enhancement and maintenance of force production. Most research has examined PAP effects either on evoked contractile properties or strength and power activities. There is scarce research that examines the time course of neuromuscular alterations that occur during middle- to long-distance running. Furthermore, the use of explosive exercises using CLX bands that allow task-specific activities lacks sufficient research.

**Purpose:** The aim of this study was to characterize the time course of the effects of a PAP conditioning stimulus (CLX explosive squat protocol) on a subsequent 5- × 1-km running trial.

**Design:** This study used a randomized within-subjects, repeated-measures experimental study design.

**Methods:** In total, 12 healthy, endurance-trained male athletes completed 2 familiarization and 2 intervention sessions in a randomized order and separated by a minimum of 72 h. The familiarization sessions included a run to volitional exhaustion ($VO_2$ max) and familiarization of testing, estimation of the individual's 5RM, and testing of evoked contractile properties. The intervention sessions included a running-specific warm-up, the conditioning exercise intervention (4 × 5RM jump squats with CLX bands or no squats), and a 5- × 1-km time trial runs. Tests were conducted immediately prior to the intervention, after each kilometer, immediately following the 5- × 1-km run, and at 7 and 10 min after the 5-km run. These measures included the interpolated twitch technique (ITT) as an estimate of muscle activation, evoked contractile properties (peak twitch torque, rate of force development, half-relaxation time, M-wave), maximum voluntary isometric contractions (MVIC) to determine peak ankle plantar flexor force, force produced in the first 100 ms (F100), 30-cm drop jump (height, contact time, and reactive strength index), rate of perceived exertion (RPE), and heart rate.

**Statistical Analysis:** A repeated-measures, within-subjects ANOVA (2 conditions × 8 times) was used.

**Result:** The CLX jump squat condition yielded a 3.6% reduction in the aggregate time to complete the 5 km ($P = 0.05$, $d = 0.55$, 3% ↑). Greater MVC forces were evident with the squat stimulus compared with control at 10 min post run as compared with pretest. In addition, only the squat condition showed significantly higher MVC force for the squat condition at 4 km ($d = 0.29$, $P = 0.034$, 8% ↑) and 10 min post run ($d = 0.36$, $P = 0.036$, 9.5% ↑) compared with pretest. %VA was significantly greater when comparing squat stimulus with control at 7 min post run ($P = 0.05$, $d = 0.54$, 10% ↑) and 10 min post run ($P = 0.05$, $d = 0.53$, 11.5% ↑) compared with pretest. Temporal effects were apparent, with the squat condition revealing lower TPT at 3 km ($P = 0.061$, $d = 0.5$, 5% ↓) and 10 min post run ($P = 0.032$, $d = 0.6$, 5% ↓) versus control. Similarly, there was a near-significant main effect for condition ($P = 0.07$, $d = 0.51$) with lower potentiated TPT in the squat condition. Participants showed significantly increased drop jump height in the squat condition during 2 km ($d = 0.47$, $P = 0.015$, 9% ↑), 3 ($d = 0.42$, $P = 0.05$, 8% ↑), and 4 ($d = 0.51$, $P = 0.011$, 8.5% ↑) as compared with the control.

**Discussion:** The CLX jump squat induced PAP, improving the time to complete 5 km with associated improvements in force, muscle activation, temporal characteristics, and jump height.

**Clinical Interpretations:** CLX are portable and efficient devices that can be used before competitions to improve running performance.

## Effects of multicomponent and power training programs using elastic devices on motor function, body composition, and metabolic, bone and inflammatory profile in older adults

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**Background:** It is needed to understand what type of training strategy can be the most effective for contributing to a healthier, active, and more independent elderly population. Nowadays, there are novel types of training interventions and devices, but only little is known regarding whether these can provoke positive benefits in this target population. Concretely, no evidence has examined the effectiveness of high-speed resistance training and multicomponent training in older adults in respect of not only physical function but also bone, immunity, and metabolic status. Developing an understanding these novel training strategies can ultimately provide a viable alternative to traditional modes of exercise training for a broader range of participants.

**Purpose:** The purpose of this paper was to investigate the effects of a high-speed resistance training and multicomponent training program with variable

resistance on molecular, body composition, and physical functions in older adults.

**Design:** This study used a randomized clinical trial with the following 3 parallel arms: (1) high-speed/power elastic band CLX resistance training group (P) (6 exercises at 10–12 repetitions (R) at 4–6 rate of perceived exertion (RPE), 3–4 sets, 60-s rest); (2) multicomponent training group (MC) (balance, aerobic [65% at 85% maximum heart rate), flexibility, muscular endurance (2 exercises with CLX elastic bands, 3–4 sets, 15 R at 8–9 RPE, 60-s rest and ratio 2/2]) and coordination); and (3) control group (CG). Subjects developed a 20-week training program with 2 sessions each week: each session lasted 75 min for P (325 kcal/session) and 60 min for MC (317 kcal/session). Variables analyzed were bone metabolism; metabolic, inflammatory, and immune profile; functional performance; and fat mass. Statistical analysis was developed with SPSS (Version 24.0, SPSS Inc., Chicago, IL). All data were reported as mean and standard deviation. The assumption of normality and homogeneity of the dependent variables was verified with the Kolmogorov–Smirnov and Levene tests, respectively. An analysis of repeated measures was used to determine the effects of the group and moment on the variables analyzed. When significant differences were found, Bonferroni post hoc test was applied. A 95% confidence level was accepted (significance of $P < 0.05$). Cohen coefficients (value *d*) were used as indicators of effect size in intragroup evolution (trivial, <0.02, 0.2–0.49; moderate, 0.5–0.8; large, >0.8). The percentage increase/decrease of each variable was calculated with the following formula: % = [(posttest value − pretest value/pretest value] × 100.

**Results:** There were no significant changes for CG in assessment of hip perimeter, glycosylated hemoglobin, C-reactive protein, osteocalcin; up and go, Romberg, functional, 5-repetition sit-to-stand, 30-s chair stand, 30-s elbow flexion, and manual dynamometry; 4-Meter Gait Speed and 6-min walk tests. CG got significantly worse in percent body fat, waist perimeter, glycemia, cholesterol, LDC-c, triglycerides, type 1 cross-linked C-telopeptide, and climbing stairs and 10-meter gait speed¨s tests. P and MC had positive significant changes in all these variables without differences between them and with significant changes regarding CG. MC had positive changes in C-reactive protein level for P and CG, and the P group showed significant and positive differences in osteocalcin level, 5-repetition sit-to-stand and 30-s chair stand, and manual dynamometry tests for MC and CG. MC was the only group with significant changes in lymphocytes, although without intergroup differences.

**Conclusions:** Although both groups had similar caloric consumption in each session, the most important findings of this study were that a P program with high volume can improve metabolic risk parameters like an MC program, in which endurance activities are predominant. Moreover P training provoked larger positive adaptations in bone profile and strength. Meanwhile MC training had a larger influence on inflammatory and immune profiles. Positive improvements were equal in both groups regarding body composition, balance, and mobility. Trainers, physicians, and physiotherapists must take into account the different adaptions for prescribing more efficient training programs in this type of population. CLX bands could provoke very significant health improvements in older people.

## Effectiveness of progressive TheraBand® strength training performed in primary care for patients with chronic low back pain: randomized controlled trial

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**Background:** Low back pain (LBP) is the leading cause of disability. Despite most episodes of LBP being short-lasting, 33% of cases are recurrent during the first year, converting LBP into a chronic condition (CLBP). In primary health-care services, Back School Programs (focused on exercise and education) are the most common CLBP rehabilitation treatments. However, a recent review found that there is no effect supporting this treatment. While physical exercise has shown to be effective in many studies, simple and cost-effective exercise programs that can simultaneously be performed by several patients in primary care at cheap cost are warranted.

**Purpose:** To evaluate the effectiveness of a progressive strength training program in patients with CLBP in primary care services compared with usual care (back school).

**Design:** This study used a randomized controlled trial design.