LITERATURE REVIEW GUIDELINES

General Guidelines
1. Literature reviews must be research-based journal articles pertaining to the use of therapeutic modalities.
   
2. The journal articles must have been published in either the *Journal of Athletic Training* or the *Journal of Sport Rehabilitation*.

Formatting Guidelines
1. Each article summary should be a minimum of 2 pages, typed double-spaced with 1” margins all around, using 12 pt Times New Roman font.
   
2. Each research-based article review should include the following information:
   a. purpose of the study
   b. research questions or hypotheses (if provided in the article)
   c. who were the subjects in the study
   d. instrumentation (if any instruments were used)
   e. procedures used in collecting the data
   f. results (i.e., what did the author(s) find)
   g. discussion (i.e., how do the findings compare to previous research)
   h. implications (i.e., how should these findings be applied to the “real-world” use this modality)

3. Reference Style
   a. AMA Manual of Style
   b. Index Medicus style of abbreviating journal titles
   c. See Journal of Athletic Training Author’s Guide

4. Cover Page

<table>
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5. Body of Literature Review
   a. Type the article reference (see example below) at the top of the paper
   b. Skip one line and begin your summary
   c. See attached sample.

Jane Doe

KINE 3333 Therapeutic Modalities
Spring 2004

Literature Review #1
2/19/04

**Purpose:** The purpose of this study was to examine the effect of using three 30-minute high-volt pulsed electrical stimulation treatments on reducing pain, increasing range of motion, regaining strength losses produced by delayed onset muscle soreness (DOMS). **Subjects** for this study included 17 women and 11 men with a mean age of 21.8 ± 2.5 years. Each subject was given a description of the study and then signed a consent form. All subjects were instructed not to apply ice, massage, or take any pain medication for the discomfort associated with their DOMS. Before inclusion in the study, the subjects were also asked to verify the following: (1) that they had not been following a strength and conditioning program over the past month, (2) that they had no previous history of a lower extremity injury, and (3) that they did not currently have any muscle soreness in their right leg. **Instrumentation:** Researchers used a visual analog scale (VAS) to measure pain. The VAS scale was a 10 cm line with anchors of “no pain” and “severe pain”. Knee flexion was measured with the subject prone, using a 12-inch plastic goniometer. A Cybex leg extension machine (Eagle Fitness Systems, Owatonna, MN) was used to obtain strength measures and to inflict the DOMS. An OmniStim 3020 high-volt e-stim machine (Physio Technology, Inc., Topeka, KS). Settings for the e-stim included: submotor stimulation, frequency of 125 pps, pulse duration of 40 μsec, and interphase interval of 100 μsec. **Data Collection Procedures:** The subjects were randomly assigned to one of two groups: the e-stim group or the control group that received a sham treatment. All subjects completed the same knee flexion-extension exercise program designed to induce DOMS. Subjects started with 75% of their one-repetition maximum and performed up to 30 sets of 10 repetitions. Following the completion of each set, subjects were given a 15 to 20 second rest period. After 8 sets of 10
repetitions, subjects were given a 2 minute rest period. The subjects continued to perform sets until they were unable to fully extend their knee during the concentric phase of the lift. At this point, the subjects were asked to continue with the eccentric phase of the lift (the researchers completed the concentric phase by lifting the weight for the subject). Subjects continued the exercise program until they couldn’t eccentrically lower a 30 pound load or until they refused to go on. Electrical stimulation treatments were administered for 30 minutes at 24, 48, and 72 hours postexercise. The E-stim group received treatments using the following parameters: high-volt, twin-peak, pulsed electrical current set at 125 pps. One electrode was placed over the sorest point and the other electrode was placed over the soreness site that was furthest away from the first electrode (either proximal or distal, which ever provided the greatest distance between electrodes). Intensity was set at a submotor level. Subjects in the control (Sham) group were set up to a false channel of an e-stim machine so that they could see the amplitude level change, but they received no actual current. They were told that they shouldn’t feel anything since their treatment was at a nonsensory level. Patients’ degree of muscle soreness, loss of ROM, and strength loss were assessed both before and after each treatment. The VAS was used to assess pain. Subjects were asked to mark an X on the VAS scale where it corresponded to their pain. All ROM measurements were taken with the subject supine. The goniometer placement sites were marked with a permanent marker to ensure consistency in measurements from day to day. The Cybex leg extension machine was used to assess strength before and after each treatment. Subjects performed a 1RM and the weight was recorded to the nearest 5 pounds. **Results:** The subjects’ pain peaked at 48 hours postexercise for both groups. Both groups reported a decrease in pain between pre- and posttreatment time, which means that the control (sham) group actually experienced a “treatment effect” from their placebo treatment. Loss of ROM also peaked at 48
hours with both groups, but there was no difference between groups. Strength loss measures also peaked at 48 hours across both groups; however, there were no differences in the measures between groups. **Discussion:** The results from this study are similar to previous studies with respect to the progression of DOMS. However, based on the severity of DOMS symptoms reported by the subjects in this study, the exercise program utilized to induce DOMS might have been too strenuous. Most of the studies that have investigated the effect of e-stim on reducing DOMS have utilized TENS (both high and low frequency); however, Wolcot et al found that high-volt, pulsed current (HVPC) was also effective in reducing DOMS. The results from this study do not compare with Wolcot’s findings. The researchers proposed two possible reasons for their differing results: (1) the exercise program was too strenuous and therefore produced DOMS symptoms too severe to be effectively reduced by HVPC, and (2) the e-stim set-up parameters used in this study might not be appropriate for effectively reducing DOMS.