

# SCIENTIFIC

## PHYSICAL THERAPY

### **Inflammatory prostaglandins Are they all bad or do we need them?**

By  
Didrik J. Sopleer Ph.D., L.Ac.

The inflammatory prostaglandins do not have a good reputation. They are usually looked at as undesirable and we need to do all we can to inhibit them.

After an injury which results in local inflammation and pain, an anti-inflammatory drug should ideally be taken. When the damaging prostaglandins are inhibited and the pain is reduced, the patient is getting better, faster. At least that is what both the patient and the practitioner usually believe.

What happens after a muscle injury? An initial acute inflammatory response takes place and the body starts several cellular processes to regenerate the injured tissue. Inflammation and myogenesis are a part of these cellular processes. The inflammatory response serves several purposes. It is a defense mechanism and the migration of neutrophils to the site of injury will protect the body against foreign pathogens by phagocytosis. The prostaglandins modulate inflammation but they are also involved in the various stages of myogenesis.

The prostaglandin synthesis is triggered by different forms of cyclooxygenase (COX). These cyclooxygenase enzymes are the targets for the various nonsteroidal anti-inflammatory drugs. To clarify the role of the different COX isoforms in the regulation of muscle regeneration a very interesting study was published last year.<sup>1</sup>

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The researchers induced a localized freeze injury in the anterior tibialis muscles of mice. These mice were treated with either a COX-1 or COX-2 selective inhibitor starting before the injury. The size of the regenerating myofibers was analyzed at several time points up to 5 weeks after the injury.

The results were very interesting and showed that the size of the regenerating myofibers was decreased in the group given the COX-2 inhibitor. The COX-2 inhibitor had however no effect on myofiber growth when administered starting 7 days after the injury.

The researchers stated that the attenuation of the myofiber growth by treatment with COX-2 inhibitors is associated with a decrease in the number of myoblasts and intramuscular inflammatory cells at early times after injury. This suggests that COX-2 dependent prostaglandin synthesis is required during early stages of muscle regeneration.

They go on saying that this thus raises caution about the use of COX-2 selective inhibition in patients with muscle injury or disease.

The COX-2 inhibitors have also been associated with an increased risk for cardiovascular disease.<sup>2</sup> Inhibitors of the COX-2 enzymes in the vascular

endothelium will result in lowered production of prostacyclin and an increased risk for coronary thrombosis.

The more traditional non-steroidal anti-inflammatory drugs (NSAID's) have shown to inhibit osteogenic activity and spinal fusion.<sup>3</sup> These drugs can also interfere with the metabolism of cartilage.<sup>4,5</sup> It is a well known fact that NSAID's can cause serious gastrointestinal symptoms and can lead to gastritis and ulcers.<sup>6</sup>

The long term use of steroids, which are even more powerful, can lead to osteoporosis, decreased synthesis of collagen and proteoglycans and increased risk for avascular necrosis.<sup>7</sup>

The inflammatory prostaglandins play many important roles. It is important to remember that there are many reasons why they exist.

Acute inflammation with the release of inflammatory prostaglandins as a response to an injury is not necessarily a bad thing, it is an important part of regeneration and healing.

Inflammation is only harmful if it gets out of hand and when it gets chronic. Chronic inflammation as in arthritic and degenerative conditions is harmful and low grade systemic inflammation is harmful. When inflammation is present chronically, it can not only cause degeneration and pain, but even cause cardio-

vascular and neurological disease. The patient does not even have to be aware of low grade systemic inflammation, but it can still cause serious problems.

The patient would greatly benefit if we keep in mind the different roles of the inflammatory prostaglandins. We can motivate the patient to take the right actions by explaining when these chemicals are important and when they are harmful.

Nutritional intervention can be an effective tool in reducing chronic inflammation. A nutritional approach to reduce inflammation looks more and more attractive, especially as more side effects are discovered from anti-inflammatory drugs.

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## Abstract

### Relationship of Superficial Skin Temperature of the Dorsal Forearm to Dosed Exercise and Subjective Perception of Fatigue

By  
Andelee J. Baker, D.P.T.

#### Purpose

The purpose of this study was two-fold: first to determine the relationship between changes in skin temperature over the dorsal forearm and wrist extension exercises dosed on the basis of the Holten curve; and second, to determine the relationship between changes in skin temperature and subjective perceptions of fatigue.

#### Methodology

The research design chosen for this study was a single group experimental design with repeated measures, in which the dominant arm was used as the experimental arm and the non-dominant arm was used as the control. Readings on liquid crystal temperature strips, heart rate monitors, and respiration measures, plus responses to subjective pain questionnaire were the repeated measures.

Twelve healthy subjects, who were found to be compatible with the inclusion/exclusion criteria, were utilized for the study.

Data analysis techniques included the Wilcoxon signed-ranks test, which was used with the first four hypotheses, and the Spearman Rank Order Correlation, which was used with the fifth hypotheses.



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#### Findings

Skin temperature after 60% RM exercise were significantly higher for the experimental arms, but not the control arms; heart rate increases were significantly higher for both 60% RM and 90%; respiration increases were significantly higher; but the relationship between skin temperature and perceived fatigue was not significant.

#### Conclusions

Findings in the current study were in agreement with the findings of other studies cited by the researcher. Recommendations for further research included conducting studies of other isolated muscle groups, other subject populations, and other subjects with musculoskeletal injuries, and considering alternative measures for the variables.

# Abstract

## Enhancement of Glenohumeral Joint Stability by Capsular Shrinkage via Thermal Assisted Surgery

By  
Kristine D. Braun, DPT

### Purpose

The purpose of this study was to determine, through a review of the existing literature, the role of thermal energy plays in relation to four factors: enhancement of the glenohumeral joint stability, current applications of the thermal energy devices, historical effects and their clinical implications; and the effects on rehabilitation guidelines.

### Methodology

The research design for this study consisted of identifying the articles in the literature that pertained to one of the four factors under investigation.

Sources and kinds of data included the professional journals, books, and conference proceedings that were identifiable through a computerized search of the MEDLINE database.

Analysis of the data involved allocating the documents identified through the literature search to the most appropriate factor in the study, composing synopses of each document in order to provide a manageable amount of data with which to work, and synthesizing the information contained in the synopses to form answers to each of the factors under investigation.

### Findings

Glenohumeral joint stability can be enhanced by thermally assisted capsular shift, which addresses the capsular redundancy

that is the primary cause of shoulder subluxators/dislocators.

The Ho:YAG laser is the thermal energy device that is used most frequently but the radiofrequency device is also used. Both devices have strengths and weaknesses when used to produce shrinkage.

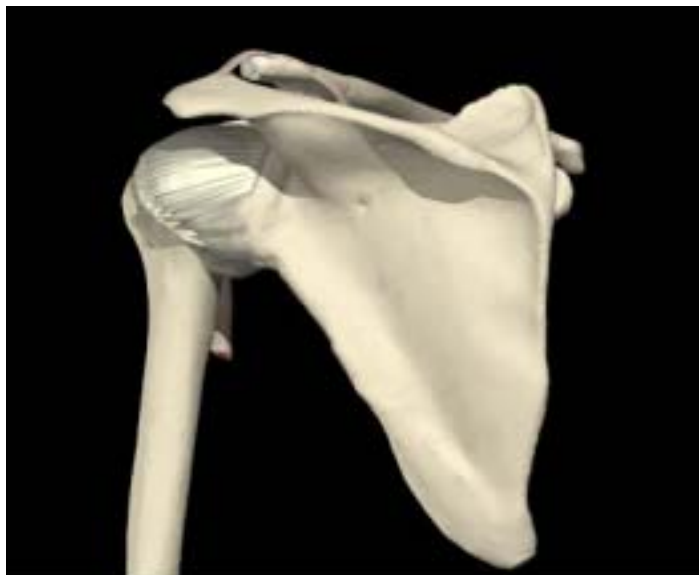
In addition to thermal energy devices, open procedures such as the Bankart and modified Bankart have been used to enhance joint stability, but thermal energy devices provide patients with advantages not available in open procedures.

Because there is little pain after the procedure, rehabilitation guidelines need to take into account the possibility of treatment compliance problems.

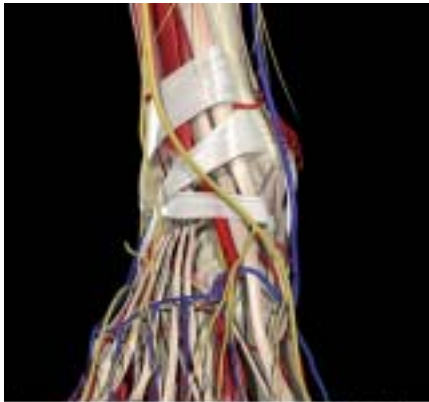
Treatment needs to include a short immobilization period, active and passive range of motion, local measures, strengthening, proprioceptive neuromuscular facilitation and plyometrics.

### Conclusions

Based on the findings of the current study, it is clear that glenohumeral joint stability can be enhanced through capsular shrinkage by thermal assisted surgery, however little is known about the long term histological effects of thermally treated tissue. Further, more comparisons need to be made between stable and unstable joints, since it has been determined that they have a different histological makeup.



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# Abstract

## The Relative Effectiveness of Two Exercise Programs in Improving the Outer Range of Motion of the Gastrocnemius and Joint Position Sense at the Ankle Joint

By  
Julie A. Crane, DPT

### Purpose

The purpose of this study was to determine whether passive stretching or concentric/eccentric exercises to end range of motion was more effective in improving the outer range of motion of the gastrocnemius muscle (dorsiflexion with the knee extended) and joint position sense at the ankle joint in older subjects with limited ankle dorsiflexion.

### Methodology

The research design was a single blinded, randomized, three group experimental design with repeated measures, in which one group received concentric and eccentric exercises, the second group received static stretching exercises, and the third group received no exercises.

Subjects comprising the sample were sixty years of age or older who had limited active ankle dorsiflexion of ten degrees or less due to restriction in the gastrocnemius.

Analysis of Covariance (ANCOVA) was used to analyze changes in dorsiflexion while Analysis of Variance (ANOVA) was used to analyze the joint position sense data.

### Findings

Changes in mean dorsiflexion scores were

greatest for the concentric/eccentric exercise group, and, when compared with mean changes in the static stretching and control groups, narrowly missed achieving statistical significance.

Changes in mean joint position sense were greatest for the concentric/eccentric group, but did not achieve statistical significance when compared with mean changes in the static stretching and control groups.

### Conclusions

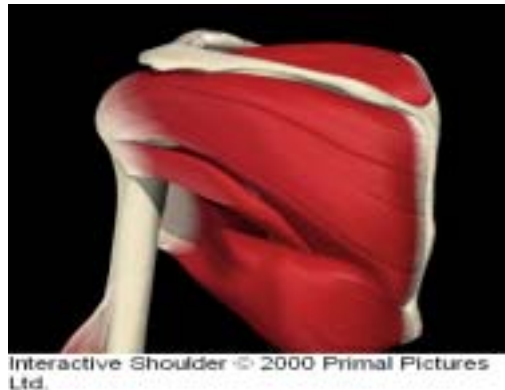
Current findings support the literature that has demonstrated the lack of relationship between concentric/eccentric exercise on ankle dorsiflexion, while current findings are also consistent with the literature which demonstrated that static stretching does not improve ankle dorsiflexion. Current findings regarding joint position sense could not be compared with current literature because no studies were found that addressed the relationship between this variable and either concentric/eccentric or static stretching exercises.

Recommendations for further research include replicating the current study with changes in the duration of exercises, increased supervision to insure exercises are being done correctly, and changes and additions to the measurements taken.

# Abstract

## Effectiveness of Pulley Resistance Exercises and Elastic Resistance Exercises in the Rehabilitation of Supraspinatus Tendinitis

By  
Maude Cejudo, DMT



### Purpose

The purpose of this study was to determine the relative effectiveness of two resistance exercise approaches, pulleys and elastic bands, in the rehabilitation of shoulder patients with the diagnosis of supraspinatus tendinitis.

### Methodology

The research design for this study consisted of two parts: (1) a two group experimental design with repeated measures was used in relation to the first six hypotheses, and (2) a single subject A-B research design was used in relation to the last three hypotheses. A questionnaire assessing symptoms and function of the shoulder, goniometer readings, the Visual Analog Scale, and Dynamometer muscle tests were the repeated measures.

The 12 subjects utilized in the study were referred to the researcher by a physician with the diagnosis of supraspinatus tendinitis.

In addition to this diagnosis, subjects were compatible with the other inclusion/exclusion criteria.

Shoulder questionnaire data were analyzed statistically using the Mann-Whitney U test, while the one sample t test was used to analyze the data generated by the other measures.

### Findings

Statistically significant findings included the following: pulley resistance exercise was more effective than elastic band resistance exercise in increasing range of motion, increasing shoulder strength, and reducing pain. No statistically significant differences between the two groups could be found for the questionnaire subscales of global assessment, changes in pain level, activities of daily living, athletics and recreation, work rehabilitation, and rehabilitation satisfaction.

### Conclusions

Positive rehabilitation results are possible for patients with the diagnosis of supraspinatus tendonitis, using an exercise program based on Scientific Therapeutic Exercise Progressions that utilizes pulleys as the resistive exercise approach of choice. Recommendations for further research included replication this study with different patient diagnosis, different measures of patient rehabilitation, and the other commonly used resistive exercise approach: free weights.

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**He was born March 14<sup>th</sup> 1929 in Grong, Norway, and his initial profession was in the army, where he achieved the rank of Captain. He continued his education at “Idrettshøyskolen”, in Oslo, Norway and worked in physical education for two years before he went on to physical therapy school, and got involved in the Norwegian development of manual therapy as a young graduate.**

**Harald’s clinical experience was broad and thorough. He implemented his expertise throughout the field of rheumatology, sports medicine, manual therapy and ergonomics as well as serving as examiner at the Governmental Physical Therapy College for 12 years.**

**For 23 years, Harald was a consultant for the department of orthopedics and rehabilitation at a major health institution at Vesterås in Sweden and was one of the founding members of manual therapy in Norway. He was a popular and highly recommended clinical supervisor, educator and organizational administrator for physical therapists and physicians in courses and national programs for 25 years. Harald’s engagement and compassion for his profession qualified him as a consultant for the Norwegian National department of Culture’s council for physical therapy education. In March 2002 Harald Frøseth was granted an Honorary Doctor of Physical Therapy Degree for his services to the profession.**

**Harald’s dedication and sincere support of his students made a deep impression on my own development as an instructor. As a friend, mentor and clinician, his spirit will live on among his students, colleagues and patients.**

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