EXPLOSIVE TRAINING

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INTRODUCTION

Explosive training is a concept that appeals to a great number of strength and conditioning professionals, athletic trainers, athletes, and non-athletes alike. Performing exercises in an explosive manner has been shown to produce favorable results in terms of athletic and human performance (5,6,10). This would seem logical since explosive power output is the main determinant of performance in activities requiring jumping, throwing, striking, accelerating, and rapidly changing direction. However, this type of exercise is also beneficial to a wide range of individuals, from adolescents to seniors, who merely perform normal everyday activities of daily living.

Training explosively (1,4,5) involves performing the eccentric (lowering) portion of a lift at normal speed while the concentric (lifting) portion is performed as rapidly and forcefully as possible. Explosive training is designed to increase muscular power which is defined as the rate of performing work. In addition, the explosive performance of an exercise appears to increase both the rate of force development and the rate of velocity development or an individuals ability to produce force and velocity in a very short time period (5,9). The adaptations to explosive training continue to be researched, but there are a few widely accepted fundamental principles which underlie the effectiveness of these exercises.

Adaptations

The neural adaptations which occur during explosive training provide the greatest explanation for their effectiveness. Improved motor unit recruitment may account for the most important adaptation encountered during explosive training regimens. Since larger motor units (composed predominantly of Type II muscle fibers, or fast twitch) have higher neural thresholds than do smaller motor units, therefore they are stimulated only under greater intensity training. Explosive training achieves this demand, resulting in recruitment of the larger more powerful motor units. Training explosively may result in adaptations that allow the athlete the ability to recruit larger motor units sooner or more efficiently (6). Another neural adaptation that occurs during explosive training is the rate coding mechanism. Rate coding is defined as the frequency of neural impulses sent to motor neurons (3). In this way, force is increased without the recruitment of additional motor units. Explosive training stimulates an increase in rate coding, which may work in conjunction with motor unit recruitment to provide optimal neural adaptations for increased power production.

Explosive training generally results in very high power outputs, which is why they have a large effect on performance in activities and sports requiring high speed movements. A recent study (13) demonstrated that subjects performing Olympic lifts (explosive training) produced superior

performance outcomes when compared with subjects who did not perform the same lifts. In addition, previous studies (2,14), have found greater improvements in power performance due to explosive training when compared to heavier, slower weight training. Increasing power is certainly an attractive reason for performing explosive exercises as part of a training regimen. Since the absolute weight lifted is less during explosive training, it must be noted here that increased power does not necessarily translate to increased strength. This concept should be considered when designing any training program, as maximum strength has been shown to have a strong correlation to sport performances which rely on speed and power (12).

Program Design

One point of contention when discussing explosive training is movement velocity of the apparatus. It has been demonstrated by some researchers that the actual velocity of training is far less important than the intended velocity (1,15). Their results indicate that as long as one attempts to move as quickly as possible, adaptations related to explosive training will occur regardless of whether the actual training is fast or slow. These studies would appear to conclude that there is no velocity specific effect when performing explosive training.

However, more recent studies have shown velocity specific effects in regards to explosive training (5,7,8). In short, these studies had individuals lift light or heavy loads as quickly as possible. The groups training at heavier weights showed the greatest increases in strength but not in speed, while the groups training with light weights produced the greatest increases in movement velocity. In conclusion, individuals who trained fast got faster while individuals who trained slow remained the same. Based on the previous literature, it is unclear at this time if one needs to train at a high velocity in order to improve performance speed, or if simply attempting to train at a high velocity is sufficient to elicit improved movement speed.

While the ideal training velocity is yet to be determined, the general consensus is that training explosively is beneficial to power athletes. While athletes involved in powerful sprint, short-burst activities have received the greatest attention regarding explosive training, there is also evidence to support improvements in endurance athletes and non-athletes. Due to improved neuromuscular characteristics which result from explosive training, well-trained endurance runners have experienced improved 5k times (10) and cross-country skiers have seen improvements in their performance (11). The benefits of explosive training for seniors and non-athletes may be that neural conduction speed, which declines with age, may be improved through explosive training (4).

Summary

Explosive training may be incorporated into any exercise regimen. Research has shown that participating in these types of exercises improve power, neural control, and movement speed. These adaptations may benefit a wide variety of individuals, not just power athletes. When done in a safe environment and supervised by a certified strength and conditioning professional, the benefits of performing explosive exercises appear axiomatic.

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