 4.00 | 5.00 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 0.00 | 1.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6" above JT Line | 1.00 | 1.00 | 4.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 8" above JT Line | 2.00 | 2.00 | 5.00 | 3.00 | 1.00 | 2.00 | 2.00 | 1.67 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 130.45 | 162.72 | 166.79 | 244.76 |
| S1/R2 | 152.41 | 197.03 | 163.94 | 243.81 |
| S1/R3 | 132.62 | 197.43 | 198.52 | 238.38 |
| **Average** | 138.49 | 185.73 | 176.42 | 242.32 |

**DAY 4:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 129.00 | 130.00 | 130.00 | | 130.00 | 131.00 | 131.00 | |
| **Average** | 129.67 | | | | 130.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.10 | 38.10 | 38.20 | 38.13 | 38.10 | 38.10 | 38.10 | 38.10 |
| 2" above JT Line | 40.40 | 40.40 | 40.30 | 40.37 | 39.10 | 39.10 | 39.10 | 39.10 |
| 4" above JT Line | 44.90 | 44.90 | 44.80 | 44.87 | 43.30 | 43.40 | 43.30 | 43.33 |
| 6" above JT Line | 50.30 | 50.40 | 50.40 | 50.37 | 49.30 | 49.40 | 49.30 | 49.33 |
| 8" above JT Line | 55.10 | 55.00 | 55.00 | 55.03 | 53.40 | 53.40 | 53.40 | 53.40 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 4.00 | 3.00 | 1.00 | 2.67 | 3.00 | 1.00 | 1.00 | 1.67 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6" above JT Line | 3.00 | 2.00 | 2.00 | 2.33 | 1.00 | 3.00 | 0.00 | 1.33 |
| 8" above JT Line | 4.00 | 3.00 | 3.00 | 3.33 | 0.50 | 3.00 | 1.00 | 1.50 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 92.34 | 5.15 | 177.23 | 21.97 |
| S1/R2 | 121.23 | 196.76 | 212.49 | 273.78 |
| S1/R3 | 106.17 | 210.72 | 224.55 | 270.39 |
| **Average** | 106.58 | 137.54 | 204.76 | 188.71 |

**DAY 5:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 131.00 | 131.00 | 132.00 | | 131.00 | 129.00 | 130.00 | |
| **Average** | 131.33 | | | | 130.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.10 | 38.20 | 38.00 | 38.10 | 38.30 | 38.20 | 38.30 | 38.27 |
| 2" above JT Line | 40.60 | 40.70 | 40.70 | 40.67 | 40.00 | 40.00 | 40.00 | 40.00 |
| 4" above JT Line | 45.20 | 45.20 | 45.30 | 45.23 | 44.70 | 44.80 | 44.70 | 44.73 |
| 6" above JT Line | 50.70 | 50.80 | 50.70 | 50.73 | 51.00 | 51.00 | 51.10 | 51.03 |
| 8" above JT Line | 54.40 | 54.40 | 54.50 | 54.43 | 53.90 | 53.80 | 53.90 | 53.87 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | | 1.00 | 0.00 | 0.00 | | 0.00 |
| 2" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 6" above JT Line | 2.00 | 0.00 | | 1.00 | 1.00 | 0.00 | | 0.50 |
| 8" above JT Line | 3.00 | 1.00 | | 2.00 | 0.50 | 0.00 | | 0.25 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 142.24 | 183.33 | 208.00 | 292.35 |
| S1/R2 | 194.86 | 215.06 | 248.55 | 280.69 |
| S1/R3 | 181.70 | 222.52 | 308.35 | 273.91 |
| **Average** | 172.93 | 206.97 | 254.97 | 282.32 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub13 | **Height:** | **172.72** | **Weight:** | 84.09 |
| **Treatment:** | RI/Lno | **Age:** | **29** | **Target HR:** | 124.15 |
| | Male | | | | |

**DAY 1:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 136.00 | 138.00 | 137.00 | | 136.00 | 137.00 | 136.00 | |
| **Average** | 137.00 | | | | 136.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.10 | 38.20 | 38.20 | 38.17 | 38.00 | 38.00 | 38.10 | 38.03 |
| 2" above JT Line | 40.80 | 40.80 | 40.80 | 40.80 | 40.10 | 40.10 | 40.10 | 40.10 |
| 4" above JT Line | 45.40 | 45.50 | 45.50 | 45.47 | 44.60 | 44.70 | 44.70 | 44.67 |
| 6" above JT Line | 51.30 | 51.30 | 51.30 | 51.30 | 51.00 | 51.00 | 51.00 | 51.00 |
| 8" above JT Line | 55.60 | 55.60 | 55.60 | 55.60 | 55.90 | 56.00 | 55.90 | 55.93 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 2" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 6" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 8" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 259.67 | 250.86 | 326.80 | 318.39 |
| S1/R2 | 224.69 | 251.27 | 297.10 | 318.80 |
| S1/R3 | 233.10 | 223.06 | 322.86 | 306.59 |
| **Average** | 239.15 | 241.73 | 315.59 | 314.59 |

**DAY 2:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**DAY 3:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 122.00 | 123.00 | 123.00 | | 122.00 | 123.00 | 124.00 | |
| **Average** | 122.67 | | | | 123.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.10 | 38.10 | 38.20 | 38.13 | 38.10 | 38.20 | 38.00 | 38.10 |
| 2" above JT Line | 42.20 | 42.20 | 42.30 | 42.23 | 40.10 | 40.00 | 40.20 | 40.10 |
| 4" above JT Line | 47.00 | 47.00 | 47.00 | 47.00 | 45.20 | 45.20 | 45.20 | 45.20 |
| 6" above JT Line | 52.40 | 52.20 | 52.20 | 52.27 | 51.80 | 51.80 | 51.80 | 51.80 |
| 8" above JT Line | 57.10 | 57.10 | 57.10 | 57.10 | 56.70 | 56.70 | 56.80 | 56.73 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 0.50 | 0.50 | 3.00 | 1.33 | 1.00 | 0.50 | 2.00 | 1.17 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 0.00 | 0.00 | 3.00 | 1.00 | 1.00 | 0.00 | 2.00 | 1.00 |
| 6" above JT Line | 1.00 | 0.50 | 4.00 | 1.83 | 3.00 | 1.00 | 3.00 | 2.33 |
| 8" above JT Line | 3.00 | 1.00 | 5.00 | 3.00 | 4.00 | 2.00 | 4.00 | 3.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 121.36 | 127.06 | 173.03 | 160.28 |
| S1/R2 | 186.31 | 201.77 | 213.30 | 160.01 |
| S1/R3 | 209.77 | 201.23 | 246.93 | 203.13 |
| **Average** | 172.48 | 176.69 | 211.09 | 174.47 |

**DAY 4:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 80.00 | 81.00 | 81.00 | | 87.00 | 92.00 | 93.00 | |
| **Average** | 80.67 | | | | 90.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 38.60 | 38.60 | 38.60 | 38.60 | 38.00 | 38.10 | 38.10 | 38.07 |
| 2" above JT Line | 42.00 | 42.10 | 42.00 | 42.03 | 41.10 | 41.10 | 41.10 | 41.10 |
| 4" above JT Line | 46.10 | 46.10 | 46.10 | 46.10 | 46.00 | 46.00 | 46.00 | 46.00 |
| 6" above JT Line | 52.60 | 52.60 | 52.70 | 52.63 | 51.60 | 51.60 | 51.60 | 51.60 |
| 8" above JT Line | 57.00 | 57.10 | 57.00 | 57.03 | 56.60 | 56.60 | 56.00 | 56.40 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 5.00 | 1.00 | 2.00 | 2.67 | 5.00 | 2.00 | 2.00 | 3.00 |
| 2" above JT Line | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4" above JT Line | 3.00 | 0.00 | 2.00 | 1.67 | 7.00 | 1.00 | 3.00 | 3.67 |
| 6" above JT Line | 7.00 | 4.00 | 7.00 | 6.00 | 9.00 | 5.00 | 4.00 | 6.00 |
| 8" above JT Line | 7.00 | 7.00 | 10.00 | 8.00 | 10.00 | 7.00 | 7.00 | 8.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 48.95 | 38.10 | 57.36 | 26.31 |
| S1/R2 | 49.90 | 47.60 | 62.24 | 46.24 |
| S1/R3 | 65.36 | 50.85 | 76.34 | 49.77 |
| **Average** | 54.74 | 45.52 | 65.31 | 40.77 |

**DAY 5:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 92.00 | 93.00 | 95.00 | | 95.00 | 100.00 | 105.00 | |
| **Average** | 93.33 | | | | 100.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 39.50 | 39.50 | 39.60 | 39.53 | 37.90 | 37.90 | 37.90 | 37.90 |
| 2" above JT Line | 42.10 | 42.10 | 42.20 | 42.13 | 40.40 | 40.40 | 40.30 | 40.37 |
| 4" above JT Line | 46.30 | 46.30 | 46.30 | 46.30 | 45.90 | 45.90 | 45.80 | 45.87 |
| 6" above JT Line | 52.00 | 52.10 | 52.10 | 52.07 | 52.10 | 52.00 | 52.00 | 52.03 |
| 8" above JT Line | 57.10 | 57.10 | 57.20 | 57.13 | 56.70 | 56.70 | 56.70 | 56.70 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 1.00 | | 1.50 | 2.00 | 2.00 | | 2.00 |
| 2" above JT Line | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | | 0.00 |
| 4" above JT Line | 4.00 | 1.00 | | 2.50 | 3.00 | 1.00 | | 2.00 |
| 6" above JT Line | 7.00 | 3.00 | | 5.00 | 5.00 | 4.00 | | 4.50 |
| 8" above JT Line | 10.00 | 5.00 | | 7.50 | 10.00 | 7.00 | | 8.50 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 58.99 | 59.94 | 60.21 | 51.26 |
| S1/R2 | 61.43 | 76.48 | 71.60 | 79.60 |
| S1/R3 | 75.26 | 80.28 | 82.17 | 85.97 |
| **Average** | 65.23 | 72.23 | 71.33 | 72.28 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub14 | **Height:** | **162.56** | **Weight:** | 81.82 |
| **Treatment:** | Lno/RI | **Age:** | **29** | **Target HR:** | 124.15 |
| | Female | | | | |

**DAY 1:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135.00 | 135.00 | 135.00 | | 135.00 | 135.00 | 135.00 | |
| **Average** | 135.00 | | | | 135.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 40.50 | 40.50 | 40.50 | 40.50 | 40.80 | 40.90 | 40.90 | 40.87 |
| 2" above JT Line | 44.60 | 44.60 | 44.60 | 44.60 | 45.80 | 45.80 | 45.80 | 45.80 |
| 4" above JT Line | 51.30 | 51.30 | 51.30 | 51.30 | 52.20 | 52.20 | 52.30 | 52.23 |
| 6" above JT Line | 58.30 | 58.30 | 58.40 | 58.33 | 57.70 | 57.60 | 57.70 | 57.67 |
| 8" above JT Line | 62.60 | 62.70 | 62.70 | 62.67 | 62.80 | 62.90 | 62.80 | 62.83 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 4.00 | 3.00 | | 3.50 | 4.00 | 3.00 | | 3.50 |
| 2" above JT Line | 1.00 | 1.00 | | 1.00 | 2.00 | 1.00 | | 1.50 |
| 4" above JT Line | 2.00 | 1.00 | | 1.50 | 1.00 | 1.00 | | 1.00 |
| 6" above JT Line | 2.00 | 1.00 | | 1.50 | 2.00 | 1.00 | | 1.50 |
| 8" above JT Line | 2.00 | 0.50 | | 1.25 | 2.00 | 0.50 | | 1.25 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 68.07 | 59.53 | 247.33 | 277.98 |
| S1/R2 | 120.14 | 120.01 | 244.89 | 255.61 |
| S1/R3 | 98.31 | 122.85 | 276.08 | 291.68 |
| **Average** | 95.51 | 100.80 | 256.10 | 275.09 |

**DAY 2:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 5.00 | 4.00 | 1.00 | 3.33 | 4.00 | 4.00 | 3.00 | 3.67 |
| 2" above JT Line | 1.00 | 1.00 | 0.50 | 0.83 | 1.00 | 1.00 | 1.00 | 1.00 |
| 4" above JT Line | 2.00 | 1.00 | 0.50 | 1.17 | 2.00 | 1.00 | 1.00 | 1.33 |
| 6" above JT Line | 2.00 | 1.00 | 0.50 | 1.17 | 1.00 | 1.00 | 1.00 | 1.00 |
| 8" above JT Line | 2.00 | 1.00 | 0.50 | 1.17 | 2.00 | 1.00 | 1.00 | 1.33 |

**DAY 3:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135.00 | 135.00 | 135.00 | | 132.00 | 131.00 | 132.00 | |
| **Average** | 135.00 | | | | 131.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 40.50 | 40.40 | 40.50 | 40.47 | 40.30 | 40.40 | 40.50 | 40.40 |
| 2" above JT Line | 44.70 | 44.80 | 44.80 | 44.77 | 45.30 | 45.40 | 45.40 | 45.37 |
| 4" above JT Line | 52.80 | 52.80 | 52.80 | 52.80 | 51.80 | 51.80 | 51.90 | 51.83 |
| 6" above JT Line | 58.80 | 58.90 | 58.90 | 58.87 | 58.70 | 58.80 | 58.70 | 58.73 |
| 8" above JT Line | 64.10 | 64.20 | 64.20 | 64.17 | 64.70 | 64.80 | 64.70 | 64.73 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 5.00 | 5.00 | 4.00 | 4.67 | 5.00 | 4.00 | 5.00 | 4.67 |
| 2" above JT Line | 2.00 | 0.50 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 4" above JT Line | 2.00 | 1.00 | 1.00 | 1.33 | 2.00 | 2.00 | 2.00 | 2.00 |
| 6" above JT Line | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 8" above JT Line | 4.00 | 2.00 | 2.00 | 2.67 | 4.00 | 3.00 | 4.00 | 3.67 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 41.49 | 56.68 | 117.57 | 98.58 |
| S1/R2 | 101.16 | 62.38 | 121.36 | 104.68 |
| S1/R3 | 113.90 | 62.38 | 118.24 | 86.51 |
| **Average** | 85.52 | 60.48 | 119.06 | 96.59 |

**DAY 4:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135.00 | 135.00 | 135.00 | | 133.00 | 132.00 | 131.00 | |
| **Average** | 135.00 | | | | 132.00 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 40.30 | 40.20 | 40.20 | 40.23 | 40.40 | 40.40 | 40.50 | 40.43 |
| 2" above JT Line | 45.10 | 45.10 | 45.20 | 45.13 | 45.60 | 45.60 | 45.60 | 45.60 |
| 4" above JT Line | 51.50 | 51.50 | 51.50 | 51.50 | 53.20 | 53.20 | 53.30 | 53.23 |
| 6" above JT Line | 58.40 | 58.50 | 58.50 | 58.47 | 59.30 | 59.30 | 59.30 | 59.30 |
| 8" above JT Line | 65.50 | 65.50 | 65.50 | 65.50 | 65.50 | 65.70 | 65.70 | 65.63 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 5.00 | 4.00 | 4.00 | 4.33 | 6.00 | 4.00 | 5.00 | 5.00 |
| 2" above JT Line | 1.00 | 0.50 | 0.50 | 0.67 | 1.00 | 0.50 | 0.50 | 0.67 |
| 4" above JT Line | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.33 |
| 6" above JT Line | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 2.00 | 2.00 | 2.33 |
| 8" above JT Line | 3.00 | 2.00 | 2.00 | 2.33 | 4.00 | 2.00 | 2.00 | 2.67 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 41.90 | 58.17 | 92.75 | 101.29 |
| S1/R2 | 98.04 | 68.75 | 93.29 | 94.92 |
| S1/R3 | 88.53 | 59.80 | 117.57 | 94.51 |
| **Average** | 76.16 | 62.24 | 101.20 | 96.91 |

**DAY 5:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135.00 | 135.00 | 135.00 | | 128.00 | 130.00 | 130.00 | |
| **Average** | 135.00 | | | | 129.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 40.50 | 40.60 | 40.60 | 40.57 | 40.90 | 40.90 | 40.90 | 40.90 |
| 2" above JT Line | 45.50 | 45.50 | 45.60 | 45.53 | 46.10 | 46.10 | 46.10 | 46.10 |
| 4" above JT Line | 52.00 | 52.00 | 52.00 | 52.00 | 53.30 | 53.30 | 53.20 | 53.27 |
| 6" above JT Line | 58.70 | 58.80 | 58.80 | 58.77 | 59.90 | 59.80 | 59.90 | 59.87 |
| 8" above JT Line | 65.50 | 65.50 | 65.50 | 65.50 | 65.30 | 65.20 | 65.30 | 65.27 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 5.00 | 5.00 | | 5.00 | 6.00 | 5.00 | | 5.50 |
| 2" above JT Line | 1.00 | 0.50 | | 0.75 | 1.00 | 0.50 | | 0.75 |
| 4" above JT Line | 2.00 | 1.00 | | 1.50 | 2.00 | 1.00 | | 1.50 |
| 6" above JT Line | 3.00 | 2.00 | | 2.50 | 4.00 | 2.00 | | 3.00 |
| 8" above JT Line | 4.00 | 2.00 | | 3.00 | 5.00 | 2.00 | | 3.50 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 42.58 | 43.39 | 134.38 | 134.38 |
| S1/R2 | 69.43 | 76.89 | 136.68 | 141.84 |
| S1/R3 | 86.92 | 58.04 | 150.92 | 154.04 |
| **Average** | 66.31 | 59.44 | 140.66 | 143.42 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub15 | **Height:** | 172.72 | **Weight:** | 75.91 |
| **Treatment:** | LI/Rno | **Age:** | 24 | **Target HR:** | 127.4 |
| | Male | | | | |

**DAY 1:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135.00 | 135.00 | 135.00 | | 133.00 | 134.00 | 134.00 | |
| **Average** | 135.00 | | | | 133.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 37.50 | 37.70 | 37.70 | 37.63 | 37.20 | 37.20 | 37.20 | 37.20 |
| 2" above JT Line | 40.00 | 40.00 | 40.00 | 40.00 | 40.40 | 40.30 | 40.40 | 40.37 |
| 4" above JT Line | 47.50 | 47.40 | 47.50 | 47.47 | 46.80 | 46.80 | 46.70 | 46.77 |
| 6" above JT Line | 51.30 | 51.40 | 51.40 | 51.37 | 52.60 | 52.70 | 52.60 | 52.63 |
| 8" above JT Line | 56.30 | 56.30 | 56.40 | 56.33 | 55.60 | 55.50 | 55.60 | 55.57 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 2.00 | 4.00 | | 3.00 | 3.00 | 4.00 | | 3.50 |
| 2" above JT Line | 3.00 | 3.00 | | 3.00 | 2.00 | 4.00 | | 3.00 |
| 4" above JT Line | 3.00 | 4.00 | | 3.50 | 3.00 | 4.00 | | 3.50 |
| 6" above JT Line | 4.00 | 4.00 | | 4.00 | 4.00 | 4.00 | | 4.00 |
| 8" above JT Line | 4.00 | 5.00 | | 4.50 | 3.00 | 5.00 | | 4.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 104.01 | 145.63 | 239.06 | 226.32 |
| S1/R2 | 179.94 | 163.80 | 288.83 | 231.88 |
| S1/R3 | 163.80 | 148.08 | 279.74 | 258.86 |
| **Average** | 149.25 | 152.50 | 269.21 | 239.02 |

**DAY 2:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 4.00 | 3.00 | 3.33 |
| 2" above JT Line | 3.00 | 3.00 | 3.00 | 3.00 | 2.00 | 4.00 | 2.00 | 2.67 |
| 4" above JT Line | 3.00 | 3.00 | 4.00 | 3.33 | 3.00 | 4.00 | 3.00 | 3.33 |
| 6" above JT Line | 3.00 | 4.00 | 4.00 | 3.67 | 4.00 | 4.00 | 3.00 | 3.67 |
| 8" above JT Line | 4.00 | 4.00 | 4.00 | 4.00 | 3.00 | 5.00 | 3.00 | 3.67 |

**DAY 3:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 137.00 | 135.00 | 135.00 | | 135.00 | 137.00 | 137.00 | |
| **Average** | 135.67 | | | | 136.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 37.60 | 37.60 | 37.70 | 37.63 | 36.90 | 37.00 | 37.00 | 36.97 |
| 2" above JT Line | 40.10 | 40.10 | 40.10 | 40.10 | 39.80 | 39..9 | 39.80 | 39.80 |
| 4" above JT Line | 47.40 | 47.50 | 47.40 | 47.43 | 46.90 | 46.90 | 46.80 | 46.87 |
| 6" above JT Line | 51.50 | 51.60 | 51.60 | 51.57 | 52.40 | 52.50 | 52.40 | 52.43 |
| 8" above JT Line | 55.60 | 55.50 | 55.60 | 55.57 | 55.70 | 55.80 | 55.80 | 55.77 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 2" above JT Line | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 4" above JT Line | 4.00 | 3.00 | 5.00 | 4.00 | 4.00 | 3.00 | 4.00 | 3.67 |
| 6" above JT Line | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 4.00 | 5.00 | 4.67 |
| 8" above JT Line | 6.00 | 6.00 | 6.00 | 6.00 | 5.00 | 5.00 | 5.00 | 5.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 152.55 | 155.94 | 260.62 | 241.50 |
| S1/R2 | 186.04 | 175.47 | 289.37 | 264.69 |
| S1/R3 | 185.37 | 162.18 | 275.54 | 286.66 |
| **Average** | 174.65 | 164.53 | 275.18 | 264.28 |

**DAY 4:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135.00 | 135.00 | 135.00 | | 135.00 | 135.00 | 134.00 | |
| **Average** | 135.00 | | | | 134.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 37.50 | 37.60 | 37.70 | 37.60 | 37.30 | 37.30 | 37.30 | 37.30 |
| 2" above JT Line | 39.80 | 39.90 | 39.90 | 39.87 | 40.60 | 40.70 | 40.70 | 40.67 |
| 4" above JT Line | 46.60 | 46.70 | 46.70 | 46.67 | 46.50 | 46.40 | 46.40 | 46.43 |
| 6" above JT Line | 51.50 | 51.60 | 51.60 | 51.57 | 52.60 | 52.70 | 52.60 | 52.63 |
| 8" above JT Line | 56.00 | 56.10 | 56.10 | 56.07 | 55.80 | 56.00 | 56.00 | 55.93 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 2" above JT Line | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 4" above JT Line | 4.00 | 3.00 | 4.00 | 3.67 | 3.00 | 3.00 | 4.00 | 3.33 |
| 6" above JT Line | 6.00 | 5.00 | 6.00 | 5.67 | 4.00 | 3.00 | 4.00 | 3.67 |
| 8" above JT Line | 7.00 | 7.00 | 8.00 | 7.33 | 4.00 | 4.00 | 4.00 | 4.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 155.53 | 156.62 | 251.54 | 256.83 |
| S1/R2 | 187.26 | 177.91 | 250.59 | 279.88 |
| S1/R3 | 167.60 | 165.30 | 262.39 | 259.27 |
| **Average** | 170.13 | 166.61 | 254.84 | 265.33 |

**DAY 5:**

| | Untreated | | | | Treated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 139.00 | 138.00 | 138.00 | | 135.00 | 134.00 | 135.00 | |
| **Average** | 138.33 | | | | 134.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 37.20 | 37.20 | 37.30 | 37.23 | 37.40 | 37.50 | 37.50 | 37.47 |
| 2" above JT Line | 39.40 | 39.50 | 39.50 | 39.47 | 40.00 | 40.10 | 40.10 | 40.07 |
| 4" above JT Line | 46.30 | 46.40 | 46.40 | 46.37 | 47.20 | 47.20 | 47.20 | 47.20 |
| 6" above JT Line | 51.80 | 51.80 | 51.80 | 51.80 | 52.20 | 52.20 | 52.30 | 52.23 |
| 8" above JT Line | 55.20 | 55.20 | 55.10 | 55.17 | 54.90 | 54.90 | 55.00 | 54.93 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 3.00 | | 3.00 | 3.00 | 3.00 | | 3.00 |
| 2" above JT Line | 3.00 | 3.00 | | 3.00 | 3.00 | 3.00 | | 3.00 |
| 4" above JT Line | 4.00 | 3.00 | | 3.50 | 3.00 | 3.00 | | 3.00 |
| 6" above JT Line | 5.00 | 5.00 | | 5.00 | 3.00 | 3.00 | | 3.00 |
| 8" above JT Line | 7.00 | 7.00 | | 7.00 | 4.00 | 4.00 | | 4.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Untreater | Treated | Untreated | Treated |
| S1/R1 | 140.48 | 142.24 | 268.76 | 265.91 |
| S1/R2 | 187.53 | 173.97 | 262.11 | 279.74 |
| S1/R3 | 194.31 | 161.77 | 291.54 | 296.15 |
| **Average** | 174.11 | 159.33 | 274.14 | 280.60 |

| | | | | | |
|---|---|---|---|---|---|
| **Subject:** | DOMSsub16 | **Height:** | **175.26** | **Weight:** | 72.73 |
| **Treatment:** | RI/Lno | **Age:** | **37** | **Target HR:** | 118.15 |
| | Male | | | | |

**DAY 1:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 140.00 | 140.00 | 140.00 | | 145.00 | 146.00 | 145.00 | |
| **Average** | 140.00 | | | | 145.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 36.00 | 36.10 | 36.00 | 36.03 | 35.40 | 35.40 | 35.50 | 35.43 |
| 2" above JT Line | 36.30 | 36.40 | 36.30 | 36.33 | 36.40 | 36.40 | 36.40 | 36.40 |
| 4" above JT Line | 39.50 | 39.60 | 39.50 | 39.53 | 40.00 | 39.90 | 39.90 | 39.93 |
| 6" above JT Line | 44.70 | 44.80 | 44.90 | 44.80 | 46.10 | 46.00 | 46.10 | 46.07 |
| 8" above JT Line | 49.80 | 49.90 | 49.90 | 49.87 | 50.40 | 50.40 | 50.40 | 50.40 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 1.00 | 1.00 | | 1.00 | 1.00 | 2.00 | | 1.50 |
| 2" above JT Line | 0.50 | 0.50 | | 0.50 | 0.50 | 1.00 | | 0.75 |
| 4" above JT Line | 1.00 | 1.00 | | 1.00 | 0.50 | 1.00 | | 0.75 |
| 6" above JT Line | 1.00 | 1.00 | | 1.00 | 0.50 | 0.50 | | 0.50 |
| 8" above JT Line | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | | 1.00 |

| **Peak Torque:** | **Concentric** | | **Eccentric** | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 124.35 | 191.20 | 232.55 | 277.44 |
| S1/R2 | 167.19 | 184.14 | 240.69 | 218.72 |
| S1/R3 | 129.36 | 168.55 | 289.37 | 290.05 |
| **Average** | 140.30 | 181.30 | 254.20 | 262.07 |

**DAY 2:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 2.00 | 1.00 | 1.00 | 1.33 | 2.00 | 2.00 | 3.00 | 2.33 |
| 2" above JT Line | 1.00 | 1.00 | 2.00 | 1.33 | 1.00 | 1.00 | 1.00 | 1.00 |
| 4" above JT Line | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 6" above JT Line | 1.00 | 1.00 | 3.00 | 1.67 | 1.00 | 1.00 | 1.00 | 1.00 |
| 8" above JT Line | 1.00 | 1.00 | 2.00 | 1.33 | 1.00 | 1.00 | 2.00 | 1.33 |

**DAY 3:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 135.00 | 135.00 | 135.00 | | 136.00 | 136.00 | 137.00 | |
| **Average** | 135.00 | | | | 136.33 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 36.30 | 36.20 | 36.20 | 36.23 | 35.80 | 35.90 | 35.80 | 35.83 |
| 2" above JT Line | 36.70 | 36.80 | 36.80 | 36.77 | 36.80 | 36.80 | 36.80 | 36.80 |
| 4" above JT Line | 40.80 | 40.70 | 40.80 | 40.77 | 40.50 | 40.60 | 40.60 | 40.57 |
| 6" above JT Line | 46.00 | 46.00 | 46.00 | 46.00 | 46.50 | 46.60 | 46.60 | 46.57 |
| 8" above JT Line | 50.90 | 50.80 | 50.90 | 50.87 | 50.90 | 50.90 | 51.00 | 50.93 |

| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
|---|---|---|---|---|---|---|---|---|
| VMO | 3.00 | 4.00 | 4.00 | 3.67 | 3.00 | 4.00 | 3.00 | 3.33 |
| 2" above JT Line | 2.00 | 2.00 | 3.00 | 2.33 | 2.00 | 2.00 | 2.00 | 2.00 |
| 4" above JT Line | 3.00 | 2.00 | 3.00 | 2.67 | 3.00 | 2.00 | 2.00 | 2.33 |
| 6" above JT Line | 2.00 | 2.00 | 3.00 | 2.33 | 3.00 | 3.00 | 2.00 | 2.67 |
| 8" above JT Line | 2.00 | 3.00 | 3.00 | 2.67 | 4.00 | 3.00 | 3.00 | 3.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 97.23 | 108.21 | 190.25 | 195.94 |
| S1/R2 | 107.80 | 75.26 | 213.71 | 205.98 |
| S1/R3 | 94.51 | 204.08 | 219.94 | 204.08 |
| **Average** | 99.85 | 129.18 | 207.97 | 202.00 |

**DAY 4:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 132.00 | 134.00 | 134.00 | | 130.00 | 130.00 | 132.00 | |
| **Average Circumfrence:** | | | | | | | | |
| Joint Line | 35.50 | 35.40 | 35.40 | 35.43 | 35.70 | 35.80 | 35.80 | 35.77 |
| 2" above JT Line | 36.50 | 36.50 | 36.40 | 36.47 | 36.70 | 36.70 | 36.80 | 36.73 |
| 4" above JT Line | 41.10 | 41.00 | 41.00 | 41.03 | 41.40 | 41.30 | 41.30 | 41.33 |
| 6" above JT Line | 46.50 | 46.50 | 46.50 | 46.50 | 46.70 | 46.70 | 46.80 | 46.73 |
| 8" above JT Line | 51.20 | 51.20 | 51.20 | 51.20 | 51.10 | 51.10 | 51.10 | 51.10 |
| **Pain:** | | | | | | | | |
| VMO | 5.00 | 5.00 | 7.00 | 5.67 | 5.00 | 5.00 | 5.00 | 5.00 |
| 2" above JT Line | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| 4" above JT Line | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| 6" above JT Line | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 4.00 | 4.67 |
| 8" above JT Line | 6.00 | 5.00 | 6.00 | 5.67 | 6.00 | 5.00 | 5.00 | 5.33 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 58.83 | 72.68 | 141.84 | 133.84 |
| S1/R2 | 76.21 | 77.43 | 177.09 | 150.92 |
| S1/R3 | 72.41 | 73.09 | 179.67 | 151.87 |
| **Average** | 69.15 | 74.40 | 166.20 | 145.54 |

**DAY 5:**

| | Treated | | | | Untreated | | | |
|---|---|---|---|---|---|---|---|---|
| **ROM:** | 134.00 | 135.00 | 136.00 | | 134.00 | 135.00 | 135.00 | |
| **Average** | 135.00 | | | | 134.67 | | | |
| **Circumfrence:** | | | | | | | | |
| Joint Line | 36.00 | 36.00 | 36.00 | 36.00 | 35.50 | 35.50 | 35.50 | 35.50 |
| 2" above JT Line | 37.10 | 37.10 | 37.00 | 37.07 | 36.60 | 36.60 | 36.60 | 36.60 |
| 4" above JT Line | 41.00 | 40.90 | 40.90 | 40.93 | 40.70 | 40.80 | 40.80 | 40.77 |
| 6" above JT Line | 46.40 | 46.40 | 46.50 | 46.43 | 46.30 | 46.40 | 46.30 | 46.33 |
| 8" above JT Line | 51.10 | 51.10 | 51.20 | 51.13 | 51.20 | 51.20 | 51.20 | 51.20 |
| **Pain:** | Pre Ex | Post Ex | Post Tx | | Pre Ex | Post Ex | Post Tx | |
| VMO | 5.00 | 5.00 | | 5.00 | 5.00 | 4.00 | | 4.50 |
| 2" above JT Line | 3.00 | 3.00 | | 3.00 | 3.00 | 3.00 | | 3.00 |
| 4" above JT Line | 2.00 | 3.00 | | 2.50 | 4.00 | 4.00 | | 4.00 |
| 6" above JT Line | 3.00 | 3.00 | | 3.00 | 5.00 | 4.00 | | 4.50 |
| 8" above JT Line | 4.00 | 5.00 | | 4.50 | 3.00 | 5.00 | | 4.00 |

| Peak Torque: | Concentric | | Eccentric | |
|---|---|---|---|---|
| | Treated | Untreated | Treated | Untreated |
| S1/R1 | 75.80 | 99.80 | 168.69 | 165.57 |
| S1/R2 | 85.83 | 106.04 | 182.25 | 168.96 |
| S1/R3 | 82.31 | 90.99 | 187.81 | 170.72 |
| **Average** | 81.31 | 98.94 | 179.58 | 168.42 |

| | | | | | | Eccentric PT (Nm) Treated | | | | Eccentric PT (Nm) Unrated | | | | Range of Motion (degrees) Treated | | | | Range of Motion (degrees) Unrated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sex | Age | 65% of T-HR | Ht (cm) | Wt (kg) | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h |
| DOMSsub 01 | Female | 22 | 128.70 | 166.37 | 59.09 | 2.28 | 1.88 | 2.40 | 2.90 | 2.71 | 1.79 | 3.15 | 3.50 | 148.00 | 134.67 | 137.33 | 139.33 | 141.83 | 144.33 | 138.33 | 139.67 |
| DOMSsub 02 | Female | 24 | 127.40 | 162.56 | 61.36 | 3.61 | 3.58 | 3.63 | 4.04 | 3.50 | 3.23 | 3.33 | 3.48 | 140.00 | 138.00 | 142.67 | 145.33 | 142.33 | 139.00 | 142.33 | 146.33 |
| DOMSsub 03 | Male | 25 | 126.75 | 172.72 | 92.27 | 2.32 | 1.86 | 2.09 | 3.39 | 1.98 | 1.41 | 0.90 | 2.88 | 120.67 | 124.67 | 119.33 | 124.33 | 120.00 | 118.67 | 105.33 | 120.67 |
| DOMSsub 04 | Male | 21 | 129.85 | 186.69 | 84.09 | 3.00 | 2.82 | 2.36 | 2.22 | 3.16 | 2.19 | 2.11 | 2.38 | 129.67 | 125.33 | 121.33 | 126.00 | 123.00 | 123.00 | 118.67 | 126.00 |
| DOMSsub 05 | Female | 23 | 128.05 | 154.94 | 50.00 | 3.89 | 3.11 | 3.17 | 3.66 | 4.40 | 3.58 | 3.52 | 3.83 | 144.33 | 131.67 | 140.00 | 142.00 | 140.00 | 140.00 | 140.00 | 144.00 |
| DOMSsub 06 | Male | 31 | 122.85 | 169.55 | 66.60 | 4.82 | 3.71 | 3.29 | 3.48 | 4.71 | 3.74 | 2.22 | 2.98 | 140.67 | 139.67 | 135.33 | 137.00 | 144.33 | 136.33 | 129.33 | 130.33 |
| DOMSsub 07 | Female | 26 | 126.10 | 168.91 | 58.64 | 2.14 | 2.38 | 2.96 | 3.79 | 3.50 | 3.75 | 2.92 | 4.58 | 146.33 | 141.33 | 145.33 | 145.33 | 146.00 | 142.67 | 145.33 | 145.00 |
| DOMSsub 08 | Female | 37 | 118.95 | 157.48 | 104.55 | 1.60 | 1.17 | 0.72 | 1.09 | 1.51 | 1.10 | 0.98 | 1.21 | 123.67 | 110.33 | 100.67 | 112.00 | 124.33 | 105.00 | 110.33 | 115.33 |
| DOMSsub 09 | Male | 29 | 124.15 | 166.37 | 79.54 | 4.14 | 3.94 | 4.10 | 4.05 | 4.09 | 4.28 | 3.98 | 4.01 | 135.67 | 135.67 | 134.67 | 135.00 | 134.33 | 134.67 | 134.00 | 134.00 |
| DOMSsub 10 | Female | 24 | 127.40 | 156.21 | 48.64 | 3.09 | 3.01 | 2.98 | 2.56 | 1.92 | 2.79 | 2.96 | 1.61 | 150.00 | 149.00 | 150.00 | 152.33 | 150.67 | 145.00 | 145.00 | 150.00 |
| DOMSsub 11 | Female | 23 | 128.05 | 165.10 | 62.27 | 1.93 | 1.70 | 2.26 | 1.43 | 1.81 | 1.84 | 2.18 | 2.23 | 154.67 | 150.33 | 151.67 | 154.00 | 155.00 | 150.00 | 151.00 | 154.33 |
| DOMSsub 12 | Male | 25 | 126.75 | 182.88 | 81.82 | 3.03 | 2.16 | 2.50 | 3.12 | 3.46 | 2.96 | 2.31 | 3.45 | 134.33 | 129.33 | 129.67 | 131.33 | 134.67 | 127.33 | 130.67 | 130.00 |
| DOMSsub 13 | Male | 29 | 124.15 | 172.72 | 84.09 | 3.75 | 2.51 | 0.78 | 0.85 | 3.74 | 2.07 | 0.48 | 0.86 | 137.00 | 122.67 | 80.67 | 93.33 | 136.33 | 123.00 | 90.67 | 100.00 |
| DOMSsub 14 | Female | 29 | 124.15 | 162.56 | 81.82 | 3.13 | 1.46 | 1.24 | 1.72 | 3.36 | 1.18 | 1.18 | 1.75 | 135.00 | 135.00 | 135.00 | 135.00 | 135.00 | 131.67 | 132.00 | 129.33 |
| DOMSsub 15 | Male | 24 | 127.40 | 172.72 | 75.91 | 3.15 | 3.48 | 3.50 | 3.70 | 3.55 | 3.63 | 3.36 | 3.61 | 133.67 | 136.33 | 134.67 | 134.67 | 135.00 | 135.67 | 135.00 | 138.33 |
| DOMSsub 16 | Male | 37 | 118.15 | 175.26 | 72.73 | 3.50 | 2.86 | 2.29 | 2.47 | 3.60 | 2.78 | 2.00 | 2.32 | 140.00 | 135.00 | 0.00 | 135.00 | 145.33 | 136.33 | 0.00 | 134.67 |
| | Mean | 26.81 | 125.55 | 168.32 | 72.71 | 3.09 | 2.60 | 2.52 | 2.78 | 3.19 | 2.64 | 2.35 | 2.79 | 138.35 | 133.69 | 122.40 | 133.88 | 138.01 | 133.29 | 121.75 | 133.63 |
| | StDev | 4.87 | 3.33 | 8.89 | 15.56 | 0.87 | 0.85 | 0.98 | 1.06 | 0.95 | 1.01 | 1.05 | 1.07 | 9.19 | 9.94 | 37.39 | 15.06 | 9.75 | 11.53 | 36.29 | 13.88 |
| | StErr | 1.22 | 0.83 | 2.22 | 3.89 | 0.22 | 0.21 | 0.24 | 0.26 | 0.24 | 0.25 | 0.26 | 0.27 | 2.30 | 2.48 | 9.35 | 3.76 | 2.44 | 2.88 | 9.07 | 3.47 |

| | Joint Line Girth (cm) Treated | | | | Joint Line Girth (cm) Untreated | | | | 5 cm above JT Line Girth (cm) Treated | | | | 5 cm above JT Line Girth (cm) Untreated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h |
| DOMSsub 01 | 33.43 | 33.90 | 33.90 | 34.27 | 33.33 | 33.90 | 33.90 | 33.77 | 36.13 | 36.13 | 35.93 | 36.07 | 35.77 | 35.67 | 35.73 | 36.07 |
| DOMSsub 02 | 33.20 | 33.57 | 33.47 | 33.17 | 33.27 | 33.37 | 33.33 | 33.07 | 36.50 | 36.83 | 36.93 | 36.37 | 36.40 | 36.73 | 36.40 | 36.10 |
| DOMSsub 03 | 41.43 | 41.37 | 41.73 | 41.63 | 41.80 | 42.00 | 41.40 | 42.20 | 44.73 | 44.40 | 44.80 | 44.50 | 45.03 | 45.40 | 45.50 | 45.43 |
| DOMSsub 04 | 39.87 | 39.30 | 38.67 | 38.97 | 39.00 | 38.83 | 38.97 | 38.90 | 40.27 | 40.13 | 40.07 | 40.27 | 40.07 | 40.23 | 40.47 | 40.30 |
| DOMSsub 05 | 32.97 | 32.90 | 33.00 | 32.33 | 34.07 | 33.13 | 33.30 | 33.33 | 35.43 | 35.47 | 35.33 | 34.80 | 36.93 | 36.07 | 36.37 | 36.07 |
| DOMSsub 06 | 36.73 | 36.43 | 36.83 | 36.77 | 36.37 | 36.03 | 36.37 | 36.67 | 37.47 | 36.67 | 37.83 | 37.63 | 38.00 | 37.23 | 38.23 | 38.47 |
| DOMSsub 07 | 34.93 | 35.07 | 35.53 | 35.23 | 35.23 | 35.07 | 36.43 | 36.30 | 37.13 | 37.43 | 38.40 | 37.63 | 37.17 | 37.37 | 38.37 | 38.53 |
| DOMSsub 08 | 45.97 | 45.17 | 44.73 | 45.37 | 42.33 | 43.57 | 42.60 | 43.77 | 50.53 | 50.50 | 50.63 | 50.83 | 51.13 | 51.47 | 50.73 | 51.10 |
| DOMSsub 09 | 37.73 | 38.27 | 38.27 | 38.60 | 38.77 | 38.90 | 39.23 | 39.03 | 43.13 | 42.27 | 42.33 | 43.33 | 42.53 | 43.37 | 42.73 | 43.00 |
| DOMSsub 10 | 34.00 | 33.63 | 33.70 | 33.67 | 33.13 | 33.33 | 33.47 | 33.43 | 34.10 | 34.07 | 34.03 | 34.10 | 34.13 | 34.27 | 34.00 | 33.90 |
| DOMSsub 11 | 38.43 | 38.53 | 38.50 | 38.03 | 38.83 | 39.23 | 39.73 | 39.20 | 40.67 | 40.97 | 41.03 | 41.07 | 40.83 | 41.57 | 41.43 | 41.33 |
| DOMSsub 12 | 38.07 | 38.07 | 38.13 | 38.10 | 38.03 | 37.67 | 38.10 | 38.27 | 39.77 | 39.90 | 40.37 | 40.67 | 39.47 | 38.93 | 39.10 | 40.00 |
| DOMSsub 13 | 38.17 | 38.13 | 38.60 | 39.53 | 38.03 | 38.10 | 38.07 | 37.90 | 40.80 | 42.23 | 42.03 | 42.13 | 40.10 | 40.10 | 41.10 | 40.37 |
| DOMSsub 14 | 40.50 | 40.47 | 40.23 | 40.57 | 40.87 | 40.40 | 40.43 | 40.90 | 44.60 | 44.77 | 45.13 | 45.53 | 45.80 | 45.37 | 45.60 | 46.10 |
| DOMSsub 15 | 37.20 | 36.97 | 37.30 | 37.47 | 37.63 | 37.63 | 37.60 | 37.23 | 40.37 | 39.80 | 40.67 | 40.07 | 40.00 | 40.10 | 39.87 | 39.47 |
| DOMSsub 16 | 36.03 | 36.23 | 35.43 | 36.00 | 35.43 | 35.83 | 35.77 | 35.50 | 36.33 | 36.77 | 36.47 | 37.07 | 36.40 | 36.80 | 36.73 | 36.60 |
| | 37.42 | 37.38 | 37.38 | 37.48 | 37.26 | 37.31 | 37.42 | 37.47 | 39.87 | 39.90 | 40.13 | 40.13 | 39.99 | 40.04 | 40.15 | 40.18 |
| | 3.47 | 3.28 | 3.21 | 3.42 | 3.00 | 3.16 | 2.95 | 3.21 | 4.29 | 4.26 | 4.29 | 4.44 | 4.40 | 4.52 | 4.36 | 4.47 |
| | 0.87 | 0.82 | 0.80 | 0.85 | 0.75 | 0.79 | 0.74 | 0.80 | 1.07 | 1.06 | 1.07 | 1.11 | 1.10 | 1.13 | 1.09 | 1.12 |

| | 10 cm above JT Line Girth (cm) Treated | | | | 10 cm above JT Line Girth (cm) Untreated | | | | 15 cm above JT Line Girth (cm) Treated | | | | 15 cm above JT Line Girth (cm) Untreated | | | | 20 cm above JT Line Girth (cm) Treated | | | | 20 cm above JT Line Girth (cm) Untreated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h |
| DOMSsub 01 | 41.70 | 41.10 | 41.03 | 40.73 | 40.00 | 40.70 | 40.43 | 40.70 | 46.97 | 46.70 | 46.37 | 46.53 | 45.10 | 46.40 | 46.40 | 46.33 | 52.20 | 51.63 | 51.70 | 52.13 | 50.77 | 51.10 | 50.57 | 50.57 |
| DOMSsub 02 | 40.73 | 40.67 | 40.93 | 40.50 | 40.30 | 40.37 | 40.53 | 40.27 | 45.80 | 45.90 | 46.13 | 46.03 | 45.53 | 45.40 | 45.60 | 45.10 | 50.40 | 50.50 | 50.17 | 50.03 | 49.43 | 50.20 | 49.67 | 49.60 |
| DOMSsub 03 | 51.47 | 50.67 | 51.20 | 50.50 | 50.73 | 51.60 | 50.53 | 51.33 | 58.57 | 57.70 | 58.87 | 58.30 | 57.30 | 59.00 | 58.00 | 57.97 | 63.40 | 63.17 | 63.60 | 63.27 | 62.43 | 62.57 | 63.00 | 63.20 |
| DOMSsub 04 | 45.53 | 44.90 | 45.43 | 45.37 | 44.53 | 45.17 | 45.07 | 45.53 | 51.03 | 50.03 | 51.13 | 50.77 | 49.53 | 49.90 | 50.70 | 50.47 | 55.53 | 55.43 | 55.47 | 54.40 | 54.63 | 55.13 | 55.53 | 54.80 |
| DOMSsub 05 | 40.40 | 40.60 | 40.83 | 39.57 | 42.00 | 42.30 | 41.30 | 40.47 | 46.27 | 46.37 | 46.07 | 45.37 | 47.07 | 47.03 | 47.00 | 46.13 | 51.00 | 51.77 | 50.53 | 50.50 | 48.50 | 53.03 | 51.57 | 51.13 |
| DOMSsub 06 | 42.70 | 42.47 | 43.80 | 43.57 | 42.67 | 42.37 | 42.53 | 43.83 | 47.80 | 47.83 | 48.53 | 48.83 | 47.67 | 47.60 | 48.07 | 49.23 | 51.00 | 51.07 | 52.13 | 51.63 | 51.17 | 51.43 | 54.17 | 52.87 |
| DOMSsub 07 | 40.73 | 41.43 | 42.67 | 41.83 | 41.03 | 41.13 | 42.43 | 43.37 | 45.27 | 46.07 | 47.27 | 46.80 | 46.77 | 46.23 | 48.20 | 48.73 | 50.53 | 50.97 | 51.17 | 51.23 | 52.23 | 51.03 | 53.00 | 53.63 |
| DOMSsub 08 | 61.33 | 59.13 | 59.53 | 60.13 | 59.13 | 59.13 | 58.73 | 58.17 | 68.20 | 67.53 | 67.73 | 67.83 | 64.57 | 66.07 | 66.13 | 64.77 | 71.57 | 72.43 | 74.67 | 71.13 | 72.67 | 72.83 | 73.77 | 72.63 |
| DOMSsub 09 | 49.47 | 49.67 | 48.83 | 49.53 | 49.83 | 49.63 | 49.27 | 49.13 | 55.67 | 55.43 | 56.50 | 55.73 | 54.57 | 54.97 | 55.63 | 55.13 | 58.47 | 58.67 | 59.03 | 58.90 | 58.43 | 58.37 | 58.77 | 58.60 |
| DOMSsub 10 | 39.13 | 38.73 | 39.43 | 37.73 | 38.23 | 37.73 | 37.93 | 38.53 | 44.13 | 43.50 | 44.43 | 43.93 | 43.13 | 42.50 | 42.73 | 43.20 | 48.27 | 48.77 | 48.63 | 48.63 | 47.73 | 47.00 | 47.17 | 47.03 |
| DOMSsub 11 | 44.07 | 45.03 | 44.83 | 44.40 | 44.23 | 44.40 | 43.87 | 44.03 | 49.27 | 49.47 | 49.23 | 49.23 | 47.13 | 47.57 | 48.03 | 48.17 | 52.33 | 53.43 | 53.77 | 52.33 | 51.73 | 51.93 | 52.40 | 51.77 |
| DOMSsub 12 | 44.53 | 44.60 | 44.87 | 45.23 | 43.50 | 44.07 | 43.33 | 44.73 | 50.13 | 50.40 | 50.37 | 50.73 | 48.83 | 49.83 | 49.33 | 51.03 | 55.27 | 55.33 | 55.03 | 54.43 | 54.00 | 54.27 | 53.40 | 53.87 |
| DOMSsub 13 | 45.47 | 47.00 | 46.10 | 46.30 | 44.67 | 45.20 | 46.00 | 45.87 | 51.30 | 52.27 | 52.63 | 52.07 | 51.00 | 51.80 | 51.60 | 52.03 | 55.60 | 57.10 | 57.03 | 57.13 | 55.93 | 56.73 | 56.40 | 56.70 |
| DOMSsub 14 | 51.30 | 52.80 | 51.50 | 52.00 | 52.23 | 51.83 | 53.23 | 53.27 | 58.33 | 58.87 | 58.47 | 58.77 | 57.67 | 58.73 | 59.30 | 59.87 | 62.67 | 64.17 | 65.50 | 65.50 | 62.83 | 64.73 | 65.63 | 65.27 |
| DOMSsub 15 | 46.77 | 46.87 | 46.43 | 47.20 | 47.47 | 47.43 | 46.67 | 46.37 | 52.63 | 52.43 | 52.63 | 52.23 | 51.37 | 51.57 | 51.57 | 51.80 | 55.57 | 55.77 | 55.93 | 54.93 | 56.33 | 55.57 | 56.07 | 55.17 |
| DOMSsub 16 | 39.53 | 40.77 | 41.03 | 40.93 | 39.93 | 40.57 | 41.33 | 40.77 | 44.80 | 46.00 | 46.50 | 46.43 | 46.07 | 46.57 | 46.73 | 46.33 | 49.87 | 50.87 | 51.20 | 51.13 | 50.40 | 50.93 | 51.10 | 51.20 |
| | 45.30 | 45.40 | 45.53 | 45.35 | 45.03 | 45.23 | 45.20 | 45.40 | 51.01 | 51.03 | 51.43 | 51.23 | 50.21 | 50.70 | 50.94 | 51.02 | 55.23 | 55.69 | 55.97 | 55.46 | 54.95 | 55.43 | 55.76 | 55.50 |
| | 5.83 | 5.47 | 5.22 | 5.68 | 5.58 | 5.53 | 5.43 | 5.33 | 6.48 | 6.26 | 6.25 | 6.29 | 5.70 | 6.19 | 6.06 | 5.86 | 6.20 | 6.31 | 6.88 | 6.31 | 6.54 | 6.55 | 6.77 | 6.61 |
| | 1.46 | 1.37 | 1.31 | 1.42 | 1.39 | 1.38 | 1.36 | 1.33 | 1.62 | 1.57 | 1.56 | 1.57 | 1.43 | 1.55 | 1.51 | 1.46 | 1.55 | 1.58 | 1.72 | 1.58 | 1.64 | 1.64 | 1.69 | 1.65 |

| | VMO Pre Ex Pain Treated | | | | VMO Pre Ex Pain Unreated | | | | VMO Post Ex Pain Treated | | | | VMO Post Ex Pain Unreated | | | | VMO Post Tx Pain Treated | | | | VMO Post Tx Pain Unreated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | IN Tx | 24h | 48h | 72h | IN Tx | 24h | 48h | 72h |
| DOMSsub 01 | 3.00 | 3.00 | 2.00 | 2.00 | 4.00 | 3.00 | 2.00 | 3.00 | 3.00 | 3.00 | 1.00 | 2.00 | 3.00 | 3.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | – | 2.00 | 2.00 | 2.00 | – |
| DOMSsub 02 | 0.00 | 3.00 | 1.00 | 2.00 | 0.00 | 3.00 | 2.00 | 2.00 | 0.00 | 2.00 | 1.00 | 1.00 | 0.00 | 3.00 | 1.00 | 1.00 | 0.00 | 3.00 | 3.00 | – | 0.00 | 2.00 | 1.00 | – |
| DOMSsub 03 | 1.00 | 2.00 | 0.50 | 0.50 | 1.00 | 3.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 0.50 | 1.00 | 2.00 | 1.00 | 0.50 | 0.00 | 0.50 | 0.50 | – | 1.00 | 2.00 | 1.00 | – |
| DOMSsub 04 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | – | 1.00 | 1.00 | 1.00 | – |
| DOMSsub 05 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 | 3.00 | 1.00 | 0.50 | 1.00 | 1.00 | 0.50 | 0.50 | 2.00 | 1.00 | 1.00 | 0.50 | 2.00 | 1.00 | 1.00 | – | 1.00 | 0.50 | 0.50 | – |
| DOMSsub 06 | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 0.00 | 0.50 | 0.00 | – | 1.00 | 1.00 | 0.00 | – |
| DOMSsub 07 | 3.00 | 1.00 | 1.00 | 0.50 | 2.00 | 1.00 | 0.50 | 0.50 | 2.00 | 1.00 | 1.00 | 0.50 | 2.00 | 1.00 | 1.00 | 0.50 | 0.00 | 0.00 | 0.50 | – | 1.00 | 1.00 | 1.00 | – |
| DOMSsub 08 | 1.00 | 1.00 | 2.00 | 1.00 | 0.00 | 2.00 | 1.00 | 1.00 | 0.50 | 2.00 | 2.00 | 1.00 | 0.50 | 2.00 | 1.00 | 1.00 | 0.00 | 2.00 | 2.00 | – | 1.00 | 2.00 | 2.00 | – |
| DOMSsub 09 | 1.00 | 2.00 | 2.00 | 1.00 | 0.00 | 0.00 | 0.50 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 2.00 | 2.00 | 2.00 | – | 0.50 | 1.00 | 0.50 | – |
| DOMSsub 10 | 7.00 | 3.00 | 4.00 | 1.00 | 7.00 | 3.00 | 3.00 | 3.00 | 3.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 | 0.00 | 3.00 | 0.00 | 2.00 | 2.00 | – | 3.00 | 2.00 | 1.00 | – |
| DOMSsub 11 | 4.00 | 8.00 | 6.00 | 7.00 | 4.00 | 7.00 | 5.00 | 5.00 | 5.00 | 8.00 | 7.00 | 8.00 | 4.00 | 5.00 | 7.00 | 8.00 | 5.00 | 8.00 | 8.00 | – | 3.00 | 6.00 | 6.00 | – |
| DOMSsub 12 | 4.00 | 5.00 | 4.00 | 1.00 | 4.00 | 6.00 | 3.00 | 0.00 | 4.00 | 6.00 | 3.00 | 1.00 | 4.00 | 5.00 | 1.00 | 0.00 | 3.00 | 5.00 | 1.00 | – | 4.00 | 4.00 | 1.00 | – |
| DOMSsub 13 | 0.00 | 0.50 | 5.00 | 2.00 | 0.00 | 1.00 | 5.00 | 2.00 | 0.00 | 0.50 | 1.00 | 1.00 | 0.00 | 0.50 | 2.00 | 2.00 | 0.00 | 3.00 | 2.00 | – | 0.00 | 2.00 | 2.00 | – |
| DOMSsub 14 | 4.00 | 5.00 | 5.00 | 5.00 | 4.00 | 5.00 | 6.00 | 6.00 | 3.00 | 5.00 | 4.00 | 5.00 | 3.00 | 4.00 | 4.00 | 5.00 | 1.00 | 4.00 | 4.00 | – | 3.00 | 5.00 | 5.00 | – |
| DOMSsub 15 | 3.00 | 3.00 | 3.00 | 3.00 | 2.00 | 3.00 | 3.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | – | 3.00 | 3.00 | 3.00 | – |
| DOMSsub 16 | 1.00 | 3.00 | 5.00 | 5.00 | 1.00 | 3.00 | 5.00 | 5.00 | 1.00 | 4.00 | 5.00 | 5.00 | 2.00 | 4.00 | 5.00 | 4.00 | 1.00 | 4.00 | 7.00 | – | 3.00 | 3.00 | 5.00 | – |
| | 2.16 | 2.69 | 2.72 | 2.13 | 2.06 | 2.88 | 2.56 | 2.13 | 1.91 | 2.63 | 2.19 | 2.00 | 1.97 | 2.47 | 1.91 | 2.00 | 1.19 | 2.50 | 2.38 | – | 1.72 | 2.34 | 2.00 | – |
| | 1.93 | 1.98 | 1.87 | 1.95 | 2.02 | 1.86 | 1.82 | 1.88 | 1.55 | 2.15 | 1.82 | 2.21 | 1.44 | 1.53 | 1.93 | 2.18 | 1.47 | 2.06 | 2.27 | – | 1.26 | 1.54 | 1.82 | – |
| | 0.48 | 0.50 | 0.47 | 0.49 | 0.50 | 0.46 | 0.45 | 0.47 | 0.39 | 0.54 | 0.46 | 0.55 | 0.36 | 0.38 | 0.48 | 0.54 | 0.37 | 0.51 | 0.57 | – | 0.32 | 0.38 | 0.45 | – |

| | 5 cm JT Line Pre Ex Pain Treated | | | | 5 cm JT Line Pre Ex Pain Unreated | | | | 5 cm JT Line Post Ex Pain Treated | | | | 5 cm JT Line Post Ex Pain Unreated | | | | 5 cm JT Line Post Tx Pain Treated | | | | 5 cm JT Line Post Tx Pain Unreated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | IN Tx | 24h | 48h | 72h | IN Tx | 24h | 48h | 72h |
| DOMSsub 01 | 2.00 | 2.00 | 1.00 | 1.00 | 3.00 | 2.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 3.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | – | 1.00 | 1.00 | 1.00 | – |
| DOMSsub 02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | – | 0.00 | 0.00 | 0.00 | – |
| DOMSsub 03 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.00 | 0.50 | – | 0.50 | 0.50 | 0.50 | – |
| DOMSsub 04 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 1.00 | 1.00 | 0.50 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | – | 0.50 | 0.50 | 1.00 | – |
| DOMSsub 05 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 2.00 | 2.00 | 0.50 | 2.00 | 1.00 | 0.50 | 0.50 | 2.00 | 1.00 | 1.00 | 0.50 | 3.00 | 1.00 | 2.00 | – | 1.00 | 1.00 | 1.00 | – |
| DOMSsub 06 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 0.00 | 0.50 | 0.00 | – | 0.50 | 1.00 | 0.00 | – |
| DOMSsub 07 | 1.00 | 0.50 | 1.00 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 1.00 | 0.50 | 0.00 | 0.00 | 0.50 | – | 0.50 | 0.50 | 0.50 | – |
| DOMSsub 08 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.00 | 0.50 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 0.50 | 0.00 | 2.00 | 0.50 | – | 1.00 | 2.00 | 1.00 | – |
| DOMSsub 09 | 0.50 | 0.50 | 1.00 | 0.50 | 0.00 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | – | 0.50 | 0.50 | 0.50 | – |
| DOMSsub 10 | 3.00 | 0.00 | 2.00 | 1.00 | 0.00 | 1.00 | 2.00 | 0.00 | 4.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 1.00 | 1.00 | 3.00 | 0.00 | – | 1.00 | 2.00 | 1.00 | – |
| DOMSsub 11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.00 | 0.00 | 0.00 | – | 0.00 | 0.00 | 0.00 | – |
| DOMSsub 12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | – | 0.00 | 0.00 | 0.00 | – |
| DOMSsub 13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | – | 0.00 | 0.00 | 0.00 | – |
| DOMSsub 14 | 1.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | – | 1.00 | 1.00 | 0.50 | – |
| DOMSsub 15 | 2.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 2.00 | 3.00 | 3.00 | – | 3.00 | 3.00 | 3.00 | – |
| DOMSsub 16 | 0.50 | 2.00 | 3.00 | 3.00 | 0.50 | 2.00 | 3.00 | 3.00 | 0.50 | 2.00 | 3.00 | 3.00 | 1.00 | 2.00 | 3.00 | 3.00 | 2.00 | 3.00 | 3.00 | – | 1.00 | 2.00 | 3.00 | – |
| | 0.94 | 0.91 | 1.03 | 0.84 | 0.88 | 1.00 | 1.00 | 0.78 | 1.13 | 0.91 | 0.81 | 0.78 | 1.06 | 0.91 | 0.94 | 0.75 | 0.78 | 1.00 | 0.81 | – | 0.72 | 0.94 | 0.81 | – |
| | 0.89 | 0.97 | 0.99 | 0.93 | 1.01 | 0.93 | 1.00 | 1.00 | 1.28 | 0.90 | 0.93 | 0.93 | 0.98 | 0.92 | 0.96 | 0.93 | 0.97 | 1.13 | 1.01 | – | 0.73 | 0.89 | 0.95 | – |
| | 0.22 | 0.24 | 0.25 | 0.23 | 0.25 | 0.23 | 0.25 | 0.25 | 0.32 | 0.22 | 0.23 | 0.23 | 0.25 | 0.23 | 0.24 | 0.23 | 0.24 | 0.28 | 0.25 | – | 0.18 | 0.22 | 0.24 | – |

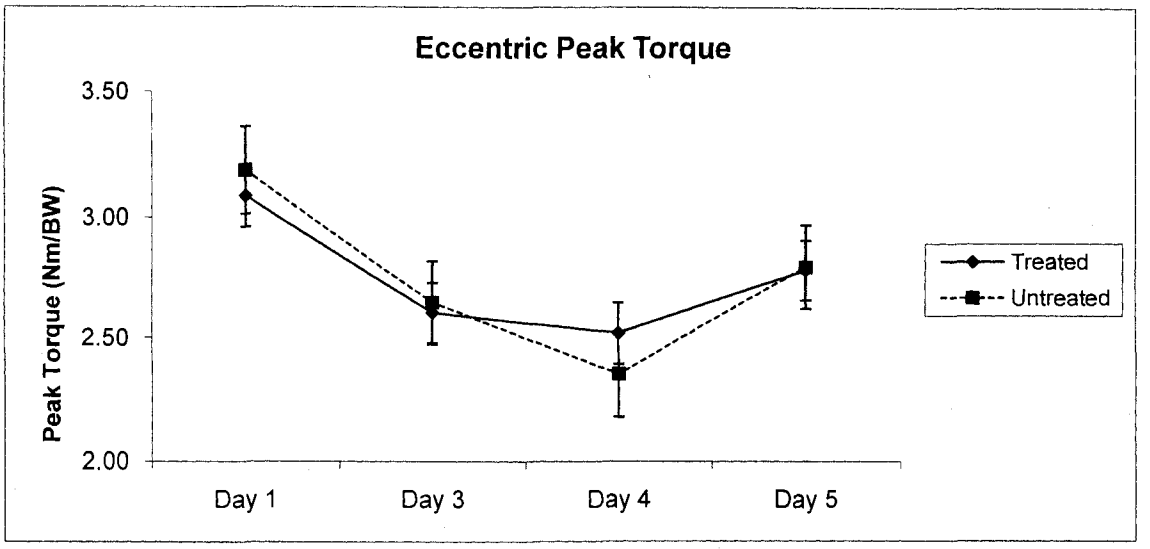
| | 10 cm JT Line Pre Ex Pain Treated | | | | 10 cm JT Line Pre Ex Pain Unreated | | | | 10 cm JT Line Post Ex Pain Treated | | | | 10 cm JT Line Post Ex Pain Unreated | | | | 10 cm JT Line Post Tx Pain Treated | | | | 10 cm JT Line Post Tx Pain Unreated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | IN Tx | 24h | 48h | 72h | IN Tx | 24h | 48h | 72h |
| DOMSsub 01 | 2.00 | 3.00 | 2.00 | 1.00 | 3.00 | 3.00 | 2.00 | 1.00 | 2.00 | 2.00 | 1.00 | 1.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | – | 2.00 | 1.00 | 1.00 | – |
| DOMSsub 02 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 2.00 | 1.00 | – | 0.00 | 0.00 | 0.00 | – |
| DOMSsub 03 | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.00 | 0.50 | – | 0.50 | 1.00 | 0.50 | – |
| DOMSsub 04 | 0.50 | 2.00 | 1.00 | 1.00 | 0.50 | 3.00 | 1.00 | 1.00 | 0.50 | 1.00 | 1.00 | 0.50 | 1.00 | 2.00 | 1.00 | 1.00 | 0.50 | 1.00 | 1.00 | – | 0.50 | 1.00 | 1.00 | – |
| DOMSsub 05 | 0.50 | 1.00 | 1.00 | 0.50 | 1.00 | 2.00 | 1.00 | 0.50 | 2.00 | 1.00 | 0.50 | 0.50 | 2.00 | 2.00 | 2.00 | 0.50 | 2.00 | 1.00 | 1.00 | – | 1.00 | 1.00 | 0.50 | – |
| DOMSsub 06 | 0.50 | 0.50 | 1.00 | 1.00 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.50 | 0.00 | – | 0.50 | 0.50 | 0.00 | – |
| DOMSsub 07 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.50 | 0.50 | 1.00 | 0.50 | 0.00 | 0.00 | 0.50 | – | 0.50 | 0.50 | 0.50 | – |
| DOMSsub 08 | 2.00 | 3.00 | 3.00 | 1.00 | 2.00 | 4.00 | 2.00 | 1.00 | 2.00 | 2.00 | 3.00 | 1.00 | 0.50 | 4.00 | 2.00 | 2.00 | 0.00 | 2.00 | 1.00 | – | 2.00 | 4.00 | 2.00 | – |
| DOMSsub 09 | 0.50 | 1.00 | 2.00 | 1.00 | 0.50 | 1.00 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 1.00 | 1.00 | 1.00 | – | 0.50 | 1.00 | 0.50 | – |
| DOMSsub 10 | 4.00 | 2.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 2.00 | 1.00 | 5.00 | 1.00 | 3.00 | 3.00 | 4.00 | 3.00 | 1.00 | 1.00 | 1.00 | – | 1.00 | 1.00 | 4.00 | – |
| DOMSsub 11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 | 2.00 | 0.00 | – | 0.00 | 0.00 | 0.00 | – |
| DOMSsub 12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | – | 0.00 | 0.00 | 0.00 | – |
| DOMSsub 13 | 0.00 | 0.00 | 3.00 | 4.00 | 0.00 | 1.00 | 7.00 | 3.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 3.00 | 2.00 | – | 0.00 | 2.00 | 3.00 | – |
| DOMSsub 14 | 2.00 | 2.00 | 1.00 | 2.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 0.50 | 1.00 | 1.00 | – | 1.00 | 2.00 | 1.00 | – |
| DOMSsub 15 | 3.00 | 4.00 | 3.00 | 3.00 | 3.00 | 4.00 | 4.00 | 4.00 | 4.00 | 3.00 | 3.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.00 | 3.00 | 4.00 | 4.00 | – | 4.00 | 5.00 | 4.00 | – |
| DOMSsub 16 | 1.00 | 3.00 | 4.00 | 2.00 | 0.50 | 3.00 | 4.00 | 4.00 | 1.00 | 2.00 | 4.00 | 3.00 | 1.00 | 2.00 | 4.00 | 4.00 | 2.00 | 3.00 | 4.00 | – | 1.00 | 2.00 | 4.00 | – |
| | 1.09 | 1.50 | 1.56 | 1.16 | 0.88 | 1.69 | 1.72 | 1.31 | 1.06 | 1.13 | 1.38 | 0.97 | 1.06 | 1.41 | 1.38 | 1.22 | 0.94 | 1.41 | 1.19 | – | 0.91 | 1.38 | 1.38 | – |
| | 1.19 | 1.25 | 1.20 | 1.11 | 0.97 | 1.39 | 1.85 | 1.33 | 1.09 | 0.79 | 1.53 | 0.87 | 1.15 | 1.27 | 1.30 | 1.17 | 1.22 | 1.17 | 1.21 | – | 1.04 | 1.40 | 1.52 | – |
| | 0.30 | 0.31 | 0.30 | 0.28 | 0.24 | 0.35 | 0.46 | 0.33 | 0.27 | 0.20 | 0.38 | 0.22 | 0.29 | 0.32 | 0.32 | 0.29 | 0.31 | 0.29 | 0.30 | – | 0.26 | 0.35 | 0.38 | – |

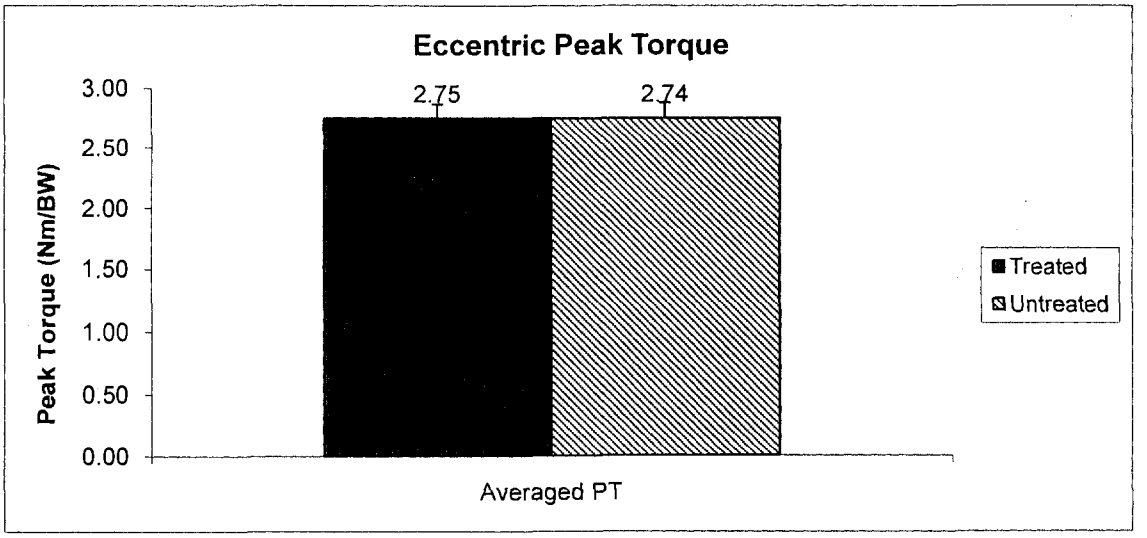
| | 15 cm JT Line Pre Ex Pain Treated | | | | 15 cm JT Line Pre Ex Pain Unreated | | | | 15 cm JT Line Post Ex Pain Treated | | | | 15 cm JT Line Post Ex Pain Unreated | | | | 15 cm JT Line Post Tx Pain Treated | | | | 15 cm JT Line Post Tx Pain Unreated | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | Pre | 24h | 48h | 72h | IN Tx | 24h | 48h | 72h | IN Tx | 24h | 48h | 72h |
| DOMSsub 01 | 3.00 | 3.00 | 4.00 | 2.00 | 3.00 | 4.00 | 4.00 | 3.00 | 2.00 | 2.00 | 2.00 | 1.00 | 2.00 | 3.00 | 3.00 | 2.00 | 1.00 | 1.00 | 1.00 | – | 1.00 | 2.00 | 3.00 | – |
| DOMSsub 02 | 0.00 | 4.00 | 4.00 | 5.00 | 0.00 | 2.00 | 4.00 | 4.00 | 0.00 | 2.00 | 1.00 | 2.00 | 0.00 | 2.00 | 2.00 | 3.00 | 0.50 | 4.00 | 4.00 | – | 0.50 | 2.00 | 3.00 | – |
| DOMSsub 03 | 1.00 | 3.00 | 1.00 | 0.50 | 1.00 | 3.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.00 | 0.50 | 0.50 | 2.00 | 2.00 | 1.00 | 0.00 | 0.50 | 1.00 | – | 0.50 | 2.00 | 1.00 | – |
| DOMSsub 04 | 0.50 | 3.00 | 3.00 | 3.00 | 0.50 | 3.00 | 3.00 | 3.00 | 0.50 | 2.00 | 3.00 | 2.00 | 1.00 | 3.00 | 3.00 | 3.00 | 1.00 | 2.00 | 3.00 | – | 0.50 | 2.00 | 4.00 | – |
| DOMSsub 05 | 0.50 | 1.00 | 2.00 | 0.50 | 0.50 | 2.00 | 3.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 2.00 | 2.00 | 3.00 | 1.00 | 3.00 | 1.00 | 2.00 | – | 1.00 | 2.00 | 1.00 | – |
| DOMSsub 06 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 3.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | – | 1.00 | 1.00 | 0.00 | – |
| DOMSsub 07 | 0.50 | 2.00 | 4.00 | 3.00 | 0.50 | 0.50 | 2.00 | 1.00 | 0.50 | 1.00 | 3.00 | 1.00 | 0.50 | 0.50 | 2.00 | 1.00 | 0.50 | 0.50 | 2.00 | – | 0.50 | 0.50 | 2.00 | – |
| DOMSsub 08 | 2.00 | 5.00 | 3.00 | 2.00 | 2.00 | 5.00 | 3.00 | 2.00 | 2.00 | 3.00 | 4.00 | 2.00 | 1.00 | 5.00 | 3.00 | 3.00 | 0.00 | 4.00 | 2.00 | – | 2.00 | 5.00 | 5.00 | – |
| DOMSsub 09 | 1.00 | 2.00 | 3.00 | 2.00 | 0.50 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 3.00 | – | 0.50 | 1.00 | 0.50 | – |
| DOMSsub 10 | 6.00 | 2.00 | 3.00 | 2.00 | 4.00 | 3.00 | 4.00 | 4.00 | 6.00 | 2.00 | 4.00 | 3.00 | 5.00 | 2.00 | 5.00 | 3.00 | 2.00 | 1.00 | 4.00 | – | 2.00 | 1.00 | 3.00 | – |
| DOMSsub 11 | 4.00 | 5.00 | 4.00 | 4.00 | 0.00 | 5.00 | 4.00 | 1.00 | 0.00 | 4.00 | 2.00 | 4.00 | 2.00 | 4.00 | 2.00 | 5.00 | 8.00 | 5.00 | 4.00 | – | 3.00 | 4.00 | 4.00 | – |
| DOMSsub 12 | 0.00 | 1.00 | 3.00 | 2.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 2.00 | 0.00 | 0.00 | 1.00 | 3.00 | 0.00 | 0.00 | 4.00 | 2.00 | – | 0.00 | 1.00 | 1.00 | – |
| DOMSsub 13 | 0.00 | 1.00 | 7.00 | 7.00 | 0.00 | 3.00 | 9.00 | 5.00 | 0.00 | 0.50 | 4.00 | 3.00 | 0.00 | 1.00 | 5.00 | 4.00 | 0.00 | 4.00 | 7.00 | – | 0.00 | 3.00 | 7.00 | – |
| DOMSsub 14 | 2.00 | 2.00 | 2.00 | 3.00 | 2.00 | 3.00 | 3.00 | 4.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 3.00 | 2.00 | 2.00 | 0.50 | 2.00 | 2.00 | – | 1.00 | 3.00 | 2.00 | – |
| DOMSsub 15 | 4.00 | 5.00 | 4.00 | 3.00 | 4.00 | 5.00 | 6.00 | 5.00 | 4.00 | 4.00 | 3.00 | 3.00 | 4.00 | 5.00 | 5.00 | 5.00 | 3.00 | 5.00 | 4.00 | – | 4.00 | 5.00 | 6.00 | – |
| DOMSsub 16 | 1.00 | 2.00 | 5.00 | 3.00 | 0.50 | 3.00 | 5.00 | 5.00 | 1.00 | 2.00 | 5.00 | 3.00 | 0.50 | 3.00 | 5.00 | 4.00 | 3.00 | 3.00 | 5.00 | – | 1.00 | 2.00 | 5.00 | – |
| | 1.66 | 2.63 | 3.31 | 2.75 | 1.22 | 2.78 | 3.56 | 2.63 | 1.38 | 1.91 | 2.44 | 1.88 | 1.34 | 2.41 | 2.94 | 2.44 | 1.47 | 2.50 | 2.88 | – | 1.16 | 2.28 | 2.97 | – |
| | 1.75 | 1.45 | 1.49 | 1.60 | 1.38 | 1.47 | 1.97 | 1.67 | 1.62 | 1.04 | 1.31 | 1.13 | 1.41 | 1.40 | 1.39 | 1.55 | 2.07 | 1.62 | 1.75 | – | 1.09 | 1.39 | 2.07 | – |
| | 0.44 | 0.36 | 0.37 | 0.40 | 0.34 | 0.37 | 0.49 | 0.42 | 0.40 | 0.26 | 0.33 | 0.28 | 0.35 | 0.35 | 0.35 | 0.39 | 0.52 | 0.41 | 0.44 | – | 0.27 | 0.35 | 0.52 | – |

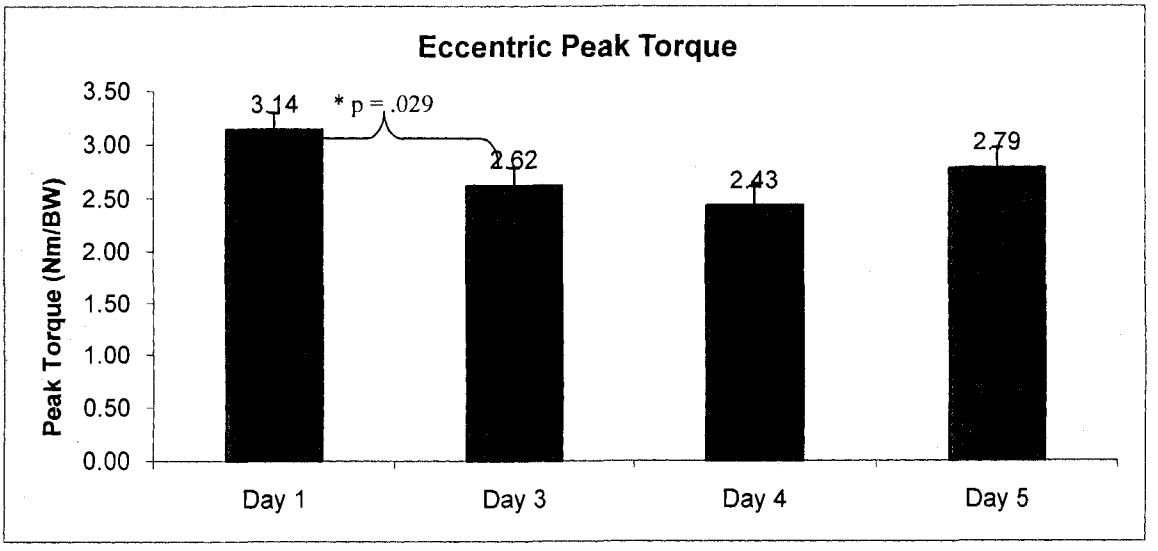
| | *20 cm JT Line Pre Ex Pain Treated* | | | | *20 cm JT Line Pre Ex Pain Untreated* | | | | *20 cm JT Line Post Ex Pain Treated* | | | | *20 cm JT Line Post Ex Pain Untreated* | | | | *20 cm JT Line Post Tx Pain Treated* | | | | *20 cm JT Line Post Tx Pain Untreated* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Pre** | **24h** | **48h** | **72h** | **Pre** | **24h** | **48h** | **72h** | **Pre** | **24h** | **48h** | **72h** | **Pre** | **24h** | **48h** | **72h** | **IN Tx** | **24h** | **48h** | **72h** | **IN Tx** | **24h** | **48h** | **72h** |
| **DOMSsub 01** | 3.00 | 4.00 | 5.00 | 1.00 | 3.00 | 4.00 | 5.00 | 3.00 | 2.00 | 3.00 | 3.00 | 3.00 | 2.00 | 3.00 | 4.00 | 3.00 | 1.00 | 2.00 | 2.00 | -- | 2.00 | 3.00 | 3.00 | -- |
| **DOMSsub 02** | 0.00 | 5.00 | 6.00 | 7.00 | 0.00 | 4.00 | 7.00 | 8.00 | 0.00 | 4.00 | 3.00 | 5.00 | 0.00 | 4.00 | 4.00 | 5.00 | 1.00 | 6.00 | 7.00 | -- | 0.50 | 4.00 | 6.00 | -- |
| **DOMSsub 03** | 1.00 | 3.00 | 1.00 | 0.50 | 0.50 | 3.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.00 | 0.50 | 0.00 | 3.00 | 2.00 | 1.00 | 0.50 | 0.50 | 1.00 | -- | 0.50 | 2.00 | 2.00 | -- |
| **DOMSsub 04** | 1.00 | 3.00 | 4.00 | 4.00 | 0.50 | 4.00 | 4.00 | 4.00 | 0.50 | 3.00 | 4.00 | 4.00 | 1.00 | 3.00 | 4.00 | 4.00 | 1.00 | 3.00 | 4.00 | -- | 0.50 | 3.00 | 4.00 | -- |
| **DOMSsub 05** | 1.00 | 1.00 | 2.00 | 1.00 | 0.50 | 2.00 | 4.00 | 3.00 | 1.00 | 2.00 | 2.00 | 1.00 | 2.00 | 2.00 | 4.00 | 3.00 | 1.00 | 1.00 | 2.00 | -- | 1.00 | 2.00 | 3.00 | -- |
| **DOMSsub 06** | 2.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 2.00 | 0.00 | 0.50 | 0.00 | -- | 1.00 | 1.00 | 0.00 | -- |
| **DOMSsub 07** | 2.00 | 3.00 | 6.00 | 5.00 | 2.00 | 2.00 | 3.00 | 3.00 | 2.00 | 2.00 | 5.00 | 3.00 | 2.00 | 1.00 | 3.00 | 3.00 | 1.00 | 0.50 | 3.00 | -- | 2.00 | 1.00 | 2.00 | -- |
| **DOMSsub 08** | 4.00 | 5.00 | 5.00 | 3.00 | 3.00 | 6.00 | 3.00 | 3.00 | 4.00 | 5.00 | 5.00 | 3.00 | 2.00 | 6.00 | 5.00 | 4.00 | 0.00 | 5.00 | 4.00 | -- | 3.00 | 6.00 | 5.00 | -- |
| **DOMSsub 09** | 2.00 | 3.00 | 3.00 | 2.00 | 1.00 | 2.00 | 1.00 | 2.00 | 1.00 | 2.00 | 2.00 | 3.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 3.00 | 3.00 | -- | 1.00 | 2.00 | 1.00 | -- |
| **DOMSsub 10** | 6.00 | 3.00 | 4.00 | 3.00 | 6.00 | 4.00 | 7.00 | 6.00 | 7.00 | 4.00 | 3.00 | 4.00 | 8.00 | 5.00 | 5.00 | 5.00 | 4.00 | 2.00 | 4.00 | -- | 6.00 | 1.00 | 8.00 | -- |
| **DOMSsub 11** | 0.00 | 5.00 | 5.00 | 4.00 | 4.00 | 7.00 | 5.00 | 5.00 | 0.00 | 5.00 | 7.00 | 8.00 | 4.00 | 5.00 | 5.00 | 8.00 | 4.00 | 6.00 | 4.00 | -- | 4.00 | 5.00 | 5.00 | -- |
| **DOMSsub 12** | 0.00 | 2.00 | 4.00 | 3.00 | 0.00 | 1.00 | 0.50 | 0.50 | 0.00 | 2.00 | 3.00 | 1.00 | 0.00 | 2.00 | 3.00 | 0.00 | 0.00 | 5.00 | 3.00 | -- | 0.00 | 2.00 | 1.00 | -- |
| **DOMSsub 13** | 0.00 | 3.00 | 7.00 | 10.00 | 0.00 | 4.00 | 10.00 | 10.00 | 0.00 | 1.00 | 7.00 | 5.00 | 0.00 | 2.00 | 7.00 | 7.00 | 0.00 | 5.00 | 10.00 | -- | 0.00 | 4.00 | 7.00 | -- |
| **DOMSsub 14** | 2.00 | 4.00 | 3.00 | 4.00 | 2.00 | 4.00 | 4.00 | 5.00 | 0.50 | 2.00 | 2.00 | 2.00 | 0.50 | 3.00 | 2.00 | 2.00 | 0.50 | 2.00 | 2.00 | -- | 1.00 | 4.00 | 2.00 | -- |
| **DOMSsub 15** | 3.00 | 5.00 | 4.00 | 4.00 | 4.00 | 6.00 | 7.00 | 7.00 | 5.00 | 5.00 | 4.00 | 4.00 | 5.00 | 6.00 | 7.00 | 7.00 | 3.00 | 5.00 | 4.00 | -- | 4.00 | 6.00 | 8.00 | -- |
| **DOMSsub 16** | 1.00 | 2.00 | 6.00 | 4.00 | 1.00 | 4.00 | 6.00 | 3.00 | 1.00 | 3.00 | 5.00 | 5.00 | 1.00 | 3.00 | 5.00 | 5.00 | 2.00 | 3.00 | 6.00 | -- | 2.00 | 3.00 | 5.00 | -- |
| | 1.75 | 3.25 | 4.19 | 3.59 | 1.84 | 3.69 | 4.41 | 4.09 | 1.63 | 2.88 | 3.63 | 3.34 | 1.84 | 3.13 | 3.94 | 3.75 | 1.31 | 3.09 | 3.69 | -- | 1.78 | 3.06 | 3.88 | -- |
| | 1.65 | 1.34 | 1.68 | 2.38 | 1.76 | 1.66 | 2.55 | 2.60 | 2.02 | 1.36 | 1.78 | 1.90 | 2.17 | 1.67 | 1.73 | 2.32 | 1.34 | 1.99 | 2.41 | -- | 1.69 | 1.65 | 2.53 | -- |
| | 0.41 | 0.34 | 0.42 | 0.59 | 0.44 | 0.42 | 0.64 | 0.65 | 0.51 | 0.34 | 0.45 | 0.48 | 0.54 | 0.42 | 0.43 | 0.58 | 0.34 | 0.50 | 0.60 | -- | 0.42 | 0.41 | 0.63 | -- |

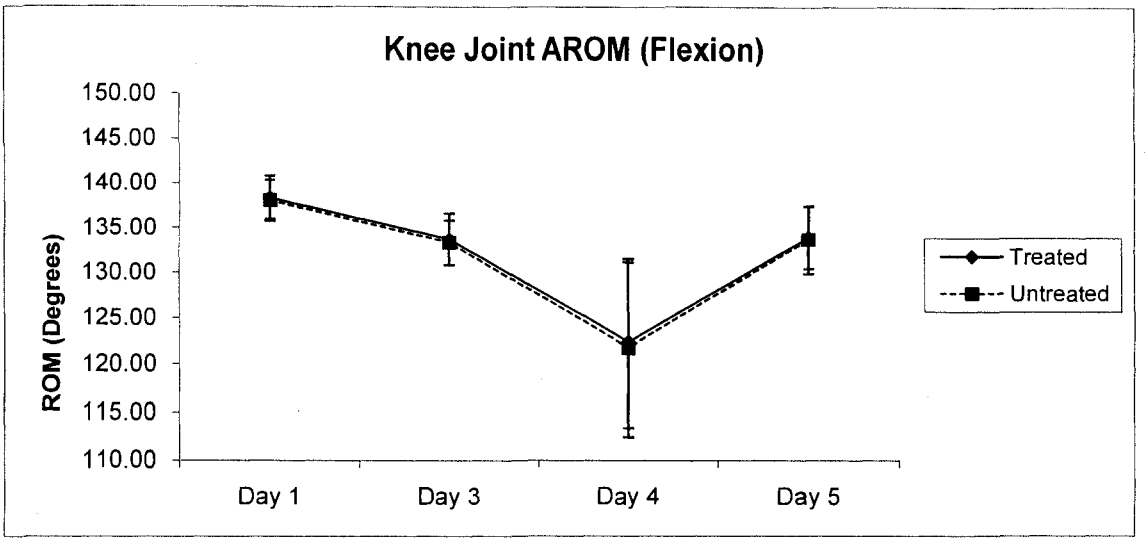
# APPENDIX II

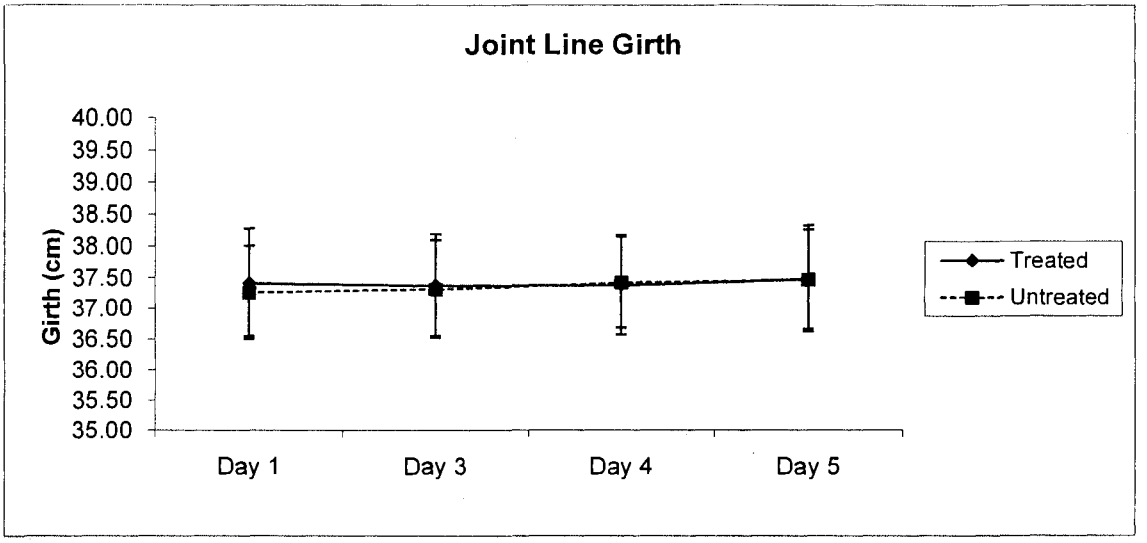
# DATA CHARTS

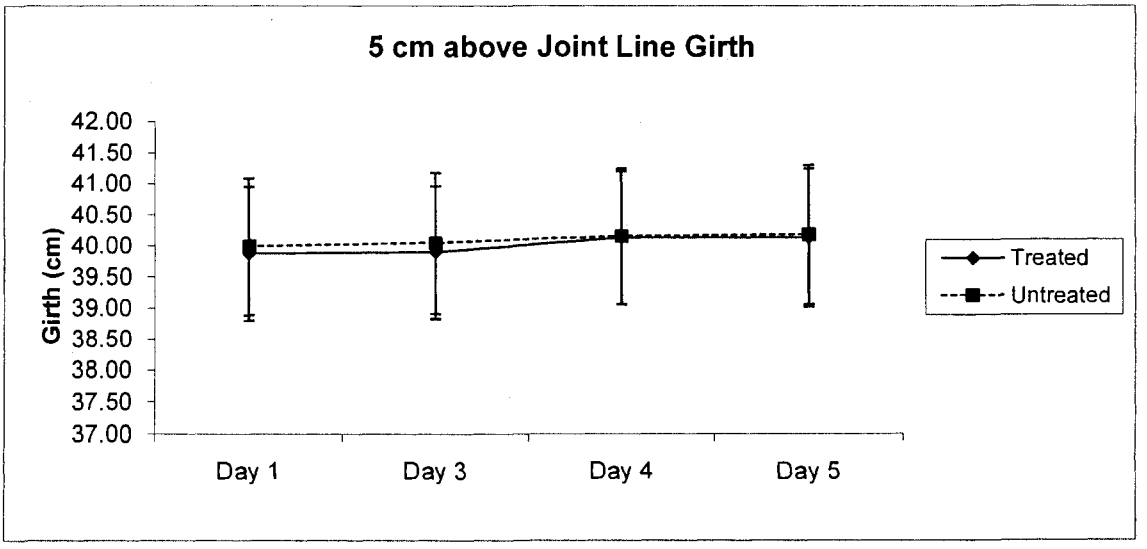

Eccentric Peak Torque
Peak Torque (Nm/BW)
3.50
3.00
2.50
2.00
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

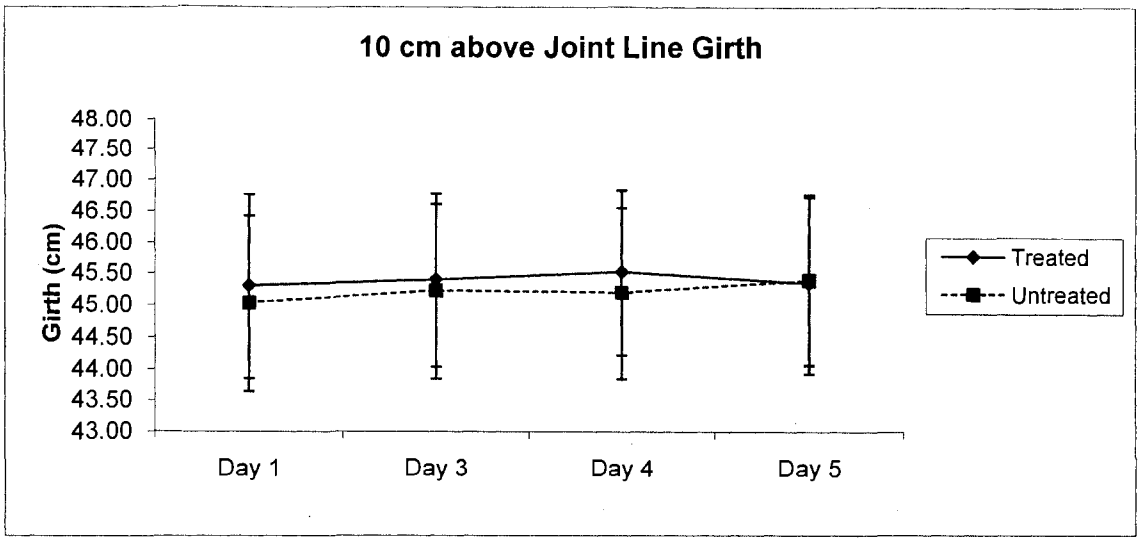

Eccentric Peak Torque
Peak Torque (Nm/BW)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2.75
2.74
Averaged PT
Treated
Untreated

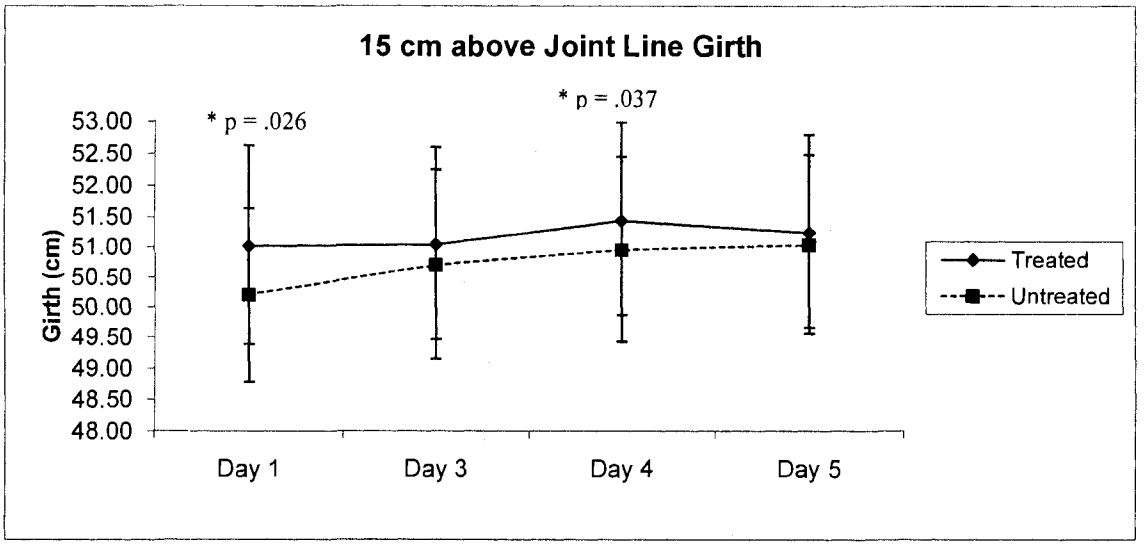

Eccentric Peak Torque
Peak Torque (Nm/BW)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
3.14
* p = .029
2.62
2.43
2.79
Day 1
Day 3
Day 4
Day 5

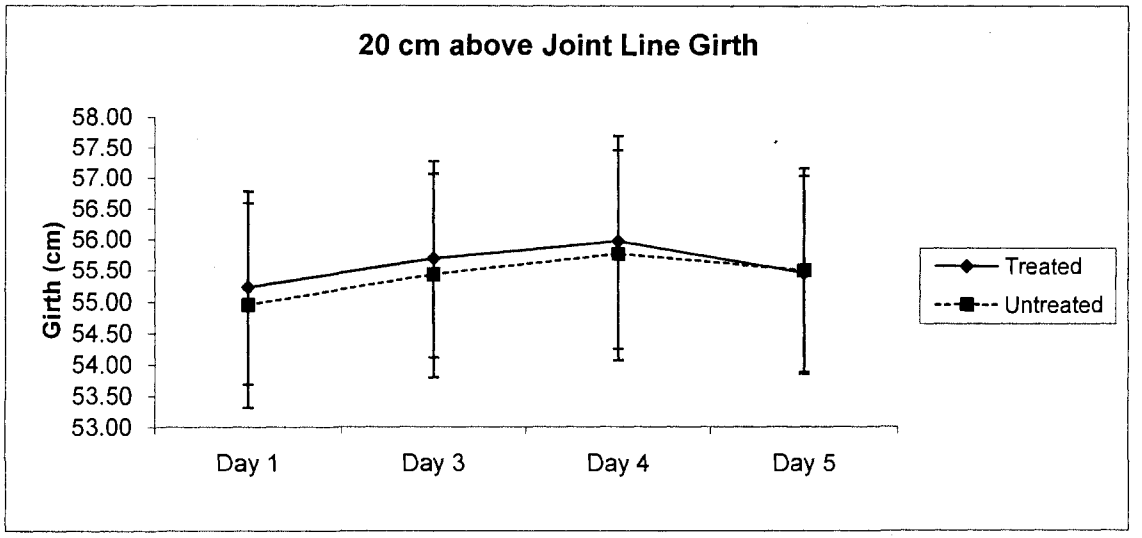

Knee Joint AROM (Flexion)
150.00
145.00
140.00
135.00
130.00
125.00
120.00
115.00
110.00
ROM (Degrees)
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

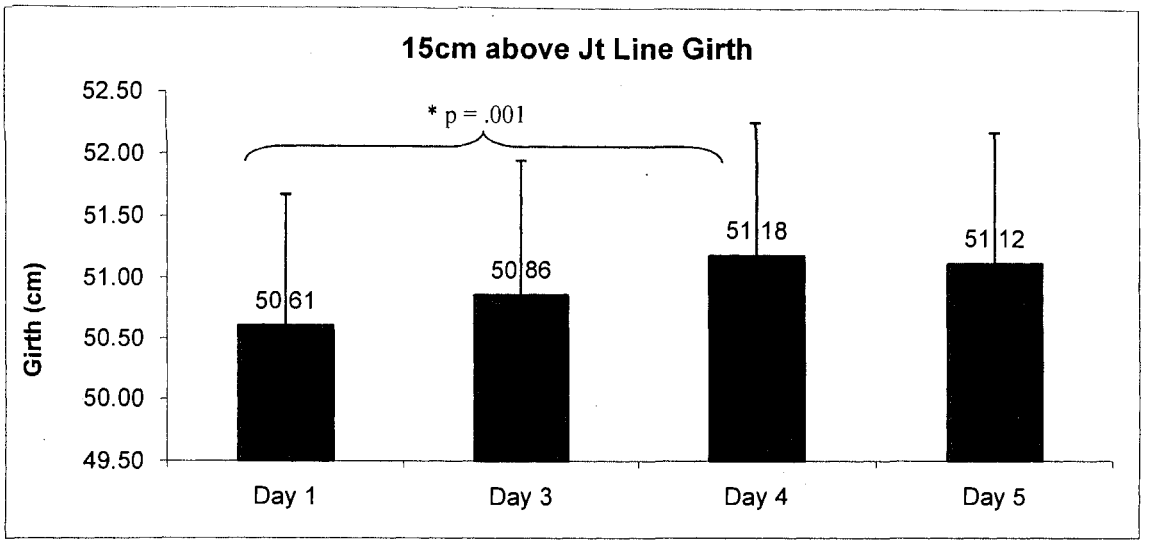

Joint Line Girth
40.00
39.50
39.00
38.50
38.00
37.50
37.00
36.50
36.00
35.50
35.00
Girth (cm)
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

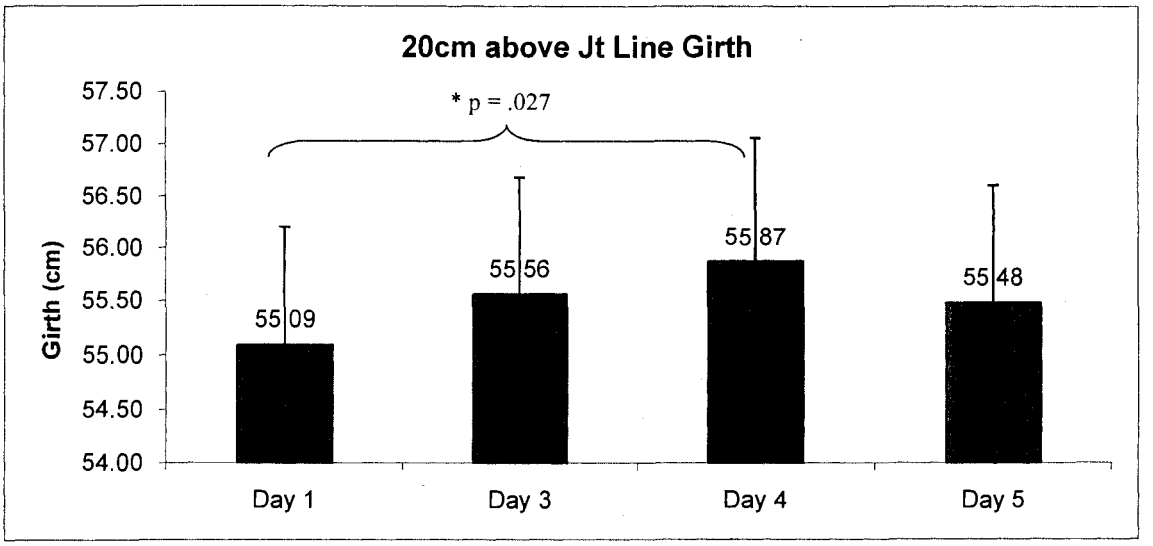

5 cm above Joint Line Girth
42.00
41.50
41.00
40.50
40.00
39.50
39.00
38.50
38.00
37.50
37.00
Girth (cm)
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

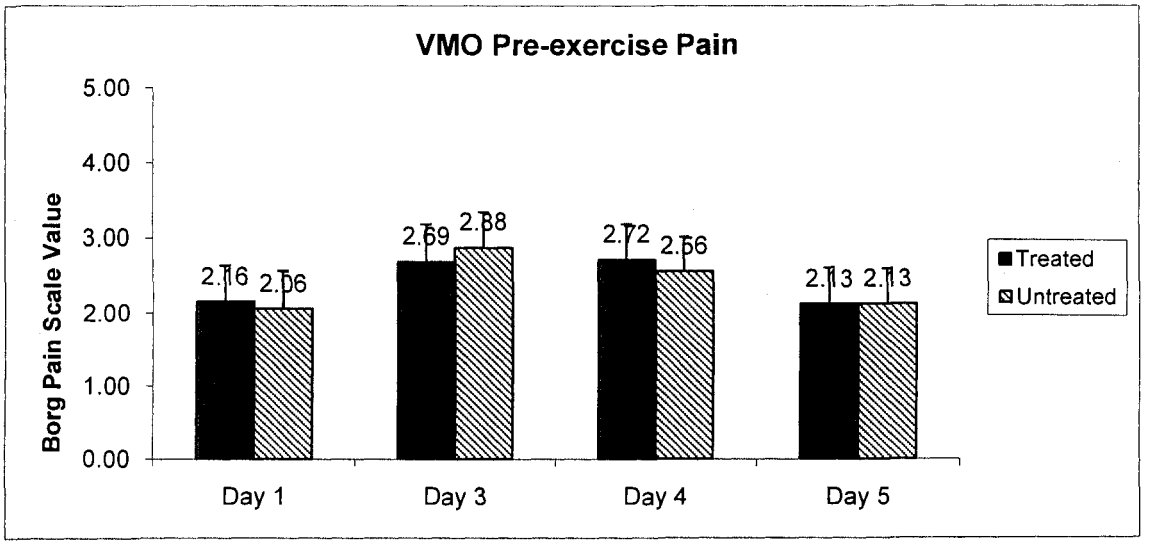

10 cm above Joint Line Girth
Girth (cm)
48.00
47.50
47.00
46.50
46.00
45.50
45.00
44.50
44.00
43.50
43.00
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

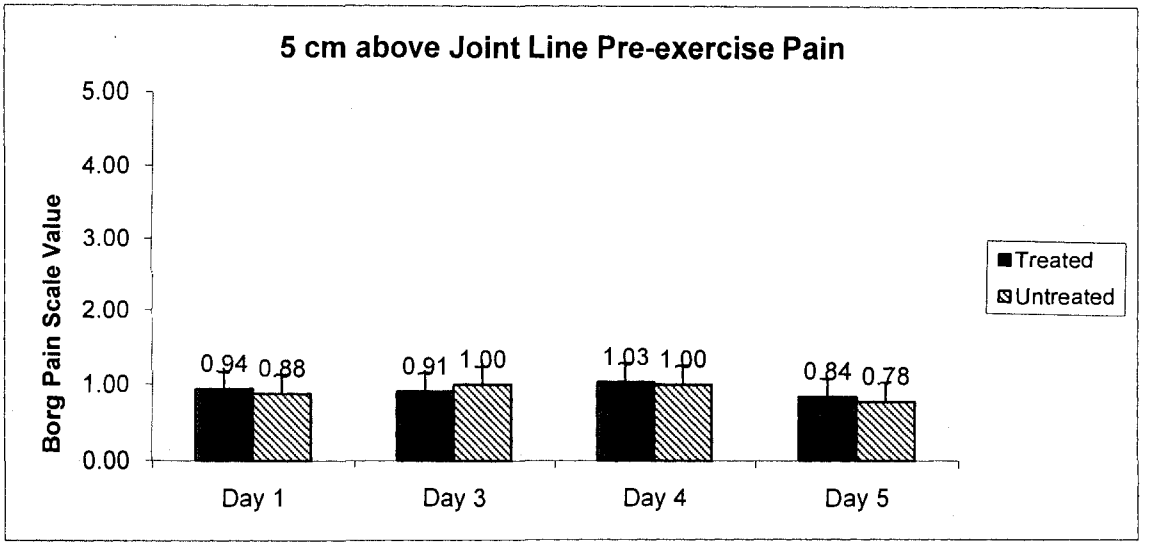

15 cm above Joint Line Girth
* p = .026
* p = .037
Girth (cm)
53.00
52.50
52.00
51.50
51.00
50.50
50.00
49.50
49.00
48.50
48.00
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

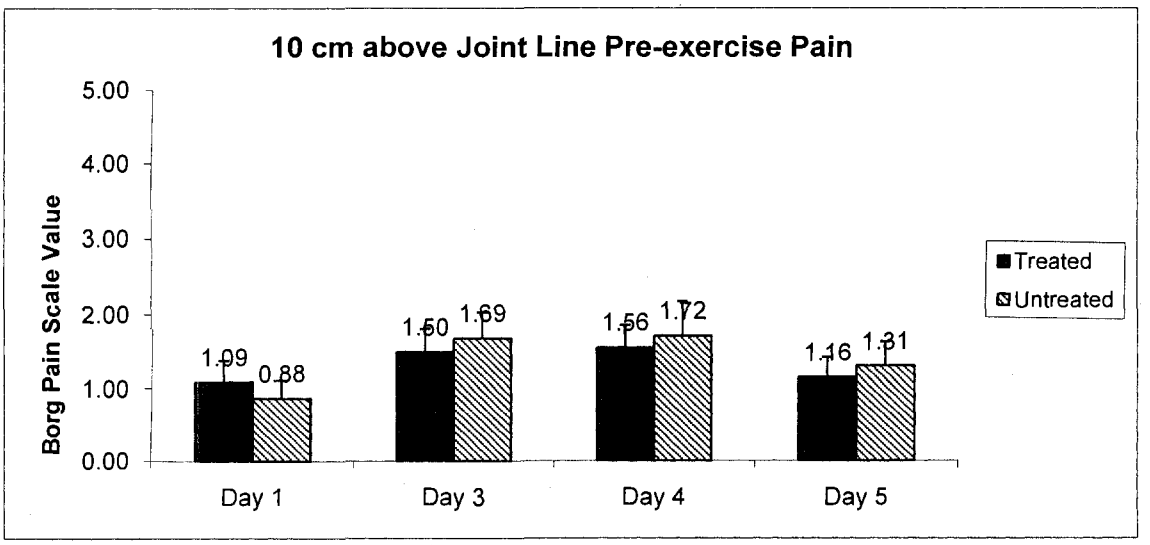

20 cm above Joint Line Girth
Girth (cm)
58.00
57.50
57.00
56.50
56.00
55.50
55.00
54.50
54.00
53.50
53.00
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

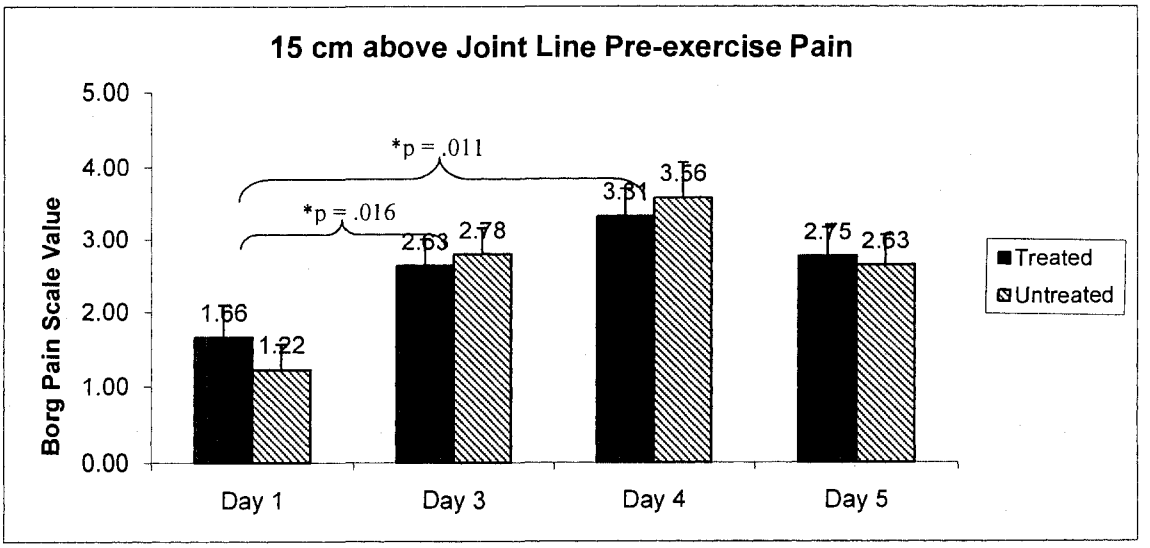

15cm above Jt Line Girth
* p = .001
Girth (cm)
52.50
52.00
51.50
51.00
50.50
50.00
49.50
50.61
50.86
51.18
51.12
Day 1
Day 3
Day 4
Day 5

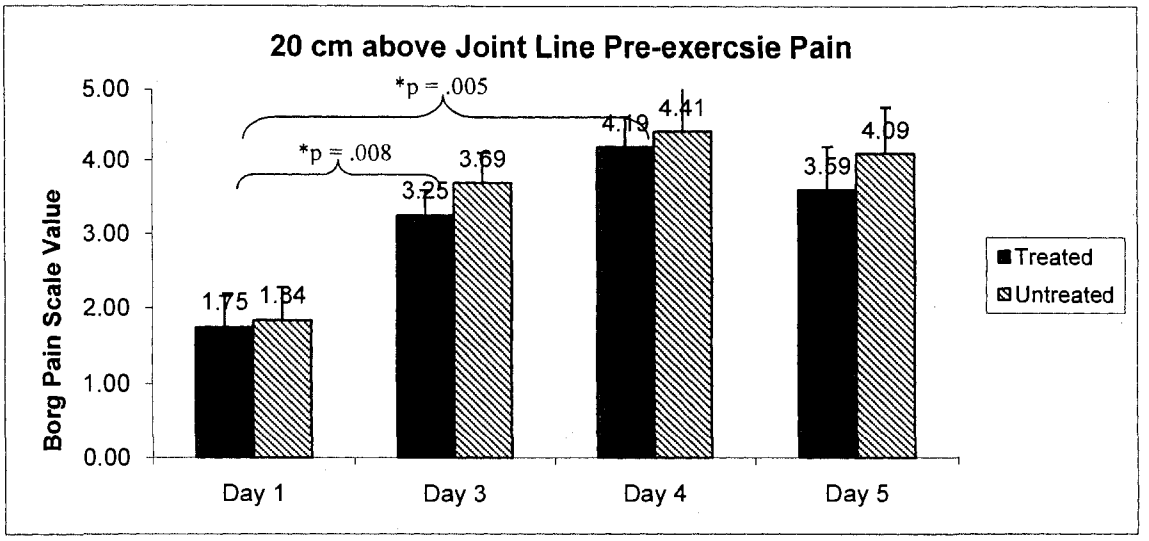

20cm above Jt Line Girth
* p = .027
Girth (cm)
57.50
57.00
56.50
56.00
55.50
55.00
54.50
54.00
55.09
55.56
55.87
55.48
Day 1
Day 3
Day 4
Day 5

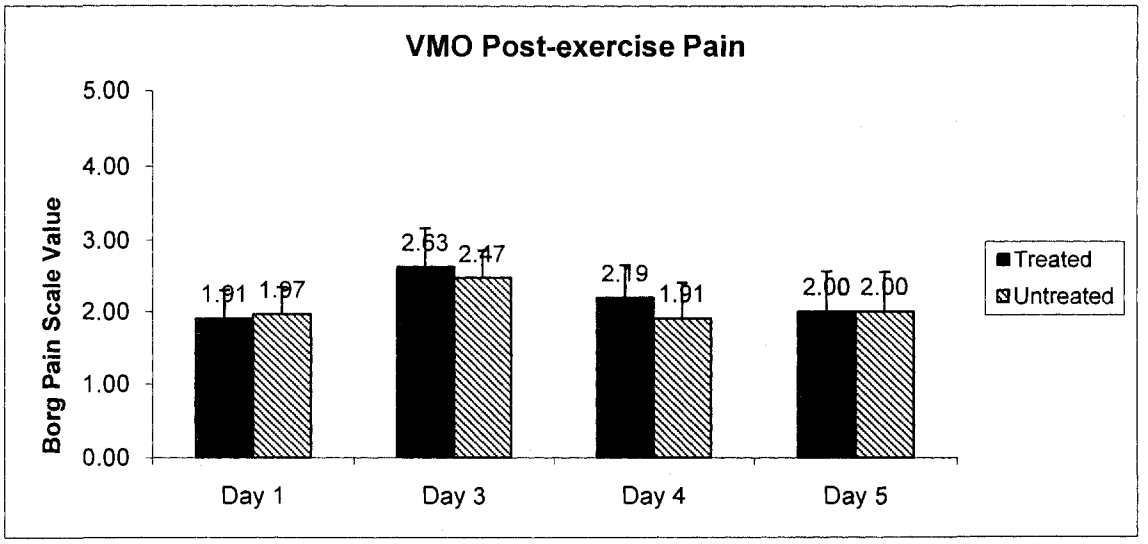

VMO Pre-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
2.16
2.06
2.69
2.88
2.72
2.56
2.13
2.13
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

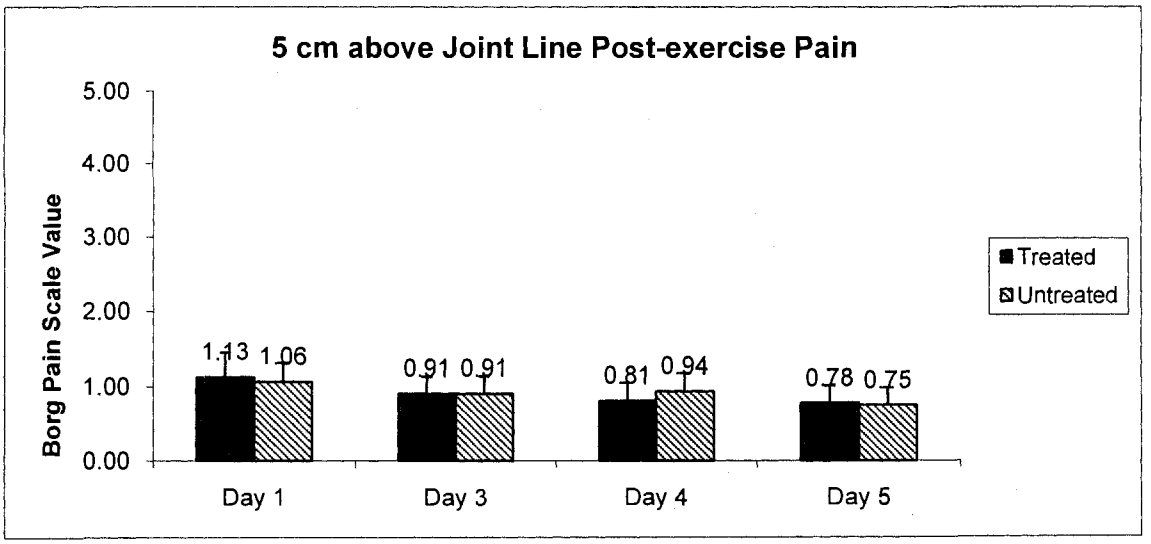

5 cm above Joint Line Pre-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
0.94
0.88
0.91
1.00
1.03
1.00
0.84
0.78
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

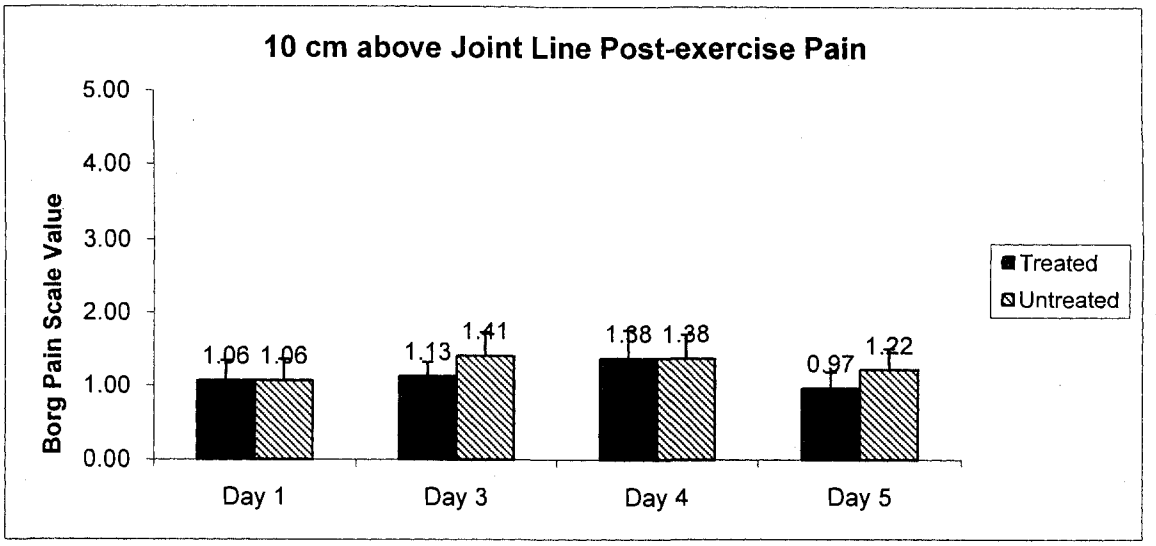

10 cm above Joint Line Pre-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
1.09
0.88
1.50
1.69
1.56
1.72
1.16
1.31
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

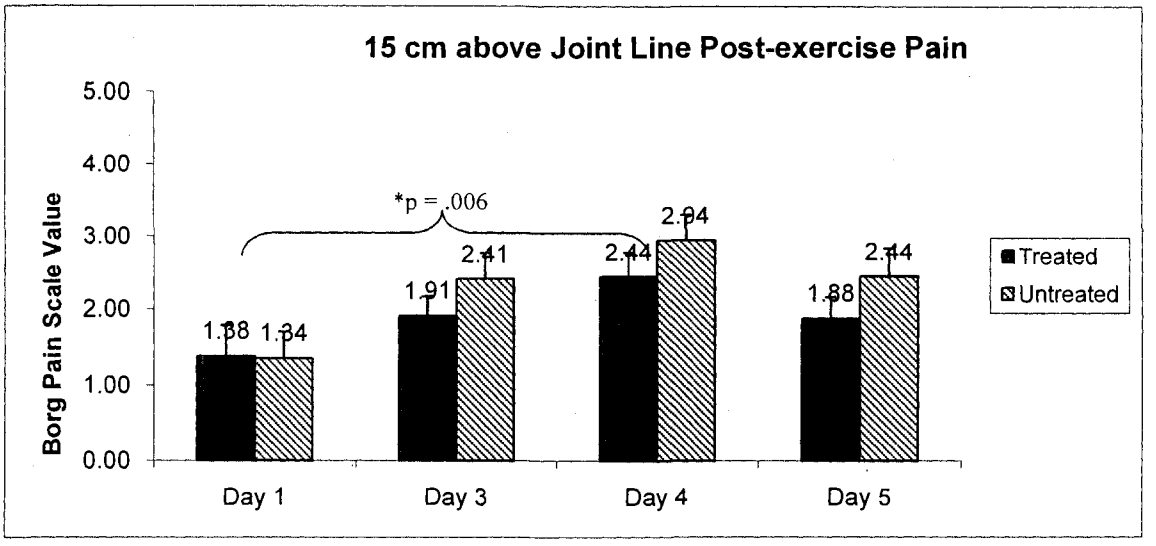

15 cm above Joint Line Pre-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
*p = .011
*p = .016
1.66
1.22
2.63
2.78
3.31
3.56
2.75
2.63
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

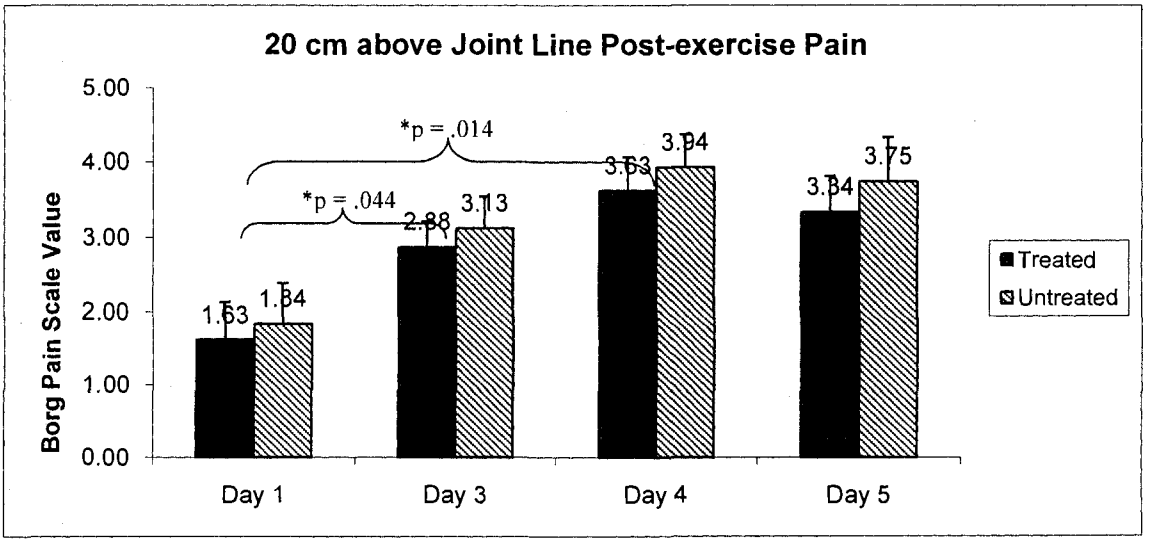

20 cm above Joint Line Pre-exercsie Pain
*p = .005
*p = .008
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
1.75
1.84
3.25
3.69
4.19
4.41
3.59
4.09
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

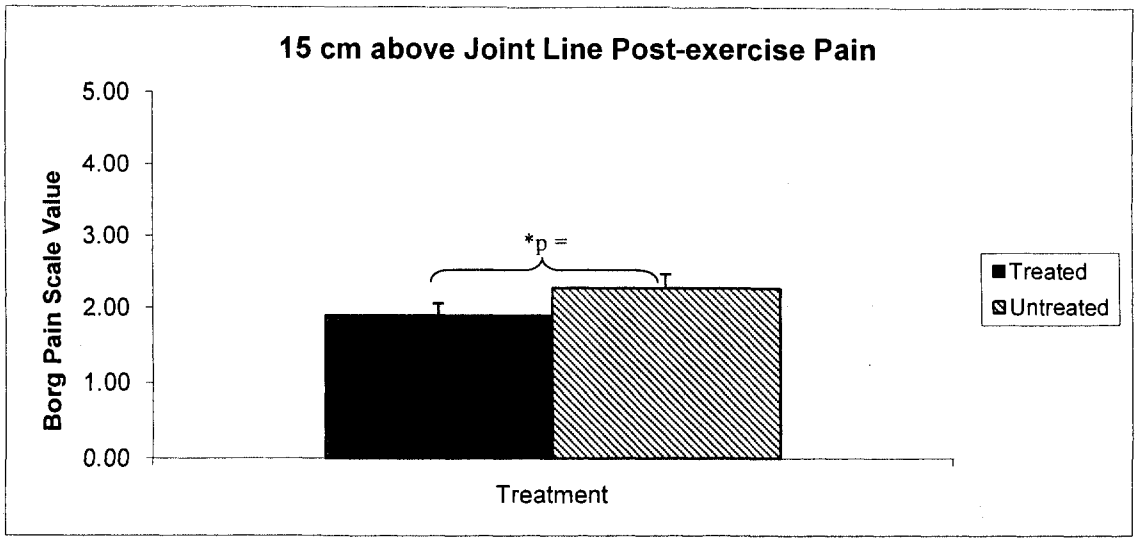

VMO Post-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
1.91
1.97
2.63
2.47
2.19
1.91
2.00
2.00
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

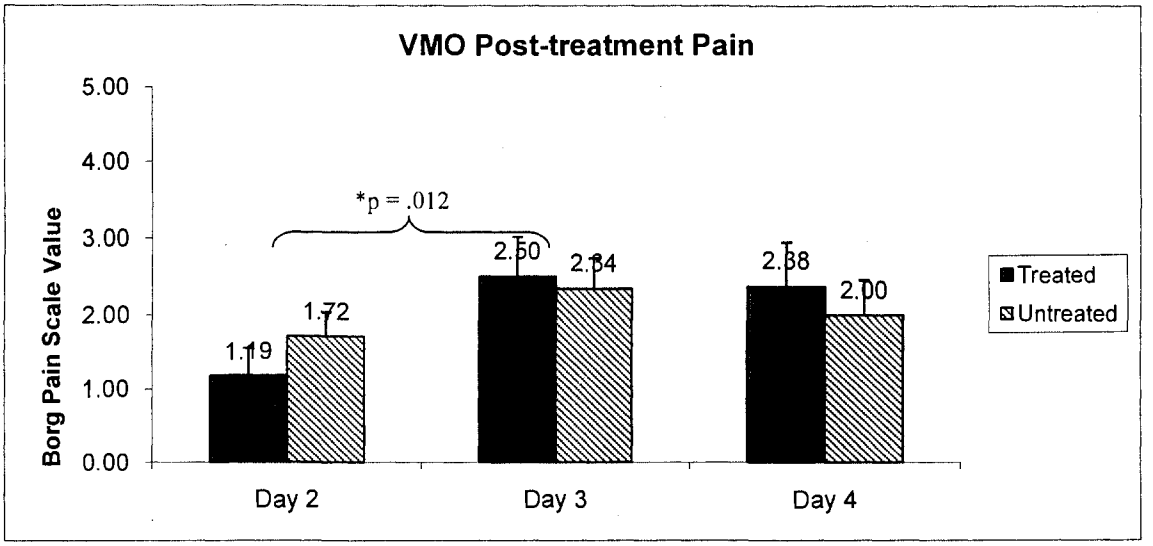

5 cm above Joint Line Post-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
1.13
1.06
0.91
0.91
0.81
0.94
0.78
0.75
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

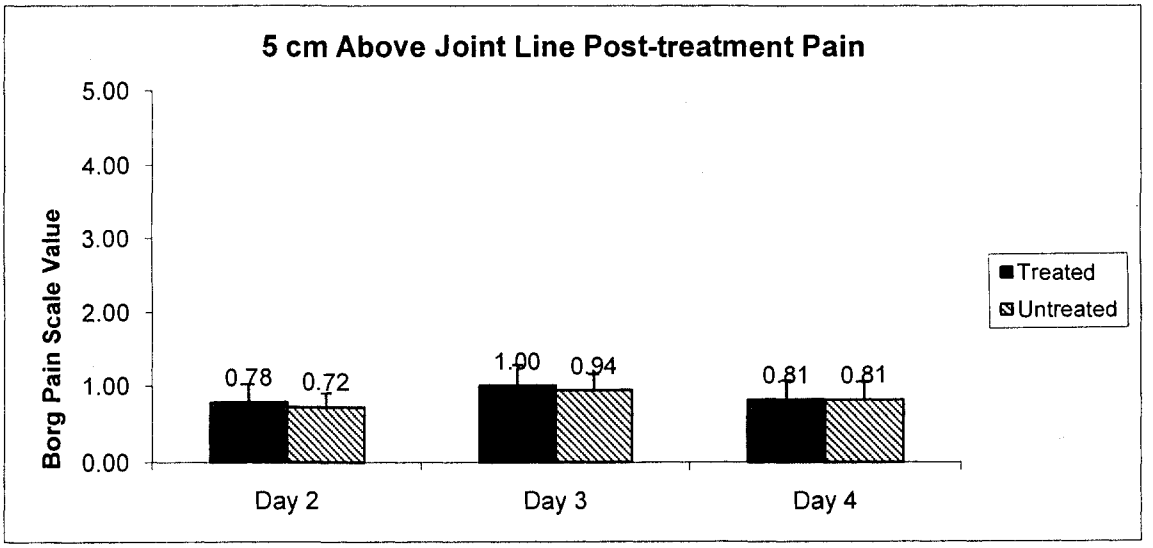

10 cm above Joint Line Post-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
1.06 1.06
1.13 1.41
1.38 1.38
0.97 1.22
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

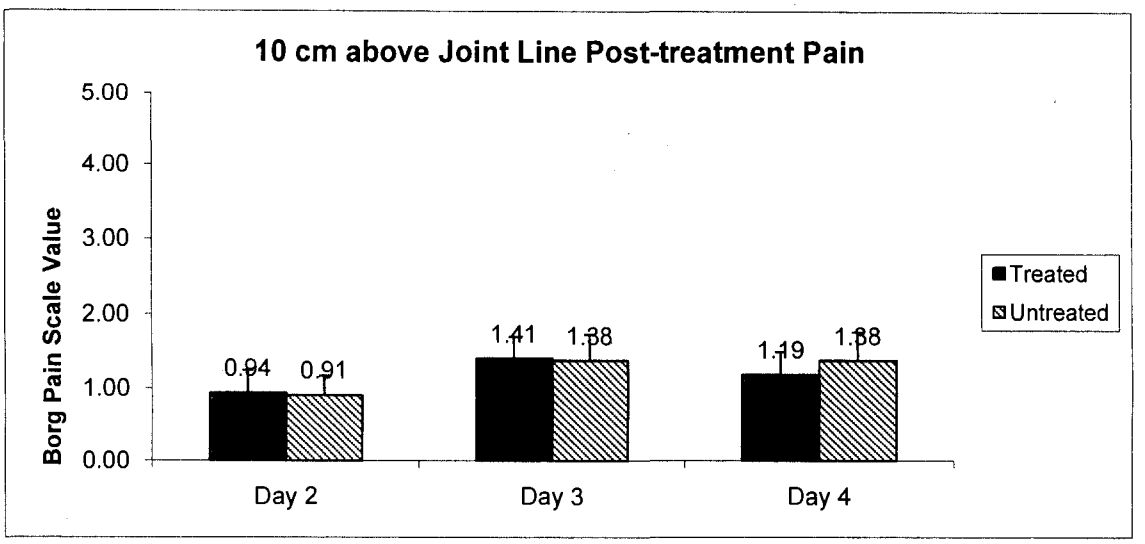

15 cm above Joint Line Post-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
*p = .006
1.38 1.34
1.91 2.41
2.44 2.94
1.88 2.44
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

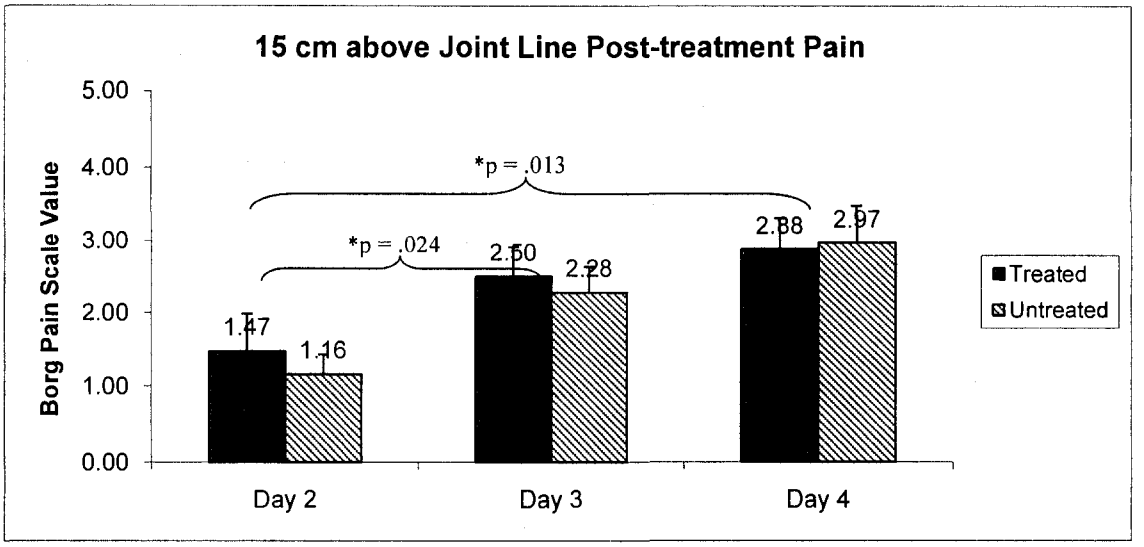

20 cm above Joint Line Post-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
*p = .014
*p = .044
1.63 1.84
2.88 3.13
3.63 3.94
3.34 3.75
Day 1
Day 3
Day 4
Day 5
Treated
Untreated

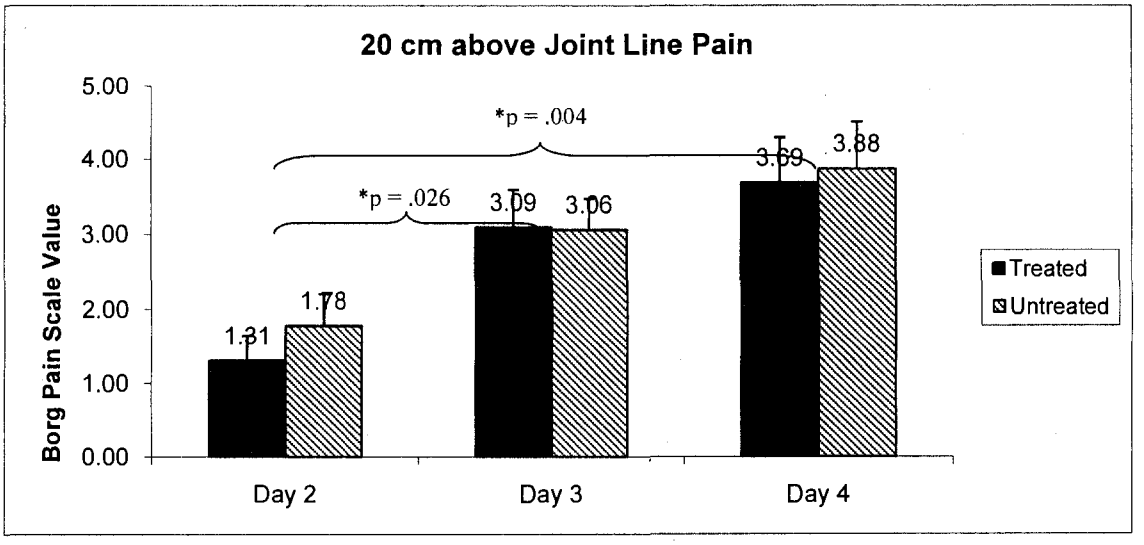

15 cm above Joint Line Post-exercise Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
*p =
Treatment
Treated
Untreated

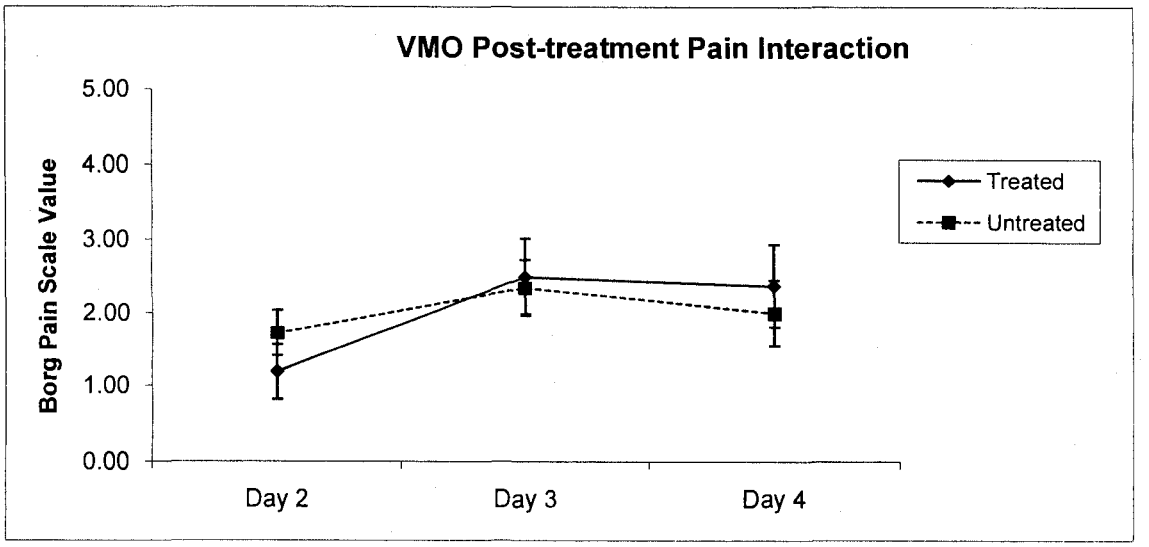

VMO Post-treatment Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
*p = .012
1.19
1.72
2.50
2.34
2.38
2.00
Day 2
Day 3
Day 4
Treated
Untreated

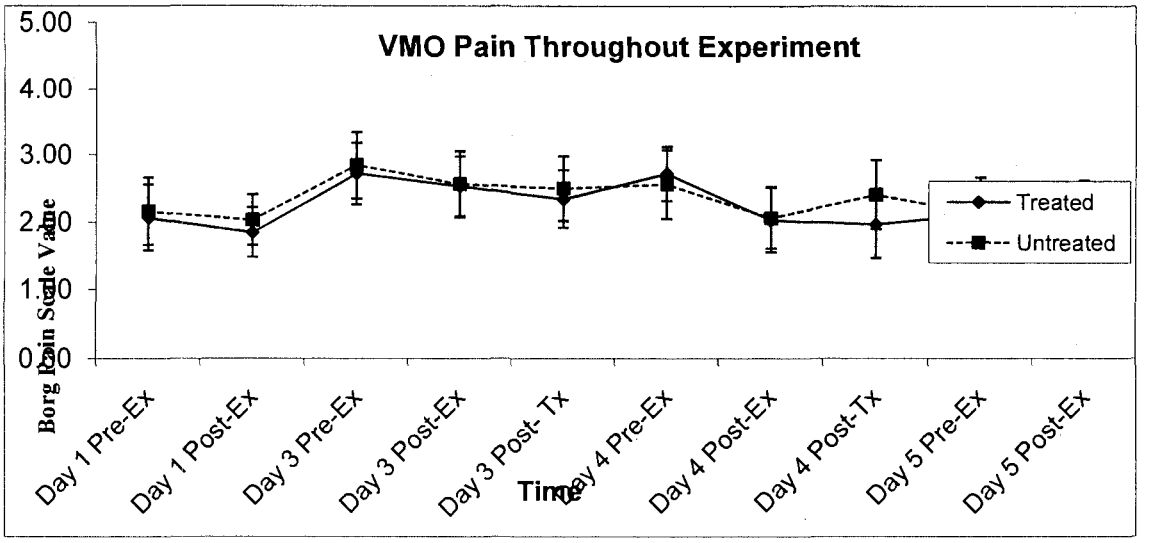

5 cm Above Joint Line Post-treatment Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
0.78
0.72
1.00
0.94
0.81
0.81
Day 2
Day 3
Day 4
Treated
Untreated

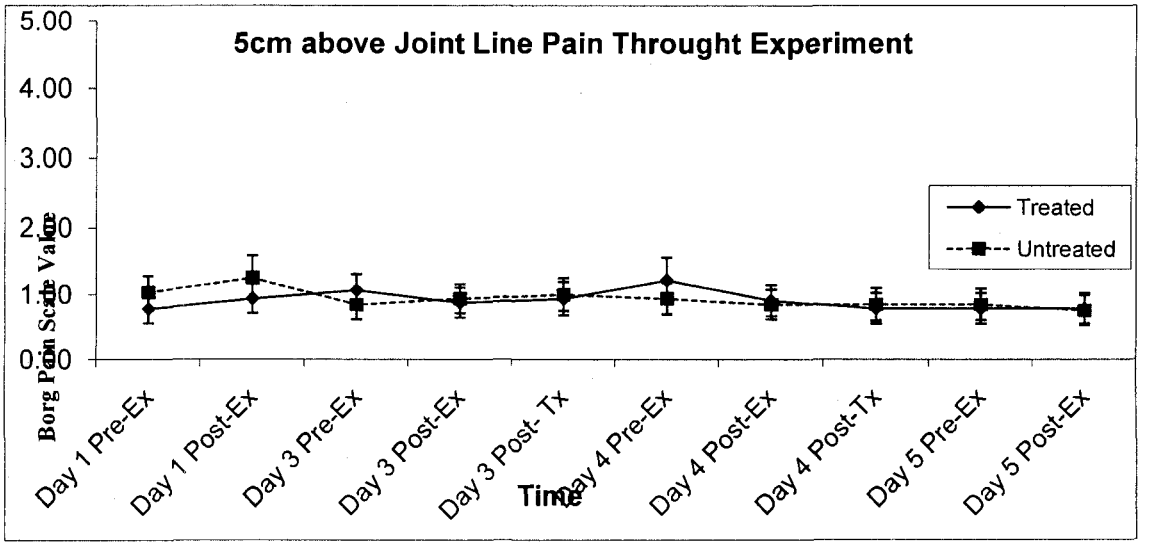

10 cm above Joint Line Post-treatment Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
0.94
0.91
1.41
1.38
1.19
1.38
Day 2
Day 3
Day 4
Treated
Untreated

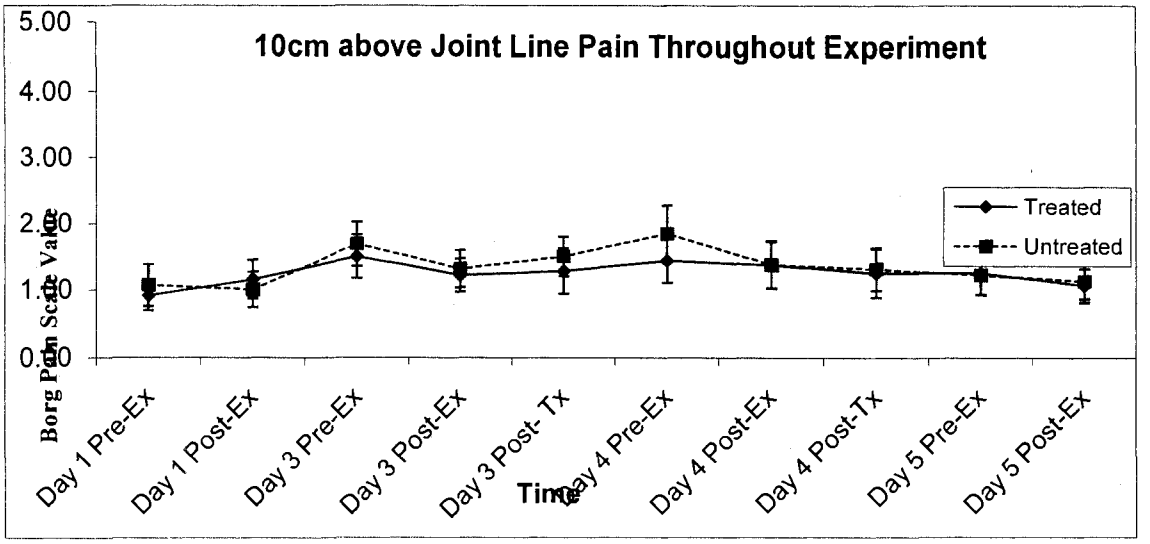

15 cm above Joint Line Post-treatment Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
*p = .013
*p = .024
1.47
1.16
2.50
2.28
2.88
2.97
Day 2
Day 3
Day 4
Treated
Untreated

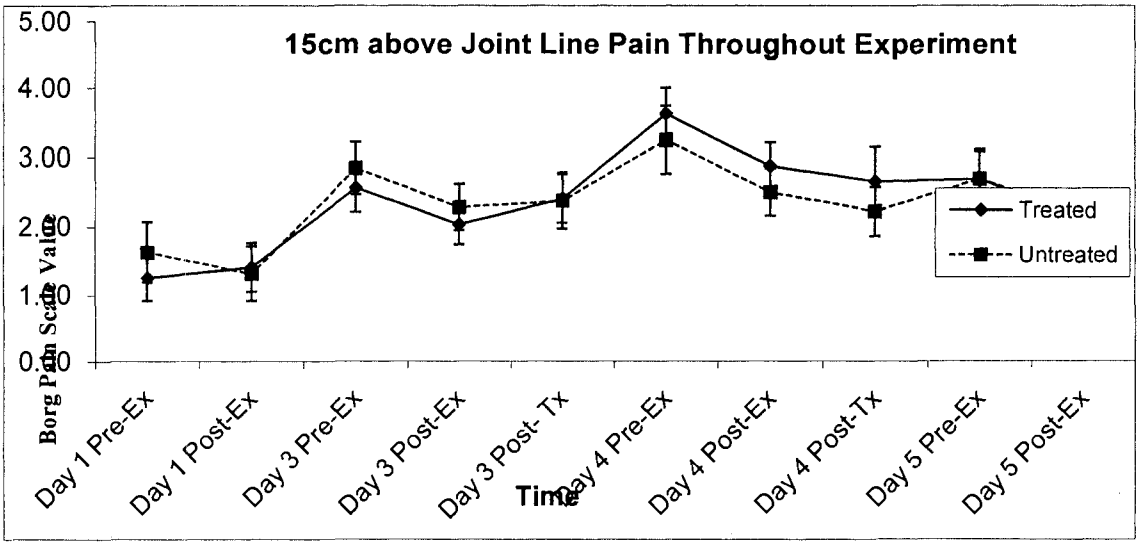

20 cm above Joint Line Pain
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
*p = .004
*p = .026
1.31
1.78
3.09
3.06
3.69
3.88
Day 2
Day 3
Day 4
Treated
Untreated

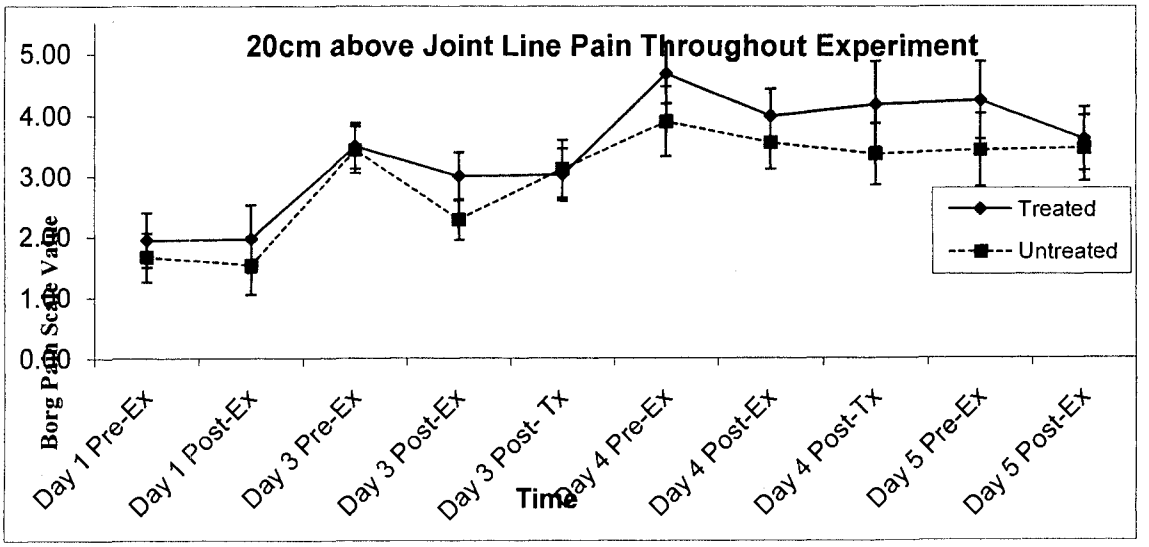

VMO Post-treatment Pain Interaction
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
Day 2
Day 3
Day 4
Treated
Untreated


VMO Pain Throughout Experiment
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
Day 1 Pre-Ex
Day 1 Post-Ex
Day 3 Pre-Ex
Day 3 Post-Ex
Day 3 Post- Tx
Day 4 Pre-Ex
Day 4 Post-Ex
Day 4 Post-Tx
Day 5 Pre-Ex
Day 5 Post-Ex
Time
Treated
Untreated


5cm above Joint Line Pain Throught Experiment
Borg Pain Scale Value
5.00
4.00
3.00
2.00
1.00
0.00
Day 1 Pre-Ex
Day 1 Post-Ex
Day 3 Pre-Ex
Day 3 Post-Ex
Day 3 Post- Tx
Day 4 Pre-Ex
Day 4 Post-Ex
Day 4 Post-Tx
Day 5 Pre-Ex
Day 5 Post-Ex
Time
Treated
Untreated


10cm above Joint Line Pain Throughout Experiment
5.00
4.00
3.00
2.00
1.00
0.00
Borg Pain Scale Value
Treated
Untreated
Day 1 Pre-Ex
Day 1 Post-Ex
Day 3 Pre-Ex
Day 3 Post-Ex
Day 3 Post- Tx
Day 4 Pre-Ex
Day 4 Post-Ex
Day 4 Post-Tx
Day 5 Pre-Ex
Day 5 Post-Ex
Time


15cm above Joint Line Pain Throughout Experiment
5.00
4.00
3.00
2.00
1.00
0.00
Borg Pain Scale Value
Treated
Untreated
Day 1 Pre-Ex
Day 1 Post-Ex
Day 3 Pre-Ex
Day 3 Post-Ex
Day 3 Post- Tx
Day 4 Pre-Ex
Day 4 Post-Ex
Day 4 Post-Tx
Day 5 Pre-Ex
Day 5 Post-Ex
Time


20cm above Joint Line Pain Throughout Experiment
5.00
4.00
3.00
2.00
1.00
0.00
Borg Pain Scale Value
Treated
Untreated
Day 1 Pre-Ex
Day 1 Post-Ex
Day 3 Pre-Ex
Day 3 Post-Ex
Day 3 Post- Tx
Day 4 Pre-Ex
Day 4 Post-Ex
Day 4 Post-Tx
Day 5 Pre-Ex
Day 5 Post-Ex
Time

# APPENDIX III

## SPSS DATA OUTPUTS

| *DEPENDENT VARIABLES* | *df* | F | p-value |
|---|---|---|---|
| **Concentric Peak Torque** | | | |
| Treatment | 1.000 | .017 | .897 |
| Time | 1.549 | 3.787 | .047 |
| Treatment*Time | 3.000 | 1.919 | .140 |
| **Eccentric Peak Torque** | | | |
| Treatment | 1.000 | .001 | .979 |
| Time | 1.965 | 4.480 | .020 |
| Treatment*Time | 3.000 | 1.742 | .172 |
| **Range of Motion** | | | |
| Treatment | 1.000 | .405 | .534 |
| Time | 1.162 | 2.408 | .136 |
| Treatment*Time | 3.000 | .031 | .993 |
| **Joint Line Girth** | | | |
| Treatment | 1.000 | .070 | .795 |
| Time | 3.000 | 1.037 | .385 |
| Treatment*Time | 3.000 | .561 | .644 |
| **5cm above Joint Line Girth** | | | |
| Treatment | 1.000 | .286 | .601 |
| Time | 3.000 | 2.409 | .079 |
| Treatment*Time | 3.000 | .314 | .815 |
| **10cm above Joint Line Girth** | | | |
| Treatment | 1.000 | 1.349 | .264 |
| Time | 2.173 | .718 | .506 |
| Treatment*Time | 3.000 | .858 | .471 |
| **15cm above Joint Line Girth** | | | |
| Treatment | 1.000 | 4.330 | .055 |
| Time | 3.000 | 7.415 | .000 |
| Treatment*Time | 3.000 | 2.827 | .049 |
| **20cm above Joint Line Girth** | | | |
| Treatment | 1.000 | .806 | .383 |
| Time | 3.000 | 4.848 | .005 |
| Treatment*Time | 3.000 | .726 | .542 |
| **VMO Pre-exercise Pain** | | | |
| Treatment | 1.000 | .011 | .916 |
| Time | 3.000 | 1.274 | .295 |
| Treatment*Time | 3.000 | .706 | .554 |
| **VMO Post-exercise Pain** | | | |
| Treatment | 1.000 | .685 | .421 |
| Time | 2.150 | 1.326 | .281 |
| Treatment*Time | 3.000 | .847 | .475 |
| **VMO Post-treatment Pain** | | | |
| Treatment | 1.000 | .000 | 1.000 |
| Time | 2.000 | 4.650 | .017 |
| Treatment*Time | 1.405 | 6.072 | .015 |

| *DEPENDENT VARIABLES* | *df* | F | p-value |
|---|---|---|---|
| **5cm Pre-exercise Pain** | | | |
| Treatment | 1.000 | .031 | .863 |
| Time | 2.169 | .591 | .573 |
| Treatment*Time | 1.414 | .247 | .706 |
| **5cm Post-exercise Pain** | | | |
| Treatment | 1.000 | .050 | .827 |
| Time | 1.621 | 1.332 | .278 |
| Treatment*Time | 1.338 | .672 | .464 |
| **5cm Post-treatment Pain** | | | |
| Treatment | 1.000 | .149 | .705 |
| Time | 2.000 | .961 | .394 |
| Treatment*Time | 2.000 | .063 | .939 |
| **10cm Pre-exercise Pain** | | | |
| Treatment | 1.000 | .487 | .496 |
| Time | 1.730 | 2.384 | .118 |
| Treatment*Time | 3.000 | .771 | .516 |
| **10cm Post-exercise Pain** | | | |
| Treatment | 1.000 | 2.442 | .139 |
| Time | 3.000 | .973 | .414 |
| Treatment*Time | 3.000 | .791 | .505 |
| **10cm Post-treatment Pain** | | | |
| Treatment | 1.000 | .039 | .847 |
| Time | 2.000 | 2.180 | .131 |
| Treatment*Time | 2.000 | .346 | .711 |
| **15cm Pre-exercise Pain** | | | |
| Treatment | 1.000 | .034 | .855 |
| Time | 1.986 | 7.595 | .002 |
| Treatment*Time | 3.000 | 1.301 | .286 |
| **15cm Post-exercise Pain** | | | |
| Treatment | 1.000 | 10.281 | .006 |
| Time | 3.000 | 4.749 | .006 |
| Treatment*Time | 3.000 | 2.644 | .061 |
| **15cm Post-treatment Pain** | | | |
| Treatment | 1.000 | .305 | .589 |
| Time | 2.000 | 8.498 | .001 |
| Treatment*Time | 2.000 | .559 | .578 |
| **20cm Pre-exercise Pain** | | | |
| Treatment | 1.000 | 1.291 | .274 |
| Time | 1.751 | 8.494 | .002 |
| Treatment*Time | 2.202 | .416 | .682 |
| **20cm Post-exercise Pain** | | | |
| Treatment | 1.000 | 2.945 | .107 |
| Time | 2.101 | 7.987 | .001 |
| Treatment*Time | 2.245 | .099 | .924 |
| **20cm Post-treatment Pain** | | | |
| Treatment | 1.000 | .526 | .479 |
| Time | 2.000 | 10.081 | .000 |
| Treatment*Time | 2.000 | .754 | .479 |

## General Linear Model

### Within-Subjects Factors

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Ecc_PT_PreT |
| | 2 | Ecc_PT_24T |
| | 3 | Ecc_PT_48T |
| | 4 | Ecc_PT_72T |
| 2 | 1 | Ecc_PT_PreN |
| | 2 | Ecc_PT_24N |
| | 3 | Ecc_PT_48N |
| | 4 | Ecc_PT_72N |

### Descriptive Statistics

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Ecc_PT_PreT | 3.0862 | .86961 | 16 |
| Ecc_PT_24T | 2.6019 | .84763 | 16 |
| Ecc_PT_48T | 2.5169 | .97847 | 16 |
| Ecc_PT_72T | 2.7794 | 1.05889 | 16 |
| Ecc_PT_PreN | 3.1875 | .94916 | 16 |
| Ecc_PT_24N | 2.6450 | 1.01304 | 16 |
| Ecc_PT_48N | 2.3488 | 1.04613 | 16 |
| Ecc_PT_72N | 2.7925 | 1.07407 | 16 |

### Mauchly's Test of Sphericity[b]

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .258 | 18.585 | 5 | .002 | .584 | .655 | .333 |
| Treatment * Time | .628 | 6.385 | 5 | .272 | .786 | .942 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum Of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .000 | 1 | .000 | .001 | .979 | .000 | .001 | .050 |
| | Greenhouse-Geisser | .000 | 1.000 | .000 | .001 | .979 | .000 | .001 | .050 |
| | Huynh-Feldt | .000 | 1.000 | .000 | .001 | .979 | .000 | .001 | .050 |
| | Lower-bound | .000 | 1.000 | .000 | .001 | .979 | .000 | .001 | .050 |
| Error(Treatment) | Sphericity Assumed | 4.636 | 15 | .309 | | | | | |
| | Greenhouse-Geisser | 4.636 | 15.000 | .309 | | | | | |
| | Huynh-Feldt | 4.636 | 15.000 | .309 | | | | | |
| | Lower-bound | 4.636 | 15.000 | .309 | | | | | |
| Time | Sphericity Assumed | 8.559 | 3 | 2.853 | 4.480 | .008 | .230 | 13.441 | .851 |
| | Greenhouse-Geisser | 8.559 | 1.752 | 4.885 | 4.480 | .025 | .230 | 7.851 | .679 |
| | Huynh-Feldt | 8.559 | 1.965 | 4.355 | 4.480 | .020 | .230 | 8.806 | .717 |
| | Lower-bound | 8.559 | 1.000 | 8.559 | 4.480 | .051 | .230 | 4.480 | .508 |
| Error(Time) | Sphericity Assumed | 28.656 | 45 | .637 | | | | | |
| | Greenhouse-Geisser | 28.656 | 26.285 | 1.090 | | | | | |
| | Huynh-Feldt | 28.656 | 29.481 | .972 | | | | | |
| | Lower-bound | 28.656 | 15.000 | 1.910 | | | | | |
| Treatment * Time | Sphericity Assumed | .324 | 3 | .108 | 1.742 | .172 | .104 | 5.225 | .424 |
| | Greenhouse-Geisser | .324 | 2.357 | .138 | 1.742 | .185 | .104 | 4.105 | .369 |
| | Huynh-Feldt | .324 | 2.825 | .115 | 1.742 | .176 | .104 | 4.920 | .409 |
| | Lower-bound | .324 | 1.000 | .324 | 1.742 | .207 | .104 | 1.742 | .235 |
| Error(Treatment*Time) | Sphericity Assumed | 2.792 | 45 | .062 | | | | | |
| | Greenhouse-Geisser | 2.792 | 35.354 | .079 | | | | | |
| | Huynh-Feldt | 2.792 | 42.368 | .066 | | | | | |
| | Lower-bound | 2.792 | 15.000 | .186 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | ROM_PreT |
| | 2 | ROM_24T |
| | 3 | ROM_48T |
| | 4 | ROM_72T |
| 2 | 1 | ROM_PreN |
| | 2 | ROM_24N |
| | 3 | ROM_48N |
| | 4 | ROM_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| ROM_PreT | 138.3550 | 9.19120 | 16 |
| ROM_24T | 133.6875 | 9.93561 | 16 |
| ROM_48T | 122.3962 | 37.39308 | 16 |
| ROM_72T | 133.8738 | 15.05549 | 16 |
| ROM_PreN | 138.0094 | 9.75007 | 16 |
| ROM_24N | 133.2919 | 11.52932 | 16 |
| ROM_48N | 121.7494 | 36.28581 | 16 |
| ROM_72N | 133.6244 | 13.87795 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .011 | 62.267 | 5 | .000 | .377 | .387 | .333 |
| Treatment * Time | .509 | 9.255 | 5 | .100 | .787 | .943 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | 5.363 | 1 | 5.363 | .405 | .534 | .026 | .405 | .092 |
| | Greenhouse-Geisser | 5.363 | 1.000 | 5.363 | .405 | .534 | .026 | .405 | .092 |
| | Huynh-Feldt | 5.363 | 1.000 | 5.363 | .405 | .534 | .026 | .405 | .092 |
| | Lower-bound | 5.363 | 1.000 | 5.363 | .405 | .534 | .026 | .405 | .092 |
| Error(Treatment) | Sphericity Assumed | 198.588 | 15 | 13.239 | | | | | |
| | Greenhouse-Geisser | 198.588 | 15.000 | 13.239 | | | | | |
| | Huynh-Feldt | 198.588 | 15.000 | 13.239 | | | | | |
| | Lower-bound | 198.588 | 15.000 | 13.239 | | | | | |
| Time | Sphericity Assumed | 4543.450 | 3 | 1514.483 | 2.408 | .079 | .138 | 7.225 | .564 |
| | Greenhouse-Geisser | 4543.450 | 1.132 | 4012.090 | 2.408 | .137 | .138 | 2.727 | .327 |
| | Huynh-Feldt | 4543.450 | 1.162 | 3908.829 | 2.408 | .136 | .138 | 2.799 | .332 |
| | Lower-bound | 4543.450 | 1.000 | 4543.450 | 2.408 | .142 | .138 | 2.408 | .306 |
| Error(Time) | Sphericity Assumed | 28296.848 | 45 | 628.819 | | | | | |
| | Greenhouse-Geisser | 28296.848 | 16.987 | 1665.834 | | | | | |
| | Huynh-Feldt | 28296.848 | 17.435 | 1622.960 | | | | | |
| | Lower-bound | 28296.848 | 15.000 | 1886.457 | | | | | |
| Treatment * Time | Sphericity Assumed | .690 | 3 | .230 | .031 | .993 | .002 | .093 | .055 |
| | Greenhouse-Geisser | .690 | 2.360 | .292 | .031 | .982 | .002 | .073 | .055 |
| | Huynh-Feldt | .690 | 2.830 | .244 | .031 | .991 | .002 | .088 | .055 |
| | Lower-bound | .690 | 1.000 | .690 | .031 | .863 | .002 | .031 | .053 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Error(Treatment*Time) | Sphericity Assumed | 334.052 | 45 | 7.423 | | | | | |
| | Greenhouse-Geisser | 334.052 | 35.405 | 9.435 | | | | | |
| | Huynh-Feldt | 334.052 | 42.444 | 7.870 | | | | | |
| | Lower-bound | 334.052 | 15.000 | 22.270 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Girth_Jt_PreT |
| | 2 | Girth_Jt_24T |
| | 3 | Girth_Jt_48T |
| | 4 | Girth_Jt_72T |
| 2 | 1 | Girth_Jt_PreN |
| | 2 | Girth_Jt_24N |
| | 3 | Girth_Jt_48N |
| | 4 | Girth_Jt_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Girth_Jt_PreT | 37.4163 | 3.47041 | 16 |
| Girth_Jt_24T | 37.3756 | 3.28106 | 16 |
| Girth_Jt_48T | 37.3763 | 3.20924 | 16 |
| Girth_Jt_72T | 37.4819 | 3.41626 | 16 |
| Girth_Jt_PreN | 37.2575 | 3.00337 | 16 |
| Girth_Jt_24N | 37.3119 | 3.15620 | 16 |
| Girth_Jt_48N | 37.4188 | 2.94579 | 16 |
| Girth_Jt_72N | 37.4669 | 3.21022 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .782 | 3.371 | 5 | .644 | .866 | 1.000 | .333 |
| Treatment * Time | .771 | 3.569 | 5 | .614 | .850 | 1.000 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .076 | 1 | .076 | .070 | .795 | .005 | .070 | .057 |
| | Greenhouse-Geisser | .076 | 1.000 | .076 | .070 | .795 | .005 | .070 | .057 |
| | Huynh-Feldt | .076 | 1.000 | .076 | .070 | .795 | .005 | .070 | .057 |
| | Lower-bound | .076 | 1.000 | .076 | .070 | .795 | .005 | .070 | .057 |
| Error(Treatment) | Sphericity Assumed | 16.264 | 15 | 1.084 | | | | | |
| | Greenhouse-Geisser | 16.264 | 15.000 | 1.084 | | | | | |
| | Huynh-Feldt | 16.264 | 15.000 | 1.084 | | | | | |
| | Lower-bound | 16.264 | 15.000 | 1.084 | | | | | |
| Time | Sphericity Assumed | .388 | 3 | .129 | 1.037 | .385 | .065 | 3.112 | .263 |
| | Greenhouse-Geisser | .388 | 2.598 | .149 | 1.037 | .379 | .065 | 2.695 | .244 |
| | Huynh-Feldt | .388 | 3.000 | .129 | 1.037 | .385 | .065 | 3.112 | .263 |
| | Lower-bound | .388 | 1.000 | .388 | 1.037 | .325 | .065 | 1.037 | .159 |
| Error(Time) | Sphericity Assumed | 5.610 | 45 | .125 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Greenhouse-Geisser | 5.610 | 38.974 | .144 | | | | | |
| | Huynh-Feldt | 5.610 | 45.000 | .125 | | | | | |
| | Lower-bound | 5.610 | 15.000 | .374 | | | | | |
| Treatment * Time | Sphericity Assumed | .174 | 3 | .058 | .561 | .644 | .036 | 1.682 | .156 |
| | Greenhouse-Geisser | .174 | 2.551 | .068 | .561 | .617 | .036 | 1.430 | .147 |
| | Huynh-Feldt | .174 | 3.000 | .058 | .561 | .644 | .036 | 1.682 | .156 |
| | Lower-bound | .174 | 1.000 | .174 | .561 | .466 | .036 | .561 | .108 |
| Error(Treatment*Time) | Sphericity Assumed | 4.665 | 45 | .104 | | | | | |
| | Greenhouse-Geisser | 4.665 | 38.272 | .122 | | | | | |
| | Huynh-Feldt | 4.665 | 45.000 | .104 | | | | | |
| | Lower-bound | 4.665 | 15.000 | .311 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Girth_5cm_PreT |
| | 2 | Girth_5cm_24T |
| | 3 | Girth_5cm_48T |
| | 4 | Girth_5cm_72T |
| 2 | 1 | Girth_5cm_PreN |
| | 2 | Girth_5cm_24N |
| | 3 | Girth_5cm_48N |
| | 4 | Girth_5cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Girth_5cm_PreT | 39.8725 | 4.29209 | 16 |
| Girth_5cm_24T | 39.8962 | 4.25960 | 16 |
| Girth_5cm_48T | 40.1238 | 4.29325 | 16 |
| Girth_5cm_72T | 40.1294 | 4.43802 | 16 |
| Girth_5cm_PreN | 39.9850 | 4.39624 | 16 |
| Girth_5cm_24N | 40.0425 | 4.52488 | 16 |
| Girth_5cm_48N | 40.1475 | 4.35892 | 16 |
| Girth_5cm_72N | 40.1775 | 4.47250 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .840 | 2.388 | 5 | .794 | .892 | 1.000 | .333 |
| Treatment * Time | .723 | 4.455 | 5 | .487 | .810 | .978 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .219 | 1 | .219 | .286 | .601 | .019 | .286 | .079 |
| | Greenhouse-Geisser | .219 | 1.000 | .219 | .286 | .601 | .019 | .286 | .079 |
| | Huynh-Feldt | .219 | 1.000 | .219 | .286 | .601 | .019 | .286 | .079 |
| | Lower-bound | .219 | 1.000 | .219 | .286 | .601 | .019 | .286 | .079 |
| Error(Treatment) | Sphericity Assumed | 11.463 | 15 | .764 | | | | | |
| | Greenhouse-Geisser | 11.463 | 15.000 | .764 | | | | | |
| | Huynh-Feldt | 11.463 | 15.000 | .764 | | | | | |
| | Lower-bound | 11.463 | 15.000 | .764 | | | | | |
| Time | Sphericity Assumed | 1.254 | 3 | .418 | 2.409 | .079 | .138 | 7.226 | .564 |
| | Greenhouse-Geisser | 1.254 | 2.676 | .469 | 2.409 | .088 | .138 | 6.446 | .529 |
| | Huynh-Feldt | 1.254 | 3.000 | .418 | 2.409 | .079 | .138 | 7.226 | .564 |
| | Lower-bound | 1.254 | 1.000 | 1.254 | 2.409 | .142 | .138 | 2.409 | .306 |
| Error(Time) | Sphericity Assumed | 7.810 | 45 | .174 | | | | | |
| | Greenhouse-Geisser | 7.810 | 40.146 | .195 | | | | | |
| | Huynh-Feldt | 7.810 | 45.000 | .174 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Lower-bound | 7.810 | 15.000 | .521 | | | | | |
| Treatment * Time | Sphericity Assumed | .077 | 3 | .026 | .314 | .815 | .020 | .941 | .106 |
| | Greenhouse-Geisser | .077 | 2.429 | .032 | .314 | .773 | .020 | .762 | .100 |
| | Huynh-Feldt | .077 | 2.933 | .026 | .314 | .811 | .020 | .920 | .105 |
| | Lower-bound | .077 | 1.000 | .077 | .314 | .584 | .020 | .314 | .082 |
| Error(Treatment*Time) | Sphericity Assumed | 3.671 | 45 | .082 | | | | | |
| | Greenhouse-Geisser | 3.671 | 36.440 | .101 | | | | | |
| | Huynh-Feldt | 3.671 | 43.995 | .083 | | | | | |
| | Lower-bound | 3.671 | 15.000 | .245 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Girth_10cm_PreT |
| | 2 | Girth_10cm_24T |
| | 3 | Girth_10cm_48T |
| | 4 | Girth_10cm_72T |
| 2 | 1 | Girth_10cm_PreN |
| | 2 | Girth_10cm_24N |
| | 3 | Girth_10cm_48N |
| | 4 | Girth_10cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Girth_10cm_PreT | 45.3038 | 5.82883 | 16 |
| Girth_10cm_24T | 45.4025 | 5.47236 | 16 |
| Girth_10cm_48T | 45.5275 | 5.22100 | 16 |
| Girth_10cm_72T | 45.3450 | 5.67652 | 16 |
| Girth_10cm_PreN | 45.0300 | 5.57476 | 16 |
| Girth_10cm_24N | 45.2269 | 5.53333 | 16 |
| Girth_10cm_48N | 45.1988 | 5.43447 | 16 |
| Girth_10cm_72N | 45.3981 | 5.32618 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .420 | 11.897 | 5 | .037 | .635 | .724 | .333 |
| Treatment * Time | .858 | 2.108 | 5 | .834 | .920 | 1.000 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | 1.051 | 1 | 1.051 | 1.349 | .264 | .083 | 1.349 | .193 |
| | Greenhouse-Geisser | 1.051 | 1.000 | 1.051 | 1.349 | .264 | .083 | 1.349 | .193 |
| | Huynh-Feldt | 1.051 | 1.000 | 1.051 | 1.349 | .264 | .083 | 1.349 | .193 |
| | Lower-bound | 1.051 | 1.000 | 1.051 | 1.349 | .264 | .083 | 1.349 | .193 |
| Error(Treatment) | Sphericity Assumed | 11.687 | 15 | .779 | | | | | |
| | Greenhouse-Geisser | 11.687 | 15.000 | .779 | | | | | |
| | Huynh-Feldt | 11.687 | 15.000 | .779 | | | | | |
| | Lower-bound | 11.687 | 15.000 | .779 | | | | | |
| Time | Sphericity Assumed | .863 | 3 | .288 | .718 | .547 | .046 | 2.153 | .190 |
| | Greenhouse-Geisser | .863 | 1.904 | .454 | .718 | .490 | .046 | 1.366 | .157 |
| | Huynh-Feldt | .863 | 2.173 | .397 | .718 | .506 | .046 | 1.559 | .165 |
| | Lower-bound | .863 | 1.000 | .863 | .718 | .410 | .046 | .718 | .125 |
| Error(Time) | Sphericity Assumed | 18.045 | 45 | .401 | | | | | |
| | Greenhouse-Geisser | 18.045 | 28.553 | .632 | | | | | |
| | Huynh-Feldt | 18.045 | 32.593 | .554 | | | | | |
| | Lower-bound | 18.045 | 15.000 | 1.203 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Treatment * Time | Sphericity Assumed | .682 | 3 | .227 | .856 | .471 | .054 | 2.567 | .221 |
| | Greenhouse-Geisser | .682 | 2.760 | .247 | .856 | .464 | .054 | 2.361 | .212 |
| | Huynh-Feldt | .682 | 3.000 | .227 | .856 | .471 | .054 | 2.567 | .221 |
| | Lower-bound | .682 | 1.000 | .682 | .856 | .370 | .054 | .856 | .140 |
| Error(Treatment*Time) | Sphericity Assumed | 11.961 | 45 | .266 | | | | | |
| | Greenhouse-Geisser | 11.961 | 41.394 | .289 | | | | | |
| | Huynh-Feldt | 11.961 | 45.000 | .266 | | | | | |
| | Lower-bound | 11.961 | 15.000 | .797 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Girth_15cm_PreT |
| | 2 | Girth_15cm_24T |
| | 3 | Girth_15cm_48T |
| | 4 | Girth_15cm_72T |
| 2 | 1 | Girth_15cm_PreN |
| | 2 | Girth_15cm_24N |
| | 3 | Girth_15cm_48N |
| | 4 | Girth_15cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Girth_15cm_PreT | 51.0106 | 6.47839 | 16 |
| Girth_15cm_24T | 51.0312 | 6.26374 | 16 |
| Girth_15cm_48T | 51.4288 | 6.25400 | 16 |
| Girth_15cm_72T | 51.2238 | 6.29284 | 16 |
| Girth_15cm_PreN | 50.2069 | 5.70606 | 16 |
| Girth_15cm_24N | 50.6981 | 6.19106 | 16 |
| Girth_15cm_48N | 50.9388 | 6.05497 | 16 |
| Girth_15cm_72N | 51.0181 | 5.86051 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .566 | 7.812 | 5 | .168 | .715 | .838 | .333 |
| Treatment * Time | .751 | 3.930 | 5 | .560 | .849 | 1.000 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | 6.716 | 1 | 6.716 | 4.330 | .055 | .224 | 4.330 | .495 |
| | Greenhouse-Geisser | 6.716 | 1.000 | 6.716 | 4.330 | .055 | .224 | 4.330 | .495 |
| | Huynh-Feldt | 6.716 | 1.000 | 6.716 | 4.330 | .055 | .224 | 4.330 | .495 |
| | Lower-bound | 6.716 | 1.000 | 6.716 | 4.330 | .055 | .224 | 4.330 | .495 |
| Error(Treatment) | Sphericity Assumed | 23.267 | 15 | 1.551 | | | | | |
| | Greenhouse-Geisser | 23.267 | 15.000 | 1.551 | | | | | |
| | Huynh-Feldt | 23.267 | 15.000 | 1.551 | | | | | |
| | Lower-bound | 23.267 | 15.000 | 1.551 | | | | | |
| Time | Sphericity Assumed | 6.639 | 3 | 2.213 | 7.415 | .000 | .331 | 22.244 | .977 |
| | Greenhouse-Geisser | 6.639 | 2.146 | 3.094 | 7.415 | .002 | .331 | 15.909 | .930 |
| | Huynh-Feldt | 6.639 | 2.515 | 2.640 | 7.415 | .001 | .331 | 18.648 | .957 |
| | Lower-bound | 6.639 | 1.000 | 6.639 | 7.415 | .016 | .331 | 7.415 | .721 |
| Error(Time) | Sphericity Assumed | 13.431 | 45 | .298 | | | | | |
| | Greenhouse-Geisser | 13.431 | 32.184 | .417 | | | | | |
| | Huynh-Feldt | 13.431 | 37.726 | .356 | | | | | |
| | Lower-bound | 13.431 | 15.000 | .895 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Treatment * Time | Sphericity Assumed | 1.599 | 3 | .533 | 2.827 | .049 | .159 | 8.481 | .640 |
| | Greenhouse-Geisser | 1.599 | 2.548 | .627 | 2.827 | .059 | .159 | 7.204 | .587 |
| | Huynh-Feldt | 1.599 | 3.000 | .533 | 2.827 | .049 | .159 | 8.481 | .640 |
| | Lower-bound | 1.599 | 1.000 | 1.599 | 2.827 | .113 | .159 | 2.827 | .350 |
| Error(Treatment*Time) | Sphericity Assumed | 8.483 | 45 | .189 | | | | | |
| | Greenhouse-Geisser | 8.483 | 38.220 | .222 | | | | | |
| | Huynh-Feldt | 8.483 | 45.000 | .189 | | | | | |
| | Lower-bound | 8.483 | 15.000 | .566 | | | | | |

a. Computed using alpha = .05

**Estimated Marginal Means**

**1. Treatment**

**Estimates**

Measure:MEASURE_1

| Treatment | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 51.174 | 1.578 | 47.810 | 54.537 |
| 2 | 50.715 | 1.484 | 47.552 | 53.879 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Treatment | (J) Treatment | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | .458 | .220 | .055 | -.011 | .927 |
| 2 | 1 | -.458 | .220 | .055 | -.927 | .011 |

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

**2. Time**

**Estimates**

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 50.609 | 1.517 | 47.374 | 53.843 |
| 2 | 50.865 | 1.554 | 47.553 | 54.176 |
| 3 | 51.184 | 1.535 | 47.912 | 54.456 |
| 4 | 51.121 | 1.514 | 47.894 | 54.348 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -.256 | .107 | .180 | -.580 | .068 |
| | 3 | -.575* | .120 | .001 | -.938 | -.212 |
| | 4 | -.512 | .176 | .065 | -1.047 | .023 |
| 2 | 3 | -.319 | .122 | .115 | -.688 | .050 |
| | 4 | -.256 | .161 | .791 | -.744 | .232 |
| 3 | 4 | .063 | .120 | 1.000 | -.303 | .428 |

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

*. The mean difference is significant at the .05 level.

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Girth_20cm_PreT |
| | 2 | Girth_20cm_24T |
| | 3 | Girth_20cm_48T |
| | 4 | Girth_20cm_72T |
| 2 | 1 | Girth_20cm_PreN |
| | 2 | Girth_20cm_24N |
| | 3 | Girth_20cm_48N |
| | 4 | Girth_20cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Girth_20cm_PreT | 55.2300 | 6.19627 | 16 |
| Girth_20cm_24T | 55.6925 | 6.31293 | 16 |
| Girth_20cm_48T | 55.9725 | 6.88511 | 16 |
| Girth_20cm_72T | 55.4563 | 6.31066 | 16 |
| Girth_20cm_PreN | 54.9506 | 6.54449 | 16 |
| Girth_20cm_24N | 55.4281 | 6.54627 | 16 |
| Girth_20cm_48N | 55.7638 | 6.77201 | 16 |
| Girth_20cm_72N | 55.5025 | 6.60936 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .854 | 2.160 | 5 | .827 | .901 | 1.000 | .333 |
| Treatment * Time | .549 | 8.230 | 5 | .145 | .703 | .822 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .998 | 1 | .998 | .808 | .383 | .051 | .808 | .134 |
| | Greenhouse-Geisser | .998 | 1.000 | .998 | .808 | .383 | .051 | .808 | .134 |
| | Huynh-Feldt | .998 | 1.000 | .998 | .808 | .383 | .051 | .808 | .134 |
| | Lower-bound | .998 | 1.000 | .998 | .808 | .383 | .051 | .808 | .134 |
| Error(Treatment) | Sphericity Assumed | 18.518 | 15 | 1.235 | | | | | |
| | Greenhouse-Geisser | 18.518 | 15.000 | 1.235 | | | | | |
| | Huynh-Feldt | 18.518 | 15.000 | 1.235 | | | | | |
| | Lower-bound | 18.518 | 15.000 | 1.235 | | | | | |
| Time | Sphericity Assumed | 9.838 | 3 | 3.279 | 4.848 | .005 | .244 | 14.545 | .880 |
| | Greenhouse-Geisser | 9.838 | 2.702 | 3.641 | 4.848 | .007 | .244 | 13.100 | .851 |
| | Huynh-Feldt | 9.838 | 3.000 | 3.279 | 4.848 | .005 | .244 | 14.545 | .880 |
| | Lower-bound | 9.838 | 1.000 | 9.838 | 4.848 | .044 | .244 | 4.848 | .540 |
| Error(Time) | Sphericity Assumed | 30.436 | 45 | .676 | | | | | |
| | Greenhouse-Geisser | 30.436 | 40.528 | .751 | | | | | |
| | Huynh-Feldt | 30.436 | 45.000 | .676 | | | | | |
| | Lower-bound | 30.436 | 15.000 | 2.029 | | | | | |
| Treatment * Time | Sphericity Assumed | .552 | 3 | .184 | .726 | .542 | .046 | 2.177 | .192 |
| | Greenhouse-Geisser | .552 | 2.110 | .261 | .726 | .499 | .046 | 1.532 | .165 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Huynh-Feldt | .552 | 2.465 | .224 | .726 | .518 | .046 | 1.789 | .176 |
| | Lower-bound | .552 | 1.000 | .552 | .726 | .408 | .046 | .726 | .126 |
| Error(Treatment*Time) | Sphericity Assumed | 11.403 | 45 | .253 | | | | | |
| | Greenhouse-Geisser | 11.403 | 31.657 | .360 | | | | | |
| | Huynh-Feldt | 11.403 | 36.968 | .308 | | | | | |
| | Lower-bound | 11.403 | 15.000 | .760 | | | | | |

a. Computed using alpha = .05

## General Linear Model

### Within-Subjects Factors

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | VMOprex_PreT |
| | 2 | VMOprex_24T |
| | 3 | VMOprex_48T |
| | 4 | VMOprex_72T |
| 2 | 1 | VMOprex_PreN |
| | 2 | VMOprex_24N |
| | 3 | VMOprex_48N |
| | 4 | VMOprex_72N |

### Descriptive Statistics

| | Mean | Std. Deviation | N |
|---|---|---|---|
| VMOprex_PreT | 2.1562 | 1.92976 | 16 |
| VMOprex_24T | 2.6875 | 1.98221 | 16 |
| VMOprex_48T | 2.7188 | 1.87055 | 16 |
| VMOprex_72T | 2.1250 | 1.94508 | 16 |
| VMOprex_PreN | 2.0625 | 2.01556 | 16 |
| VMOprex_24N | 2.8750 | 1.85742 | 16 |
| VMOprex_48N | 2.5625 | 1.81544 | 16 |
| VMOprex_72N | 2.1250 | 1.88414 | 16 |

### Mauchly's Test of Sphericity[b]

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .503 | 9.419 | 5 | .094 | .702 | .820 | .333 |
| Treatment * Time | .960 | .559 | 5 | .990 | .974 | 1.000 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .008 | 1 | .008 | .011 | .916 | .001 | .011 | .051 |
| | Greenhouse-Geisser | .008 | 1.000 | .008 | .011 | .916 | .001 | .011 | .051 |
| | Huynh-Feldt | .008 | 1.000 | .008 | .011 | .916 | .001 | .011 | .051 |
| | Lower-bound | .008 | 1.000 | .008 | .011 | .916 | .001 | .011 | .051 |
| Error(Treatment) | Sphericity Assumed | 10.242 | 15 | .683 | | | | | |
| | Greenhouse-Geisser | 10.242 | 15.000 | .683 | | | | | |
| | Huynh-Feldt | 10.242 | 15.000 | .683 | | | | | |
| | Lower-bound | 10.242 | 15.000 | .683 | | | | | |
| Time | Sphericity Assumed | 11.602 | 3 | 3.867 | 1.274 | .295 | .078 | 3.821 | .317 |
| | Greenhouse-Geisser | 11.602 | 2.107 | 5.507 | 1.274 | .295 | .078 | 2.683 | .262 |
| | Huynh-Feldt | 11.602 | 2.459 | 4.718 | 1.274 | .296 | .078 | 3.132 | .284 |
| | Lower-bound | 11.602 | 1.000 | 11.602 | 1.274 | .277 | .078 | 1.274 | .185 |
| Error(Time) | Sphericity Assumed | 136.648 | 45 | 3.037 | | | | | |
| | Greenhouse-Geisser | 136.648 | 31.599 | 4.324 | | | | | |
| | Huynh-Feldt | 136.648 | 36.887 | 3.705 | | | | | |
| | Lower-bound | 136.648 | 15.000 | 9.110 | | | | | |
| Treatment * Time | Sphericity Assumed | .539 | 3 | .180 | .706 | .554 | .045 | 2.117 | .188 |
| | Greenhouse-Geisser | .539 | 2.921 | .185 | .706 | .550 | .045 | 2.061 | .185 |
| | Huynh-Feldt | .539 | 3.000 | .180 | .706 | .554 | .045 | 2.117 | .188 |
| | Lower-bound | .539 | 1.000 | .539 | .706 | .414 | .045 | .706 | .123 |
| Error(Treatment*Time) | Sphericity Assumed | 11.461 | 45 | .255 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Greenhouse-Geisser | 11.461 | 43.819 | .262 | | | | | |
| | Huynh-Feldt | 11.461 | 45.000 | .255 | | | | | |
| | Lower-bound | 11.461 | 15.000 | .764 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | VMOpstex_PreT |
| | 2 | VMOpstex_24T |
| | 3 | VMOpstex_48T |
| | 4 | VMOpstex_72T |
| 2 | 1 | VMOpstex_PreN |
| | 2 | VMOpstex_24N |
| | 3 | VMOpstex_48N |
| | 4 | VMOpstex_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| VMOpstex_PreT | 1.9062 | 1.55154 | 16 |
| VMOpstex_24T | 2.6250 | 2.14864 | 16 |
| VMOpstex_48T | 2.1875 | 1.82460 | 16 |
| VMOpstex_72T | 2.0000 | 2.20605 | 16 |
| VMOpstex_PreN | 1.9688 | 1.44301 | 16 |
| VMOpstex_24N | 2.4687 | 1.53263 | 16 |
| VMOpstex_48N | 1.9062 | 1.93407 | 16 |
| VMOpstex_72N | 2.0000 | 2.17562 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .379 | 13.304 | 5 | .021 | .629 | .717 | .333 |
| Treatment * Time | .562 | 7.897 | 5 | .163 | .741 | .876 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .281 | 1 | .281 | .685 | .421 | .044 | .685 | .121 |
| | Greenhouse-Geisser | .281 | 1.000 | .281 | .685 | .421 | .044 | .685 | .121 |
| | Huynh-Feldt | .281 | 1.000 | .281 | .685 | .421 | .044 | .685 | .121 |
| | Lower-bound | .281 | 1.000 | .281 | .685 | .421 | .044 | .685 | .121 |
| Error(Treatment) | Sphericity Assumed | 6.156 | 15 | .410 | | | | | |
| | Greenhouse-Geisser | 6.156 | 15.000 | .410 | | | | | |
| | Huynh-Feldt | 6.156 | 15.000 | .410 | | | | | |
| | Lower-bound | 6.156 | 15.000 | .410 | | | | | |
| Time | Sphericity Assumed | 7.508 | 3 | 2.503 | 1.326 | .278 | .081 | 3.978 | .329 |
| | Greenhouse-Geisser | 7.508 | 1.887 | 3.979 | 1.326 | .280 | .081 | 2.502 | .256 |
| | Huynh-Feldt | 7.508 | 2.150 | 3.493 | 1.326 | .281 | .081 | 2.850 | .274 |
| | Lower-bound | 7.508 | 1.000 | 7.508 | 1.326 | .268 | .081 | 1.326 | .190 |
| Error(Time) | Sphericity Assumed | 84.930 | 45 | 1.887 | | | | | |
| | Greenhouse-Geisser | 84.930 | 28.300 | 3.001 | | | | | |
| | Huynh-Feldt | 84.930 | 32.243 | 2.634 | | | | | |
| | Lower-bound | 84.930 | 15.000 | 5.662 | | | | | |
| Treatment * Time | Sphericity Assumed | .578 | 3 | .193 | .847 | .475 | .053 | 2.542 | .219 |
| | Greenhouse-Geisser | .578 | 2.223 | .260 | .847 | .448 | .053 | 1.883 | .190 |
| | Huynh-Feldt | .578 | 2.627 | .220 | .847 | .463 | .053 | 2.226 | .206 |
| | Lower-bound | .578 | 1.000 | .578 | .847 | .372 | .053 | .847 | .139 |
| Error(Treatment*Time) | Sphericity Assumed | 10.234 | 45 | .227 | | | | | |
| | Greenhouse-Geisser | 10.234 | 33.338 | .307 | | | | | |
| | Huynh-Feldt | 10.234 | 39.398 | .260 | | | | | |
| | Lower-bound | 10.234 | 15.000 | .682 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | VMOpsttx_PreT |
| | 2 | VMOpsttx_24T |
| | 3 | VMOpsttx_48T |
| 2 | 1 | VMOpsttx_PreN |
| | 2 | VMOpsttx_24N |
| | 3 | VMOpsttx_48N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| VMOpsttx_PreT | 1.1875 | 1.47054 | 16 |
| VMOpsttx_24T | 2.5000 | 2.05751 | 16 |
| VMOpsttx_48T | 2.3750 | 2.26936 | 16 |
| VMOpsttx_PreN | 1.7188 | 1.26450 | 16 |
| VMOpsttx_24N | 2.3438 | 1.53535 | 16 |
| VMOpsttx_48N | 2.0000 | 1.81659 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .730 | 4.401 | 2 | .111 | .788 | .864 | .500 |
| Treatment * Time | .491 | 9.952 | 2 | .007 | .663 | .702 | .500 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .000 | 1 | .000 | .000 | 1.000 | .000 | .000 | .050 |
| | Greenhouse-Geisser | .000 | 1.000 | .000 | .000 | 1.000 | .000 | .000 | .050 |
| | Huynh-Feldt | .000 | 1.000 | .000 | .000 | 1.000 | .000 | .000 | .050 |
| | Lower-bound | .000 | 1.000 | .000 | .000 | 1.000 | .000 | .000 | .050 |
| Error(Treatment) | Sphericity Assumed | 19.083 | 15 | 1.272 | | | | | |
| | Greenhouse-Geisser | 19.083 | 15.000 | 1.272 | | | | | |
| | Huynh-Feldt | 19.083 | 15.000 | 1.272 | | | | | |
| | Lower-bound | 19.083 | 15.000 | 1.272 | | | | | |
| Time | Sphericity Assumed | 16.349 | 2 | 8.174 | 4.650 | .017 | .237 | 9.301 | .740 |
| | Greenhouse-Geisser | 16.349 | 1.575 | 10.379 | 4.650 | .027 | .237 | 7.325 | .662 |
| | Huynh-Feldt | 16.349 | 1.728 | 9.459 | 4.650 | .023 | .237 | 8.037 | .692 |
| | Lower-bound | 16.349 | 1.000 | 16.349 | 4.650 | .048 | .237 | 4.650 | .523 |
| Error(Time) | Sphericity Assumed | 52.734 | 30 | 1.758 | | | | | |
| | Greenhouse-Geisser | 52.734 | 23.627 | 2.232 | | | | | |
| | Huynh-Feldt | 52.734 | 25.925 | 2.034 | | | | | |
| | Lower-bound | 52.734 | 15.000 | 3.516 | | | | | |
| Treatment * Time | Sphericity Assumed | 3.578 | 2 | 1.789 | 6.072 | .006 | .288 | 12.145 | .852 |
| | Greenhouse-Geisser | 3.578 | 1.326 | 2.699 | 6.072 | .016 | .288 | 8.050 | .725 |
| | Huynh-Feldt | 3.578 | 1.405 | 2.547 | 6.072 | .015 | .288 | 8.530 | .744 |
| | Lower-bound | 3.578 | 1.000 | 3.578 | 6.072 | .026 | .288 | 6.072 | .635 |
| Error(Treatment*Time) | Sphericity Assumed | 8.839 | 30 | .295 | | | | | |
| | Greenhouse-Geisser | 8.839 | 19.884 | .445 | | | | | |
| | Huynh-Feldt | 8.839 | 21.072 | .419 | | | | | |
| | Lower-bound | 8.839 | 15.000 | .589 | | | | | |

a. Computed using alpha = .05

## Estimated Marginal Means

### 1. Treatment

**Estimates**

Measure:MEASURE_1

| Treatment | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 2.021 | .433 | 1.099 | 2.943 |
| 2 | 2.021 | .345 | 1.286 | 2.756 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Treatment | (J) Treatment | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | .000 | .230 | 1.000 | -.491 | .491 |
| 2 | 1 | .000 | .230 | 1.000 | -.491 | .491 |

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

### 2. Time

**Estimates**

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.453 | .301 | .811 | 2.095 |
| 2 | 2.422 | .437 | 1.490 | 3.353 |
| 3 | 2.188 | .498 | 1.127 | 3.248 |

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Prex_5cm_PreT |
| | 2 | Prex_5cm_24T |
| | 3 | Prex_5cm_48T |
| | 4 | Prex_5cm_72T |
| 2 | 1 | Prex_5cm_PreN |
| | 2 | Prex_5cm_24N |
| | 3 | Prex_5cm_48N |
| | 4 | Prex_5cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Prex_5cm_PreT | .9375 | .89209 | 16 |
| Prex_5cm_24T | .9062 | .96986 | 16 |
| Prex_5cm_48T | 1.0312 | .99111 | 16 |
| Prex_5cm_72T | .8438 | .92590 | 16 |
| Prex_5cm_PreN | .8750 | 1.00830 | 16 |
| Prex_5cm_24N | 1.0000 | .93095 | 16 |
| Prex_5cm_48N | 1.0000 | 1.00000 | 16 |
| Prex_5cm_72N | .7812 | .99948 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .398 | 12.626 | 5 | .028 | .634 | .723 | .333 |
| Treatment * Time | .081 | 34.471 | 5 | .000 | .444 | .471 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .008 | 1 | .008 | .031 | .863 | .002 | .031 | .053 |
| | Greenhouse-Geisser | .008 | 1.000 | .008 | .031 | .863 | .002 | .031 | .053 |
| | Huynh-Feldt | .008 | 1.000 | .008 | .031 | .863 | .002 | .031 | .053 |
| | Lower-bound | .008 | 1.000 | .008 | .031 | .863 | .002 | .031 | .053 |
| Error(Treatment) | Sphericity Assumed | 3.805 | 15 | .254 | | | | | |
| | Greenhouse-Geisser | 3.805 | 15.000 | .254 | | | | | |
| | Huynh-Feldt | 3.805 | 15.000 | .254 | | | | | |
| | Lower-bound | 3.805 | 15.000 | .254 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Sphericity Assumed | .703 | 3 | .234 | .591 | .624 | .038 | 1.772 | .163 |
| | Greenhouse-Geisser | .703 | 1.901 | .370 | .591 | .552 | .038 | 1.123 | .136 |
| | Huynh-Feldt | .703 | 2.169 | .324 | .591 | .573 | .038 | 1.281 | .143 |
| | Lower-bound | .703 | 1.000 | .703 | .591 | .454 | .038 | .591 | .111 |
| Error(Time) | Sphericity Assumed | 17.859 | 45 | .397 | | | | | |
| | Greenhouse-Geisser | 17.859 | 28.515 | .626 | | | | | |
| | Huynh-Feldt | 17.859 | 32.540 | .549 | | | | | |
| | Lower-bound | 17.859 | 15.000 | 1.191 | | | | | |
| Treatment * Time | Sphericity Assumed | .133 | 3 | .044 | .247 | .863 | .016 | .742 | .093 |
| | Greenhouse-Geisser | .133 | 1.333 | .100 | .247 | .692 | .016 | .330 | .079 |
| | Huynh-Feldt | .133 | 1.414 | .094 | .247 | .706 | .016 | .350 | .080 |
| | Lower-bound | .133 | 1.000 | .133 | .247 | .626 | .016 | .247 | .075 |
| Error(Treatment*Time) | Sphericity Assumed | 8.055 | 45 | .179 | | | | | |
| | Greenhouse-Geisser | 8.055 | 19.996 | .403 | | | | | |
| | Huynh-Feldt | 8.055 | 21.215 | .380 | | | | | |
| | Lower-bound | 8.055 | 15.000 | .537 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Pstex_5cm_PreT |
| | 2 | Pstex_5cm_24T |
| | 3 | Pstex_5cm_48T |
| | 4 | Pstex_5cm_72T |
| 2 | 1 | Pstex_5cm_PreN |
| | 2 | Pstex_5cm_24N |
| | 3 | Pstex_5cm_48N |
| | 4 | Pstex_5cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Pstex_5cm_PreT | 1.1250 | 1.28452 | 16 |
| Pstex_5cm_24T | .9062 | .89849 | 16 |
| Pstex_5cm_48T | .8125 | .92871 | 16 |
| Pstex_5cm_72T | .7812 | .93039 | 16 |
| Pstex_5cm_PreN | 1.0625 | .98107 | 16 |
| Pstex_5cm_24N | .9062 | .91686 | 16 |
| Pstex_5cm_48N | .9375 | .96393 | 16 |
| Pstex_5cm_72N | .7500 | .93095 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .083 | 34.120 | 5 | .000 | .498 | .540 | .333 |
| Treatment * Time | .075 | 35.515 | 5 | .000 | .424 | .446 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .002 | 1 | .002 | .050 | .827 | .003 | .050 | .055 |
| | Greenhouse-Geisser | .002 | 1.000 | .002 | .050 | .827 | .003 | .050 | .055 |
| | Huynh-Feldt | .002 | 1.000 | .002 | .050 | .827 | .003 | .050 | .055 |
| | Lower-bound | .002 | 1.000 | .002 | .050 | .827 | .003 | .050 | .055 |
| Error(Treatment) | Sphericity Assumed | .592 | 15 | .039 | | | | | |
| | Greenhouse-Geisser | .592 | 15.000 | .039 | | | | | |
| | Huynh-Feldt | .592 | 15.000 | .039 | | | | | |
| | Lower-bound | .592 | 15.000 | .039 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Sphericity Assumed | 1.787 | 3 | .596 | 1.332 | .276 | .082 | 3.997 | .331 |
| | Greenhouse-Geisser | 1.787 | 1.494 | 1.196 | 1.332 | .276 | .082 | 1.990 | .229 |
| | Huynh-Feldt | 1.787 | 1.621 | 1.102 | 1.332 | .278 | .082 | 2.160 | .238 |
| | Lower-bound | 1.787 | 1.000 | 1.787 | 1.332 | .266 | .082 | 1.332 | .191 |
| Error(Time) | Sphericity Assumed | 20.119 | 45 | .447 | | | | | |
| | Greenhouse-Geisser | 20.119 | 22.404 | .898 | | | | | |
| | Huynh-Feldt | 20.119 | 24.320 | .827 | | | | | |
| | Lower-bound | 20.119 | 15.000 | 1.341 | | | | | |
| Treatment * Time | Sphericity Assumed | .162 | 3 | .054 | .672 | .574 | .043 | 2.016 | .180 |
| | Greenhouse-Geisser | .162 | 1.273 | .127 | .672 | .457 | .043 | .855 | .129 |
| | Huynh-Feldt | .162 | 1.338 | .121 | .672 | .464 | .043 | .899 | .132 |
| | Lower-bound | .162 | 1.000 | .162 | .672 | .425 | .043 | .672 | .120 |
| Error(Treatment*Time) | Sphericity Assumed | 3.619 | 45 | .080 | | | | | |
| | Greenhouse-Geisser | 3.619 | 19.091 | .190 | | | | | |
| | Huynh-Feldt | 3.619 | 20.066 | .180 | | | | | |
| | Lower-bound | 3.619 | 15.000 | .241 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Psttx_5cm_PreT |
| | 2 | Psttx_5cm_24T |
| | 3 | Psttx_5cm_48T |
| 2 | 1 | Psttx_5cm_PreN |
| | 2 | Psttx_5cm_24N |
| | 3 | Psttx_5cm_48N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Psttx_5cm_PreT | .7813 | .96555 | 16 |
| Psttx_5cm_24T | 1.0000 | 1.12546 | 16 |
| Psttx_5cm_48T | .8125 | 1.01448 | 16 |
| Psttx_5cm_PreN | .7188 | .72958 | 16 |
| Psttx_5cm_24N | .9375 | .89209 | 16 |
| Psttx_5cm_48N | .8125 | .94648 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .919 | 1.181 | 2 | .554 | .925 | 1.000 | .500 |
| Treatment * Time | .955 | .650 | 2 | .722 | .957 | 1.000 | .500 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .042 | 1 | .042 | .149 | .705 | .010 | .149 | .065 |
| | Greenhouse-Geisser | .042 | 1.000 | .042 | .149 | .705 | .010 | .149 | .065 |
| | Huynh-Feldt | .042 | 1.000 | .042 | .149 | .705 | .010 | .149 | .065 |
| | Lower-bound | .042 | 1.000 | .042 | .149 | .705 | .010 | .149 | .065 |
| Error(Treatment) | Sphericity Assumed | 4.208 | 15 | .281 | | | | | |
| | Greenhouse-Geisser | 4.208 | 15.000 | .281 | | | | | |
| | Huynh-Feldt | 4.208 | 15.000 | .281 | | | | | |
| | Lower-bound | 4.208 | 15.000 | .281 | | | | | |
| Time | Sphericity Assumed | .813 | 2 | .406 | .961 | .394 | .060 | 1.921 | .201 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Greenhouse-Geisser | .813 | 1.850 | .439 | .961 | .389 | .060 | 1.777 | .194 |
| | Huynh-Feldt | .813 | 2.000 | .406 | .961 | .394 | .060 | 1.921 | .201 |
| | Lower-bound | .813 | 1.000 | .813 | .961 | .343 | .060 | .961 | .151 |
| Error(Time) | Sphericity Assumed | 12.688 | 30 | .423 | | | | | |
| | Greenhouse-Geisser | 12.688 | 27.754 | .457 | | | | | |
| | Huynh-Feldt | 12.688 | 30.000 | .423 | | | | | |
| | Lower-bound | 12.688 | 15.000 | .846 | | | | | |
| Treatment * Time | Sphericity Assumed | .021 | 2 | .010 | .063 | .939 | .004 | .126 | .059 |
| | Greenhouse-Geisser | .021 | 1.913 | .011 | .063 | .933 | .004 | .120 | .058 |
| | Huynh-Feldt | .021 | 2.000 | .010 | .063 | .939 | .004 | .126 | .059 |
| | Lower-bound | .021 | 1.000 | .021 | .063 | .806 | .004 | .063 | .056 |
| Error(Treatment*Time) | Sphericity Assumed | 4.979 | 30 | .166 | | | | | |
| | Greenhouse-Geisser | 4.979 | 28.697 | .174 | | | | | |
| | Huynh-Feldt | 4.979 | 30.000 | .166 | | | | | |
| | Lower-bound | 4.979 | 15.000 | .332 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Prex_10cm_PreT |
| | 2 | Prex_10cm_24T |
| | 3 | Prex_10cm_48T |
| | 4 | Prex_10cm_72T |
| 2 | 1 | Prex_10cm_PreN |
| | 2 | Prex_10cm_24N |
| | 3 | Prex_10cm_48N |
| | 4 | Prex_10cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Prex_10cm_PreT | 1.0938 | 1.18629 | 16 |
| Prex_10cm_24T | 1.5000 | 1.25167 | 16 |
| Prex_10cm_48T | 1.5625 | 1.19548 | 16 |
| Prex_10cm_72T | 1.1562 | 1.10633 | 16 |
| Prex_10cm_PreN | .8750 | .97468 | 16 |
| Prex_10cm_24N | 1.6875 | 1.38894 | 16 |
| Prex_10cm_48N | 1.7188 | 1.85264 | 16 |
| Prex_10cm_72N | 1.3125 | 1.32759 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .208 | 21.554 | 5 | .001 | .525 | .577 | .333 |
| Treatment * Time | .612 | 6.745 | 5 | .241 | .789 | .947 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .158 | 1 | .158 | .487 | .496 | .031 | .487 | .100 |
| | Greenhouse-Geisser | .158 | 1.000 | .158 | .487 | .496 | .031 | .487 | .100 |
| | Huynh-Feldt | .158 | 1.000 | .158 | .487 | .496 | .031 | .487 | .100 |
| | Lower-bound | .158 | 1.000 | .158 | .487 | .496 | .031 | .487 | .100 |
| Error(Treatment) | Sphericity Assumed | 4.873 | 15 | .325 | | | | | |
| | Greenhouse-Geisser | 4.873 | 15.000 | .325 | | | | | |
| | Huynh-Feldt | 4.873 | 15.000 | .325 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Lower-bound | 4.873 | 15.000 | .325 | | | | | |
| Time | Sphericity Assumed | 9.287 | 3 | 3.096 | 2.384 | .082 | .137 | 7.152 | .559 |
| | Greenhouse-Geisser | 9.287 | 1.576 | 5.892 | 2.384 | .123 | .137 | 3.758 | .388 |
| | Huynh-Feldt | 9.287 | 1.730 | 5.369 | 2.384 | .118 | .137 | 4.124 | .409 |
| | Lower-bound | 9.287 | 1.000 | 9.287 | 2.384 | .143 | .137 | 2.384 | .304 |
| Error(Time) | Sphericity Assumed | 58.432 | 45 | 1.298 | | | | | |
| | Greenhouse-Geisser | 58.432 | 23.644 | 2.471 | | | | | |
| | Huynh-Feldt | 58.432 | 25.947 | 2.252 | | | | | |
| | Lower-bound | 58.432 | 15.000 | 3.895 | | | | | |
| Treatment * Time | Sphericity Assumed | .896 | 3 | .299 | .771 | .516 | .049 | 2.312 | .202 |
| | Greenhouse-Geisser | .896 | 2.368 | .379 | .771 | .490 | .049 | 1.825 | .181 |
| | Huynh-Feldt | .896 | 2.841 | .316 | .771 | .510 | .049 | 2.190 | .197 |
| | Lower-bound | .896 | 1.000 | .896 | .771 | .394 | .049 | .771 | .130 |
| Error(Treatment*Time) | Sphericity Assumed | 17.447 | 45 | .388 | | | | | |
| | Greenhouse-Geisser | 17.447 | 35.521 | .491 | | | | | |
| | Huynh-Feldt | 17.447 | 42.617 | .409 | | | | | |
| | Lower-bound | 17.447 | 15.000 | 1.163 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Pstex_10cm_PreT |
| | 2 | Pstex_10cm_24T |
| | 3 | Pstex_10cm_48T |
| | 4 | Pstex_10cm_72T |
| 2 | 1 | Pstex_10cm_PreN |
| | 2 | Pstex_10cm_24N |
| | 3 | Pstex_10cm_48N |
| | 4 | Pstex_10cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Pstex_10cm_PreT | 1.0625 | 1.09354 | 16 |
| Pstex_10cm_24T | 1.1250 | .78528 | 16 |
| Pstex_10cm_48T | 1.3750 | 1.53297 | 16 |
| Pstex_10cm_72T | .9688 | .86542 | 16 |
| Pstex_10cm_PreN | 1.0625 | 1.15289 | 16 |
| Pstex_10cm_24N | 1.4062 | 1.26779 | 16 |
| Pstex_10cm_48N | 1.3750 | 1.29743 | 16 |
| Pstex_10cm_72N | 1.2188 | 1.16860 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .637 | 6.179 | 5 | .290 | .760 | .904 | .333 |
| Treatment * Time | .511 | 9.217 | 5 | .101 | .715 | .837 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .564 | 1 | .564 | 2.442 | .139 | .140 | 2.442 | .310 |
| | Greenhouse-Geisser | .564 | 1.000 | .564 | 2.442 | .139 | .140 | 2.442 | .310 |
| | Huynh-Feldt | .564 | 1.000 | .564 | 2.442 | .139 | .140 | 2.442 | .310 |
| | Lower-bound | .564 | 1.000 | .564 | 2.442 | .139 | .140 | 2.442 | .310 |
| Error(Treatment) | Sphericity Assumed | 3.467 | 15 | .231 | | | | | |
| | Greenhouse-Geisser | 3.467 | 15.000 | .231 | | | | | |
| | Huynh-Feldt | 3.467 | 15.000 | .231 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Lower-bound | 3.467 | 15.000 | .231 | | | | | |
| Time | Sphericity Assumed | 2.084 | 3 | .695 | .973 | .414 | .061 | 2.918 | .248 |
| | Greenhouse-Geisser | 2.084 | 2.280 | .914 | .973 | .398 | .061 | 2.218 | .216 |
| | Huynh-Feldt | 2.084 | 2.711 | .769 | .973 | .408 | .061 | 2.637 | .235 |
| | Lower-bound | 2.084 | 1.000 | 2.084 | .973 | .340 | .061 | .973 | .152 |
| Error(Time) | Sphericity Assumed | 32.135 | 45 | .714 | | | | | |
| | Greenhouse-Geisser | 32.135 | 34.203 | .940 | | | | | |
| | Huynh-Feldt | 32.135 | 40.665 | .790 | | | | | |
| | Lower-bound | 32.135 | 15.000 | 2.142 | | | | | |
| Treatment * Time | Sphericity Assumed | .568 | 3 | .189 | .791 | .505 | .050 | 2.374 | .207 |
| | Greenhouse-Geisser | .568 | 2.144 | .265 | .791 | .470 | .050 | 1.696 | .177 |
| | Huynh-Feldt | .568 | 2.512 | .226 | .791 | .487 | .050 | 1.988 | .190 |
| | Lower-bound | .568 | 1.000 | .568 | .791 | .388 | .050 | .791 | .133 |
| Error(Treatment*Time) | Sphericity Assumed | 10.775 | 45 | .239 | | | | | |
| | Greenhouse-Geisser | 10.775 | 32.157 | .335 | | | | | |
| | Huynh-Feldt | 10.775 | 37.687 | .286 | | | | | |
| | Lower-bound | 10.775 | 15.000 | .718 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Psttx_10cm_PreT |
| | 2 | Psttx_10cm_24T |
| | 3 | Psttx_10cm_48T |
| 2 | 1 | Psttx_10cm_PreN |
| | 2 | Psttx_10cm_24N |
| | 3 | Psttx_10cm_48N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Psttx_10cm_PreT | .9375 | 1.22304 | 16 |
| Psttx_10cm_24T | 1.4062 | 1.17216 | 16 |
| Psttx_10cm_48T | 1.1875 | 1.20934 | 16 |
| Psttx_10cm_PreN | .9062 | 1.03632 | 16 |
| Psttx_10cm_24N | 1.3750 | 1.39642 | 16 |
| Psttx_10cm_48N | 1.3750 | 1.52206 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .804 | 3.052 | 2 | .217 | .836 | .929 | .500 |
| Treatment * Time | .741 | 4.200 | 2 | .122 | .794 | .873 | .500 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .042 | 1 | .042 | .039 | .847 | .003 | .039 | .054 |
| | Greenhouse-Geisser | .042 | 1.000 | .042 | .039 | .847 | .003 | .039 | .054 |
| | Huynh-Feldt | .042 | 1.000 | .042 | .039 | .847 | .003 | .039 | .054 |
| | Lower-bound | .042 | 1.000 | .042 | .039 | .847 | .003 | .039 | .054 |
| Error(Treatment) | Sphericity Assumed | 16.125 | 15 | 1.075 | | | | | |
| | Greenhouse-Geisser | 16.125 | 15.000 | 1.075 | | | | | |
| | Huynh-Feldt | 16.125 | 15.000 | 1.075 | | | | | |
| | Lower-bound | 16.125 | 15.000 | 1.075 | | | | | |
| Time | Sphericity Assumed | 3.849 | 2 | 1.924 | 2.180 | .131 | .127 | 4.360 | .410 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Greenhouse-Geisser | 3.849 | 1.672 | 2.301 | 2.180 | .141 | .127 | 3.646 | .371 |
| | Huynh-Feldt | 3.849 | 1.858 | 2.072 | 2.180 | .135 | .127 | 4.050 | .393 |
| | Lower-bound | 3.849 | 1.000 | 3.849 | 2.180 | .161 | .127 | 2.180 | .282 |
| Error(Time) | Sphericity Assumed | 26.484 | 30 | .883 | | | | | |
| | Greenhouse-Geisser | 26.484 | 25.086 | 1.056 | | | | | |
| | Huynh-Feldt | 26.484 | 27.865 | .950 | | | | | |
| | Lower-bound | 26.484 | 15.000 | 1.766 | | | | | |
| Treatment * Time | Sphericity Assumed | .255 | 2 | .128 | .346 | .711 | .023 | .691 | .100 |
| | Greenhouse-Geisser | .255 | 1.588 | .161 | .346 | .662 | .023 | .549 | .095 |
| | Huynh-Feldt | .255 | 1.746 | .146 | .346 | .682 | .023 | .603 | .097 |
| | Lower-bound | .255 | 1.000 | .255 | .346 | .565 | .023 | .346 | .085 |
| Error(Treatment*Time) | Sphericity Assumed | 11.078 | 30 | .369 | | | | | |
| | Greenhouse-Geisser | 11.078 | 23.825 | .465 | | | | | |
| | Huynh-Feldt | 11.078 | 26.186 | .423 | | | | | |
| | Lower-bound | 11.078 | 15.000 | .739 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Prex_15cm_PreT |
| | 2 | Prex_15cm_24T |
| | 3 | Prex_15cm_48T |
| | 4 | Prex_15cm_72T |
| 2 | 1 | Prex_15cm_PreN |
| | 2 | Prex_15cm_24N |
| | 3 | Prex_15cm_48N |
| | 4 | Prex_15cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Prex_15cm_PreT | 1.6563 | 1.74851 | 16 |
| Prex_15cm_24T | 2.6250 | 1.45488 | 16 |
| Prex_15cm_48T | 3.3125 | 1.49304 | 16 |
| Prex_15cm_72T | 2.7500 | 1.60208 | 16 |
| Prex_15cm_PreN | 1.2188 | 1.37803 | 16 |
| Prex_15cm_24N | 2.7812 | 1.47161 | 16 |
| Prex_15cm_48N | 3.5625 | 1.96532 | 16 |
| Prex_15cm_72N | 2.6250 | 1.66833 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .288 | 17.095 | 5 | .004 | .589 | .662 | .333 |
| Treatment * Time | .807 | 2.950 | 5 | .708 | .895 | 1.000 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .049 | 1 | .049 | .034 | .855 | .002 | .034 | .053 |
| | Greenhouse-Geisser | .049 | 1.000 | .049 | .034 | .855 | .002 | .034 | .053 |
| | Huynh-Feldt | .049 | 1.000 | .049 | .034 | .855 | .002 | .034 | .053 |
| | Lower-bound | .049 | 1.000 | .049 | .034 | .855 | .002 | .034 | .053 |
| Error(Treatment) | Sphericity Assumed | 21.232 | 15 | 1.415 | | | | | |
| | Greenhouse-Geisser | 21.232 | 15.000 | 1.415 | | | | | |
| | Huynh-Feldt | 21.232 | 15.000 | 1.415 | | | | | |
| | Lower-bound | 21.232 | 15.000 | 1.415 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Sphericity Assumed | 66.131 | 3 | 22.044 | 7.596 | .000 | .336 | 22.788 | .980 |
| | Greenhouse-Geisser | 66.131 | 1.767 | 37.419 | 7.596 | .003 | .336 | 13.425 | .896 |
| | Huynh-Feldt | 66.131 | 1.986 | 33.303 | 7.596 | .002 | .336 | 15.084 | .921 |
| | Lower-bound | 66.131 | 1.000 | 66.131 | 7.596 | .015 | .336 | 7.596 | .731 |
| Error(Time) | Sphericity Assumed | 130.588 | 45 | 2.902 | | | | | |
| | Greenhouse-Geisser | 130.588 | 26.510 | 4.926 | | | | | |
| | Huynh-Feldt | 130.588 | 29.786 | 4.384 | | | | | |
| | Lower-bound | 130.588 | 15.000 | 8.706 | | | | | |
| Treatment * Time | Sphericity Assumed | 2.303 | 3 | .768 | 1.301 | .286 | .080 | 3.904 | .324 |
| | Greenhouse-Geisser | 2.303 | 2.686 | .857 | 1.301 | .287 | .080 | 3.495 | .304 |
| | Huynh-Feldt | 2.303 | 3.000 | .768 | 1.301 | .286 | .080 | 3.904 | .324 |
| | Lower-bound | 2.303 | 1.000 | 2.303 | 1.301 | .272 | .080 | 1.301 | .188 |
| Error(Treatment*Time) | Sphericity Assumed | 26.541 | 45 | .590 | | | | | |
| | Greenhouse-Geisser | 26.541 | 40.287 | .659 | | | | | |
| | Huynh-Feldt | 26.541 | 45.000 | .590 | | | | | |
| | Lower-bound | 26.541 | 15.000 | 1.769 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Pstex_15cm_PreT |
| | 2 | Pstex_15cm_24T |
| | 3 | Pstex_15cm_48T |
| | 4 | Pstex_15cm_72T |
| 2 | 1 | Pstex_15cm_PreN |
| | 2 | Pstex_15cm_24N |
| | 3 | Pstex_15cm_48N |
| | 4 | Pstex_15cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Pstex_15cm_PreT | 1.3750 | 1.61761 | 16 |
| Pstex_15cm_24T | 1.9062 | 1.03632 | 16 |
| Pstex_15cm_48T | 2.4375 | 1.31498 | 16 |
| Pstex_15cm_72T | 1.8750 | 1.13284 | 16 |
| Pstex_15cm_PreN | 1.3438 | 1.41090 | 16 |
| Pstex_15cm_24N | 2.4062 | 1.40498 | 16 |
| Pstex_15cm_48N | 2.9375 | 1.38894 | 16 |
| Pstex_15cm_72N | 2.4375 | 1.54785 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .681 | 5.275 | 5 | .384 | .838 | 1.000 | .333 |
| Treatment * Time | .680 | 5.285 | 5 | .383 | .845 | 1.000 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | 4.689 | 1 | 4.689 | 10.281 | .006 | .407 | 10.281 | .850 |
| | Greenhouse-Geisser | 4.689 | 1.000 | 4.689 | 10.281 | .006 | .407 | 10.281 | .850 |
| | Huynh-Feldt | 4.689 | 1.000 | 4.689 | 10.281 | .006 | .407 | 10.281 | .850 |
| | Lower-bound | 4.689 | 1.000 | 4.689 | 10.281 | .006 | .407 | 10.281 | .850 |
| Error(Treatment) | Sphericity Assumed | 6.842 | 15 | .456 | | | | | |
| | Greenhouse-Geisser | 6.842 | 15.000 | .456 | | | | | |
| | Huynh-Feldt | 6.842 | 15.000 | .456 | | | | | |
| | Lower-bound | 6.842 | 15.000 | .456 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Sphericity Assumed | 28.787 | 3 | 9.596 | 4.749 | .006 | .240 | 14.246 | .872 |
| | Greenhouse-Geisser | 28.787 | 2.513 | 11.455 | 4.749 | .010 | .240 | 11.934 | .822 |
| | Huynh-Feldt | 28.787 | 3.000 | 9.596 | 4.749 | .006 | .240 | 14.246 | .872 |
| | Lower-bound | 28.787 | 1.000 | 28.787 | 4.749 | .046 | .240 | 4.749 | .531 |
| Error(Time) | Sphericity Assumed | 90.932 | 45 | 2.021 | | | | | |
| | Greenhouse-Geisser | 90.932 | 37.697 | 2.412 | | | | | |
| | Huynh-Feldt | 90.932 | 45.000 | 2.021 | | | | | |
| | Lower-bound | 90.932 | 15.000 | 6.062 | | | | | |
| Treatment * Time | Sphericity Assumed | 1.850 | 3 | .617 | 2.644 | .061 | .150 | 7.931 | .608 |
| | Greenhouse-Geisser | 1.850 | 2.535 | .730 | 2.644 | .072 | .150 | 6.702 | .554 |
| | Huynh-Feldt | 1.850 | 3.000 | .617 | 2.644 | .061 | .150 | 7.931 | .608 |
| | Lower-bound | 1.850 | 1.000 | 1.850 | 2.644 | .125 | .150 | 2.644 | .331 |
| Error(Treatment*Time) | Sphericity Assumed | 10.494 | 45 | .233 | | | | | |
| | Greenhouse-Geisser | 10.494 | 38.026 | .276 | | | | | |
| | Huynh-Feldt | 10.494 | 45.000 | .233 | | | | | |
| | Lower-bound | 10.494 | 15.000 | .700 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Psttx_15cm_PreT |
| | 2 | Psttx_15cm_24T |
| | 3 | Psttx_15cm_48T |
| 2 | 1 | Psttx_15cm_PreN |
| | 2 | Psttx_15cm_24N |
| | 3 | Psttx_15cm_48N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Psttx_15cm_PreT | 1.4687 | 2.06937 | 16 |
| Psttx_15cm_24T | 2.5000 | 1.62275 | 16 |
| Psttx_15cm_48T | 2.8750 | 1.74642 | 16 |
| Psttx_15cm_PreN | 1.1562 | 1.09116 | 16 |
| Psttx_15cm_24N | 2.2813 | 1.39007 | 16 |
| Psttx_15cm_48N | 2.9688 | 2.06937 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .793 | 3.244 | 2 | .197 | .829 | .919 | .500 |
| Treatment * Time | .905 | 1.396 | 2 | .498 | .913 | 1.000 | .500 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | .510 | 1 | .510 | .305 | .589 | .020 | .305 | .081 |
| | Greenhouse-Geisser | .510 | 1.000 | .510 | .305 | .589 | .020 | .305 | .081 |
| | Huynh-Feldt | .510 | 1.000 | .510 | .305 | .589 | .020 | .305 | .081 |
| | Lower-bound | .510 | 1.000 | .510 | .305 | .589 | .020 | .305 | .081 |
| Error(Treatment) | Sphericity Assumed | 25.073 | 15 | 1.672 | | | | | |
| | Greenhouse-Geisser | 25.073 | 15.000 | 1.672 | | | | | |
| | Huynh-Feldt | 25.073 | 15.000 | 1.672 | | | | | |
| | Lower-bound | 25.073 | 15.000 | 1.672 | | | | | |
| Time | Sphericity Assumed | 43.036 | 2 | 21.518 | 8.498 | .001 | .362 | 16.996 | .949 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Greenhouse-Geisser | 43.036 | 1.657 | 25.969 | 8.498 | .003 | .362 | 14.083 | .914 |
| | Huynh-Feldt | 43.036 | 1.837 | 23.423 | 8.498 | .002 | .362 | 15.614 | .934 |
| | Lower-bound | 43.036 | 1.000 | 43.036 | 8.498 | .011 | .362 | 8.498 | .778 |
| Error(Time) | Sphericity Assumed | 75.964 | 30 | 2.532 | | | | | |
| | Greenhouse-Geisser | 75.964 | 24.858 | 3.056 | | | | | |
| | Huynh-Feldt | 75.964 | 27.561 | 2.756 | | | | | |
| | Lower-bound | 75.964 | 15.000 | 5.064 | | | | | |
| Treatment * Time | Sphericity Assumed | .724 | 2 | .362 | .559 | .578 | .036 | 1.117 | .134 |
| | Greenhouse-Geisser | .724 | 1.827 | .396 | .559 | .563 | .036 | 1.020 | .130 |
| | Huynh-Feldt | .724 | 2.000 | .362 | .559 | .578 | .036 | 1.117 | .134 |
| | Lower-bound | .724 | 1.000 | .724 | .559 | .466 | .036 | .559 | .108 |
| Error(Treatment*Time) | Sphericity Assumed | 19.443 | 30 | .648 | | | | | |
| | Greenhouse-Geisser | 19.443 | 27.400 | .710 | | | | | |
| | Huynh-Feldt | 19.443 | 30.000 | .648 | | | | | |
| | Lower-bound | 19.443 | 15.000 | 1.296 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Prex_20cm_PreT |
| | 2 | Prex_20cm_24T |
| | 3 | Prex_20cm_48T |
| | 4 | Prex_20cm_72T |
| 2 | 1 | Prex_20cm_PreN |
| | 2 | Prex_20cm_24N |
| | 3 | Prex_20cm_48N |
| | 4 | Prex_20cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Prex_20cm_PreT | 1.7500 | 1.65328 | 16 |
| Prex_20cm_24T | 3.2500 | 1.34164 | 16 |
| Prex_20cm_48T | 4.1875 | 1.68201 | 16 |
| Prex_20cm_72T | 3.5938 | 2.37500 | 16 |
| Prex_20cm_PreN | 1.8438 | 1.75802 | 16 |
| Prex_20cm_24N | 3.6875 | 1.66208 | 16 |
| Prex_20cm_48N | 4.4062 | 2.55094 | 16 |
| Prex_20cm_72N | 4.0938 | 2.59627 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .231 | 20.091 | 5 | .001 | .531 | .584 | .333 |
| Treatment * Time | .441 | 11.229 | 5 | .048 | .642 | .734 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | 3.125 | 1 | 3.125 | 1.291 | .274 | .079 | 1.291 | .187 |
| | Greenhouse-Geisser | 3.125 | 1.000 | 3.125 | 1.291 | .274 | .079 | 1.291 | .187 |
| | Huynh-Feldt | 3.125 | 1.000 | 3.125 | 1.291 | .274 | .079 | 1.291 | .187 |
| | Lower-bound | 3.125 | 1.000 | 3.125 | 1.291 | .274 | .079 | 1.291 | .187 |
| Error(Treatment) | Sphericity Assumed | 36.313 | 15 | 2.421 | | | | | |
| | Greenhouse-Geisser | 36.313 | 15.000 | 2.421 | | | | | |
| | Huynh-Feldt | 36.313 | 15.000 | 2.421 | | | | | |
| | Lower-bound | 36.313 | 15.000 | 2.421 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Sphericity Assumed | 114.133 | 3 | 38.044 | 8.494 | .000 | .362 | 25.482 | .989 |
| | Greenhouse-Geisser | 114.133 | 1.592 | 71.676 | 8.494 | .003 | .362 | 13.525 | .905 |
| | Huynh-Feldt | 114.133 | 1.751 | 65.180 | 8.494 | .002 | .362 | 14.873 | .925 |
| | Lower-bound | 114.133 | 1.000 | 114.133 | 8.494 | .011 | .362 | 8.494 | .778 |
| Error(Time) | Sphericity Assumed | 201.555 | 45 | 4.479 | | | | | |
| | Greenhouse-Geisser | 201.555 | 23.885 | 8.438 | | | | | |
| | Huynh-Feldt | 201.555 | 26.266 | 7.674 | | | | | |
| | Lower-bound | 201.555 | 15.000 | 13.437 | | | | | |
| Treatment * Time | Sphericity Assumed | .859 | 3 | .286 | .416 | .742 | .027 | 1.249 | .126 |
| | Greenhouse-Geisser | .859 | 1.925 | .447 | .416 | .656 | .027 | .802 | .110 |
| | Huynh-Feldt | .859 | 2.202 | .390 | .416 | .682 | .027 | .917 | .114 |
| | Lower-bound | .859 | 1.000 | .859 | .416 | .528 | .027 | .416 | .093 |
| Error(Treatment*Time) | Sphericity Assumed | 30.953 | 45 | .688 | | | | | |
| | Greenhouse-Geisser | 30.953 | 28.869 | 1.072 | | | | | |
| | Huynh-Feldt | 30.953 | 33.031 | .937 | | | | | |
| | Lower-bound | 30.953 | 15.000 | 2.064 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Pstex_20cm_PreT |
| | 2 | Pstex_20cm_24T |
| | 3 | Pstex_20cm_48T |
| | 4 | Pstex_20cm_72T |
| 2 | 1 | Pstex_20cm_PreN |
| | 2 | Pstex_20cm_24N |
| | 3 | Pstex_20cm_48N |
| | 4 | Pstex_20cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Pstex_20cm_PreT | 1.6250 | 2.02073 | 16 |
| Pstex_20cm_24T | 2.8750 | 1.36015 | 16 |
| Pstex_20cm_48T | 3.6250 | 1.78419 | 16 |
| Pstex_20cm_72T | 3.3437 | 1.90367 | 16 |
| Pstex_20cm_PreN | 1.8438 | 2.17347 | 16 |
| Pstex_20cm_24N | 3.1250 | 1.66833 | 16 |
| Pstex_20cm_48N | 3.9375 | 1.73085 | 16 |
| Pstex_20cm_72N | 3.7500 | 2.32379 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .400 | 12.575 | 5 | .028 | .617 | .700 | .333 |
| Treatment * Time | .443 | 11.165 | 5 | .049 | .652 | .748 | .333 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | 2.820 | 1 | 2.820 | 2.945 | .107 | .164 | 2.945 | .362 |
| | Greenhouse-Geisser | 2.820 | 1.000 | 2.820 | 2.945 | .107 | .164 | 2.945 | .362 |
| | Huynh-Feldt | 2.820 | 1.000 | 2.820 | 2.945 | .107 | .164 | 2.945 | .362 |
| | Lower-bound | 2.820 | 1.000 | 2.820 | 2.945 | .107 | .164 | 2.945 | .362 |
| Error(Treatment) | Sphericity Assumed | 14.367 | 15 | .958 | | | | | |
| | Greenhouse-Geisser | 14.367 | 15.000 | .958 | | | | | |
| | Huynh-Feldt | 14.367 | 15.000 | .958 | | | | | |
| | Lower-bound | 14.367 | 15.000 | .958 | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | Sphericity Assumed | 80.328 | 3 | 26.776 | 7.987 | .000 | .347 | 23.961 | .985 |
| | Greenhouse-Geisser | 80.328 | 1.852 | 43.378 | 7.987 | .002 | .347 | 14.791 | .920 |
| | Huynh-Feldt | 80.328 | 2.101 | 38.227 | 7.987 | .001 | .347 | 16.784 | .944 |
| | Lower-bound | 80.328 | 1.000 | 80.328 | 7.987 | .013 | .347 | 7.987 | .752 |
| Error(Time) | Sphericity Assumed | 150.859 | 45 | 3.352 | | | | | |
| | Greenhouse-Geisser | 150.859 | 27.777 | 5.431 | | | | | |
| | Huynh-Feldt | 150.859 | 31.520 | 4.786 | | | | | |
| | Lower-bound | 150.859 | 15.000 | 10.057 | | | | | |
| Treatment * Time | Sphericity Assumed | .164 | 3 | .055 | .099 | .960 | .007 | .297 | .066 |
| | Greenhouse-Geisser | .164 | 1.955 | .084 | .099 | .902 | .007 | .193 | .064 |
| | Huynh-Feldt | .164 | 2.245 | .073 | .099 | .924 | .007 | .222 | .064 |
| | Lower-bound | .164 | 1.000 | .164 | .099 | .758 | .007 | .099 | .060 |
| Error(Treatment*Time) | Sphericity Assumed | 24.898 | 45 | .553 | | | | | |
| | Greenhouse-Geisser | 24.898 | 29.326 | .849 | | | | | |
| | Huynh-Feldt | 24.898 | 33.670 | .739 | | | | | |
| | Lower-bound | 24.898 | 15.000 | 1.660 | | | | | |

a. Computed using alpha = .05

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Psttx_20cm_PreT |
| | 2 | Psttx_20cm_24T |
| | 3 | Psttx_20cm_48T |
| 2 | 1 | Psttx_20cm_PreN |
| | 2 | Psttx_20cm_24N |
| | 3 | Psttx_20cm_48N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Psttx_20cm_PreT | 1.3125 | 1.34009 | 16 |
| Psttx_20cm_24T | 3.0938 | 1.99348 | 16 |
| Psttx_20cm_48T | 3.6875 | 2.41437 | 16 |
| Psttx_20cm_PreN | 1.7813 | 1.69282 | 16 |
| Psttx_20cm_24N | 3.0625 | 1.65202 | 16 |
| Psttx_20cm_48N | 3.8750 | 2.52653 | 16 |

**Mauchly's Test of Sphericity[b]**

Measure:MEASURE_1

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | df | Sig. | Epsilon[a] | | |
|---|---|---|---|---|---|---|---|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Treatment | 1.000 | .000 | 0 | . | 1.000 | 1.000 | 1.000 |
| Time | .933 | .965 | 2 | .617 | .938 | 1.000 | .500 |
| Treatment * Time | .885 | 1.712 | 2 | .425 | .897 | 1.000 | .500 |

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept Within Subjects Design: Treatment + Time + Treatment * Time

**Tests of Within-Subjects Effects**

Measure:MEASURE_1

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power[a] |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Sphericity Assumed | 1.042 | 1 | 1.042 | .526 | .479 | .034 | .526 | .104 |
| | Greenhouse-Geisser | 1.042 | 1.000 | 1.042 | .526 | .479 | .034 | .526 | .104 |
| | Huynh-Feldt | 1.042 | 1.000 | 1.042 | .526 | .479 | .034 | .526 | .104 |
| | Lower-bound | 1.042 | 1.000 | 1.042 | .526 | .479 | .034 | .526 | .104 |
| Error(Treatment) | Sphericity Assumed | 29.708 | 15 | 1.981 | | | | | |
| | Greenhouse-Geisser | 29.708 | 15.000 | 1.981 | | | | | |
| | Huynh-Feldt | 29.708 | 15.000 | 1.981 | | | | | |
| | Lower-bound | 29.708 | 15.000 | 1.981 | | | | | |
| Time | Sphericity Assumed | 83.536 | 2 | 41.768 | 10.081 | .000 | .402 | 20.162 | .976 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Greenhouse-Geisser | 83.536 | 1.875 | 44.550 | 10.081 | .001 | .402 | 18.903 | .969 |
| | Huynh-Feldt | 83.536 | 2.000 | 41.768 | 10.081 | .000 | .402 | 20.162 | .976 |
| | Lower-bound | 83.536 | 1.000 | 83.536 | 10.081 | .006 | .402 | 10.081 | .843 |
| Error(Time) | Sphericity Assumed | 124.297 | 30 | 4.143 | | | | | |
| | Greenhouse-Geisser | 124.297 | 28.127 | 4.419 | | | | | |
| | Huynh-Feldt | 124.297 | 30.000 | 4.143 | | | | | |
| | Lower-bound | 124.297 | 15.000 | 8.286 | | | | | |
| Treatment * Time | Sphericity Assumed | 1.005 | 2 | .503 | .754 | .479 | .048 | 1.508 | .166 |
| | Greenhouse-Geisser | 1.005 | 1.794 | .560 | .754 | .467 | .048 | 1.353 | .159 |
| | Huynh-Feldt | 1.005 | 2.000 | .503 | .754 | .479 | .048 | 1.508 | .166 |
| | Lower-bound | 1.005 | 1.000 | 1.005 | .754 | .399 | .048 | .754 | .129 |
| Error(Treatment*Time) | Sphericity Assumed | 19.995 | 30 | .666 | | | | | |
| | Greenhouse-Geisser | 19.995 | 26.903 | .743 | | | | | |
| | Huynh-Feldt | 19.995 | 30.000 | .666 | | | | | |
| | Lower-bound | 19.995 | 15.000 | 1.333 | | | | | |

a. Computed using alpha = .05

**T-Test**

**Paired Samples Statistics**

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Girth_15cm_PreT | 51.0106 | 16 | 6.478 | 1.620 |
| | Girth_15cm_PreN | 50.207 | 16 | 5.706 | 1.427 |
| Pair 2 | Girth_15cm_24T | 51.031 | 16 | 6.264 | 1.566 |
| | Girth_15cm_24N | 50.698 | 16 | 6.191 | 1.548 |
| Pair 3 | Girth_15cm_48T | 51.429 | 16 | 6.254 | 1.564 |
| | Girth_15cm_48N | 50.939 | 16 | 6.055 | 1.514 |
| Pair 4 | Girth_15cm_72T | 51.224 | 16 | 6.293 | 1.573 |
| | Girth_15cm_72N | 51.018 | 16 | 5.861 | 1.465 |

**Paired Samples Correlations**

| | | N | Correlation | Sig. |
|---|---|---|---|---|
| Pair 1 | Girth_15cm_PreT & Girth_15cm_PreN | 16 | .985 | .000 |
| Pair 2 | Girth_15cm_24T & Girth_15cm_24N | 16 | .992 | .000 |
| Pair 3 | Girth_15cm_48T & Girth_15cm_48N | 16 | .991 | .000 |
| Pair 4 | Girth_15cm_72T & Girth_15cm_72N | 16 | .986 | .000 |

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Girth_15cm_PreT – Girth_15cm_PreN | .804 | 1.301 | .325 | .111 | 1.497 | 2.471 | 15 | .026 |
| Pair 2 | Girth_15cm_24T – Girth_15cm_24N | .333 | .790 | .198 | -.088 | .754 | 1.686 | 15 | .112 |
| Pair 3 | Girth_15cm_48T – Girth_15cm_48N | .490 | .856 | .214 | .034 | .946 | 2.291 | 15 | .037 |
| Pair 4 | Girth_15cm_72T – Girth_15cm_72N | .206 | 1.089 | .272 | -.374 | .786 | .756 | 15 | .461 |

**T-Test**

**Paired Samples Statistics**

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | VMOpsttx_PreT | 1.188 | 16 | 1.471 | .368 |
| | VMOpsttx_PreN | 1.719 | 16 | 1.265 | .316 |
| Pair 2 | VMOpsttx_24T | 2.500 | 16 | 2.058 | .514 |
| | VMOpsttx_24N | 2.344 | 16 | 1.535 | .384 |
| Pair 3 | VMOpsttx_48T | 2.375 | 16 | 2.269 | .567 |
| | VMOpsttx_48N | 2.000 | 16 | 1.817 | .454 |

**Paired Samples Correlations**

| | | N | Correlation | Sig. |
|---|---|---|---|---|
| Pair 1 | VMOpsttx_PreT & VMOpsttx_PreN | 16 | .550 | .027 |
| Pair 2 | VMOpsttx_24T & VMOpsttx_24N | 16 | .892 | .000 |
| Pair 3 | VMOpsttx_48T & VMOpsttx_48N | 16 | .898 | .000 |

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference Lower | Upper | | | |
| Pair 1 | VMOpsttx_PreT – VMOpsttx_PreN | -.531 | 1.310 | .327 | -1.229 | .167 | -1.622 | 15 | .126 |
| Pair 2 | VMOpsttx_24T – VMOpsttx_24N | .156 | .978 | .245 | -.365 | .678 | .639 | 15 | .533 |
| Pair 3 | VMOpsttx_48T – VMOpsttx_48N | .375 | 1.025 | .256 | -.171 | .921 | 1.464 | 15 | .164 |

**General Linear Model**

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Ecc_PT_PreT |
| | 2 | Ecc_PT_24T |
| | 3 | Ecc_PT_48T |
| | 4 | Ecc_PT_72T |
| 2 | 1 | Ecc_PT_PreN |
| | 2 | Ecc_PT_24N |
| | 3 | Ecc_PT_48N |
| | 4 | Ecc_PT_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Ecc_PT_PreT | 3.0862 | .86961 | 16 |
| Ecc_PT_24T | 2.6019 | .84763 | 16 |
| Ecc_PT_48T | 2.5169 | .97847 | 16 |
| Ecc_PT_72T | 2.7794 | 1.05889 | 16 |
| Ecc_PT_PreN | 3.1875 | .94916 | 16 |
| Ecc_PT_24N | 2.6450 | 1.01304 | 16 |
| Ecc_PT_48N | 2.3488 | 1.04613 | 16 |
| Ecc_PT_72N | 2.7925 | 1.07407 | 16 |

**Estimated Marginal Means**

**1. Time**

**Estimates**

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 3.137 | .218 | 2.672 | 3.601 |
| 2 | 2.623 | .225 | 2.145 | 3.102 |
| 3 | 2.433 | .246 | 1.908 | 2.958 |
| 4 | 2.786 | .260 | 2.233 | 3.339 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | | .513* | .156 | .029 | .040 | .987 |
| | 3 | .704 | .253 | .084 | -.064 | 1.472 |
| | 4 | .351 | .266 | 1.000 | -.456 | 1.158 |
| 2 | 3 | .191 | .143 | 1.000 | -.244 | .625 |
| | 4 | -.163 | .195 | 1.000 | -.755 | .430 |
| 3 | | | | | | |
| | 4 | -.353 | .146 | .174 | -.797 | .091 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

**General Linear Model**

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Girth_15cm_PreT |
| | 2 | Girth_15cm_24T |
| | 3 | Girth_15cm_48T |
| | 4 | Girth_15cm_72T |
| 2 | 1 | Girth_15cm_PreN |
| | 2 | Girth_15cm_24N |
| | 3 | Girth_15cm_48N |
| | 4 | Girth_15cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Girth_15cm_PreT | 51.0106 | 6.47839 | 16 |
| Girth_15cm_24T | 51.0312 | 6.26374 | 16 |
| Girth_15cm_48T | 51.4288 | 6.25400 | 16 |
| Girth_15cm_72T | 51.2238 | 6.29284 | 16 |
| Girth_15cm_PreN | 50.2069 | 5.70606 | 16 |
| Girth_15cm_24N | 50.6981 | 6.19106 | 16 |
| Girth_15cm_48N | 50.9388 | 6.05497 | 16 |
| Girth_15cm_72N | 51.0181 | 5.86051 | 16 |

**Estimated Marginal Means**

**1. Time**

**Estimates**

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 50.609 | 1.517 | 47.374 | 53.843 |
| 2 | 50.865 | 1.554 | 47.553 | 54.176 |
| 3 | 51.184 | 1.535 | 47.912 | 54.456 |
| 4 | 51.121 | 1.514 | 47.894 | 54.348 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -.256 | .107 | .180 | -.580 | .068 |
| | 3 | -.575* | .120 | .001 | -.938 | -.212 |
| | 4 | -.512 | .176 | .065 | -1.047 | .023 |
| 2 | 1 | .256 | .107 | .180 | -.068 | .580 |
| | 3 | -.319 | .122 | .115 | -.688 | .050 |
| | 4 | -.256 | .161 | .791 | -.744 | .232 |
| 3 | 1 | .575* | .120 | .001 | .212 | .938 |
| | 2 | .319 | .122 | .115 | -.050 | .688 |
| | 4 | .063 | .120 | 1.000 | -.303 | .428 |
| 4 | 1 | .512 | .176 | .065 | -.023 | 1.047 |
| | 2 | .256 | .161 | .791 | -.232 | .744 |
| | 3 | -.063 | .120 | 1.000 | -.428 | .303 |

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

*. The mean difference is significant at the .05 level.

**General Linear Model**

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Girth_20cm_PreT |
| | 2 | Girth_20cm_24T |
| | 3 | Girth_20cm_48T |
| | 4 | Girth_20cm_72T |
| 2 | 1 | Girth_20cm_PreN |
| | 2 | Girth_20cm_24N |
| | 3 | Girth_20cm_48N |
| | 4 | Girth_20cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Girth_20cm_PreT | 55.2300 | 6.19627 | 16 |
| Girth_20cm_24T | 55.6925 | 6.31293 | 16 |
| Girth_20cm_48T | 55.9725 | 6.88511 | 16 |
| Girth_20cm_72T | 55.4563 | 6.31066 | 16 |
| Girth_20cm_PreN | 54.9506 | 6.54449 | 16 |
| Girth_20cm_24N | 55.4281 | 6.54627 | 16 |
| Girth_20cm_48N | 55.7638 | 6.77201 | 16 |
| Girth_20cm_72N | 55.5025 | 6.60936 | 16 |

**Estimated Marginal Means**

**1. Time**

**Estimates**

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 55.090 | 1.588 | 51.706 | 58.474 |
| 2 | 55.560 | 1.605 | 52.140 | 58.981 |
| 3 | 55.868 | 1.702 | 52.241 | 59.495 |
| 4 | 55.479 | 1.610 | 52.047 | 58.911 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -.470 | .199 | .193 | -1.074 | .134 |
| | 3 | -.778* | .233 | .027 | -1.484 | -.071 |
| | 4 | -.389 | .224 | .620 | -1.070 | .292 |
| 2 | 1 | .470 | .199 | .193 | -.134 | 1.074 |
| | 3 | -.308 | .206 | .937 | -.934 | .318 |
| | 4 | .081 | .195 | 1.000 | -.510 | .672 |
| 3 | 1 | .778* | .233 | .027 | .071 | 1.484 |
| | 2 | .308 | .206 | .937 | -.318 | .934 |
| | 4 | .389 | .171 | .227 | -.129 | .907 |
| 4 | 1 | .389 | .224 | .620 | -.292 | 1.070 |
| | 2 | -.081 | .195 | 1.000 | -.672 | .510 |
| | 3 | -.389 | .171 | .227 | -.907 | .129 |

Based on estimated marginal means
a. Adjustment for multiple comparisons: Bonferroni.
*. The mean difference is significant at the .05 level.

**General Linear Model**

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | VMOpsttx_PreT |
| | 2 | VMOpsttx_24T |
| | 3 | VMOpsttx_48T |
| 2 | 1 | VMOpsttx_PreN |
| | 2 | VMOpsttx_24N |
| | 3 | VMOpsttx_48N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| VMOpsttx_PreT | 1.1875 | 1.47054 | 16 |
| VMOpsttx_24T | 2.5000 | 2.05751 | 16 |
| VMOpsttx_48T | 2.3750 | 2.26936 | 16 |
| VMOpsttx_PreN | 1.7188 | 1.26450 | 16 |
| VMOpsttx_24N | 2.3438 | 1.53535 | 16 |
| VMOpsttx_48N | 2.0000 | 1.81659 | 16 |

**Estimated Marginal Means**

**1. Time**

**Estimates**

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.453 | .301 | .811 | 2.095 |
| 2 | 2.422 | .437 | 1.490 | 3.353 |
| 3 | 2.188 | .498 | 1.127 | 3.248 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -.969* | .287 | .012 | -1.741 | -.196 |
| | 3 | -.734 | .409 | .277 | -1.835 | .366 |
| 2 | 1 | .969* | .287 | .012 | .196 | 1.741 |
| | 3 | .234 | .284 | 1.000 | -.530 | .998 |
| 3 | 1 | .734 | .409 | .277 | -.366 | 1.835 |
| | 2 | -.234 | .284 | 1.000 | -.998 | .530 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

**General Linear Model**

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Prex_15cm_PreT |
| | 2 | Prex_15cm_24T |
| | 3 | Prex_15cm_48T |
| | 4 | Prex_15cm_72T |
| 2 | 1 | Prex_15cm_PreN |
| | 2 | Prex_15cm_24N |
| | 3 | Prex_15cm_48N |
| | 4 | Prex_15cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Prex_15cm_PreT | 1.6563 | 1.74851 | 16 |
| Prex_15cm_24T | 2.6250 | 1.45488 | 16 |
| Prex_15cm_48T | 3.3125 | 1.49304 | 16 |
| Prex_15cm_72T | 2.7500 | 1.60208 | 16 |
| Prex_15cm_PreN | 1.2188 | 1.37803 | 16 |
| Prex_15cm_24N | 2.7812 | 1.47161 | 16 |
| Prex_15cm_48N | 3.5625 | 1.96532 | 16 |
| Prex_15cm_72N | 2.6250 | 1.66833 | 16 |

## Estimated Marginal Means

**1. Time**

### Estimates

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.438 | .370 | .649 | 2.226 |
| 2 | 2.703 | .342 | 1.973 | 3.433 |
| 3 | 3.438 | .403 | 2.579 | 4.296 |
| 4 | 2.688 | .361 | 1.918 | 3.457 |

### Pairwise Comparisons

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -1.266* | .351 | .016 | -2.331 | -.200 |
| | 3 | -2.000* | .528 | .011 | -3.603 | -.397 |
| | 4 | -1.250 | .501 | .149 | -2.771 | .271 |
| 2 | 1 | 1.266* | .351 | .016 | .200 | 2.331 |
| | 3 | -.734 | .454 | .759 | -2.112 | .644 |
| | 4 | .016 | .436 | 1.000 | -1.309 | 1.340 |
| 3 | 1 | 2.000* | .528 | .011 | .397 | 3.603 |
| | 2 | .734 | .454 | .759 | -.644 | 2.112 |
| | 4 | .750* | .198 | .011 | .150 | 1.350 |
| 4 | 1 | 1.250 | .501 | .149 | -.271 | 2.771 |
| | 2 | -.016 | .436 | 1.000 | -1.340 | 1.309 |
| | 3 | -.750* | .198 | .011 | -1.350 | -.150 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Pstex_15cm_PreT |
| | 2 | Pstex_15cm_24T |
| | 3 | Pstex_15cm_48T |
| | 4 | Pstex_15cm_72T |
| 2 | 1 | Pstex_15cm_PreN |
| | 2 | Pstex_15cm_24N |
| | 3 | Pstex_15cm_48N |
| | 4 | Pstex_15cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Pstex_15cm_PreT | 1.3750 | 1.61761 | 16 |
| Pstex_15cm_24T | 1.9062 | 1.03632 | 16 |
| Pstex_15cm_48T | 2.4375 | 1.31498 | 16 |
| Pstex_15cm_72T | 1.8750 | 1.13284 | 16 |
| Pstex_15cm_PreN | 1.3438 | 1.41090 | 16 |
| Pstex_15cm_24N | 2.4062 | 1.40498 | 16 |
| Pstex_15cm_48N | 2.9375 | 1.38894 | 16 |
| Pstex_15cm_72N | 2.4375 | 1.54785 | 16 |

**Estimated Marginal Means**

**1. Time**

**Estimates**

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.359 | .367 | .577 | 2.142 |
| 2 | 2.156 | .297 | 1.522 | 2.790 |
| 3 | 2.688 | .319 | 2.007 | 3.368 |
| 4 | 2.156 | .327 | 1.458 | 2.854 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -.797 | .374 | .302 | -1.934 | .340 |
| | 3 | -1.328* | .387 | .022 | -2.503 | -.153 |
| | 4 | -.797 | .411 | .429 | -2.045 | .451 |
| 2 | 1 | .797 | .374 | .302 | -.340 | 1.934 |
| | 3 | -.531 | .371 | 1.000 | -1.659 | .596 |
| | 4 | .000 | .268 | 1.000 | -.814 | .814 |
| 3 | 1 | 1.328* | .387 | .022 | .153 | 2.503 |
| | 2 | .531 | .371 | 1.000 | -.596 | 1.659 |
| | 4 | .531 | .298 | .571 | -.375 | 1.437 |
| 4 | 1 | .797 | .411 | .429 | -.451 | 2.045 |
| | 2 | .000 | .268 | 1.000 | -.814 | .814 |
| | 3 | -.531 | .298 | .571 | -1.437 | .375 |

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

*. The mean difference is significant at the .05 level.

**2. Treatment**

**Estimates**

Measure:MEASURE_1

| Treatment | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.898 | .228 | 1.412 | 2.384 |
| 2 | 2.281 | .277 | 1.691 | 2.871 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Treatment | (J) Treatment | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -.383* | .119 | .006 | -.637 | -.128 |
| 2 | 1 | .383* | .119 | .006 | .128 | .637 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

## General Linear Model

### Within-Subjects Factors

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Psttx_15cm_PreT |
| | 2 | Psttx_15cm_24T |
| | 3 | Psttx_15cm_48T |
| 2 | 1 | Psttx_15cm_PreN |
| | 2 | Psttx_15cm_24N |
| | 3 | Psttx_15cm_48N |

### Descriptive Statistics

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Psttx_15cm_PreT | 1.4687 | 2.06937 | 16 |
| Psttx_15cm_24T | 2.5000 | 1.62275 | 16 |
| Psttx_15cm_48T | 2.8750 | 1.74642 | 16 |
| Psttx_15cm_PreN | 1.1562 | 1.09116 | 16 |
| Psttx_15cm_24N | 2.2813 | 1.39007 | 16 |
| Psttx_15cm_48N | 2.9688 | 2.06937 | 16 |

### Estimated Marginal Means

**1. Time**

### Estimates

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.312 | .362 | .541 | 2.084 |
| 2 | 2.391 | .345 | 1.655 | 3.127 |
| 3 | 2.922 | .447 | 1.969 | 3.875 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -1.078* | .353 | .024 | -2.028 | -.128 |
| | 3 | -1.609* | .480 | .013 | -2.902 | -.317 |
| 2 | 1 | 1.078* | .353 | .024 | .128 | 2.028 |
| | 3 | -.531 | .347 | .439 | -1.465 | .403 |
| 3 | 1 | 1.609* | .480 | .013 | .317 | 2.902 |
| | 2 | .531 | .347 | .439 | -.403 | 1.465 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

**General Linear Model**

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Prex_20cm_PreT |
| | 2 | Prex_20cm_24T |
| | 3 | Prex_20cm_48T |
| | 4 | Prex_20cm_72T |
| 2 | 1 | Prex_20cm_PreN |
| | 2 | Prex_20cm_24N |
| | 3 | Prex_20cm_48N |
| | 4 | Prex_20cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Prex_20cm_PreT | 1.7500 | 1.65328 | 16 |
| Prex_20cm_24T | 3.2500 | 1.34164 | 16 |
| Prex_20cm_48T | 4.1875 | 1.68201 | 16 |
| Prex_20cm_72T | 3.5938 | 2.37500 | 16 |
| Prex_20cm_PreN | 1.8438 | 1.75802 | 16 |
| Prex_20cm_24N | 3.6875 | 1.66208 | 16 |
| Prex_20cm_48N | 4.4062 | 2.55094 | 16 |
| Prex_20cm_72N | 4.0938 | 2.59627 | 16 |

## Estimated Marginal Means

**1. Time**

### Estimates

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.797 | .402 | .940 | 2.654 |
| 2 | 3.469 | .355 | 2.712 | 4.225 |
| 3 | 4.297 | .476 | 3.282 | 5.312 |
| 4 | 3.844 | .591 | 2.585 | 5.103 |

### Pairwise Comparisons

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -1.672* | .428 | .008 | -2.971 | -.372 |
| | 3 | -2.500* | .602 | .005 | -4.328 | -.672 |
| | 4 | -2.047 | .750 | .093 | -4.323 | .230 |
| 2 | 1 | 1.672* | .428 | .008 | .372 | 2.971 |
| | 3 | -.828 | .435 | .457 | -2.148 | .492 |
| | 4 | -.375 | .545 | 1.000 | -2.031 | 1.281 |
| 3 | 1 | 2.500* | .602 | .005 | .672 | 4.328 |
| | 2 | .828 | .435 | .457 | -.492 | 2.148 |
| | 4 | .453 | .292 | .853 | -.435 | 1.341 |
| 4 | 1 | 2.047 | .750 | .093 | -.230 | 4.323 |
| | 2 | .375 | .545 | 1.000 | -1.281 | 2.031 |
| | 3 | -.453 | .292 | .853 | -1.341 | .435 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

## General Linear Model

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Pstex_20cm_PreT |
| | 2 | Pstex_20cm_24T |
| | 3 | Pstex_20cm_48T |
| | 4 | Pstex_20cm_72T |
| 2 | 1 | Pstex_20cm_PreN |
| | 2 | Pstex_20cm_24N |
| | 3 | Pstex_20cm_48N |
| | 4 | Pstex_20cm_72N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Pstex_20cm_PreT | 1.6250 | 2.02073 | 16 |
| Pstex_20cm_24T | 2.8750 | 1.36015 | 16 |
| Pstex_20cm_48T | 3.6250 | 1.78419 | 16 |
| Pstex_20cm_72T | 3.3437 | 1.90367 | 16 |
| Pstex_20cm_PreN | 1.8438 | 2.17347 | 16 |
| Pstex_20cm_24N | 3.1250 | 1.66833 | 16 |
| Pstex_20cm_48N | 3.9375 | 1.73085 | 16 |
| Pstex_20cm_72N | 3.7500 | 2.32379 | 16 |

**Estimated Marginal Means**

**1. Time**

**Estimates**

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.734 | .502 | .665 | 2.804 |
| 2 | 3.000 | .371 | 2.210 | 3.790 |
| 3 | 3.781 | .406 | 2.917 | 4.646 |
| 4 | 3.547 | .509 | 2.461 | 4.633 |

**Pairwise Comparisons**

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -1.266* | .408 | .044 | -2.504 | -.027 |
| | 3 | -2.047* | .560 | .014 | -3.747 | -.346 |
| | 4 | -1.812 | .603 | .053 | -3.644 | .019 |
| 2 | 1 | 1.266* | .408 | .044 | .027 | 2.504 |
| | 3 | -.781 | .395 | .400 | -1.981 | .419 |
| | 4 | -.547 | .426 | 1.000 | -1.840 | .746 |
| 3 | 1 | 2.047* | .560 | .014 | .346 | 3.747 |
| | 2 | .781 | .395 | .400 | -.419 | 1.981 |
| | 4 | .234 | .275 | 1.000 | -.601 | 1.070 |
| 4 | 1 | 1.812 | .603 | .053 | -.019 | 3.644 |
| | 2 | .547 | .426 | 1.000 | -.746 | 1.840 |
| | 3 | -.234 | .275 | 1.000 | -1.070 | .601 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

**General Linear Model**

**Within-Subjects Factors**

Measure:MEASURE_1

| Treatment | Time | Dependent Variable |
|---|---|---|
| 1 | 1 | Psttx_20cm_PreT |
| | 2 | Psttx_20cm_24T |
| | 3 | Psttx_20cm_48T |
| 2 | 1 | Psttx_20cm_PreN |
| | 2 | Psttx_20cm_24N |
| | 3 | Psttx_20cm_48N |

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Psttx_20cm_PreT | 1.3125 | 1.34009 | 16 |
| Psttx_20cm_24T | 3.0938 | 1.99348 | 16 |
| Psttx_20cm_48T | 3.6875 | 2.41437 | 16 |
| Psttx_20cm_PreN | 1.7813 | 1.69282 | 16 |
| Psttx_20cm_24N | 3.0625 | 1.65202 | 16 |
| Psttx_20cm_48N | 3.8750 | 2.52653 | 16 |

## Estimated Marginal Means

**1. Time**

### Estimates

Measure:MEASURE_1

| Time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 1.547 | .360 | .779 | 2.315 |
| 2 | 3.078 | .425 | 2.172 | 3.984 |
| 3 | 3.781 | .568 | 2.570 | 4.992 |

### Pairwise Comparisons

Measure:MEASURE_1

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -1.531* | .509 | .026 | -2.902 | -.161 |
| | 3 | -2.234* | .563 | .004 | -3.751 | -.718 |
| 2 | 1 | 1.531* | .509 | .026 | .161 | 2.902 |
| | 3 | -.703 | .449 | .413 | -1.911 | .505 |
| 3 | 1 | 2.234* | .563 | .004 | .718 | 3.751 |
| | 2 | .703 | .449 | .413 | -.505 | 1.911 |

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

# APPENDIX IV

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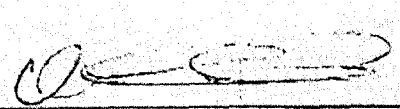

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"The Effects of Cryotherapy on Deep Tissue Cooling." Rubley MD, Liceralde P, **Peluaga MN**, Touton TM, Tritsch AJ, Milligan M, Knight KL. Athletic Training Research Laboratory. University of Nevada, Las Vegas.

Presentation of Original Research:

**Peluaga MN**, Rubley MD, Klaasen JM, Tandy RD. "The Efficacy of Common Sterilization Procedures used for Implantable Thermocouples." Thematic Poster Session *The Far West Athletic Trainers' Association, Regional Chapter*, San Francisco, CA. Thematic Poster Session *University of Nevada, Las Vegas, Health Sciences Interdisciplinary Research Scholarship Day*, Las Vegas, NV. Thematic Poster Session *The National Athletic Trainers' Association, National Chapter*, St. Louis, MO.

Rubley MD, **Peluaga MN,** Mendoza J, Threat J, Holcomb WR, Tritsch AJ, Tandy RD. "Ultrasound Heating of the Achilles Tendon: A Comparison of Direct and Indirect Application Techniques." Thematic Poster Session *The Far West Athletic Trainers' Association, Regional Chapter*, San Francisco, CA. Thematic Poster Session *University of Nevada, Las Vegas, Health Sciences Interdisciplinary Research Scholarship Day*, Las Vegas, NV. Oral Presentation *The National Athletic Trainers' Association, National Chapter*, St. Louis, MO.

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