

Patterned Electrical Nerve Stimulation Improves Quadricep Strength and Power at High Isokinetic Speeds

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Context: Patterned Electrical Nerve Stimulation (PENS) allows for activation of the quadriceps and hamstrings in patterns that mimic natural motion. Previous work demonstrated no immediate effects of one PENS treatment on quadriceps function; however, little is known about the training effects. **Objective:** The purpose of the study was to investigate the effects of twelve PENS treatments on quadriceps torque, power, and work during two isokinetic speeds. **Design:** 2x3 (group x time) between-within repeated measures design. Group included PENS and sham microcurrent (SMC). Time was Day 1, Day 6, and Day 12. **Setting:** Research Laboratory. **Patients or Other Participants:** Nineteen subjects without knee injuries (within 6 months) volunteered. Subjects were not engaged in organized weight training programs and were randomly assigned to either PENS (n=10; 4 men, 6 women, age = 22.1 ± 0.8 yrs) or SMC group (n = 9; 5 men, 5 women, age = 24.6 ± 2 years). **Interventions:** Test days included day 1 before 1st treatment, day 6 before 6th treatment, and day 12 within 24 hours after last treatment. Subjects reported for 12 treatment sessions where two 3x5 inch electrode pads were placed on the quadriceps and two 2x4 inch electrode pads were placed on the hamstring. Fifteen minutes of passive PENS or SMC protocols were delivered using OmniStimFx2. PENS is a triphasic sinusoidal wave with pulse duration of 70µsec at 40Hz and we used an intensity that produced a comfortable yet visible contraction. The SMC was described as a sub-sensory microcurrent but was a sham treatment (no stimulation delivered). Testing was done on a Biodex® and included two isokinetic speeds (90°/s and 180°/s). **Main Outcome Measures:** Dependent

variables included peak torque (90PT, 180PT) and peak power (90PP, 180PP) and work (90WORK, 180WORK). **Results:** Analyses were completed using separate linear mixed model repeated measures and Sidak post-hoc assessments ($\alpha = 0.05$). There were no significant differences between group and time for 90PT, 90PP, 90WORK ($p > 0.05$). There were significant group x time interactions for all 180°/sec variables ($p < 0.05$). Within the PENS group only, Day 6 and Day 12 were significantly greater than Day 1 for 180PP ($p < 0.02$), 180PT ($p < 0.03$) and 180WORK ($p < 0.02$) but Day 12 was not greater than Day 6 ($p > 0.05$). At Day 6 the PENS group demonstrated increases from Day 1 of 9.7 ± 2.4 N (peak torque), 31.5 ± 7.4 W (peak power), and 13.9 ± 2.7 J (work). **Conclusions:** Our results support the positive effects of 6-12 sessions of PENS treatments on muscle function at high speeds. We believe this occurred as a result of more efficient recruitment of large motor units. We used healthy normal subjects for this assessment but believe that patients experiencing quadriceps inhibition would especially benefit from at least 6 treatments of PENS as a part of strength therapy.

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Free Communications Sessions

Dear NATA Members and Friends:

We are pleased to present the annual Supplement to the Journal of Athletic Training. This Supplement contains abstracts presented at the 2015 NATA Clinical Symposia & AT Expo in St. Louis, Missouri as part of the NATA Foundation Free Communications Program.

The Free Communications Program provides certified athletic trainers, students and other healthcare providers an opportunity to present and learn about the latest in athletic training research. Research is presented in oral and poster formats and includes general research, NATA Foundation-funded research, thematic posters, clinical case reports and our Student Exchange program posters. Abstracts of the research are printed here in the order of presentation at the NATA Convention in Missouri for your convenience. Free Communications presentations represent a wide range of research and clinical interests. In addition, the Clinical Case Reports sessions allow you to test your clinical assessment skills. We encourage you to attend these presentations.

We also urge you to attend the sessions featuring research funded by the NATA Foundation. The NATA Foundation funds research and a variety of educational programs, including summits on issues critical to athletic training, as well as annual scholarships to undergraduate and graduate students of athletic training.

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NATA and the NATA Foundation are pleased to offer this supplement as a service to NATA members. We hope that it provides theoretical and practical information you can use to improve your effectiveness as a certified athletic trainer. Thank you for your support!

Sincerely,



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NATA Research & Education Foundation Committee



James Thornton, MA, ATC

President, NATA

Dear Colleagues:

On behalf of the National Athletic Trainers' Association Research & Education Foundation and the Free Communications Sub-Committee, we would like to thank all the authors who submitted abstracts to the Free Communications Program. We are happy to report a record number of submissions again this year with the total exceeding 500 Peer Reviewed and Student Exchange Track submissions, combined. We are excited about this year's Free Communications Program as we believe it contains an exciting mix of both high caliber research reports and clinical case studies. Please keep in mind that we consider oral and poster presentations to be equal in terms of caliber and encourage clinicians and researchers to attend both oral and posters sessions.

We would also like to take this opportunity to extend a special thanks to the all of the NATA Foundation staff and especially Velma Meza, Patsy Brown; and Rachael Oats, CAE whose attention to detail and dedication makes the Free Communications Program possible. Additionally, many individuals have worked very hard to review submissions, schedule presentations, and produce this Supplement to the *Journal of Athletic Training*. Therefore, we would like to thank and recognize the efforts of the Free Communications Committee including: Steven Broglio, PhD, ATC; Thomas Buckley, EdD, ATC; Kenneth Cameron, PhD, MPH, ATC; Jeff Driban, PhD, ATC, CSCS; Jennifer Earl-Boehm, PhD, ATC; Blaine Long, PhD, AT, ATC; Stephanie Mazerolle, PhD, ATC; Brendan McDermott, PhD, ATC; Melanie McGrath, PhD, ATC; Sara Nottingham, EdD, ATC; Charles Thigpen, PhD, ATC, PT; Kavin Tsang, PhD, ATC; ATC; Erik Wikstrom, PhD, ATC, LAT and Michelle Boling, PhD, ATC (liaison to Convention Program Committee) for their long hours of abstract reviews and preparation for the Free Communications programming. Lastly, we wish to thank Leslie Neistadt and the staff at the editorial office of the *Journal of Athletic Training* for making the Supplement possible.

As we move forward, we continually try to improve and make the review process more transparent. Our goal is to be as inclusive as possible while maintaining the high level of scholarship that readers expect of the *Journal of Athletic Training*. We appreciate the feedback we have received from authors, and suggestions are always welcomed and discussed in committee meetings to further improve the process.

We look forward to seeing you in St. Louis. Please take the opportunity to attend the Free Communications evidenced-based forums, peer reviewed oral and poster sessions, and the student exchange poster presentations. Please note that projects funded by the NATA Research & Education Foundation are specified in this Supplement. Finally, if you have the opportunity, please offer your thanks to those recognized above.

Sincerely,



Joseph M. Hart, III, PhD, ATC
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