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New Training Methods

Features

The Grappler: The Reinvention of an Old Training Modality
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about this PUBLICATION

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NSCA's
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Editorial Office

1885 Bob Johnson Drive
Colorado Springs, Colorado 80906
Phone: +1 719-632-6722

Editor

Keith Cinea, MA, CSCS,*D, NSCA-CPT,*D

Sponsorship Information

Richard Irwin
email: rirwin@nsca-lift.org

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Kyle Brown, CSCS

Muay Thai: Cross-Train with Thai Boxing For Fun and Effective Results

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).

One of the hottest new fitness training methods is MMA (Mixed Martial Arts) training. Its benefits are not just for competitors or self defense, but also for cross-training conditioning. A wide variety of men and women from serious athletes to desk jockeys and housewives are embracing MMA training to enhance their fitness level. Considered to be the most brutal of the Martial Arts, Muay Thai (Thai-boxing) includes kicking and punching as well as devastating elbow, knee, and shin strikes (1). Muay Thai is one of the best sports for physical conditioning and a great compliment to your resistance training program for fun and effective results.

Benefits

Athletes and weekend warriors alike can benefit from incorporating Muay Thai conditioning into their workout routine without the dangers of combat. Muay Thai training methods develop incredible speed, agility, cardiovascular endurance, flexibility, strength, and power. Side benefits include: stress relief, increased confidence, self defense skills, and exciting, challenging workouts (2).

Conditioning

Nearly all techniques in Muay Thai involve movement of the entire body. The foundation of these movements involves rotating the hips with each kick, punch, and block. The power behind each striking movement comes from the core—not the lever being used (the arms or legs). This intense focus on the core is a big part of what differentiates Muay Thai from other Martial Arts (2).

Muay Thai-specific training includes using Thai-pads, focus mitts, heavy bag, and sparring. Muay Thai athletes also use traditional combat sport conditioning methods like running, shadowboxing, jumping rope, weight training, bodyweight-resistance exercises, medicine-ball exercises, and abdominal exercises (1).

The foundation of the Thai-boxer's conditioning is the use of Thai-pads. Thai-pads are heavy pads strapped to the arms of a trainer/workout partner that work as targets to absorb the impact of the strikes and allow the athlete to react to the attacks of the pad holder. This method of training is advantageous to the heavy bag in that it allows the fighter to respond to a "live" opponent (3). Lastly, the heavy bag training can be used in addition to the Thai-pads and focus mitts for conditioning and power training. However, if you do not have the benefit of a trainer/workout partner, a Thai heavy bag or Body Opponent Bag (BOB) can be utilized.

A typical Muay Thai training program includes three to five minute rounds alternating between these various training skills – followed by a minute or two-minute rest period (3). If you are looking to include Muay Thai into your fitness routine but do not have the time to make it a separate workout from your resistance training days, you can incorporate it into your resistance training workouts. Table 1 provides a sample 45 to 60 minute Resistance Training/Muay Thai Workout. ■

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2. Mousel T. The Thai Boxing Workout: A Scientific Approach. Accessed May 22, 2008 from http://ezinearticles.com/?The-Thaiboxing-Workout:-A-Scientific-Approach&id=200986, 2006.
3. Rebac Z. (1987) Thai Boxing Dynamite: The Explosive Art of Muay Thai. Boulder, CO: Paladin Press, 1987.

Part 1. Dynamic Warm Up

Complete all 3 movements back to back then repeat

Exercises	Sets	Reps/Time	Rest	Notes
Jump Rope	1	3 minutes moderate intensity	30 seconds	
Walking Lunges w/ twist	2	15 steps each leg	15 to 30 seconds	Superset
Speed Jumping Jacks	2	30 seconds	15 to 30 seconds	Superset

Part 2. Resistance Training

Complete all 3 movements back to back then repeat

Exercises	Sets	Reps/Time	Rest	Notes
Dumbbell Chest Press	2	12 – 15 reps	15 – 30 seconds	Superset
Leg Press	2	12 – 15 reps	15 – 30 seconds	Superset
Seated Lat Rows	2	12 – 15 reps	15 – 30 seconds	Superset

Part 3. Muay Thai Training

Exercises	Sets	Reps/Time	Rest	Notes
Shadow Boxing	2	1 minute slow step by step combinations followed by 3 minutes high intensity	30 seconds	Focus on mechanics
Focus Mitts	2	3 minutes high intensity	1 minute	Punches, cross punches, Uppercuts
Thai Pad Strikes	2	3 minutes high intensity	1 minute	Intertwine kicks, knees, and shins
Heavy Bag (BOB) Strikes	2	3 minutes high intensity	1 minute	Intertwine kicks, punches, knees, and shins
Jump Rope	1	3 minutes high intensity	1 minute	

Table 1
Sample Resistance Training / Muay Thai Workout

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

about the **AUTHOR**

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

Assessing Athletic Balance with the Star Excursion Balance Test

Coaches and sports medicine professionals generally agree that athletes should possess good balance in order to be successful at their sport. The term balance relates to one's ability to maintain his or her center of mass within his or her base of support. For example, a running back demonstrates good dynamic balance by staying upright and continuing forward progress despite being hit by a defensive back.

Balance training is often incorporated into a functional exercise program. Coaches and sports medicine professionals are usually able to observe and correct gross balance dysfunction with specific exercises or drills. However, subtle side-to-side movement asymmetries may exist and ultimately go unnoticed. An athlete with an asymmetry may have an increased risk of experiencing an injury (2).

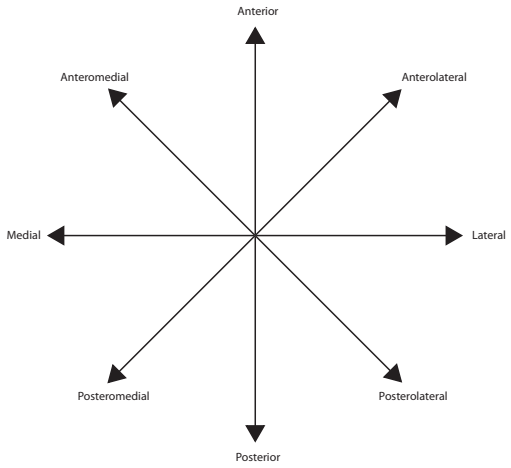

Figure 1. Star Excursion Balance Test

The Star Excursion Balance Test

State-of-the-art computerized balance machines can be used to identify asymmetries in athletic individuals. However, most high schools and colleges are unable to afford the high price tag associated with these machines. There is a low tech, inexpensive option called the Star Excursion Balance Test (SEBT) which can be utilized by coaches and sports medicine professionals to quickly assess an athlete's dynamic balance (1, 2).

The SEBT is proving to be an effective tool in predicting injury risk. Researchers from Rocky Mountain University of Health Professions (Provo, Utah) found that high school basketball players with asymmetrical reach distances (as little as 4 centimeters) had a greater risk of experiencing a lower extremity injury (2).

Constructing and Performing the SEBT

The "star" is easy to construct and requires minimal space (figure 1). First, cut athletic tape into four 6 to 8-foot strips (1). Lay two strips on the floor in the shape of a "+". Place the remaining two strips on the floor intersecting the "+" at 45° angles (forming an "x").

To initiate testing, stand on one leg at the center of the "star" (figure 2). Reach with the opposite leg in a particular direction as far as possible, touching the tape with either the forefoot or toes (figure 3 & 4). A tester should then mark this point for future measurement (1). Return to the starting position after each reaching trial. Repeat a test if unable to maintain balance on the stance leg during the reaching motion or if the reaching leg is used to provide support during the test (1). Tests should be performed in all eight motions to allow for side-to-side comparisons.

Balance and Movement Training

The "star" can also be effectively incorporated into a training or rehabilitation program. If an asymmetry is presented, reaching or movement patterns may be performed in the challenging direction. Figure 5 demonstrates how to perform a functional movement pattern to address a posterior movement dysfunction.

Figure 2. SEBT Starting Position

Figure 3. Reaching with the right leg in the anterolateral direction.

Figure 4. Reaching with the right leg in the posteromedial direction.

Figure 5. Posterior lunge with ipsilateral trunk rotation.

G. Gregory Haff, PhD, CSCS, FNSCA

about the AUTHOR

G. Gregory Haff is an assistant professor in the Division of Exercise Physiology at the Medical School at West Virginia University in Morgantown, WV. He is a member of the National Strength and Conditioning Association's Board of Directors. He is a Fellow of the National Strength and Conditioning Association. Dr. Haff received the National Strength and Conditioning Association's Young Investigator Award in 2001.

Combining Stretching with Vibration Increases Flexibility but Does not Compromise Explosive Strength

Traditionally, the inclusion of passive stretching in a warm-up session has been demonstrated to result in reductions in maximal strength, rate of force development, power generating capacity, and explosive performance. For some athletes, such as gymnasts, this may create a problem as pre-event stretching assists them in achieving specific positions. On method of improving flexibility that has recently received some attention is a combination of passive stretching and vibration. Researchers from East Tennessee State University's Sports Performance Consortium recently examined the effects of combining stretching and vibration on markers of explosive strength with 22 female gymnasts (age 11.3±2.6 yr; body mass 35.3±11.6 kg). Subjects performed several treatments: 1) vibration + stretching, 2) vibration only, and 3) stretching only. The vibration treatment consisted of three sets of four sets of vibration at 10 s vibration bouts of 30 Hz vibration interspersed with five seconds of recovery on four lower body sites. The non-stretching treatments consisted of quiet rest for the duration used for the vibration treatment. The results of the study confirmed that the inclusion of 30 Hz of vibration during a stretching protocol resulted in significantly greater increases in markers of flexibility when compared to stretching alone or vibration alone. Additionally, the inclusion of vibration performed in conjunction with stretching resulted in no strength power performance decrements as indicated by a maintenance of vertical jump displacement. Conversely, the stretching only group demonstrated significant decreases in jumping performance. Therefore these data seem to suggest that if stretching must be done prior to a technical skill that requires range of motion and explosive power production it should be done in conjunction with a 30 hz vibration. Currently this line of research is in its infancy but looks promising as a tool to enhance the athlete's performance by optimizing the effectiveness of the warm-up period.

Kinser, AM, Ramsey, MW, O'Bryant, HS, Ayres, CA, Sands, WA, Stone MH. Vibration and stretching effects on flexibility and explosive strength in young gymnasts. *Med Sci Sports Exerc* 40:133 – 140. 2008.

Speed Training with Body Weight Unloading Improves Energy Cost and Maximal Speed in Healthy Older Women

When looking at independence in older adults it seems that walking speed is very important. In order to effectively improve walking performance many exercise interventions have been employed with varying degrees of success. Several studies have suggested that body weight unloading in conjunction with treadmill work can rehabilitate individuals with various neurological and orthopedic impairments which result in some form of locomotor impairment. The process of unloading body weight appears to allow the individual to walk at a faster speed. Therefore it was hypothesized that a progressive training program which employed over-speed training on a treadmill and body weight unloading would result in a significant increase in maximal walking speed. Eleven older women (age: 79.6±3.7) participated in 12 weeks of training which consisted of three days per week of training. During the first six weeks the subjects performed with 40% body weight unloading at a speed that corresponded to the highest walking speed the subjects could tolerate, or a rating of perceived exertion of 15. Each session consisted of four sets of five minute walking which contained three, one minute high speed intervals and two, one minute intervals performed at a comfortable walking speed. Across the six weeks the speed of movement was progressively increased. During the second half of the study (last six weeks) the amount of body weight unloading was reduced to 10%. After the completion of the study the treatment group demonstrated a 18 – 21% decrease in the energy cost of walking, a 13% increase in maximal walking speed, and a 67% increase in the speed at which they could walk comfortably. Ultimately this type of protocol appears to be very effective at improving walking economy and performance with this population. Therefore, this type of novel training may be very useful when working with clinical populations.

Thomas, EE, De Vito, G, Macaluso, A. Speed training with body weight unloading improves walking energy cost and maximal speed in 75- to 85-year-old healthy women. *J Appl Physiol* 103:1598 – 1603. 2007.

Four Weeks of Intermittent Hypobaric Hypoxia Exposure Coupled with Sea Level Training Does Not Improve Sub-maximal Exercise Economy in Well-Trained Swimmers and Runners

Recently it has been suggested that short periods of hpyobaric hypoxic exposure may serve as a time-efficient variant of the "live high-train low" altitude training paradigm. Ideally the concept centers on the fact that altitude acclimatization stimulates positive physiological adaptations such as accelerated red blood cell production has been suggested to improve submaximal exercise economy. It was determined that limited data exists in the scientific literature about intermittent altitude exposure which is interspersed with sea level normoxia. Therefore the purpose of this study was to explore the effects of intermittent hypobaric hypoxic exposure coupled with sea level training on submaximal exercise economy. Twenty three well trained athletes (10 runners and 13 swimmers) participated in this four week study. The group was randomly assigned to one of two groups: group 1 was assigned to the hypobaric hypoxia treatment (simulated altitude of 4,000 – 5,500 m), and group 2 was assigned to a normoxia treatment (simulated 500 m). Both groups rested in the hypobaric chamber for three hours per day five days per week for four weeks and performed their regular training program. Performance testing was conducted before and after the four week intervention. When examining the data there was no difference between the treatment groups for exercise economy, heart rate response, ventilation or velocity at maximal aerobic power. The results of this study suggested that intermittent hypobaric hypoxia exposure coupled with sea level training did not result in any improvement in exercise economy.

Truijens, MJ, Rodriguez, FA, Townsend, NE, Stray-Gundersen, J, Gore, CJ, Levine, BD. The effect of intermittent hypobaric hypoxic exposure and sea level training on submaximal economy in well-trained swimmers and runners. *J Appl Physiol* 104:328 – 337. 2008.

What should a Soccer Player do to Recovery in Between Two Successive Matches?

Women's soccer has increased in popularity and the number of matches in a year has increased incrementally, as has the distance covered during a match. With this increase in number of matches it is not uncommon to see multiple competitions in close proximity to one another. When this occurs it is essential that the athlete is able to recover from the accumulated neuromuscular fatigue and subsequent biochemical changes between clustered groups of multiple matches. In order to determine the optimal recovery strategy researchers from Sweden and Norway examined the effect of passive and active recovery interventions employed between two successive soccer matches. Seventeen elite women soccer players were randomly assigned to either a passive (n=9) or active (n=8) recovery protocol. Subjects then played two matches in a four day period with only two days between each match. The active recovery group performed a low intensity aerobic (60% Heart Rate Peak) and resistance training (<50% 1-RM) 22 and 46 hours after the first match. Perceived muscle soreness, sprint, jumping, and isokinetic performance were performed prior to, immediately after match one, five hours after match one, recovery session one, recovery session two, and soccer match two. Additionally, blood measures of creatine kinase, blood urea and uric acid were measured before and after each soccer match and prior to each recovery training session. Sprint performance was found to recover by five hours after match one, while isokinetic knee flexion force generating capacity did not return to baseline until 27 hours post match one. Muscle soreness was not returned to baseline until 69 hours after match one. Finally, jumping performance did not return to baseline during any point of the study. When examining the treatment effects it was determined that the type of recovery session employed did not impact the rate of recovery. Ultimately it appears that recovery for neuromuscular and biochemical parameters exhibit very different recovery patterns. While an active recovery protocol did not result in significant alterations in these patterns, specific protocols to aid in recovery still need to be explored to optimize the post training and competition recovery patterns. ■

Andersson, H, Raastad, T, Nilsson, J, Paulsen, G, Garthe, I, Kadi, F. Neuromuscular fatigue and recovery in elite female soccer: effects of active recovery. *Med Sci Sports Exerc* 40:372 – 380. 2008.

The Grappler: The Reinvention of an Old Training Modality

Vilayat "Sean" Del Rossi, CSCS,*D, NSCA-CPT

Figure 1. T-Bar Row

Back in the days of the dark and dingy hole in the wall gyms and training facilities, exercisers and athletes alike became creative in how they would train. Trainers, coaches and lifters would come up with hundreds of ways to utilize the dumbbell and barbell. The original grappler exercise was very simple and rudimentary. A lifter would take a 20 kg (45 lb) barbell, and place one end of it on the floor at a diagonal corner of a wall in the facility. The lifter would then use the wall as an anchor/stopper and then grab the other end of the bar and perform t-bar rows and shoulder presses. Because the barbell was not in a fixed position, the surface it was pushing up against would get damaged. Essentially a hole in the wall would be produced and the lifters would then move on to destroy another wall.

In today's training setting, what is old is new again, with a twist. This article will cover an old training method that has been reintroduced with a twist, literally. The grappler, now has been reintroduced to perform multi-planar exercises utilizing an Olympic bar and a new home plate device that the 20 kg bar can insert into a sleeve to improve stability and versatility.

The grappler is a versatile training tool, all that is needed to put it into practice is a little creativity and to focus on the basic athletic ground based movements. The purpose of this article is to assist an individual in how to utilize the grappler modality in progressing from basic exercises to more advanced exercises and some program design complexes. Please remember that the exercises derived from the grappler are for an experienced lifter.

Versatility of the Grappler

There are three major points of benefits or versatility that the grappler has:

- Multi-planar movement—allowing movement on all three of the planes.
- Ground based in all the three foot positions—all ground based movements derive from three foot

about the AUTHOR

Vilayat 'Sean' Del Rossi is a senior program manager with Club One, focusing on worksite health and fitness programs for corporate partners and universities. He also manages the Bronco Fitness Center, and is a lecturer for the Kinesiology and Health Promotions Department at Cal Poly-Pomona University. He has an extensive background in sports performance, including being a Strength and Conditioning Coach at Florida State University and with the Department of the Navy. Contact him at sdrossi@asi.csupomona.edu.

Photo Credit: Photos by Macrino Diaz, NSCA-CPT

Figure 2. Shoulder Press

Figure 3. Squat (Start Position)

Figure 4. Squat (Finish Position)

positions, parallel stance, staggered stance, and one leg. One leg stance will not be an example in this article.

- Push/Pull—these movements allow the lifter to train opposing muscle groups, sometimes in the same exercise complex.

Most barbell, dumbbell, and even band exercises allow this as well. But the grappler is a little different because the distal end of the bar is fixed and allows any type of movement from its ground based pivot point.

Exercise Progressions

The following will cover some of the basic beginning, intermediate, and advanced exercises. The exercises will progress with complexity, speed of movement, and changes in foot position. There will be a few examples of exercises in each category. It is not an exhaustive list, but it can get a person started on how to progress exercises. All movements should be performed with a 45 lb or 35 lb bar before progressing with weight. Use of Olympic bumper plates is recommended to standardize starting positions as well as preparation for a missed lift.

Beginning Exercises

These movements are basic weight training exercises, performed using a new modality. Start here to accustom yourself to the ellipse movement that the grappler provides.

T-Bar Row

Straddle the bar near the far end, maintaining a straight back, with the knees flexed. Reach over and grab the bar and pull it towards your midsection. The torso should be parallel to the bar (Figure 1).

Shoulder Press

In an athletic stance, the bar is resting at shoulder level. With a firm grip, push the bar towards the ceiling, primarily on the sagittal plane (Figure 2).

Squat

The starting position of this exercise is actually where we define the parallel or down position of the normal squat. While in the down position, grab the bar at hip level and proceed to lift the bar while keeping the arms completely extended until the body is in an upright position (Figures 3 and 4).

Intermediate Exercises

These movements are a bit more challenging from the previous beginning exercises because they involve more joint actions.

Deadlift

From a parallel stance in front of the bar, maintaining a straight back with the knees flexed, pick the bar up to the starting position. From here, flex the hips as the plate is lowered to the floor. Raise the bar back up to the starting position to begin the next repetition (Figures 5 and 6).

Squat Press

Begin in a parallel squat stance with the hips and knees flexed in the parallel or bottom position of the squat. The arms should be holding the bar at shoulder level. From this position extend the hips and knees, coming up in the concentric phase of the squat. At the top of the squat the arms will press the bar fully overhead (Figures 7 and 8).

Half Rainbow

Begin in a staggered foot position in relationship to the bar. The bar should be sitting just above the trailing leg. An alternating hand grip is used with this exercise, and corresponds with the foot position. The back hand should have a supinated grip and the front hand a pronated grip. As you extend out of the squat position, the bar will ascend in an ellipse to the opposite shoulder. During the whole movement the arms should be fully extended (Figures 9 and 10).

Advanced Exercises

These movements have progressed to the most complex or challenging exercises. They have a high degree of difficulty because they incorporate the explosive nature of the clean and jerk, as well as incorporating a release movement in some instances, such as with the clean and press. Please be careful when proceeding to these exercises.

Figure 5. Deadlift (Start Position)

Figure 6. Deadlift (End Position)

Figure 7. Squat Press (Start Position)

Power Clean and Press

Begin in the starting position for a clean. The feet should be parallel to each other and perpendicular to the end of the bar. The hands should grip the bar in a neutral closed double grip. Proceed through the first pull and transition/scoop still gripping bar. As you progress through the second pull, release your grip and catch the bar in the catch position (pronating the hands). Finally perform the press and move the bar overhead to complete the lift (Figures 11, 12, and 13).

One-Arm Power Clean and Jerk

Begin in the starting position for a clean, close to full squat. The feet should be parallel to each other and diagonal to the end of bar. The end of bar should be half the distance between both legs. Perform the first pull and transition in the same foot position. When progressing through to the second pull, square the foot position in relationship to the bar to prepare for the catch. Once the bar has reached the catch position, prepare for the split jerk. When performing the split jerk, the foot that goes forward is the side of the body that the bar is on (Figures 14, 15, and 16).

Program Design

Traditional program design for the above exercises should be based on your goals. For muscular endurance training, the load should be ≤67 % of 1RM with a goal of ≥12 repetitions. For hypertrophy training, the load should be 67 – 85 % of 1RM with a goal of 6 – 12 repetitions. Finally for muscular strength or power training, the load should be ≥85% of 1RM with a goal of ≤6 repetitions (1).

That would be the traditional way to set-up the exercises and integrate them into a resistance training program. Since the grappler modality is so versatile, you can do several exercises one after the other utilizing the same load and never have to move to another piece of equipment. The following is an example of an Advanced Metabolic Circuit (AMC). An AMC would be good for cardiovascular orientated athletes such as runners, as well as the intermittent cardiovascular athletes such as basketball and soccer players. Below is a list of exercises in a modified Tabata protocol (2). The load should be approximately 50% of 1RM with a work to rest ratio of 20 seconds to 10 seconds between each exercise. The AMC is designed to be a four minute circuit. The exercises should be performed in circuit fashion, one after the other with a three to four minute rest period in between circuits. The AMC will be repeated four to six times, depending on conditioning level. There are no defined repetition ranges, just timed intervals. With that in mind, there is extra attention on completing repetitions in proper form and speed. The exercises should be performed in the following order:

Figure 8. Squat Press (End Position)

Figure 9. Half Rainbow (Start Poition.)

Figure 10. Half Ranbow (End Position)

Figure 11. Power Clean & Press (Start Position)

- Half Rainbow—Left to Right
- Half Rainbow—Right to Left
- Squat
- One Arm Power Clean and Jerk—Left Arm
- One Arm Power Clean and Jerk—Right Arm
- Deadlift
- Power Clean and Press
- Squat Press

Conclusion

In conclusion, the grappler is only one training modality, but it is an extremely versatile tool. This article has given you some ideas on how to apply the modality with some exercise progressions as well as sample program design. Hopefully it will add to your tool box of acceptable modalities and exercises. Do not forget to consult with a qualified professional (NSCA-CPT or CSCS) before trying to incorporate the exercises and program design shown in this article. ■

Figure 12. Power Clean & Press (Catch Position)

Figure 13. Power Clean & Press (Press Position)

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Figure 14. One Arm Power Clean & Jerk (Start Position)

Figure 15. One Arm Power Clean & Jerk (Catch Position)

Figure 16. One Arm Power Clean & Jerk (Finish Position)

about the AUTHOR

Mr. Mark Roozen is Owner and President of Performance Edge Training Systems in Texas and works with Day of Champions Sports Camps. Mark holds his Masters Degree in Education, is a Certified Strength and Conditioning Specialist with Distinction and has served on a number of committees through the NSCA. He is also the past NSCA Texas State Director. Mark is a Club Coach with the USAW and teaches classes at Tarleton State University, part of the Texas A&M System, in Stephenville, TX. Mark has presented at the local, state, national and international level and has written numerous articles for publication.

Sandbag Training

Mark Roozen, MEd, CSCS,*D

Sandbag training certainly is nothing new, wrestlers and other athletes have been training with heavy, awkward objects such as sandbags for thousands of years. Today's athletes can benefit from the unique training techniques which can be done with sandbags. Most athletes need power, quickness, agility along with a number of other physical components to assist them in performing at the highest level. Using sandbags in a training program can help develop power, quickness, agility, and conditioning components. This can all be accomplished with a piece of equipment that can simulate contact, throws, and be utilized in ways that solid resistance equipment could not be used. Sandbags provide an excellent way to begin a routine as a warm up, as part of the power development section, or even at the end of a workout to cool down.

To be an elite athlete, requirements include strength, power, and also endurance (aerobic and/or anaerobic). Sandbag lifting challenges all these elements and more. Common with kettlebells in their ability to challenge a number of training components at once, sandbag training will allow for a wide variety of movements while also forcing the lifter to maneuver and adjust to the awkward shifting and adjusting of the weight. What is different from kettlebells is that as the exercises are performed, with the shifting of the sand in the bag, each repetition becomes slightly different from the repetition before. This shifting and adjusting causes the body to "re-adjust" with each movement, so it uses more muscles and expends more energy then during a traditional type of workout with kettlebells or dumbbells.

Another benefit of sandbag training is increasing grip strength through each exercised being used. Every exercise, even those for the lower body, will require gripping the sandbag. Many exercises incorporate catching, gripping, and then releasing the sandbag which will help to develop not only static grip strength but dynamic strength as well.

Figure 1. Single arm front raise with sandbag

Photo courtesy of Power Systems, Inc.

	Sets	Reps	Intensity (%1RM)	Rest
Endurance	2 – 3	> 12	< 70	< 30 sec.
Strength	2 – 6	< 6	> 85	2 – 5 minutes
Power	3 – 5	6 – 12	75 – 85	2 – 5 minutes

Table 1
Training Variables for Different Program Goals

Making Sandbag Training Part Of Your Program

The problem that comes into any program with new training methods seems to be "where and how do I implement this into my program?" When looking over program design, a key element is to look at what you are training for and what workout and exercise can give you the best bang for your buck. With sandbag training, many times it can be implemented in an existing program. An example would be if the "Single Arm Front Raise" exercise (see Figure 1) is included in your workout program, you can still do the same exercise but use a sandbag as the resistance instead of a dumbbell. By incorporating the sandbag into the same exercise, it changes the exercise and challenges the body in a different way.

Sandbags can replace other forms of traditional weights (barbell or dumbbell) during lifts, such as squats, lunges, presses, rows, etc. The change of implement will bring about new neural stimuli that often lead to new gains. Training with activating neuromuscular components improves the efficiency of neural actions and muscular performance (2).

Depending on the goal of training, you can adapt the load, intensity, density and rest to meet the need of what you are training for. Table 1 gives some examples of sets, reps and relative weight used. Keep in mind this is a relative value, meaning that the weight used should be relative to the strength level of the athlete.

Another option is to use sandbags as a form of active recovery. The term recovery describes the process by which energy systems regain their fuel supply and remove metabolic waste (1). With the variety of weights available with sandbag training, the load can easily be changed to enhance a motor skill and keep mobility without excessively taxing the body.

With so many options of incorporating sandbag training into a program, this is a simple and easy method and tool to implement. It is not the newest exercise to hit the market, but taking an old exercise and putting it into your program can challenge a workout and exercise program in new ways and allow the new progress to be seen in your program. ■

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Debra Wein, MS, RD, LDN, CSSD, NSCA-CPT,*D and Georgiana Mitrus, MS

Post-Exercise Nutrition: Recommendations for Resistance and Endurance Training

about the AUTHOR

Debra Wein, MS, RD, LDN, CSSD, NSCA-CPT is a faculty member at the University of Massachusetts Boston and adjunct lecturer at Simmons College. Debra is the President and Co-founder of Sensible Nutrition, Inc. (www.sensiblenutrition.com), a consulting firm established in 1994 that provides nutrition services to athletes, individuals, universities, corporate wellness programs and nonprofit groups. Debra is certified as a Specialist in Sports Dietetics (CSSD) through The American Dietetic Association. Her sport nutrition handouts and free weekly email newsletter are available online at www.sensiblenutrition.com.

Georgiana Mitrus has a Master's degree in Nutritional Sciences from the University of Arizona and has recently completed a dietetic internship at Simmons College in Boston, Massachusetts.

Too often athletes are bombarded with magazine articles, advertisements and sales-pitches, with confusing and unscientific claims about optimizing post-training nutrition. The dangers of such claims are two-fold: not only can such recommendations lack scientific evidence, but too often they also fail to distinguish between endurance and resistance or strength training. This article will provide a summary of studies on post-exercise nutrition, together with research-drawn recommendations.

Resistance Training

During strength or resistance training, muscles are contracted against a heavy load which acutely reduces their glycogen stores (7). Subsequently, an adaptive response occurs, resulting in muscle hypertrophy, or an increase in muscle strength and mass. However, the desired muscle hypertrophy can only occur when the body is synthesizing muscle protein at a higher rate than it is breaking it down (4). Both muscle synthesis and breakdown are stimulated by resistance training, but if food is not ingested, catabolism occurs (4).

Consuming carbohydrates following exercise increases plasma insulin levels (3), thereby reducing the breakdown of protein, as measured by decreases in urinary 3-methylhistidine and urea excretion (8). Although it does not directly affect muscle protein synthesis, ingesting carbohydrates following resistance training is necessary to replenish glycogen stores and reduce protein breakdown (4). The highest rate of muscle glycogen storage occurs within the first hour after strength training, and carbohydrate feeding immediately after exercise has been shown to promote higher rates of glycogen storage during the first two hours of recovery. If carbohydrates are not immediately consumed post-training, very little glycogen is restored until feeding occurs (1, 2). The current general recommendations for carbohydrate intake immediately following exercise (0 – 4 hours) are 1.0 – 1.2 g/kg, to be consumed at frequent intervals (1).

Muscle protein synthesis is achieved by ingesting protein/amino acids post-exercise, and thus attaining a positive net protein balance. Ingesting large amount of protein (30 – 40 g amino acids) post-exercise effectively stimulates muscle protein synthesis (11), but even 6 g of protein post-exercise results in positive nitrogen balance for two hours, after which the balance becomes negative unless protein feeding is resumed (4). To maximize the muscle adaptive response and increase the rate of muscle synthesis, it is recommended to consume ~15 grams of protein following strength training (4).

Endurance Training

Research on endurance training, involving prolonged or high-intensity aerobic exercise, also shows the benefits of post-exercise carbohydrate and protein ingestion. Consuming a high (~0.8 g/kg per post-training hour) versus a low (~0.4 g/kg per post-training hour) carbohydrate meal after an intense mountain trail race has been shown to reduce muscle damage as measured by interleukin-6 (6), and a combined carbohydrate-protein drink post-training reduced plasma protein kinase levels in cross-country runners (5). As with resistance training, there is an optimal window following exercise in which the body is most responsive to nutrients, as there is an increase in blood flow to the exercised muscle, enhanced insulin sensitivity, amino-acid uptake, and protein synthesis (9).

The specific carbohydrate intake recommendations during recovery are 1.2 g/kg in the immediate four hours post-exercise, and, depending on the duration of exercise, 5 – 7 g/kg/day after moderate duration/low-intensity training, 7 – 12 g/kg/day after moderate to heavy endurance exercise, and between 10 and 12 g/kg/day post extreme exercise programs (~4 – 6 hours/day) (1).

Consuming protein post-endurance exercise has a similar effect as in resistance training. Cyclists on high (0.7 g/kg per post-training hour for 4 hours) compared to low protein (0.1 g/kg) diets post-exercise had reduced creatine kinase, and also positive overnight nitrogen

Table 1
Recovery Snack Ideas

Snack	Protein (g)	Fat (g)	Carbohydrates (g)
Peanut Butter & Jelly Sandwich on Whole Wheat	12	11	36
Tuna Sandwich on Wheat	25	23	24
Chicken Sandwich on White with Lowfat Cheese	22	7	72
Large Vanilla Milkshake	12	13	86
Yogurt Smoothie, 8 oz	6	3	43
Lowfat Cottage Cheese with Pineapple, 1 cup	20	2	14
Lowfat Chocolate Milk, 12 oz	10	3	33
Lowfat Yogurt, 8 oz	8	4	20

balance and increased performance 60 hours later (10). Ingesting ~34 g protein within 4 hours post-exercise also reduced tiredness and leg-soreness sensations in cyclists exercising for 2.5 hours (9).

Replenishing nutrient stores post-exercise to maximize performance and enhance recovery does not necessarily mean consuming supplements. Table 1 shows several post-training snack ideas to consume individually or combined, depending on your specific requirements. Pair up several of the snack ideas according to your weight and type of training—at a minimum of 15 grams of protein and 1.2 g/kg carbohydrates immediately following exercise. ■

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Suzie Tuffey Riewald, PhD, NSCA-CPT,*D

Tried and True Strategies to Ensure Quality Training

about the **AUTHOR**

Suzie Tuffey Riewald received her degrees in Sport Psychology/ Exercise Science from the University of North Carolina —Greensboro. She has worked for USA Swimming as the Sport Psychology and Sport Science Director, and most recently as the Associate Director of Coaching with the USOC where she worked with various sport national governing bodies (NGBs) to develop and enhance coaching education and training. Suzie currently works as a sport psychology consultant to several NGBs.

Thanks to those of you who responded to the "call to action" in the last Mind Games column. Your colleagues are sure to benefit from your experiences.

Those of you who missed the Mind Games column in the last issue of the PTJ, let me take a minute and bring up to speed. The article overviewed the notion of quality training. It is a relatively easy concept to understand but one that is often difficult to implement on a daily basis. You can probably identify in yourself, and others, when you have "quality training days" versus those days where you just go through the motions. Quality training, a characteristic of elite athletes, is about consistently making training a physical, technical and mental endeavor by bringing intensity, effort, purposefulness into the practice arena. Training with quality enhances a given workout as well as subsequent competitive performances. So, it is well worth our efforts to develop strategies to facilitate purposeful, quality practice.

In the last article, some general mental skills and strategies that can be used to enhance quality training were discussed. The strategies identified included setting goals, keeping competition goals at the forefront, putting aside "baggage of the day," managing self-talk and consistently striving for perfection. And, I called on you to share with me some strategies you have found to be helpful. Many times, if something works for you, it will also work for someone else, so we'll use this column to share techniques and methods for ensuring quality training among the readers.

Following are specific "tried and true" strategies to facilitate quality training provided by *PTJ* readers: (in the interest of space, some responses have been paraphrased).

"We use training cues to keep them focused on correct mechanics such as 'hip first, left side block, pop at release'. We use only a few at a time otherwise the athletes are thinking too much and become too mechanical in their movement. In the weight room, we find one or two things the athlete needs to work on and repeat it to them often." Use of training cues helps keep the athlete mentally engaged in the performance process and helps them focus on the critical aspects of correct technique.

"Athletes have a tendency to get a bit lazy during drill work because of its repetitious nature. So, prior to each drill, we have the athletes take a few seconds to visualize the drill where they see and feel correct execution. We have found they develop their skills quicker when we can get them really thinking about what they are doing".

"Every day, I write my goal into a notebook before I start training. I train on my own a lot and there are days I'm not too excited about practice and don't have anyone to get me pumped. I know my bigger goals so I don't write those down. But, every day, I write down one thing I need to work on to improve my performance. It is amazing how much this has helped my motivation in practice."

One person had a unique strategy in that he identified packing proper nutrition for pre-, during and post-session as bringing quality to his training. Good nutrition helps training performance (mind and body).

"Take time prior to a training session to get in the right frame of mind rather than just jumping into the session. I listen to certain music to get me focused and psyched. It is usually the same music but sometimes I change things up depending on how I feel."

"I know my workout for the next day so before I go to bed I go through the tough parts of the workout in my head. I do the same mental rehearsal sometime before the training session—it seems to get me ready for the challenge."

Lastly, someone noted that he usually trains at a fairly high level on a daily basis. However, on days where he finds he "isn't into" what he is doing, he takes a break —literally. He stops his training session, gets away from the training environment for a few minutes and re-adjusts mentally. He said he does so by identifying one thing to focus on for the remainder of the workout.

What great ideas. Now, not all of these strategies may make sense to each of you because of your unique situation or the unique challenges you face. However, use these ideas as a starting point to developing an "arsenal" of mental strategies to bring quality to your training. ■