

(n ¼ 109) were randomized to specific ultrasound guided, sling or general exercises. Contraction thickness ratio in transverses abdominis (TrA), obliquus internus (OI) and externus (OE), and TrA lateral slide were assessed during the abdominal drawing-in maneuver by b-mode ultrasound. Changes in abdominal muscle function were also regressed on changes in pain. Only modest effects in deep abdominal muscle function were observed, mainly due to reduced activation of OI (contraction thickness ratio: 1.42e1.22, p ¼ 0.01) and reduced TrA lateral slide (1.26e1.01 cm, p ¼ 0.02) in the ultrasound group on the left side. Reduced pain was associated with increased TrA and reduced OI contraction ratio (R2 ¼ 0.18). It is concluded that 6e8 treatments with specific or general exercises for chronic low back patients attained only marginal changes in contraction thickness and slide in deep abdominal muscles, and could only to a limited extent account for reductions in pain.

Two new publications involving Redcord

In this issue of Science and News we are presenting two articles from a Norwegian RCT project for people with chronic low back pain. This project has compared a low load, biofeedback-guided method (Australian approach) with a general sling exercise program and a general exercise program for people with low back pain. This project has resulted in two articles, one (Vasseljen and Fladmark) looking at contraction thickness and function of abdominal muscles, while the other (Unsgaard Trødel M et al.) was examining pain levels and functional outcomes.

Both articles conclude that there are no significant differences between the interventions. The following factors are important to notice:

- General sling exercise shows equally good results as the acknowledged Australian approach in the treatment of chronic low back pain
- Inexpensive equipment for sling exercise (Redcord) can give equally good results as expensive equipment for precise biofeedback (ultrasound)
- With minimal training (Neurac 1 – 3 days) therapists can learn a method proven as effective as a method that requires extensive experience to utilize (ultrasound for correct muscle activation)

The trends in treatment regimens for people with long term low back pain is gradually changing. From a focus on isolated function of deep stabilizing muscles, today different approaches tend to emphasize more the integration of local and global muscles. This is supported by both research and clinical experience and is a central element in the latest development of the Neurac method. We welcome more research in this field, incorporating our new knowledge and experience.

Redcord in agreement with CRRC in China

Redcord signed September 8th an agreement with Chinese Rehabilitation Research Centre (CRRC). The agreement was signed as a part of the opening ceremony for Norwegian Healthcare & Life Science Innovation Expo held in connection to the World Expo in Shanghai.

CRRC is the leading rehabilitation centre in China and will establish a national centre in China for research, education and treatment based on the Neurac method.

At the picture (from left), the founder of Redcord, Petter Planke, Director of CRRC, Li Jianjun and Redcord representative in China, Mark Wang



Neurac 1 Instructor certification



From June 12th to June 16th Redcord arranged a course instructor certification at Redcord Clinic in Oslo. Five Neurac 1 course instructor candidates from Greece, Italy, USA and Norway participated in the seminar, which was conducted by Fredrik Halvorsen and Øyvind Pedersen.

English Neurac courses in Oslo, Norway

Neurac 1: 4th-6th November
 Neurac 2 Back/Pelvis: 10th December
 Neurac 2 Neck/Shoulder:
 11th December
 Neurac 2 Stimula: 12th December

Please contact redcord@redcord.com for more information



Dannelly BD et al. The effectiveness of traditional and sling exercise strength training in novice women. Poster presentation. National Strength and Conditioning Association, national meeting, Orlando, July 2010.

Summary:

The study conclude that both OKC and CKC strength training were equally effective for improving traditional measures of strength (e.g. 1 RM, isokinetic power). Only CKC exercise improved sling exercise push-ups indicating both specificity of training and functional training superiority of CKC exercise. The portability and ease of use of sling based CKC strength training provides an effective alternative for novice females who may be intimidated by a traditional strength training setting.

Abstract:

Twenty-six participants were randomized to one of two training interventions: open-kinetic chain exercise training (OKCE) with traditional exercises, and closed-kinetic chain exercise training (CKCE) with sling-based exercises. Participants completed six sets of strength training exercises per week for 13 weeks. Pre- and post-training evaluations included: 1 RM leg and bench press; maximum sling exercise pushups; isokinetic concentric phase peak torque and peak power for knee flexion and extension and for shoulder internal and external rotation; lateral step-down test; and the anterior, posteromedial, and posterolateral components of the Star Excursion Balance Test. The OKCE group (bench press pre $x=68.2\pm9.8$ lbs, bench press post $x=80.5\pm16.2$ lbs, leg press pre $x=120.4\pm59.3$ lbs, leg press post $x=199.2\pm67.5$ lbs) and CKCE group (bench press pre $x=76.7\pm15.1$ lbs, bench press post $x=85.4\pm13.9$ lbs, leg press pre $x=187.7\pm71.1$ lbs, leg press post $x=238.5\pm92.4$ lbs) improved 1RM leg press ($p<0.0001$) and 1RM bench press ($p<0.0001$). There was a significant group ' time interaction ($p<0.001$) for sling exercise push-ups (OKCE pre = 5.5 ± 8.6 , OKCE post = 6.1 ± 8.2 , CKCE pre = 6.8 ± 6.0 , CKCE post = 16.9 ± 6.6). For all isokinetic measures, including peak torque (PT) and peak power (PP), significant increases were observed pre to post training for knee extension, knee flexion, shoulder internal rotation, and shoulder external rotation (improvements ranged from 2.7 to 27.7%), with no differences observed in improvement between groups. Both OKCE and CKCE strength training elicited similar changes in balance with the exception of the posterolateral direction measure, where there was a trend for significant improvement in balance with CKCE training, while OKCE resulted in only a slight increase in balance. It was concluded that CKCE training is equally as effective as OKCE training in eliciting improvements during the initial phases of a strength-training program in novice women. The fact that only CKCE improved sling exercise push-ups supports previous findings suggesting functional superiority of CKCE.

Boudreau SA et al. The role of motor learning and neuroplasticity in designing rehabilitation approaches for musculoskeletal pain disorders. *Manual Therapy* 2010

Summary:

Cortical neuroplasticity is an intrinsic neurophysiological feature that occurs dynamically throughout life and can be defined as a morphological or functional change in neuronal properties, such as strength of internal connections, altered representational patterns or a reorganization of neuronal territories. The review discusses the cortical neuroplastic changes that have been shown to occur in association with experimental or chronic pain disorders and the role of novel motor-skill training in the rehabilitation of patients with musculoskeletal pain.

Abstract:

The extent of cortical neuroplastic changes has been shown to be a key neurophysiological feature that correlates with the level of functional recovery. Therefore, rehabilitation efforts that attempt to maximize cortical reorganization provide the greatest potential for rehabilitation success. This paper reviews the evidence of cortical neuroplastic changes that have been shown to occur in association with experimental or chronic pain disorders. Further, the promising role of novel motor-skill training is discussed in order to best direct the clinician to optimize rehabilitation strategies for patients with musculoskeletal pain disorders.

Gubler D et al. Ultrasound Tissue Doppler Imaging Reveals No Delay in Abdominal Muscle Feed-Forward Activity During Rapid Arm Movement in Patients With Chronic Low Back Pain. *SPINE*, Volume 35, Number 16, pp 1506-1513, 2010.

Summary:

The patients with chronic LBP examined in this study did not show a delayed onset of feed-forward activation of the lateral abdominal muscles during rapid arm movement. Although part of the answer may reside in the different measurement techniques used the authors consider it unlikely that this would result in such diametrically opposed findings.

Abstract:

Study Design. Cross-sectional study. Objective. Comparison of the timing of onset

of lateral abdominal muscle activity during rapid arm movements in patients with nonspecific chronic low back pain (cLBP) and back-pain-free controls. Summary of Background Data. Rapid movements of the arm are normally associated with prior activation of trunk-stabilizing muscles in readiness for the impending postural perturbation. Using invasive intramuscular electromyography techniques, studies have shown that this feed-forward function is delayed in some patients with low back pain (LBP). Ultrasound tissue Doppler imaging (TDI) provides an ultrasound method for quantifying muscle activation in a noninvasive manner, allowing investigation of larger groups of patients and controls. Methods. Ninety-six individuals participated (48 patients with cLBP and 48 matched LBP-free controls). During rapid shoulder flexion, abduction, and extension, surface electromyographic signals from the deltoid and motion-mode TDI images from the contralateral lateral abdominal muscles were recorded simultaneously. The onset of muscle activity was given by changes in the tissue velocity of the abdominal muscles, as measured with TDI. Pain and disability in the patients were assessed using standardized questionnaires. Data were analyzed using repeated measures analysis of variance. Results. In both groups, feed-forward activity of the lateral abdominal muscles was recorded during arm movements in all directions. The main effect of "group membership" revealed no significant difference between the groups for the earliest onset of abdominal muscle activity ($P = 0.398$). However, a significant "group _ body side" interaction ($P = 0.015$) was observed, and this was the result of earlier onsets in the cLBP group than controls for the abdominal muscles on the right (but not left) body side. No relationship was found between the time of onset of the earliest abdominal muscle activity and pain intensity, pain frequency, pain medication usage, or Roland Morris disability scores. Conclusion. Patients with cLBP did not show a delayed onset of feed-forward activation of the lateral abdominal muscles during rapid arm movements. Earlier activation was observed for one body side compared with the controls. However, the clinical relevance of this finding remains obscure, especially because there was no relationship between the onset of activation and any clinical parameters.

Unsgaard-Trødel M et al. Motor Control Exercises, Sling Exercises, and General Exercises for Patients With Chronic Low Back Pain: A Randomized Controlled Trial With 1-Year Follow-up. *Physical Therapy*, Volume 90, Number 10, 2010

Summary:

The study indicate that sling exercises could be recommended, similar to general exercises and motor control exercises, when aiming to reduce pain and disability in the early phase of LBP rehabilitation

Abstract:

Background. Exercise benefits patients with chronic nonspecific low back pain; however, the most effective type of exercise remains unknown. Objective. This study compared outcomes after motor control exercises, sling exercises, and general exercises for low back pain. Design. This was a randomized controlled trial with 1-year follow up. Setting. The study was conducted in a primary care setting in Norway. Patients. The participants were patients with chronic nonspecific low back pain ($n=109$). Interventions. The interventions in this study were low-load motor control exercises, high-load sling exercises, or general exercises, all delivered by experienced physical therapists, once a week for 8 weeks. Measurements. The primary outcome measure was pain reported on the Numeric Pain Rating Scale after treatment and at a 1-year follow-up. Secondary outcome measures were self-reported activity limitation (assessed with the Oswestry Disability Index), clinically examined function (assessed with the Fingertip-to-Floor Test), and fear-avoidance beliefs after intervention. Results. The postintervention assessment showed no significant differences among groups with respect to pain (overall group difference) or any of the outcome measures. Mean (95% confidence interval) group differences for pain reduction after treatment and after 1 year were 0.3 (-0.7 to 1.3) and 0.4 (-0.7 to 1.4) for motor control exercises versus sling exercises, 0.7 (-0.6 to 2.0) and 0.3 (-0.8 to 1.4) for sling exercises versus general exercises, and 1.0 (-0.1 to 2.0) and 0.7 (-0.3 to 1.7) for motor control exercises versus general exercises. Limitations. The nature of the interventions made blinding impossible. Conclusions. This study gave no evidence that 8 treatments with individually instructed motor control exercises or sling exercises were superior to general exercises for chronic low back pain.

Vasseljen O and Fladmark AM. Abdominal muscle contraction thickness and function after specific and general exercises: A randomized controlled trial in chronic low back pain patients. *Manual Therapy* 15 (2010) 482-489

Summary:

6-8 treatments with low load ultrasound guided abdominal drawing-in maneuver, high load sling exercises or general exercises for chronic low back pain patients attained only marginal changes in contraction thickness and slide in deep abdominal muscles.

Abstract:

The aim of this study was to assess changes in deep abdominal muscle function after 8 weeks of exercise in chronic low back pain patients. Patients