Computerized insole biofeedback measuring provides objective and accurate weight-bearing data, as well as integrating the visual and auditory senses. **DESCRIPTION:** A force-sensing insole is utilized to provide immediate feedback to the patient and the clinician via a portable, miniature microprocessor control unit for data storage. Gait performance records are objectively analyzed, visually displayed and stored. **EVALUATION:** This biofeedback device is currently being evaluated as a weight-bearing measuring tool in the assessment, data collection, evaluation and rehabilitation of patients with lower limb dysfunction in the areas of orthopedics, neurology and sports medicine. Early results are exhibiting full recovery of gait performance in a significantly shorter time period than any other rehabilitation method existing today. **CONCLUSIONS:** This technology not only allows us to document more accurately and objectively the progress of our treatment plans and goals, but also allows us as professionals to upgrade our standing in the world of science and medicine. **IMPLICATIONS:** Use of the patient-customized auditory feedback device provides a more accurate and rapid rehabilitation tool than previous methods. It was demonstrated that audio biofeedback was useful in stimulating added weight-bearing in those cases where there was a significant load difference between the affected and unaffected lower limb. This has significant implications for improving weight-bearing discrepancies in all aspects of physical therapy. **KEYWORDS:** Biofeedback, Gait rehabilitation, Weight-bearing. **FUNDING ACKNOWLEDGEMENTS:** unfunded. **CONTACT:** sportmed@zahav.net.il

Research Report Poster Display

07-24 **Wednesday 6 June 14:00**
VCEC Exhibit Hall B & C

USING INTERFERENTIAL SENSORY, MOTOR AND PAIN THRESHOLDS IN THE REHABILITATION EVALUATION OF CHRONIC NECK PAIN PATIENTS

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PURPOSE: The aim of this investigation was to document the changes of sensory, motor and pain thresholds in chronic neck pain patients during an active rehabilitation period. **RELEVANCE:** The need of other than subjective measures for rehabilitation evaluation of musculoskeletal disorders is apparent. **PARTICIPANTS:** 28 patients with chronic neck pain. **METHODS:** The effects of a six weeks' home exercise (HE) and after that a two weeks' intensive exercise (IE) program in a rehabilitation centre were evaluated in 28 chronic neck pain patients using changes in sensory, motor and pain thresholds as a measure of treatment effectiveness. The rehabilitation period did not include any electrotherapeutic treatments. Measurements were made on the wrists before intervention, in the beginning of IE period and after the rehabilitation using the Frequency Analysis Method (FAM) based on interferential currents (IFC) at three different frequencies of 10, 50 and 100 Hz. From the measured thresholds were strong sensory (ST), clear motor muscle contraction (CMC) and pain threshold (PT) taken. The results of the patients were compared with those in 14 gender, weight and height matched controls. **ANALYSIS:** Statistical analysis was made using ANOVA with repeated measures. **RESULTS:** All thresholds had a trend to increase during the rehabilitation and the changes were highest at the frequency of 10 Hz. According to the frequency used the thresholds for ST increased by 15-22% ($p = 0.02–0.006$), for CMC by 11-14% (p= 0.03–0.002) and for PT by 11-16% (p= 0.14–0.02), The CMC thresholds increased best during the HE, ST thresholds during the IE and PT by similar way during the both periods. The changes in thresholds were well correlated with the comparative relief of perceived pain. ($r = 0.53$, $p < 0.05$) which improved by 20% ($p = 0.02$). **CONCLUSIONS:** The results demonstrate, that IFCs using the FAM protocol aims to b a good and reliable way also to show clinical improvement in rehabilitation. The method is sufficiently sensitive to reveal changes in reaction thresholds. **IMPLICATIONS:** Concerning the limitations, the practicability of the method is sufficient in clinical and physiotherapy use and may help to evaluate rehabilitation results in musculoskeletal disorders. **KEYWORDS:** Electrotherapy, rehabilitation, muskuloskeletal disorders. **FUNDING ACKNOWLEDGEMENTS:** Rokua Rehabilitation Center, Utajärvi, Finland. **CONTACT:** tuomo.pienimaki@ttl.fi
ETHICS COMMITTEE: Ethics committee of Oulu University Hospital and Medical Faculty of Oulu University, Oulu, Finland

Research Report Poster Display

09-04 **Wednesday 6 June 14:00**
VCEC Exhibit Hall B & C

PHONOPHORESIS WITH DICLOFENAC GEL IN THE TREATMENT OF ANKLE SPRAINS

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PURPOSE: The ankle sprains represents one of the most frequent muscular-skeletal injuries in the physical therapy practice, specially at the acute stage, after the injury.The most common therapeutic modalities used to eliminate the pain and the inflammatory process in the acute stage are the administration of non-steroid Anti-inflammatory drugs and the Ultrasound therapy. Even though the use of these type of drugs often brings some side effects related to it's oral administration. The Transdermic administration of this drug in gel form brings some actual controversy about it's deep penetration and therapeutic index. **RELEVANCE:** Being the Ultra-sound one of the therapeutic modalities more commonly used in this type of injury, even though, with enourmous controversy found in the scientific literature on the ideal mode of it's application. The controversy also existing in the transdermic administration of topics and is effectiveness. Literature expresses positive effects on the use of Ultra-sound energy to facilitate the penetration of drugs trough the skin, this study uses the therapeutic effect of two diferent modalities used in Physiotherapy to clearify it's effectiveness. **DESCRIPTION:** This study used a sample of 30 subjects divided in two groups. In one group was administrated ultra-sound with it's normal conductive gel, and the other group was used Phonophoresis with Voltaren Emulgel(regtm) (Sodium Diclofenac gel). Both groups with a frequency of 1 MHZ, 1W/Cm2 of intensity in continuous mode of application, during 10 minutes for daily sessions.The pain levels with the joint assessed in pasive movement were measured according to the Visual Analogic Scale and Numeric Pain Rate, in six different moments with four treatment sessions intervals. The software S.P.S.S. version 10.1, was used for the data analysis. **EVALUATION:** All procedures during the program were completed with normality, with the subjects finishing the treatment with full recovery on the last assessment test. Subjects of the sample also respected all the requests from the program, showing at all time good motivation. Subjects from the group of the Phonophoresis required fewer days in the program than the subjects of the other group. No incidents during the program occurred related to adverse effects of the aplication of the treatment. **CONCLUSIONS:** At the level of significance of $\alpha = 0.05$, the analysis of the results, concluded that the application of Phonophoresis (1MHZ;1W/Cm2) with Voltaren Emulgel (regtm) in the inflammatory stage of the tissue repair of the capsular-ligament structure of the ankle, is statistically more effective than the application of the regular Ultra-sound, in the same conditions. It's also more effective in the reduction of the days that the patient shows injury and pain ($t = -2.732$; $p = 0.011$), and in the reduction of the number of treatment sessions to reach total absence of pain ($t = -3.402$; $p = 0.002$). **IMPLICATIONS:** This differences in the reduction of pain is more noticeable at the biginning of the first 4

sessions of treatment. Both treatments showed a Therapeutic Index very high, showing good results in relieving pain with total absence of adverse effects. The scales of assessing the pain demonstrated being very liable and easy to use. **KEYWORDS:** Phonophoresis; Diclofenac; Ultrasound. **FUNDING ACKNOWLEDGEMENTS:** This work was funding by Escola Superior De Tecnologias Da Saúde Do Porto (ESTSP); Centro De Saúde Do Nordeste and Fitness Absoluto Lda. **CONTACT:** fitnessabsoluto@mail.telepac.pt

Research Report Poster Display
09-08 **Wednesday 6 June 14:00**
VCEC Exhibit Hall B & C

EFFECT OF PULSATED ULTRA SOUND AT 16HZ IN VENOUS ULCERS

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PURPOSE: The pulsated ultra sound (PUS) has been used for more than 40 years to stimulate regeneration of venous ulcers. Other studies that have been done don't share the same consensus of the parameters used. The intent of this study is to verify the effect of therapeutic US with a repetition pulse frequency of 16Hz around the boarder of the venous ulcers. **RELEVANCE:** The present study is important to the practice of physiotherapy because it can reveal if there is a regeneration potential of PUS at 16 Hz on venous ulcers. **PARTICIPANTS:** In this study 16 patients were admitted with a total of 18 ulcers that were passed on by the sector of Angiology of the Celso Pierro Hospital, which consisted of a mixture of males and females at an average age of 61.18 years. **METHODS:** The PUS treatment was done with an intensity of 0.5W/cm^2, the transducer frequency of 3MHz and the pulse regimen at 20%. The time of application was from five to ten minutes depending on the size of the wound. This ultra sound technique was applied three times a week, over a period of 2 months. The patients were divided into two groups randomly through a draw. In group 1, seven patients were treated with the ultra sound turned off (sham US), in group 2, nine patients were treated with the ultra sound turned on. Both groups received the conventional treatment recommended by a medical group. The measurement of the ulcers were taken every 2 weeks by placing a transparent piece of plastic over the ulcer were the boarder was traced and reproduced onto a bristol board where it was cut out and weighed on an analytic electronic scale with high precision, this way we were able to compare each respected area by their weight. **ANALYSIS:** The analysis of the date was quantitative using the test T-student for two samples and test T- student for one sample **RESULTS:** The area of the wound was evaluated in two ways. The first way was comparing the evolution every fifteen days, the only time where the treated group showed better statistic results when compared to the placebo group between the thirtieth and forty-fifth days, there was an average difference between the groups of 4.49cm. A second analysis was done by comparing the first and the last evaluation showing the beginning and end of the treatment. There was an average decrease of 3.93cm for the treated group while the placebo showed an average increase of 1.73cm, however, there was no difference statistically between the groups. **CONCLUSIONS:** The PUS at 16Hz was statistically significant between the thirtieth and forty-fifth days, however, there was no significant difference of the therapy between the groups when comparing the first and last evaluation. **IMPLICATIONS:** The physiotherapy practical showed, based on clinical evidence, that PUS at 16Hz can be used as a regenerative resource for chronic ulcers. However other studies with a larger number of patients are necessary. **KEYWORDS:** Ultra sound, Venous Ulcer, Regeneration. **FUNDING ACKNOWLEDGEMENTS:** KLD Biosystems. **CONTACT:** walteransanellonetto@yahoo.com.br
ETHICS COMMITTEE: The project was evaluated and approved by the commitee of ethics from Pontíficia Universidade Católica de Campinas

Research Report Poster Display
09-12 **Wednesday 6 June 14:00**
VCEC Exhibit Hall B & C

THE RELATIONSHIP BETWEEN THE LEG EXTENSION STRENGTH BY STRENGTHERGO AND DYNAMIC STANDING BALANCE

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PURPOSE: The present study examines the relationship between dynamic standing balance and standard leg extension strength, right and left leg differences and gender, and compares leg extension strength to knee extension muscle strength. **RELEVANCE:** The StrengthErgo240 (SE240) is a recumbent-type ergometer that measures peak leg torque (MITSUBISHI ELECTRIC ENGINEERING, Tokyo, Japan). The SE240 is reportedly very reliable and correlates with isokinetic equipment. However, standard leg extension strength has not been investigated in the elderly. **PARTICIPANTS:** Thirty-nine healthy elderly individuals (mean age, 71.5±6.1 y; males, 18; females, 21; mean weight, 54.3±9.1 kg; height, 154.4±7.2 cm; BMI, 22.7±3.0) participated in the study. **METHODS:** We used the SE240 to measure leg extension strength, functional reach, time up and go, gait speed for dynamic standing balance and peak torque. We determined knee extension strength using a hand held dynamometer (HHD). The parameters were measured while seated at 30º to allow left knee flexion and a backrest angle of 100º in the horizontal plane. The trunk and pelvis were fixed using a belt. The subjects grasped bars that were placed outside the thigh. The crank was 170 mm long and measurements began with the left knee flexed at 30º. We performed 5 measurements with the SE240 in the isokinetic mode of 50 rpm/min. Knee extension strength was measured only in the dominant leg by HHD, and then strength per weight was calculated. **ANALYSIS:** We calculated average and standard deviations of differences between the right and left leg, and gender and correlation with dynamic standing balance. **RESULTS:** The peak torque in the dominant and non-dominant legs of males was 83.67±21.72 and 79.36±17.48 Nm, respectively and in females these values were 60.38±14.68 and 56.97±15.23 Nm, respectively. Peak torque was significantly higher in the dominant, than in the non-dominant legs of females. Peak torque per weight of the dominant and non-dominant legs of males was 1.40±0.33 and 1.33±0.28 Nm/kg, respectively and in females these values were 1.23±0.31 and 1.16±0.32 Nm/kg. The dominant peak torque per weight was significantly higher in the dominant, than in the non-dominant legs of females. Peak angle, gender, leg extension strength and dynamic standing balance did not significantly differ. Leg extension strength significantly correlated with peak torque ($r>0.6$) and leg extension strength significantly correlated dynamic standing balance for females ($r<-0.4$; except for FRT) but not for males. Peak torque measured with the SE240 significantly correlated with dynamic standing balance more than leg extension. Right and left leg differences revealed in the leg extension strength of females significantly correlated with knee extension strength. In addition, leg extension strength significantly correlated with dynamic standing balance in both males and females. **CONCLUSIONS:** These findings suggested that as a closed kinetic chain, leg extension strength is more closely correlated with dynamic standing balance than knee extension strength. **IMPLICATIONS:** For physical therapy practice. **KEYWORDS:** StrengthErgo, hand held dynamometer, leg extension muscle strength. **FUNDING ACKNOWLEDGEMENTS:** None. **CONTACT:** ymatsuda@health.gunma-u.ac.jp