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Conditioning Fundamentals

Features

German Volume Training: An Alternative Method of High Volume-Load Training For Stimulating Muscle Growth
Daniel Baker, PhD, CSCS

Triple Extension: The Key to Athletic Power
Greg Frounfelter, DPT, SCS, LAT, CSCS

about this PUBLICATION

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table of CONTENTS

conditioning fundamentals

departments

Kyle Brown, CSCS

Back to the Playground: Jumping Rope for Athletic Conditioning

about the **AUTHOR**

Kyle Brown is a health and fitness expert whose portfolio includes everything from leading workshops for Fortune 500 companies and publishing nutrition articles in top ranked fitness journals, to training celebrity clientele—from pro athletes to CEOs to multiplatinum recording artists. Kyle's unique approach to health and fitness emphasizes nutrition and supplementation as the foundation for optimal wellness. After playing water polo for Indiana University, as well as in London, Kyle became involved in bodybuilding and fitness for sport specific training. Kyle is the creator and Chief Operating Officer for FIT 365—Complete Nutritional Shake (www.fit365.com).

Reminisce for a moment back to your childhood when fitness was not a monitored chore but a multitude of fun games and activities you looked forward to participating in during recess or after school. One of the most time-efficient and beneficial childhood activities for physical fitness was jumping rope. Yet as adults, the only group that notoriously taps into the conditioning benefits of jumping rope is fighters. With a little persistent practice, you too can reap the conditioning benefits of this fun yet challenging and time-efficient workout tool.

Make sure you purchase a quality rope and the appropriate size. The rope needs to be long enough but not too long that it is not challenging. To find a standard starting measurement, stand with one foot in the center of the rope and the handles should reach your underarm. Since jumping rope is a plyometric move, (explosive jumping movement) you must ensure you have a forgiving shock absorbing surface. A few good examples are a basketball court, tennis court, or gym mat.

Since jump roping is considered by many a plyometric activity, there should be a gradual progression in the quantity and intensity of the jumps. Learning how to jump rope parallels in many ways learning how to play a musical instrument. You need to get the skills down before you can play. When you are beginning learning to jump rope, you should focus on frequency rather than duration. For example, if you are at the gym to lift weights followed by cardio, use jump rope for a minute or two as a warm up, post resistance training, and post cardio. Once you've developed baseline proficiency, you can train with a variety of programs. For instance, try one minute rounds followed by 30 seconds rest. Try to work up to 6 – 12 of them. Start by running in place or double leg jumps and work up to double unders (two turns of the rope for every jump), crisscross patterns, single leg jumps, and backwards jumps.

Not only is jumping rope a challenging workout, but once you develop proficiency it can become quite fun. No more need to stress if your hotel doesn't have a gym and it's cold or raining outside. You can take a jump rope with you wherever you travel so it's the one of the most inexpensive portable workout options. If you are a novice, be patient and expect a challenge. Yet the rewards are worth the practice and jumping rope can become and enjoyable, time-efficient conditioning tool. ■

Jason Brumitt, MSPT, SCS, ATC/R, CSCS,*D

Practical Tips to Reduce Rear Leg and Rear Foot Pain in Long Distance Runners

about the **AUTHOR**

Jason Brumitt is an instructor of physical therapy at Pacific University in Hillsboro, Oregon. He is a board certified sports physical therapist, an athletic trainer, and a certified strength and conditioning specialist with distinction. He may be reached at jbrumitt72@hotmail.com.

With spring right around the corner, thousands of professional and recreational runners will be resuming their outdoor training programs. As one's training mileage increases, so does the strain on the runner's body. Unfortunately, many runners fail to either adequately prepare their bodies for the training season or they lack the time to participate in lengthy strength training programs. Failing to prepare the body may contribute to the onset of running related overuse injury.

One region of the body that is prone to overuse injuries in long distance runners is the Achilles tendon (4). The Achilles tendon (also known as the heel cord) attaches three muscles; the gastrocnemius, soleus, and the plantaris to the heel bone (the calcaneus). It is believed that over time the stress of running, especially eccentric loads, can cause achillodynia (fancy name for pain in the Achilles). Once an athlete's Achilles tendon becomes injured; it may take at least 12 weeks of therapy (or maybe longer) to return back to running (1 – 3). In some cases, a runner may require surgical intervention to alleviate the pain. Adding a few simple exercises into one's training program may help to reduce the risk of injuring one's heel cord.

The prescription of stretching and strengthening exercises for patients with Achilles tendon pain have demonstrated positive results, allowing many to return to a normal pain free status (1 – 3). It is reasonable to assume that the inclusion of these exercises into one's regular training program may help to prevent the onset of heel cord pain. Table 1 presents a sample training program for the long distance runners. It is important to remind the readers that if one is experiencing pain, do not try to "self-rehabilitate" with the following program. The injury should be assessed by a sports medicine physician.

Figure 1. Traditional Heel Raise

Traditional Heel Raises (Figure 1)

To perform the heel raise exercise, rise up on your toes as if you are trying to reach as high as you can. At the top of the motion lower yourself to the starting position. In phase II of the program, if you have access to a calf raise machine, perform calf raises with as much weight as you can tolerate.

Sitting Calf Raises (Figure 2)

This exercise is performed exactly like the traditional heel raise, except that it is performed sitting in a chair. This exercise helps to isolate the soleus muscle.

Stretching Exercises (Figures 3 & 4)

The classic runner's stretch with the rear leg extended provides a stretch to the gastrocnemius (figure 3), whereas bending the rear leg at the knee increases the stretch on the soleus (figure 4).

Phase I: Perform these exercises 2 days a week for 3 – 4 weeks.	
Traditional Calf Raises	2 – 3 sets x 15 – 20 repetitions
Sitting Calf Raises	1 – 2 sets x 15 – 20 repetitions
Standing Gastrocnemius Stretch	2 sets x 30 second holds
Standing Soleus Stretch	2 sets x 30 second holds
Phase II: Perform these exercises 2 days a week as part of a comprehensive training program	
Traditional Calf Raises (with a machine)	2 – 3 sets x 15 – 20 repetitions
Eccentric Calf Raises	2 – 3 sets x 15 – 20 repetitions
Lateral Step Down	2 – 3 sets x 15 – 20 repetitions
Standing Gastrocnemius Stretch	2 sets x 30 second holds
Standing Soleus Stretch	2 sets x 30 second holds

Table 1

Calf Training Program for Long Distance Runners

Eccentric Calf Raise (Figure 5)

Stand on a step (a stable surface). Raise both heels off the ground followed by slowly lowering (2 – 3 seconds) the heels below the height of the step. Repeat this sequence for the desired number of repetitions.

Lateral Step Down (Figure 6)

Stand on a step with one leg off the side. Lower the non-weightbearing side toward the floor followed by raising the leg back to the starting position. Maintain weight on the weightbearing leg throughout the entire movement. ■

References

1. Alfredson H, Pietila T, Jonsson P, Lorentzon R. (1998). Heavy-load eccentric calf muscle training for the treatment of chronic achilles tendinosis. *Am J Sports Med.* 26: 360 – 366.

2. Ohberg L, Lorentzon R, Alfredson H. (2002). Eccentric training patients with chronic achilles tendinosis: normalized tendon structure and decreased thickness at follow up. *Br J Sports Med.* 38: 8 – 11.

3. Norregaard J, Larsen CC, Bieler T, Langberg H. (2007). Eccentric exercise in treatment of achilles tendinopathy. *Scand J Med Sci Sports.* 17: 133 – 138.

4. Williams JGP. (1993). Achilles tendon lesions in sport. *Sports Med.* 16:216 – 220.

Figure 2. Sitting Calf Raise

Figure 3. Standing Calf Stretch: Gastrocnemius

Figure 4. Standing Calf Stretch: Soleus

Figure 5. Eccentric Calf Raise

Figure 6. Lateral Step Down

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How do Aerobic and Anaerobic Exercise Compare in the Ability to Alter Cardiac Risk in Overweight Adults?

Recently researchers from Brazil examined the effects of 12 weeks of aerobic or anaerobic exercise on cardiac risk factors with 22 over weight adults with a mean age of 40±8. The exercise sessions for both groups were performed 3 days per week and duration of activity was progressively increased from 20 minutes in the first week to 60 minutes in the fifth week where it stayed for the remainder of the 12 week study. In the aerobic group continuous activity was performed at 10 % under the lactate threshold, while the anaerobic group performed intervals at 20% above the lactate threshold at a work-to-rest ratio of 2:1. Prior to the initiation of the study, and immediately after, the following measures were performed: total body mass, body mass index, waist circumference, hip circumference, and body composition. Additionally, plasma concentrations of glucose, total cholesterol, and triglycerides were assessed. Both exercise interventions resulted in significant reductions in total body mass, waist circumference, body mass index, and plasma glucose levels. Only the aerobic group demonstrated reductions in total cholesterol and hip circumference. Conversely, only the anaerobic group demonstrated significant reductions in the waist to hip ratio. Based upon these results it appears that both aerobic and anaerobic exercise interventions have the potential to favorably alter cardiovascular risk factors. However, the authors of this investigation suggest that both aerobic and anaerobic exercise interventions are warranted to maximize the effectiveness of the exercise regime.

Moreora, MM, De Souza, HP, Schwingel, PA, De Sa, CK, & ZOPPI, CC. Effects of aerobic and anaerobic exercise on cardiac risk variables in overweight adults. *Arq Bras Cardiol* 91:200 – 206, 219 – 226. 2008.

Does Strength Training Result in Improvements in the Cardiovascular Health of Obese Adults?

It is well documented that regular exercise can improve the cardiovascular health of obese individuals. However, there is little data comparing continuous aerobic exercise, high intensity interval training, and strength training effects on cardiovascular health. In order to address this question, researchers from the Norwegian University of Science and Technology examined the effects of various exercise regimes on cardiovascular health factors in obese adults. Forty subjects were randomly divided into one of three interventions: 1) high-intensity aerobic interval training, 2) continuous moderate intensity aerobic training, and 3) maximal strength training. All training interventions were performed three times per week and were undertaken for 12 weeks. The high intensity interval group performed walking/running intervals at 85 – 95% of maximum heart rate. The continuous aerobic training group performed exercise at 60 – 70% of max heart rate. Both of these protocols were isocaloric, in that they were matched to expend the same calories. The strength training consisted of 4 sets of 5 repetitions performed at ~90% of maximum with the leg press. Additionally, the subjects performed abdominal and back exercises with three sets of thirty repetitions with thirty seconds rest between each set. Prior to and immediately after the 12 week training intervention the subjects had their endothelial function, blood lipid profile, aerobic capacity, body composition, and SERCA (sarcoplasmic/endoplasmic reticulum Ca2+ ATPase) activity evaluated. Both strength training and moderate intensity aerobic exercise resulted in a decrease in oxidized LDL (low density lipoproteins) levels. Additionally, only strength training and high intensity interval training resulted in improved Ca2+ transport in the skeletal muscle. Only the strength training resulted in improvements to antioxidant status. All groups demonstrated improvements in endothelial function and improvements in maximal aerobic capacity. However, the high intensity interval group demonstrated the greatest improvements, while the continuous aerobic training group and strength training group demonstrated similar responses. The aerobic training group was the only training intervention to demonstrated body weight reductions and decreases in blood pressure. Taken collectively this data suggests that strength training may serve as a useful training modality for obese individuals who are attempting to improve their cardiovascular health, especially if they are limited in their ability to perform either continuous aerobic training. Additionally, it appears that high intensity interval training also may be a useful training intervention for this population.

Schjerve, IE, Tyldum, GA, Tjonna, AE, Stolen, T, Loennechen, JP, Hansen, HE, Haram, PM, Heinrich, G, Bye, A, Najjar, SM, Smith, GL, Slordahl, SA, Kemi,

OJ, and Wisloff, U. Both aerobic endurance and strength training programmes improve cardiovascular health in obese adults. *Clin Sci (Lond)* 115:283 – 293. 2008.

Strength Training Improves Running Economy in Trained Runners

Running economy can be quantified as the oxygen consumption at a given intensity of exercise. A greater running economy or efficiency of movement can result in a lower energetic cost when running at sub-maximal speeds, thus allowing the runner to move faster over a given distance. One method for improving running economy is the implementation of a strength training regime. However, little data exists comparing different types of strength training regimes on running economy. Sixteen well trained runners were randomly divided into two resistance training interventions, explosive or heavy resistance training. Each training intervention was performed twice per week for the duration of the study. Both groups performed exercise that targeted the lower leg musculature including the leg press, parallel squat, leg extension, leg flexion, and calf raise. The explosive training group performed three sets of 12RM in each exercise, while concentrating on performing the concentric portion of each lift as explosively as possible. The heavy weight training group performed three sets of 6RM in each exercise. In addition to the strength training regime, the subjects performed one high intensity aerobic exercise session (2 x 20 minutes at 60% VO-2max) and three sub-maximal aerobic sessions (45 – 60 minutes at 60 – 70% VO2max). When comparing the two training interventions the heavy weight training was the only intervention to result in improvements in running economy. Additionally, the heavy weight training resulted in a greater increase in 1RM strength and countermovement vertical jump performance when compared to the explosive resistance training group. The most important finding of this investigation is that heavy resistance training can improve running economy. However, this study should be viewed with some caution. The explosive exercise intervention is somewhat misleading in that it does not contain the set and repetition characteristics typically seen in a strength training plan that targets explosive movements. In fact the repetition scheme selected should probably be considered a high volume or an endurance lifting session. In this light the results of this study become even more interesting in that high volume lifting is typically recommended for endurance athletes. However, the results of the current study seem to suggest that lower volume, higher intensity strength training aimed at increasing maximal strength seems to result in greater improvements in running economy.

Guglielmo, L.G., Greco, CC, and Denadai, BS. Effects of strength training on running economy. *Int J Sports Med* 30:27 – 32. 2009. ■

about the AUTHOR

Daniel Baker is a Life Member and President of the Australian Strength & Conditioning Association. His full-time job for the past 14 years is as strength and conditioning coach for the Brisbane Broncos Rugby League team, who participate in Australia's professional National Rugby League (NRL) competition. Before this time he worked with elite athletes from a diverse range of sports such as power-lifting, diving, soccer, and track & field to name a few. He completed his PhD in Sport Science at Edith Cowan University in Perth, Australia, where he is also an Adjunct Lecturer. He can be contacted at www.danbakerstrength.com

German Volume Training: An Alternative Method of High Volume-Load Training For Stimulating Muscle Growth

Daniel Baker, PhD, CSCS

Introduction

Resistance training may be implemented to achieve differing outcomes such as increased control and stability, hypertrophy of muscle, maximal strength, power, or strength-endurance. Common among the desired outcomes for many trainers is the hypertrophy or growth of muscle.

Typical recommendations to develop muscle hypertrophy include a higher training volume (eg. multiple sets of > 10 repetitions) with shorter rest periods (e.g. < 3-minutes) at a moderate intensity (60 – 75% 1RM). Moreover, some research (1) and a large amount of practical training experience also suggests that a higher volume-load (total repetitions x the weight lifted) is more effective in developing muscle hypertrophy as compared to the same volume (sets and reps) and intensity performed with exercises that utilize lighter resistances.

For example, 3 x 10RM bench press with an 80 kg resistance (volume-load = 30 x 80 kg = 2400 kg) is presumed to be more effective in developing muscle growth as compared to the alternative workout of 3 x 10RM chest flies with 15 kg dumbbells (volume-load = 30 x 15 kg x 2 each = 900kg).

Consequently most trainers and athletes wisely tend to choose a predominance of multi-joint, compound exercises when training to increase muscle growth so that a high volume-load can be attained to help stimulate muscle growth. Aligned with these choices is the typical recommendation to choose multiple exercises (e.g. 2 – 4) to "hit the muscle from every angle" or increase the recruitment of different muscle fibers as typically occurs when performing different exercises for the same muscle groups. But there is an alternative method to the common edict of multiple exercises per body part, gleaned apparently, from the training of German olympic-style weightlifters that has been labeled by renowned Canadian strength coach Charles Poliquin as "German Volume Training" (GVT) (3).

The German Volume Training Workout

The GVT has been advocated in the coaching and popular media as an effective training method to help athletes gain lean body mass and muscle size (2, 3). According to Charles Poliquin, the GVT workout was purportedly developed by German weightlifting coach Rolf Fesser to aid lifters who wanted to increase lean body mass during the general preparation phase of training (3). The original GVT workout entailed the performance of a larger number of sets per exercise (ten sets per exercise) than is typically recommended for hypertrophy-oriented training (2). Specifically, the original GVT training prescription was 10 sets of 10 repetitions performed with about 60% 1RM or a 20 RM resistance. As achieving a high volume-load with a resistance of around 60% 1RM is the strategic goal of the work-out, the strategy of reducing the resistance by 2.5 to 5kg after a failed set (where 10 repetitions was not achieved) or when the athlete believes they will fail in the ensuing set, is necessary to maintain set lifting volume at 10 repetitions per set. If athletes attempt to maintain the initial resistance and do fewer repetitions per set due to accumulating

GVT complex #1 (Bench press emphasis)		
Exercise	**Sets x Reps**	**Intensity**
1a. Bench press	10 x 10	Start at 60% 1RM Rest 20 – 30 s
1b. Incline Dumbbell row	10 x 10	20RM Rest 20-30 s
1c. Abdominal curl-up	10 x 10	Bodyweight, take 3-s for each rep Rest till 3-minute mark and repeat complex.
GVT complex #2 (Pull-up emphasis)		
1a. Pull-up	10 x 10	Bodyweight Rest 20 – 30 s
1b. Dumbbell press	10 x 10	20RM Rest 20 – 30 s
1c. Reverse curl-up	10 x 10	Bodyweight, take 3-s for each rep Rest till 3-minute mark and repeat complex.
GVT complex #3 (Squat emphasis)		
1a. Squat	10 x 10	Start at 60% 1RM SQ Rest 20 – 30 s
1b. Leg curl	10 x 10	20RM
No abdominals. Rest till 3-minute mark and repeat complex.		

Table 1

Examples of the modified German Volume Training (GVT) workout. The athletes perform one set of each exercise in the order listed (1a, then 1b,then 1c). A new complex of these exercises is started every 3 minutes until all 10 sets have been completed. Each complex is an entire workout.

fatigue, then typically some athletes are only able to perform 3 – 5 repetitions in the last few sets. This procedure drastically reduces potential volume-load and is not the methodology used for the GVT workout.

The rationale of the GVT workout is to totally deplete the muscle fibers involved in one key multi-joint exercise, rather than disperse the fatigue across alternative muscle fibers as could occur with multiple exercises (3). If the exercise chosen was a key, compound exercise, then fiber recruitment would naturally be high anyway, and it was presumed that a super-compensatory growth response would occur as a result of the high volume-load training stimulus that was concentrated in the recruited fibers (3). Accordingly, exercises such as squats, bench presses, deadlifts or pulls, pull- or chin-ups are dominant exercise choices for the GVT workout.

Coach Poliquin has recommended modifying the original GVT so that an agonist-antagonist pairing of exercises can be used with sets of a key agonist heavy resistance multi-joint exercise alternated with sets of an antagonist secondary movement (3). For example, bench press sets may be alternated with a row exercise or pull-ups with dumbbell shoulder presses. The agonist exercise is the main focus of the workout and each GVT complex can be considered as either an entire workout or at least the dominant portion of a workout.

Typically each complex of the GVT starts every 3-minutes, consequently the entire GVT workout lasts 30-minutes. An abdominal training exercise can also be included in upper body GVT complexes, making this workout extremely time-effective, yet "dense" in volume-load (see Table 1). However, if performing a lower body GVT involving squats, deadlifts or pulls it is probably unwise to fatigue the torso with the inclusion of an abdominal exercise.

Effects of the GVT workout

As yet no long-term studies have been performed to gauge if the GVT workout is more effective in promoting muscle growth or lean body mass gains than the traditional hypertrophy training edict of multiple exercises to attain high load-volume. One study has been performed that looked at the acute effects of an upper body GVT workout upon upper body power output. Not surprisingly, due to the high volume-loads and the fatigue associated with the GVT workout, researchers from Edith Cowan University in Perth, Australia, reported this type of training can exert an immediate negative impact upon power output of 23%, with power still suppressed by 18% even after 7-minutes passive rest (1). As such it must be recommended that the GVT workout not be performed before power training sets or exercises, however this would appear to be an obvious recommendation for any hypertrophy-oriented training dose.

	Set #	1	2	3	4	5	6	7	8	9	10	Mean
G1	Reps	10 (0)	10 (0)	10 (0)	9.9 (0.2)	9.8 (0.9)	9.9 (0.3)	9.6 (1.0)	10 (0)	9.8 (0.5)	9.7 (0.7)	9.9 (0.5)
G2	Reps	10 (0)	10 (0)	10 (0)	9.6 (1.1)	9.6 (1.1)	9.0 (1.3)	8.6 (1.1)	8.8 (1.5)	9.8 (0.5)	9.6 (0.7)	9.5 (1.0)
G1	%1 RM	61.1 (1.6)	61.1 (1.6)	61.1 (1.6)	61.1 (1.6)	60.9 (1.7)	60.6 (2.7)	60.2 (3.4)	59.1 (5.4)	58.9 (5.3)	58.5 (5.3)	60.5 (2.8)
G2	%1 RM	60.8 (1.4)	60.8 (1.4)	60.8 (1.4)	60.8 (1.4)	60.4 (1.5)	59.3 (2.9)	56.6 (4.1)	53.0 (5.4)	51.4 (5.9)	50.4 (7.1)	57.4 (5.7)

Table 2

Average (standard deviation) repetitions and %1RM intensity per set across all 10 sets of the bench press portion of the GVT

G1 = Group 1
Professional athletes in the midst of a traditional hypertrophy program.

G2 = Group 2
Semi-Professional athletes coming off a high intensity, low volume program.

A positive response, apart from muscle growth considerations, may be that the GVT workout can evoke a moderate cardiovascular training effect that were also reported in that study by Daniel Baker and Robert Newton. Figure 1 illustrates the heart rate (HR) responses from two professional rugby league football players performing the bench press focused GVT workout detailed in Table 1. The HR's climb to over 150 and 160 beats per minute (bpm) during the latter stages of the workout with recovery HR's only dropping to 120 bpm (1).

While clearly the cardiovascular effects must impact upon the ability to perform the GVT workout, so does the state of training that the athlete is in. Table 2 compares two groups of athletes' ability to perform the GVT workout, taken from the Baker and Newton study (1). Group 1 were professional athletes in the midst of a hypertrophy-oriented training block entailing the traditional edict of 6 – 7 exercises x 3 sets x 10 reps for their upper body workouts. Group two were semi-professional athletes who had just completed a low volume-load, high-intensity training block (4 – 6 exercises x 3 sets x 2-6 reps). Clearly Group 2 could not cope with the upper body GVT workout as well as is evidenced by their more dramatic drop off in average training intensity per set across the 10 sets of the bench press portion of the workout. Basically, after the first four sets they had to reduce the training resistance continually in an attempt to maintain the performance of 10 repetitions per set. Group 1 maintained their ability to use the initial intensity far better. As such the GVT may be considered an advanced workout or a workout for athletes in a good state of muscle and cardiovascular conditioning.

Conclusion

The GVT workout entails the performance of 10 sets of 10 reps at about 60% 1RM (or 20 RM) in 1 – 2 key exercises. This concentrated training dose appears fairly difficult for some athletes to perform. However, this type of workout is time effective, may be very stimulating or challenging for advanced athletes, and apart from the expected muscle fatigue / super-compensatory growth considerations, there appears to be a moderate cardiovascular training effect. ■

References

1. Baker, D. and Newton, R. The deleterious effects of the high volume-load German Volume Training workout upon upper body power output. (in review)

2. Poliquin, C. Theory and methodology of strength training. *Sports Coach*, July-September. 22 – 27. 1989.

3. Poliquin, C. German volume training. www.bodybuilding.com/fun/luis13.htm accessed 12th September 2006.

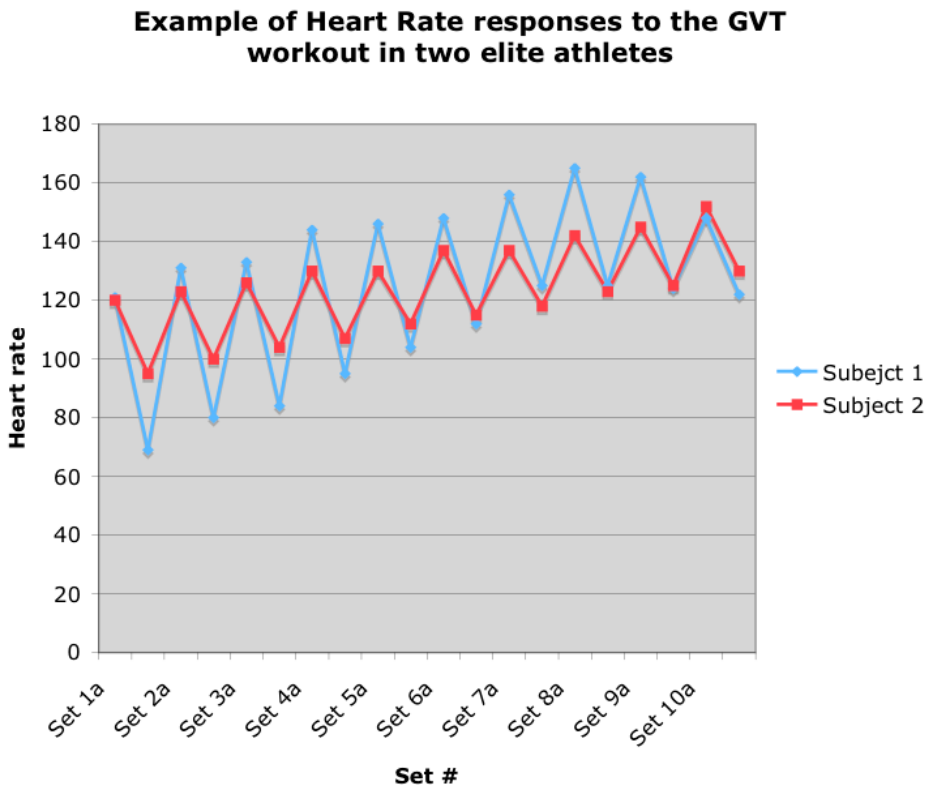

Figure 1

A graphic display of the highest and lowest heart rate responses per 3-minute complex exhibited by two elite athletes to the GVT workout. The mounting HR stress is such that the lowest recovery HR during the latter sets is higher than the working HR response in the early sets.

Triple Extension: The Key to Athletic Power

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about the AUTHOR

Dr. Frounfelter is a staff physical therapist at Baldwin Area Medical Center, Baldwin, WI. He has been a sport medicine professional for over 13 years in various settings and patient demographics. In addition to his clinical duties, he has been active with the NSCA at the state level in Wisconsin since 2001.

Introduction

Whenever one is training in preparation for sport, we are always looking for a secret; an "Edge" if you will. This is something that will give you an advantage over your opponent. After looking at the literature for many years, I have found what it is. It's power. This is the ability to move an object as quickly as possible over a given distance. In athletics this can range from moving your body mass quickly to moving an external load. In general, all other factors being equal, the athlete who can produce greater power, more often than not, wins.

So what does triple extension have to do with power? If you think of athletic power, consider the vertical jump. It is the most often used method to assess lower body power. In its liftoff phase, the body needs to explosively extend at the ankle, knee, and hip. This is how the body can propel itself upward. I know of no other way you can do it and jump any great distance, or in other words demonstrate power. This explosive extension of the knee, hip, and ankle is triple extension, and this is the key to athletic power or explosiveness if you wish to call it that. In my example of the vertical jump, the motion is up and down and with both legs. Triple extension is also performed in all planes and often with one leg as evidenced by agility needs that are seen throughout all athletics.

There are many ways to train triple extension. If you pick any type of athletic training regime, you will see that it is in there in one form or another. Triple extension training is basically explosive motion of the three major lower extremity joints of at least one leg in any direction. One of the basic ways to train triple extension is through the use of weightlifting. Weightlifting is different than weight training. Weightlifting is a sport where two lifts are contested. They are the snatch and the clean and jerk. These lifts involve raising a barbell from the floor to an overhead position. Beside the competitive lifts, there are many associated training movements that can be utilized. Luckily, they all involve the use of triple extension in their proper performance. But why chose weightlifting movements? Well to be honest, if you want to develop maximal explosiveness, these lifts are unparalleled in their ability to develop and train power (1).

Let's take a look at the basics of each of the most two common weightlifting movements used to train for sport; they are the power clean and power snatch.

The Power Clean

Begin by standing with your shins close to the bar on the ground. Your feet should be feet even and about hip-width apart. Squat down to grab the bar with a grip that is a little wider than shoulder-width (Figure 1). Ideally you should use a hook grip where your thumb is laid against the bar and encircled by your first two fingers (It takes some getting used to). Make sure you maintain an arch in your low back. The angle of your torso should be about 45 degrees in relationship to the floor. Keep your chest up and look straight ahead. Your elbows should be held firmly straight.

Use your legs to push your feet through the floor. This will cause you to lift up the bar. Keep your arms and chest tight. Your torso should remain at 45 degrees in relationship to the floor. The bar should be close to your body as you are lifting it. From the side view, your chest should be over the bar and the bar almost dragging up your legs. Once you get the bar to about mid thigh, explode by driving/extending your hips, ankles, and knees (the triple extension motion) as well as shrugging your shoulders to your ears (Figure 2). This snaps the bar into acceleration upward.

All that is left to do is catch the bar. To do this, snap your elbows under and in front of the bar. This lets you catch the bar on your deltoids (Figure 3). It is important to have a loose grip at this point so your wrists can bend and allow you to more easily catch the bar. Your knees also need to


Figure 1. Power clean starting position


Figure 2.Power clean triple extension


Figure 3. Power clean catch


Figure 4. Power snatch high thigh position

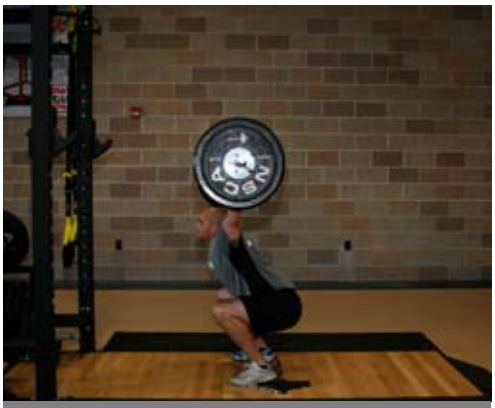
Figure 5. Power snatch catch


Figure 6. Power snatch finish position

bend a little to help you absorb the energy from catching the bar. Carefully lower the bar and perform the lift again. Often rubber plates are used so dropping the weight produces less noise and damage to the training surface.

The Power Snatch

The power snatch is essentially the same concept as the power clean, but the bar is brought overhead in one motion from the floor. Your grip on the bar is wider than with the power clean. There are several ways to measure how wide this grip should be. One is to measure from the tip of one shoulder to the fingertips of the opposite hand with it held outstretched and parallel with the ground.

You really need to make sure to keep the bar close to the body. The triple extension and shoulder shrug are done when the bar is about level with the pubic bone of the pelvis (Figure 4). Snap under the bar and catch it in an overhead position (Figure 5). Complete the lift by extending the hips and knees to a full standing position (Figure 6).

The weightlifting movements are great ways to improve your triple extension power; however, you do need to realize that these lifts can be dangerous if not executed properly and in a safe environment. Someone who is skilled in teaching these lifts should help guide you in how to perform them. With proper coaching, weightlifting movements are no more dangerous than other sporting activities (1).

Conclusion

The ability to move powerfully and explosively is a critical aspect in developing athletic success. Training triple extension ability is a critical factor to this success. Use of weightlifting movements is an important bridge to this. By using weightlifting movements such as the power clean and power snatch, you can begin to unlock explosive power that can help propel you to increased athletic success. ■

References

1. Hendrick A, Wada H. (2008). Weightlifting movements: do the benefits outweigh the risks? *Strength and Conditioning*. 30(2):26 – 34.

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Nutrients for the Common Cold? Will Anything Help Relieve Symptoms?

With cold season well upon us, athletes find themselves looking for a remedy to help battle a cold so they may continue training. There are plenty of cold medications on the pharmacy shelves, but they can leave you feeling groggy. What about commonly used natural therapies, like zinc, vitamin C, or Echinacea? Do these supplements really work? Let's take an updated look at the scientific reviews and see.

Echinacea

Echinacea purpurea is one of the most popular herbal supplements in both the US and Europe. Most people take Echinacea to help recover from a cold and it seems to help. Double-blind, placebo-controlled studies involving more than 1,000 people have found that various forms of Echinacea can reduce cold symptoms and help you get over a cold faster (2, 9). On average, people taking echinacea recovered from a cold 1.4 days faster than groups taking a placebo and also reported less severe symptoms.

The type of Echinacea that works best is the above-ground portion (flowers, stems, leaves) and not the root, of the E. purpurea plant. The best time to take Echinacea is at the first sign of getting a cold and then continue taking it for 7 to 10 days. The typical dosage is powdered extract (usually in pill form) at 300mg, 3 times a day. While it may be tempting to take Echinacea all winter long to help prevent getting a cold, the results from studies attempting to discover whether the daily use can prevent colds have not been promising (5, 6). The good news is that Echinacea does appear to be safe, with no toxic side effects noted (5, 9).

Vitamin C

Many athletes are already taking vitamin C supplements for their antioxidant properties, but does it also help prevent colds? It seems that taking vitamin C to prevent getting a cold is not warranted. However, it may help lessen the symptoms and severity of a cold. In reviewing studies of vitamin C and the common cold between the years of 1996 and 2004, researchers could not draw any significant conclusions that vitamin C supplements helped the normal population ward off a cold, but they did find that it could help shorted the duration and severity of a cold (1). It seems that vitamin C does play some role in respiratory defense mechanisms, so taking a supplement when you first feel a cold coming on may help.

Researchers did find that special populations that engage in severe physical exercise (military recruits, marathon runners) might benefit from regular supplementation, as several studies pointed towards a reduction of the incidence of the common cold by 45 to 91 percent (3). If you are training for an endurance event, for instance, it may be worthwhile to take a daily vitamin C supplement. The Recommended Dietary Allowance (RDA) for vitamin C is 90 mg/day for adult males and 75 mg/day for adult females day (10), but in the studies people were taking between 2 and 4 grams a day while they had a cold.

Vitamin C is safe when taken in moderate amounts, but be aware that too much vitamin C can cause diarrhea and other gastric disturbances. The Upper Tolerable Intake Level for vitamin C in adults is 2 grams/day.

Zinc

Zinc is another popular supplement that people take during a cold and it does seem to work. There are different types of zinc supplements, pills, lozenge, nasal spray, and they work differently. Chronic zinc deficiency is known to weaken the immune system, so taking an oral supplement containing 8 mg a day (the RDA) may be worthwhile if you follow a diet that does not contain much dietary zinc. Oys-

ters are an excellent source of zinc—one oyster contains 8 – 15 mg of zinc. Other types of shellfish, along with poultry and meat are high in zinc, providing 1 mg to 8 mg of zinc per serving. Whole grains, nuts and seeds also provide small amounts of zinc, but the zinc from them is not as readily absorbed by the body. So, a vegetarian may consider taking a zinc supplement, but should not exceed the upper limit of 40mg a day.

Usually zinc is used in lozenges or nasal spray during a cold to help lessen the symptoms. The idea is not to put more zinc into the body, but rather to coat the nasal passage or throat with zinc, as it is believed to directly interfere with the virus. Several studies have shown that zinc lozenges in the form of zinc acetate taken at the start of a cold were shown to reduce the duration and severity of cold symptoms (4, 7, 8). However, be careful when choosing a zinc lozenge as certain ingredients can interfere with the effectiveness of zinc. Certain flavoring agents, such as citric acid and tartaric acid, might prevent zinc from inhibiting viruses. Nasal gels containing zinc can also be found, but are generally not recommended because if the gel is inhaled too deeply severe pain may occur.

Bottom Line: There is enough evidence supporting the use of vitamin C, Echinacea, and zinc lozenges to be taken at the very first sign of a cold and throughout the entire duration of the cold to help lessen the severity of the cold. It seems that none of them can prevent you from getting a cold, but they all may play a role in reducing the duration of the cold. You choose whether you prefer to part with your cold a day or two sooner to return to training or competition. The best way to ward off colds is to take in adequate nutrients through a healthy diet, get enough sleep, and wash your hands often. ■

References

1. Douglas RM, Hemila H, D'Souza R, Chalker EB, Treacy B. Vitamin C for preventing the common cold. Cochrane Database Syst Rev. 4:CD000980, 2004.

2. Goel V, Lovlin R, Barton R, et al. Efficacy of a standardized Echinacea preparation for the treatment of the common cold: a randomized, double-blind, placebo-controlled trial. *J Clin Pharm Ther.* 29:75 – 84, 2004.

3. Hemila H. Vitamin C supplementation and respiratory infections: a systemic review. *Mil Medicine.* 169(11):920 – 5, 2004.

4. McElroy BH, Miller SP. Effectiveness of zinc gluconate glycine lozenges (Cold-Eeze) against the common cold in school-aged subjects: a retrospective chart review. *Am J Ther.* 9(6):472 – 5, 2002.

5. Melchart D, Walther E, Linde K, et al. Echinacea root extracts for the prevention of upper respiratory tract infections: a randomized, double-blind, placebo-controlled trial. *Arch Fam Med.* 7:541 – 545, 1998.

6. O'Neil J, Hughes S, Lourie A, et al. Effects of Echinacea on the frequency of upper respiratory tract symptoms: a randomized, double-blind, placebo-controlled trial. *Ann Allergy Asthma Immunol.* 100:384 – 388, 2008.

7. Prasad AS, Beck FW, Bao B, Snell D, Fitzgerald JT. Duration and severity of symptoms and levels of plasma interleukin-1 receptor antagonist, soluble tumor necrosis factor, and adhesion molecules in patients with common cold treated with zinc acetate. *J Infect Dis.* 197(6):795 – 802, 2008.

8. Prasad AS, Fitzgerald JT, Bao B, Beck FW, Chandrasekar PH. Duration of symptoms and plasma cytokine levels in patients with the common cold treated with zinc acetate. A randomized, double-blind, placebo-controlled trial. *Ann Intern Med.* 133(4):245 – 52, 2000.

9. Shah, SA, Sander S, White CM, Rinaldi M, Coleman CI. Evolution of Echinacea for the prevention and treatment of the common cold: a meta-analysis. *Lancet Infect Dis.* 7(7):473 – 80, 2007.

10. United States Department of Agriculture. Dietary Reference Intakes (DRIs): Recommended Intakes for Individuals, Vitamins. Retrieved January 28, 208 from http://www.iom.edu/Object.File/Master/21/372/0.pdf

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Mental Training Fundamentals

The theme of this issue of the *NSCA's Performance Training Journal* is conditioning fundamentals. These fundamentals relate to the basic or essential elements of physical conditioning; they are important to grasp as they serve as a foundation for a sound conditioning program. In this Mind Games column, as you know, the focus is on the mental aspect of training and competition. In sticking with the theme of this issue, let's "twist" things a bit by applying this notion of fundamentals to mental conditioning. That is, we'll take a look at some basics of mental conditioning (training) that are important to grasp if one is to launch or maintain a mental training program.

Mental skills can be (and need to be) learned and developed.

Having not played any basketball, would you expect to pick up a ball and sink three pointers? Do you think a hurdler could learn and execute correct hurdling technique after a few pointers from a coach? Could you run a fast 10k after just a solid week of training? No, no, and no. They seem like insane questions, right? We all know that learning and developing physical and technical skills takes practice, practice and more practice. Why then do we think differently when it comes to mental skills?

Remember, mental skills are just that, skills. Just like physical and technical skills, they need to be learned and developed if one is to become proficient in their use. Oftentimes, coaches and athletes approach mental skills as something an athlete either has or does not have (i.e., she is confident or she is not confident) or as something one can "pick up" and be proficient at in matter of hours or days. Mental skills are skills that can be and need to be learned and developed.

Mental training is work.

Athletes can learn skills and strategies to help them manage what goes on internally and to manage the external environment. However it is not easy, and because of this some athletes never develop that ability fully. Effective mental training takes time, effort, persistence, consistency, etc. All too often, an athlete will throw in the towel on trying to manage negative self-talk when after one practice session "it just didn't work, I still had doubts". Developing physical and technical skills takes hours, days, weeks, months, even years of work. A lot of time, effort, and persistence go into developing these skills; the same applies to mental skills. Be realistic by acknowledging that whether you are trying to build confidence, maintain daily motivation, enhance concentration, or manage internal dialogue, it is going to take work.

Mental Skills are valuable, period.

Felix, a master's level triathlete, had a training partner who suggested he pick up a book on sport psychology as he was really struggling with his confidence. "No, that won't help me—I'm just a recreational athlete" was his response. Some athletes, like Felix, hold an assumption that mental skills are important only for the elite level or highly competitive athlete. Unfortunately, holding such an assumption precludes one from even attempting to address the mental aspect of practice and performance. There are no qualifiers; mental training can be valuable, period. Mental training can benefit the younger athlete who needs to focus better in practice, the older athlete working to bring more quality to limited training time, the recreational athlete like Felix who lacks confidence, the professional athlete trying to optimize performance, and the exercise participant who wants to enhance enjoyment. Mental training can be of value to all athletes, irrespective of age, experience, ability, and goals.

Recognizing that mental skills are skills that can be learned and developed, that mental skills training takes work, and that mental skills are valuable to performance can set the stage for your mental training success. ■