Contrast Loading: Power Output and Rest Interval Effects on Neuromuscular Performance

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Purpose: This study examined the effect of rest interval after the execution of a jump-squat set with varied external mechanical-power outputs on repeated-jump (RJ) height, mechanical power, and electromyographic (EMG) activity. Methods: Twelve male volleyball players executed 6 RJs before and 1, 3, 5, 7, and 10 min after the execution of 6 repetitions of jump squats with a load: maximized mechanical-power output (Pmax), 70% of Pmax, 130% of Pmax, and control, without extra load. Results: RJ height did not change (P = .44) after the jump squats, mechanical power was higher (P = .02) 5 min after the 130%Pmax protocol, and EMG activity was higher (P = .001) after all exercise protocols compared with control. Irrespective of the time point, however, when the highest RJ set for each individual was analyzed, height, mechanical power, and EMG activity were higher (P = .001–.04) after all loading protocols compared with control, with no differences observed (P = .53–.72) among loads. Conclusions: Rest duration for a contrast-training session should be individually determined regardless of the load and mechanical-power output used to activate the neuromuscular system. The load that maximizes external mechanical-power output compared with a heavier or a lighter load, using the jump-squat exercise, is not more effective for increasing jumping performance afterward.

Keywords: vertical jump, postactivation potentiation, electromyography, jump squat
changes in performance and neuromuscular activation using surface electromyography (EMG). Two studies did not find changes in the EMG activity of the muscles involved and in the performance of the tasks examined. In contrast, Sotiropoulos et al found increased EMG activity of the agonist muscles along with increased vertical-jump performance. Moreover, the study of muscle electrical activity along with performance changes at different time points after the application of a conditioning stimulus using various mechanical-power outputs would give further insight into the neuromuscular processes involved with the application of the contrast-training method.

The effectiveness of a contrast-training session should depend on the conditioning stimulus applied, which can be regulated by the load used, the mechanical-power output, and the rest interval until the execution of the performance task. There are no data, however, concerning the effect of the mechanical-power output of the conditioning stimulus on the subsequent neuromuscular performance. In addition, it is not clear, from the existing studies, if there is an optimal time interval that yields the best performance. Thus, the purpose of this study was to examine the effects of rest-interval duration (1, 3, 5, 7, and 10 min) after the execution of jump-squats with 3 different loads (70%, 100%, and 130% of the load that maximized mechanical-power output [Pmax] in a jump squat) on repeated-jump (RJ) height, mechanical power, and muscle electrical activity looking at both the group mean and the individual responses.

Methods

Subjects

Twelve male volleyball players (age 20.1 ± 3.3 y, height 189.4 ± 4.4 cm, body mass 83.1 ± 4.6 kg, and 1RM at half-squat [knee angle 90°] 188.5 ± 23.5 kg) volunteered to participate in this study after signing an informed-consent form. All subjects had at least 1 year of experience with weight training, including the half-squat exercise. The experimental protocol was approved by the institutional review board committee in accordance to the Helsinki declaration.

Experimental Design

This was a randomized controlled crossover study. Subjects performed 4 different protocols, which included 6 sets of 6 RJs without load and 1 set of 6 jump-squats (knee-joint angle 90°) with a load corresponding to 70% of Pmax (70%Pmax), Pmax, a load corresponding to 130% of Pmax (130%Pmax), and without load, control (C). The 6 sets of the RJs were executed before and 1, 3, 5, 7, and 10 minutes after the loaded jump-squat set. The 4 testing sessions were performed in random order and in a counterbalanced design during a 2-week period. Jump height, average power output, and the EMG activity of the thigh muscles during the concentric phase of each jump were measured, and the average values of the 6 jumps of each set were used in the analysis of the data.

Measurements

Maximum Strength. Four days before the application of the protocols, maximum strength (1RM) in the half-squat exercise (knee angle 90°) was determined as previously described.

Load–Power Relationship. Two days before the application of the training protocols, the load–power relationship at the jump-squat exercise (knee angle 90°) was determined to identify Pmax load. The jump-squat exercise was performed with a free barbell using loads 20%, 35%, 50%, 65%, and 80% of 1RM. The distance of the vertical displacement of the barbell and subject’s body as a function of time during the jump squats was measured with a linear encoder (Ergotest Technology, Langesund, Norway) attached on a belt around the subject’s waist. When the subject moved, a signal was transmitted by the encoder to an A/D converter (Muscle Lab, Model PFMA 3010e, Ergotest AS, Langensund, Norway; sampling frequency 100 Hz) interfaced with a PC. This allowed the calculation of average velocity, force, and power during the concentric phase of the lift (Muscle Lab v 6.07). Three to five trials were executed with each load, until movement velocity did not change more than 5%. The rest interval between trials was 2 minutes. Using the best trial from each load, the load–power curve for each individual was calculated by applying a second-degree-polynomial model, Power = ax² + bx + c, where x was the applied load. The obtained curves were used to estimate the load that maximized mechanical power output using the formula Pmax load = -b/2a.

Afterward, the loads corresponding to 70% and 130% of Pmax load were determined. The 70%Pmax, the Pmax, and the 130%Pmax loads corresponded to loads 35.7% ± 1.7% (range 33.3–39.6%), 52.2% ± 2.0% (range 48.7–56.3%), and 69.3% ± 2.0% (range 66.0–72.9%) of the 1RM, respectively.

RJ Performance. Six consecutive jumps (knee flexion at 90°) with the hands firmly grasping a light metal bar resting on the subject’s shoulders were performed. RJ height was measured using a resistive platform connected to a digital timer (Ergojump, Psion CM, Magica, Rome, Italy) that recorded flight time and calculated jump height. RJ mechanical-power output was measured at the same time with a linear encoder with the procedures described in the section of the load–power-relationship determination.

EMG Activity. Electrical activity of the rectus femoris, vastus lateralis, vastus medius, and biceps femoris was measured in the right thigh with bipolar silver surface electrodes (AE-131, NeuroDyne Medical Co) that were
placed on the muscles according to the instructions of SENIAM. The raw EMG signals were amplified by a gain of 600 with a common-mode rejection ratio 100 dB and filtered through a 6- to 1500-Hz band-pass filter (Bicochip, Grenoble, France). The Muscle Lab unit converted the raw EMG signal to an average root-mean-square (rms) signal via its built-in hardware circuit network. The converted EMG signal was sampled at 100 Hz with the same A/D converter and simultaneously with the signals of the linear encoder or the force sensor. The electrical activity of quadriceps femoris was determined as the average activity of the rectus femoris, vastus lateralis, and vastus medius. The EMG amplitude of the muscles during the concentric phase of the vertical jumps was normalized to the EMG recorded during a maximal isometric knee extension performed before the first set of RJs.

Experimental Procedure

Before each experimental protocol, subjects performed a general warm-up that included 5 minutes of cycling with a 60 W-load, stretching of the lower-limb muscles, and 2 minutes of jumping exercises. Next, surface electrodes were placed on the muscles and a standardized warm-up was executed. A maximum isometric knee extension was performed, and after a 4-minute rest the first set (6 repetitions) of RJs was executed. After a 4-minute rest the jump squats (6 repetitions) with a 70%Pmax, a Pmax, or a 130%Pmax load were executed. At the first, third, fifth, seventh, and tenth minutes of recovery the second, third, fourth, fifth, and sixth sets of RJs were executed. The subjects were instructed and verbally motivated to perform each repetition as explosively as possible. During the control session the subjects followed the same procedure except the specific warm-up, and instead of jump squats they executed 6 RJs without external load.

Statistical Analyses

Two-way ANOVAs with repeated measures on both factors were used to examine the effects of exercise protocol (4 levels: 70%Pmax, Pmax, 130%Pmax, and C), time (6 levels: before the execution of the jump-squat set and at the first, third, fifth, seventh, and tenth min of recovery), and their interaction on RJ height, mechanical power, and EMG activity. The rate of appearance of neuromuscular activation or the recovery from fatigue caused by the conditioning stimulus may be different between subjects. This may mask the activation caused by the conditioning stimulus. Therefore, we examined the individual responses by calculating the differences at the preexercise values between each of the exercise protocols and the control, as well as at the time point that each participant had the greatest difference between each of the exercise protocols and the control. These RJ-height data and the corresponding mechanical-power and EMG-activity data were analyzed using 3 × 2 ANOVAs (exercise protocol [3 levels: 70%Pmax, Pmax, and 130%Pmax] × time [2 levels: before the jump-squat set and the jump-squat set]) with repeated measures on both factors. Significant differences between means were located with the Tukey honestly-significant-difference procedure. The level of significance was set at \( P < .05 \). The effect size (ES) of each treatment was determined using the Cohen \( d \) values, \( d = (\text{posttest mean} – \text{pretest mean})/\text{pooled SD} \).21 ESs >0.2, >0.5, and >0.8 were interpreted as small, moderate, and large, respectively.

Results

Training Data

All protocols differed significantly (\( P = .001 \)) from each other in load-volume product (external load × number of repetitions) for the jump-squat set (407.5 ± 65.8, 595 ± 89.4 and 788.8 ± 105.2 kg with the 70%Pmax, Pmax, and 130%Pmax protocols, respectively). Furthermore, protocols differed significantly (\( P = 001 \)) from each other in the mechanical-power output during the jump-squat set (1554 ± 198, 1820 ± 265, and 1381 ± 237 W with the 70%Pmax, Pmax, and 130%Pmax protocols, respectively).

RJ Height

RJ height did not change across time within any protocol, and no differences were observed among the protocols at any time point (\( P = .44 \); Table 1). However, when the time points of the greatest difference between each experimental session and the control session for each individual were analyzed, RJ height was higher by 11.2% (\( P = .001 \), 95% confidence limits (CL) 6.3–16.1%, ES: 0.99), 9.4% (\( P = .001 \), 95% CL 6.2–12.6%, ES 0.81), and 10.7% (\( P = .001 \), 95% CL 4.6–16.8%, ES 0.96) for the 70%Pmax, the Pmax, and the 130%Pmax protocols, respectively, compared with the control session. Table 2 depicts the minute of recovery after the execution of the jump-squat set with the Pmax, 70% of Pmax, and 130% of Pmax loads where each individual achieved the highest difference in mean RJ height compared with the corresponding time point at the control session. No differences (\( P = .72 \)) were observed among the protocols on the magnitude of RJ-height increase (Figure 1[a]).

RJ Mechanical Power

Mechanical-power output at the fifth minute after the execution of the 130%Pmax protocol was higher compared with Pmax and C protocols. Moreover, power output 7 minutes after the execution of the 70%Pmax protocol was higher (\( P = .02 \)) compared with C (Table 1). When the individual time points with the greatest differences between the experimental sessions and the control session in RJ height were analyzed, the corresponding mechanical-power output was higher by 16.1% (\( P = .001 \), 95% CL 8.9–23.3%, ES 0.81), 16.7% (\( P = .001 \),
Table 1  Repeated-Jump Height, Mechanical Power, and Quadriceps Electromyographic (EMG) Activity Before (Pre) and 1, 3, 5, 7, and 10 Minutes After the Execution of a Jump-Squat Set With the Load That Maximizes Power Output ($P_{\text{max}}$), 70% of $P_{\text{max}}$, 130% of $P_{\text{max}}$, and a Control Session, Mean ± SD

<table>
<thead>
<tr>
<th>Time</th>
<th>Pre</th>
<th>1 min</th>
<th>3 min</th>
<th>5 min</th>
<th>7 min</th>
<th>10 min</th>
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<tbody>
<tr>
<td><strong>Jump height (cm)</strong></td>
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<td></td>
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<td></td>
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<tr>
<td>control</td>
<td>34.9 ± 2.1</td>
<td>34.3 ± 2.5</td>
<td>34.2 ± 2.6</td>
<td>33.9 ± 3.0</td>
<td>33.7 ± 2.9</td>
<td>33.8 ± 4.2</td>
</tr>
<tr>
<td>70%$P_{\text{max}}$</td>
<td>34.8 ± 2.9</td>
<td>34.7 ± 3.9</td>
<td>34.8 ± 3.4</td>
<td>35.0 ± 3.3</td>
<td>34.9 ± 2.8</td>
<td>35.2 ± 3.0</td>
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<tr>
<td>$P_{\text{max}}$</td>
<td>34.7 ± 3.1</td>
<td>34.8 ± 3.6</td>
<td>35.1 ± 3.6</td>
<td>35.1 ± 3.7</td>
<td>35.2 ± 3.4</td>
<td>35.1 ± 3.2</td>
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<tr>
<td>130%$P_{\text{max}}$</td>
<td>34.5 ± 2.4</td>
<td>34.4 ± 3.2</td>
<td>34.8 ± 3.2</td>
<td>35.7 ± 3.1</td>
<td>35.3 ± 3.1</td>
<td>35.3 ± 3.0</td>
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<td><strong>Mechanical power (W)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control</td>
<td>2645 ± 430</td>
<td>2620 ± 499</td>
<td>2589 ± 442</td>
<td>2521 ± 439</td>
<td>2537 ± 407</td>
<td>2629 ± 403</td>
</tr>
<tr>
<td>70%$P_{\text{max}}$</td>
<td>2663 ± 460</td>
<td>2713 ± 424</td>
<td>2713 ± 439</td>
<td>2713 ± 363†</td>
<td>2744 ± 352†</td>
<td>2675 ± 357</td>
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<tr>
<td>$P_{\text{max}}$</td>
<td>2651 ± 344</td>
<td>2682 ± 419</td>
<td>2717 ± 427</td>
<td>2646 ± 368</td>
<td>2652 ± 369</td>
<td>2677 ± 411</td>
</tr>
<tr>
<td>130%$P_{\text{max}}$</td>
<td>2573 ± 412</td>
<td>2683 ± 543</td>
<td>2639 ± 375</td>
<td>2871 ± 440*†‡</td>
<td>2705 ± 381</td>
<td>2720 ± 390</td>
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<tr>
<td><strong>Quadriceps EMG (% iso max)</strong></td>
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<tr>
<td>control</td>
<td>123.4 ± 22.0</td>
<td>120.1 ± 24</td>
<td>116.9 ± 21.8</td>
<td>120.1 ± 26.2</td>
<td>118.4 ± 25.1</td>
<td>119.3 ± 25.1</td>
</tr>
<tr>
<td>70%$P_{\text{max}}$</td>
<td>123.3 ± 20.2</td>
<td>128.5 ± 26.4†</td>
<td>131.9 ± 31.2*†</td>
<td>137.8 ± 34.6*†</td>
<td>142.5 ± 43.4*†</td>
<td>135.0 ± 31.0*†</td>
</tr>
<tr>
<td>$P_{\text{max}}$</td>
<td>124.3 ± 18.9</td>
<td>127.8 ± 22.9</td>
<td>133.1 ± 27.8*†</td>
<td>132.6 ± 27.8*§</td>
<td>133.1 ± 27.9*†</td>
<td>134.5 ± 27.9*†</td>
</tr>
<tr>
<td>130%$P_{\text{max}}$</td>
<td>126.1 ± 18.4</td>
<td>137.1 ± 24.2*†</td>
<td>140.7 ± 27.2*†</td>
<td>143.3 ± 28.4*†</td>
<td>139.9 ± 28.6*†</td>
<td>141.3 ± 22.5*†</td>
</tr>
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</table>

*P < .05 from pre. †P < .05 from corresponding control-session value. ‡P < .05 from corresponding $P_{\text{max}}$. §P < .05 from corresponding 130%$P_{\text{max}}$.

Table 2  Minute of Recovery After the Execution of a Jump-Squat Set With the Load That Maximizes Power Output ($P_{\text{max}}$), 70% of $P_{\text{max}}$, and 130% of $P_{\text{max}}$ Where Each Individual Achieved the Highest Difference in Mean Repeated-Jump Height Compared With the Corresponding Time Point at the Control Session

<table>
<thead>
<tr>
<th>Subject</th>
<th>70%$P_{\text{max}}$</th>
<th>$P_{\text{max}}$</th>
<th>130%$P_{\text{max}}$</th>
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<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>10</td>
<td>10</td>
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<td>2</td>
<td>5</td>
<td>7</td>
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<td>5</td>
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<td>4</td>
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<tr>
<td>6</td>
<td>3</td>
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<td>8</td>
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<td>3</td>
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<tr>
<td>9</td>
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<td>10</td>
<td>10</td>
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<tr>
<td>11</td>
<td>7</td>
<td>5</td>
<td>5</td>
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<tr>
<td>12</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

95% CL 9.2–24.2%, ES 0.94), and 19.5% ($P = .001$, 95% CL 11.7–27.3%, ES 1.1) for the 70%$P_{\text{max}}$, the $P_{\text{max}}$, and the 130%$P_{\text{max}}$ protocols, respectively, compared with the control session. No differences ($P = .53$) were observed among the exercise protocols on the magnitude of mechanical-power increase.

**Quadriceps EMG Activity**

Muscle electrical activity after the execution of the 130%$P_{\text{max}}$ protocol was higher ($P = .001$) than the C protocol throughout the 10 minutes of recovery, the $P_{\text{max}}$ protocol at the first and the fifth minute of recovery, and the 70%$P_{\text{max}}$ protocol at the first and the third minute of recovery. In addition, quadriceps electrical activity at the third, fifth, seventh and tenth minute after the execution of the 70%$P_{\text{max}}$ and $P_{\text{max}}$ protocols was higher ($P = .001$) than the C protocol (Table 1). When the individual time points with the greatest differences between the experimental sessions and the control session in RJ height were analyzed, the relevant electrical activity was higher by 16.9% ($P = .04$, 95% CL 1.7–32.0%, ES 0.61), 11.5% ($P = .03$, 95% CL 2.2–20.4%, ES 0.5), and 17.4% ($P = .003$, 95% CL 8.0–26.9%, ES 0.78) for the 70%$P_{\text{max}}$, the $P_{\text{max}}$, and the 130%$P_{\text{max}}$ protocols, respectively, compared with C. No differences ($P = .64$) were observed among the exercise protocols on the magnitude of quadriceps electrical-activity increase (Figure 1[b]).
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Discussion

The results of the current study show that, when examining group data, a jump-squat set has no acute effect on RJ height, irrespective of rest interval and the mechanical-power output during its execution. When the peak responses of each individual are considered, however, large increases in RJ height and mechanical power and a moderate increase in EMG activity are observed with all power outputs. This highlights the need for an individualized recovery period for each participant during the application of the contrast-training method.

A novel approach in the current study was to compare the potentiating effects of various mechanical-power outputs. We selected 3 different loads, using as a reference point the load that maximized mechanical-power output and not the 1RM load. We hypothesized that to acutely enhance RJ performance, which requires rapid force production, the use of a load that maximized mechanical power output in the jump-squat exercise would be more effective than loads with lower power outputs. The $P_{\text{max}}$
load, however, was not found to be more effective in enhancing RJ performance and muscle electrical activity when group mean data or individual data were analyzed. Therefore, mechanical-power output during a jump-squat exercise, at least in the range of the loads examined in the current study, does not appear to differentiate subsequent RJ performance. It is possible that the higher force production (130%\(P_{\text{max}}\)) or movement velocity (70%\(P_{\text{max}}\)) overcomes the differences in mechanical-power output during the jump squat and affect to the same degree net vertical impulse, which determines jump height during subsequent RJs.\(^{22}\) In addition, the load-volume product was higher with the 130%\(P_{\text{max}}\) load, lower with the \(P_{\text{max}}\), and even lower with the 70%\(P_{\text{max}}\) since the participants executed the same number of repetitions with different loads. Even this parameter had no effect on subsequent RJ performance. Possibly, load–volume may act up to a point, currently undetermined, as a stimulus for further improvements in RJ performance, or the highest velocities of movement achieved with lower loads help overcome the lower load–volume stimulus.

In the current study we measured the average power, without including body mass in the calculations, during the jump-squat exercise, and the \(P_{\text{max}}\) load was at 52.2% \(\pm 2.0\%\) of the 1RM (range 48.7–56.3%). These values are in agreement with previous studies that used similar methods to calculate power and identify the \(P_{\text{max}}\) load.\(^{16,23,24}\) It should be mentioned, though, that other studies used different methodologies to calculate power, which also affected the determination of the external load that maximized mechanical power. The inclusion of body mass in power calculations results in lower \(P_{\text{max}}\) loads (20–37% of 1RM)\(^{16,25}\) that are similar to the loads used in the current study at the 70%\(P_{\text{max}}\) condition. It seems, therefore, that even the inclusion of body mass in power calculations would not change the conclusion drawn from the current study. Other researchers used the peak-power values instead of the average power, and mechanical power in the jump-squat exercise was optimized with zero load or at 0% of 1RM.\(^{26–28}\) It is questionable, however, how this load could be used in a contrast-training session. The concept of contrast training is that a heavier load should be used as a conditioning stimulus before an exercise is executed with a lighter load or without load. Therefore, when the \(P_{\text{max}}\) load is at zero external loads, no contrast training could be designed. In any case, it could be used as a reference point to determine heavier loads as a percentage of maximum power (ie, loads corresponding to 70%, 80%, or 90% of maximum power output). How these procedures affect performance in a contrast-training session requires further study.

Another objective of the current study was to determine if there is an optimal rest duration that would maximize RJ performance after a conditioning stimulus using various loads (a set of 6 jump squats in our study). In a recent meta-analysis, Gouvea et al\(^{29}\) concluded that the optimal rest interval after a conditioning stimulus is 8 to 12 minutes to observe enhanced vertical-jump performance. In the current study, though, no changes in RJ performance were observed (group mean data) even after 7 and 10 minutes of rest, and, therefore, no optimal rest interval was identified. In addition, the load used in the jump-squat exercise did not alter the temporal response of RJ performance. Gilbert and Lees,\(^{13}\) however, found that vertical-jump height peaked 20 minutes after the execution of 5 single repetitions with the 1RM load but 2 minutes after the execution with the \(P_{\text{max}}\) load. Furthermore, Lowery et al\(^{14}\) observed that vertical-jump height was higher only 4 minutes after 4 repetitions with a load 70% of the 1RM but 4 and 8 minutes after 3 repetitions with a load 93% of the 1RM. A limitation of the current study is that all rest durations were examined in the same session and not in separate sessions. We included, however, a control session in our research design to perceive such a learning effect, the fatigue or the potentiating effects of each set of RJs to the next one. Whether the load used to preactivate the neuromuscular system determines the rest interval to increase performance in a subsequent task and the time period that performance can be maintained at an increased level is of critical importance for training and requires further study.

The results of our study support the notion that during contrast training the rest interval between a heavy- and a light-loaded exercise should be individualized. When we analyzed the highest RJ set achieved by each individual, irrespective of the time point this occurred, large increases were found. This is in agreement with the results of other researchers who found that a heavy load was effective for enhancing RJ performance when the recovery period was individualized for each participant.\(^{3,9,11,12}\) Our study takes a step forward and shows that this occurs irrespective of the load and power output used to activate the neuromuscular system. In 10 of the 12 subjects, the highest RJ performance occurred at the same time point for at least 2 of the 3 loads used in the jump squat. Furthermore, in 7 of the 12 subjects the highest RJ performance was observed within a 2-minute period of recovery (eg, third and fifth minute or fifth and seventh minute) with all 3 loads used in the jump-squat exercise (Table 2). Therefore, it appears that the greatest enhancement of performance after a conditioning stimulus is individualized and occurs irrespective of the load used for the conditioning stimulus. The identification of this time point should, theoretically, optimize the effectiveness of contrast training.

A mechanism proposed for the enhancement of performance after a conditioning stimulus is an increase of muscle activation from the neural system. In the current study, muscle electrical activity in the RJs was moderately increased throughout the recovery period after the application of the jump-squat set with 3 different loads. However, the increase in EMG activity was not associated with increased RJ performance. It could be argued that intramuscular factors, that is, increased phosphorylation of regulatory light chains, might be more important than neural factors for the acute enhancement of performance after a conditioning stimulus. In any case, a limitation of the current study could be
considered the lack of electrical-stimulation techniques to obtain the H wave and the M wave to normalize the EMG data. This would provide insights on the contribution of the central nervous system to the enhancement of vertical-jump performance. Future studies should further explore how neural and intramuscular factors are affected by dynamic conditioning stimuli of varying intensities and how they contribute to performance enhancement of subsequent tasks.

Practical Applications and Conclusions

This study shows that a contrast-training session should be designed so that each individual should have his or her own rest period between a conditioning stimulus and a performance task. We were not able to identify a single rest interval after the execution of a jump-squat set with which the performance of all subjects in a set of RJs was enhanced. Therefore, coaches and athletes should try to find the time point that each individual achieves the best RJ height after a jump-squat set when applying a contrast-training session. In addition, the mechanical-power output achieved with different loads in a jump-squat set does not differentiate the potentiation of jump performance or the time period needed for this to occur. Therefore, the individual rest interval could be the same, irrespective of the load used to activate the neuromuscular system of the athlete in a contrast-training session.

References


