



# TSAC REPORT



## Physical Training Strategies to Improve Soldier Load Carriage

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### Background

It is crucial for the military to implement physical training strategies to enhance the warfighter's capacity to haul heavy loads in combat operations and prevent injuries that occur from carrying these loads. It has been recently reported that an increasing amount of soldiers are being sidelined with muscle and bone injuries caused by carrying combat loads weighing as much as 130 pounds (1). The number of soldiers being injured may increase as the operation tempo increases in Afghanistan where terrain, elevation and road conditions are more challenging than in Iraq.

Factors contributing to these injuries may be from poor aerobic and anaerobic conditioning in soldiers prior to basic training. An injury may originate from basic combat training because a soldier wasn't prepared for the demands of running and jumping; hence the injury will deteriorate as a soldier carries heavy loads in combat operations. The number of non-deployable soldiers has increased since 2006. Statistics from 2009 show that overall, the Army has 20,000 non-deployable soldiers—half of which are due to injuries caused by hauling heavy loads (1). Essentially, if a soldier or marine isn't able to handle these combat loads, they may not be able to track down a fast-moving enemy.

Thus, jeopardizing their mission and endangering their life or the lives of their fellow comrades. Therefore, it is very important for a soldier or marine to be physically prepared to handle the loads that are commonly carried out during combat operations.

It is important for commanders to understand the optimum way to train soldiers in order to prepare them for the rigors of operating in austere environments while hauling significant loads. In order to understand and implement an optimum training strategy, it is important to understand the physical requirements of road marching and the energy systems that may be utilized during a road march.

### Metabolic Aspects of Load Carriage

As highlighted above, load carriage constitutes an integral component of soldier mobility that incurs substantial physical costs. Loads carried and moved by a soldier can exceed 100 pounds and several miles, respectively. The ability to meet the physical requirements imposed by load carriage requires contributions from energy producing pathways, or systems, within the body. The fuel necessary for normal physiological functioning as well as physical activity comes from three major energy produc-

ing systems termed the phosphagen, glycolytic, and oxidative pathways. These pathways consist of a series of internal biochemical events that breakdown ingested foods (carbohydrates, fats, proteins) to yield high-energy molecules such as adenosine triphosphate (ATP). Severing the phosphate bonds in ATP produces the energy that drives normal physiological function and performance of physical activity.

The contribution of a given energy system depends on both the intensity and duration of the task being performed. For instance, a short sprint performed at maximal intensity for less than 10 seconds relies primarily on the phosphagen system. At the other end of the spectrum, low-intensity activities of extended duration, such as a marathon, will rely heavily on oxidative mechanisms of energy production. Activities performed at near maximal intensity for durations between 60 and 90 seconds such as a 400-meter sprint will activate the glycolytic pathway. It should be noted, however, that although a given system may predominate during a task, no singular pathway contributes exclusively to that activity. In other words, the phosphagen system will still provide contributions to energy availability at the onset of aerobic exercise. However, oxidative mechanisms predominate.

Several studies have specifically documented the impact of load carriage on physiological and metabolic variables. Quesada et al. (7) investigated heart rate (HR) and oxygen consumption (VO<sub>2</sub>) following a simulated road march with loads of 0, 30, and 50% of body mass. They found that these physiological parameters increased linearly with body mass, indicating a greater degree of stress on the body associated with marching

with heavier loads. Similarly, Beekley et al. (3) evaluated HR, VO<sub>2</sub>, respiratory exchange ratio (RER); [indicative of fuel utilization; e.g., carbohydrates vs. fat as primary energy source], rating of perceived exertion, and ventilation (VE) following a 30-minute road march at 6 km/h with loads of 30, 50, and 70% of lean body mass (LBM).

VO<sub>2</sub>, RER, and VE increased during the load carriage task performed with a greater percentage of LBM. More specifically, marching with a load of 50% LBM significantly increased VO<sub>2</sub>, HR, and VE compared to 30% LBM. Furthermore, marching with a load of 70% LBM produced significantly greater VO<sub>2</sub>, HR, and VE compared to the other two loading conditions. This investigation illustrates a linear relationship between the physiological variables and load carried, similar to the findings reported by Quesada et al. (7). Collectively, these studies demonstrate the increased metabolic and physiological stress associated with load carriage tasks. From a practical standpoint, these studies indicate that a certain degree of physical readiness must be attained to successfully perform load carriage activities. The large muscular forces required to sustain heavy loads, in conjunction with the extended durations a soldier may be performing this task, implicates both anaerobic (phosphagen, glycolytic) and aerobic (oxidative) pathways in providing the necessary energy for load carriage. The mere act of supporting a heavy load requires soldiers to have the requisite physical capabilities such as adequate muscular force generation to sustain work output. In the following section, these metabolic and biomechanical aspects of load carriage, as well as observations from the existing literature, will serve as a basis for physical training

strategies to improve soldier mobility with load carriage.

### **Training to Improve Load Carriage Ability**

A number of studies have examined the influence of different types of exercise training programs on load carriage performance. Schiotez et al. (10) found that a 10-week full body resistance training program consisting of structural exercises (squat, bench press) and assistance exercises (shoulder press, tricep extension, leg curl, seated row, biceps curl, crunches) significantly improved 10km ruck run performance with a 15kg load. In similar fashion, an exercise training program (24 weeks) was shown to increase (33%) movement velocity during a 2-mile hike while hauling a 75lbs pack (8). The training consisted of both full body resistance exercises and aerobic components that included running and hiking with load carriage. Most recently, Hendrickson et al. (4) reported that resistance and aerobic training performed independently and in conjunction improved performance on a 3.2km load carriage activity. Taken together, these studies indicate that the task of performing load carriage in combat will benefit from a combination of training strategies which incorporate strength, power, aerobic and task-specific training.

Strength training is important for withstanding the heavy loads hauled and difficult terrain in which these soldiers operate in and also to prevent injuries from occurring (2). Both upper and lower body strength training is important for this task. Lower body strength will enhance a soldier's ability to carry heavy loads over difficult terrain. Upper body strength will enhance the ability to carry the heavy load and prevent further unnecessary strain on the body. Along with

this, core training is a fundamental part that should be included in a strength training program to enhance load carriage given the use of core muscles in stabilizing and assisting the heavy loads placed on the upper body.

Power and anaerobic training is crucial in enhancing a soldier's ability to make quick and repeated movements. For example, if a soldier is taking fire or is tracking an enemy, he may need to make quick, explosive moves in order to take cover or close in on the enemy (i.e., buddy rushes). Lastly, aerobic training will prevent a soldier from becoming fatigued during long, patrolling movements. It will also enhance oxidative enzymes allowing a soldier to utilize more fat for a fuel source during these long-range patrols (9). Below (Table 1) is an example of a program that commanders and military tactical trainers can implement in order to enhance load carriage performance in soldiers and marines.

#### **Strength: Upper Body (Push)**

- Bench press 3 sets of 6 – 8 reps
- Incline bench press 3 sets of 6 – 8 reps
- Military shoulder press 3 sets of 6 – 8 reps
- Upright rows 3 sets of 8 – 10 reps
- Close-grip triceps press 3 sets of 6 – 8 reps
- Tricep dips 3 sets of 6 – 8 reps

#### **Strength: Upper Body (Pull)**

- Lat pulldowns 3 sets of 6 – 8 reps
- T-bar rows 3 sets of 6 – 8 reps
- Shrugs 3 sets of 6 – 8 reps
- Barbell curls 3 sets of 8 – 10 reps
- Hammer curls 2 sets of 8 – 10 reps

#### **Strength: Lower Body & Core**

- Squats 3 sets of 6 – 8 reps
- Leg press 3 sets of 6 – 8 reps
- Barbell lunge 2 sets of 8 – 10 reps
- Lying leg curls 3 sets of 8 – 10 reps
- Standing calf raise 3 sets of 8 – 10 reps
- Lower back extensions 4 sets of 8 – 10 reps
- Incline sit-ups 3 sets of 20 – 50 reps
- Leg raises 3 sets of 15 – 20 reps
- Abdominal crunches 3 sets of 30 – 50 reps

#### **Power & Anaerobic Plyometrics:**

- Depth jumps 4 sets of 5 reps, 5 – 10 seconds inter-rep rest, 2 – 3 minutes inter-set rest
- Box jumps 4 sets of 5 reps, 5 – 10 seconds rest between sets, 2 – 3 minutes inter-set rest
- Single-leg hop 4 sets of 5 reps, 5 – 10 seconds inter-rep rest, 2 – 3 minutes inter-set rest
- Lateral barrier hop 4 sets of 5 reps, 5 – 10 seconds inter-rep rest, 2 – 3 minutes inter-set rest
- Interval sprints 10 – 15 second sprints followed by 1 min rest (build up slowly)

#### **Aerobic & Core**

- lower back, abdominals
- 30 minutes of jogging (build up each week)

#### **Ruck March Day**

Perform a 3.2km road march with 35lbs and build up from there by slowly increasing distance and load carried.

Each training session should be preceded by a general and specific warm-up. A general warm-up consisting of low-intensity aerobic exercise (e.g., jogging) should be performed to raise core body temperature and minimize the risk for injury. A specific warm-up consists of the activities making up the bulk of the training session, but is performed at a low intensity. Each training session should also conclude with a cool down consisting of low-intensity exercise to bring heart rate to pre-activity levels. Adherence to correct lifting technique is imperative if the desired results are to be achieved (correct movement patterns for many resistance exercises can be found at <http://www.nasca-lift.org/videos/>). #

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**Table 1: Sample Monthly Training Program to Enhance Load Carriage Performance**

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Week 1	Strength-upper body-push	Power & Anaerobic	Strength-upper body-pull	Aerobic	Strength-lower body & Core	Rest	Aerobic
Week 2	Ruck march	Rest	Strength-combined upper body	Aerobic	Strength-lower body & Core	Rest	Power, Anaerobic & Aerobic
Week 3	Strength-upper body-push	Power & Anaerobic	Strength-upper body-pull	Aerobic	Strength-lower body & Core	Rest	Aerobic
Week 4	Ruck march	Rest	Strength-combined upper body	Aerobic	Strength-lower body & Core	Rest	Power, Anaerobic & Aerobic

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# Helping the Tactical Athlete Perform Better with Nutrient Timing

*Craig Hempel, CSCS*

Being able to maintain physical fitness at such a high level takes a lot of hard work for the tactical athlete. Physical training is a vital part of being military personnel, law enforcement officers, and firefighters, but training alone may not be enough. Without proper nutrition around exercise or a mission could lead to slower results from training or even a mission. Nutrient timing can help with strength gains and fight against fatigue in intense activities. I believe that nutrient timing is the best supplement you can take. There are thousands of sports nutrition supplements on the market, and they all say something about how they are the best for gaining muscle, increasing endurance, and losing fat. Many of those pre-workout and post-workout supplements have way too many ingredients in them, and some may be harmful or their side-effects are unknown. To keep it simple, carbohydrates and proteins are the most important of all the supplements. This could only be drinking a sports drink with peanut butter crackers or even a glass of chocolate milk. The reason you workout is to see improved performance and better body composition, right? Then why not get the most out of a workout by consuming the proper nutrition at the right time. This could build greater amounts of lean muscle for better performance and decrease fat percentage. There are three main phases of nutrient timing around exercise which are pre-workout, during exercise, and post-workout. Drinking a large glass of chocolate milk can help you lose weight, gain muscle mass, replenish lost nutrients, and ultimately improve performance.

## **Pre-Mission/Pre-Workout:**

“Many experts recommend a low GI meal based on the idea that such a meal would supply sustained energy during exercise,” (1). Your pre-workout snack can consist of fresh fruit, a meal replacement shake, or even some yogurt 1 – 2hrs before exercise (1). Low Glycemic Index (GI) foods are lower in sugar and do not spike blood sugar very high. They last for more sustained energy so when taken before a workout, you can have the energy supply throughout.

## **During Mission/During Workout:**

“The muscles take up more and more glucose from the bloodstream” during a long exercise lasting over an hour (1). Since this is the case, you need to replenish blood glucose as you

workout. Drinking a high glycemic beverage such as a sports drink during a workout will help maintain blood glucose levels so that there is an immediate energy supply for your muscles. “Recent studies have suggested that consuming a drink containing protein as well as carbohydrates during exercise may minimize protein breakdown following exercise, and improve recovery,” (1). Consuming a carbohydrate/protein combination during a resistance training program will result in greater increases in 1RM strength and a leaner body composition (4). Along with the addition of carbohydrates, protein too has a benefit during a workout. During a workout, protein helps protect our muscles from being broken down as much and helps in recovery by activating protein synthesis.

## **Post-Mission/Post-Workout:**

“The best time to start refueling is as soon as possible after exercise, as glycogen storage is faster during this post-exercise window than at any other time. During the first two hours, replenishment is most rapid at approximately 150% the normal rate,” (1). The sooner a carbohydrate/protein drink is consumed, then the sooner your body can start recovering. You will be able to replenish your glycogen stores and rebuild your muscle fibers from the protein. Consuming a carbohydrate/protein drink also appears to enhance recovery following resistance exercise (1). Consuming a high glycemic carbohydrate/protein drink post-exercise will vastly increase protein synthesis due to the release of insulin into the body which allows for better and faster absorption of the protein (3). “During prolonged resistance training, post-exercise consumption of carbohydrate and protein supplements in varying amounts have been shown to stimulate improvements in strength and body composition when compared to control, placebo, or carbohydrate-only conditions,” (4). According to the Journal of the International Society of Sports Nutrition, “neuromuscular function following prolonged load carriage (2hr, 25kg) will be improved with the consumption of whey protein and carbohydrate beverages,” (2). This will help a tactical athlete with recovery and enable them to carry their packs for extended periods of time or more frequently.

When following the basic steps of consuming carbohydrate/protein mixtures before, during, and after a mission, or workout, then you will begin to see results. Lean body mass will increase while fat decreases. Chocolate milk can be used as a supplement post-exercise to help build muscle and decrease body fat. Chocolate milk has the high glycemic carbohydrates needed to help replenish glycogen stores, and it has protein to stimulate protein synthesis. The proteins in milk are casein and whey. Milk is typically 80% casein and 20% whey (6). Both contribute to protein synthesis, but whey is a faster acting, shorter duration protein, and casein is a slower acting, longer duration protein. This helps with an extended period of staying in an anabolic state. Milk also contains high amounts of calcium, which is vital in that it contributes to muscle contraction and bone growth.

As an active participant in intense exercise, I consume a 20g protein drink and eat two slices of whole wheat bread 30 minutes prior to exercise. The bread has low glycemic carbohydrates that help with sustained energy. During my exercise I consume a sports drink with a ratio of 3:1 carbohydrates:protein (30g of carbohydrates and 10g of protein). After my workout, I drink another sports drink with 4g of BCAA's and 5g of creatine, and I also drink a glass of milk for its protein and calcium content. ☺

### Simple Nutrition Tips for the Tactical Athlete:

- Consume low-GI foods 30 min – 1hr prior to exercise (fruits or whole grains)
- Consume a mixture of around 3:1 carbohydrate/protein during exercise (20oz sports drink with 10g of whey protein)
- Consume high-GI foods with protein immediately after exercise (chocolate milk or a protein shake with added sugar)
- If a longer duration mission or workout is known, then consume more carbohydrates the day before (whole grain pasta, rice, or potatoes)
- “Water replacement recommendation is to drink 1 – 1.5L for every kilogram (16 – 24oz for every pound) of body weight lost during your event,” (5).

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# Small Muscles, Big Impact: Assessment and Strengthening of the Deep Neck Flexors

Maj Eric Wilson, PT, DSc, OCS, SCS, CSCS, FAAOMPT

Whether you're a fighter jock checking "six" while pulling five G's or a grunt wearing night vision goggles (NVG's), the modern battlefield places significant stress on the neck musculature—and for good reason. The body will compensate in a variety of ways to maintain the head in an upright (and off the ground) position. The deep neck flexors, or "DNF" (Figure 1) are the most important stabilizers of the neck as well as the most consistently undertrained. These muscles attach along the front of the cervical and thoracic vertebrae and flex the neck (when acting bilaterally) and assist with neck rotation and side-bending (when acting unilaterally). Weakness of the DNF predisposes personnel to chronic neck pain, whiplash injuries, and headaches (1). Thirty-seven percent of people with neck pain will report persistent problems for at least 12 months (2). In fact, personnel who have a six month or longer history of on/off neck pain most likely have weakness to their DNF. These personnel will typically complain of pain in the upper back and shoulder blades as their body employs new muscle strategies to compensate for DNF weakness. This article will focus on the assessment and the training of these important muscles.

## Part 1: DNF Assessment

Weakness of the DNF will typically result in compensation from the Sternocleidomastoid (SCM) muscles. Knowledge of this compensatory pattern makes the assessment of the DNF relatively easy. The DNF will tuck the chin—think of subtly nodding your

head to say yes (Figure 2b). This action is performed by the DNF and you can observe a "flattening" of the normal lordotic curvature of the neck. The SCM, on the other hand, draws the entire head and neck forward which increases the normal lordotic curvature of the neck. This assessment method is a variation of the neck flexor muscle endurance test reported by Harris et al. (3). The authors reported that subjects with neck pain were able to maintain a chin tuck for an average of  $24 \pm 13$  seconds while those without neck pain were able to maintain the position for an average of  $39 \pm 26$  seconds. Based on this data, a 60-second cut-off score is used for this assessment. DNF assessment is performed as follows (Figure 2c):

- (A) Lay supine with your head and shoulders off the end of a bed.
- (B) Place a tennis ball (or similar sized ball) at the front of your neck and "tuck your chin." You should be supporting the ball between your chin and the top of your sternum.
- (C) Place one hand on your stomach to monitor your abdominal muscles. The back of your head should be parallel to the floor.
- (D) Attempt to hold the ball in place for 60 seconds. Weakness of the DNF can be determined several ways. Decreased pressure between your chin and the ball is one sign. If this happens, your DNF are fatiguing and your SCM are compensating (Figure 2d). Contraction of your abdominal

muscles is another sign. This indicates the back of your head is no longer parallel to the floor—indicative of additional muscle compensation.

This simple method allows for the strengthening professional to either teach self-assessment or perform a group assessment on their personnel.

## Part 2: DNF Training

The easiest method for training the DNF is to mimic the test. This will improve static strength and provide a good foundation to build from. You do not want to train the DNF to absolute fatigue so the utilization of a sub-maximal training method should be employed. Personnel who demonstrated fatigue prior to 30 seconds of the assessment should use a "25% x 6" technique. For example, if a subject fatigued during their assessment at 20 seconds then 25% of 20 seconds is five seconds. Therefore, you would have the subject perform six repetitions for five seconds each at a 1:3 – 1:4 work-rest ratio. Personnel who fatigued between 30 – 60 seconds should use a "50% x 3" technique. For example, a subject fatigued during their assessment at 50 seconds then 50% of 50 seconds is 25 seconds. Therefore, the subject would train for three repetitions for 25 seconds each. A 1:1 – 1:2 work-rest ratio is best for these personnel.

Once a person can maintain 60 seconds on the assessment it is time to begin dynamic strengthening. This is more functional and can also be used to improve the DNF strength of your personnel

that tested as normal (>60 seconds). Dynamic DNF training is performed with an elastic band that can be obtained from your physical therapy department. It can also be easily constructed out of two pieces of surgical tubing (approximately two feet in length) placed three inches apart and secured with duct tape. The duct tape will act as a pouch to support the back of the subject's head, much like a slingshot and is the first method of training in the seated chin-tuck method (Figure 3a).

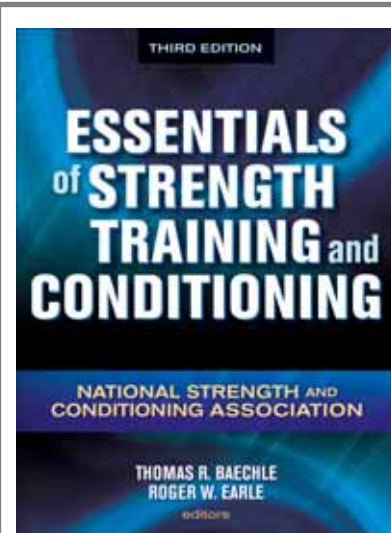
The subject places the “pouch” of the device along the back of their head (not the neck) and grasps each end in a hand and applies tension by straightening their arms to their front with their hands at head-level. The subject will then attempt to perform a chin-tuck and maintain for a 3-second count. Sets and repetitions should be established with endurance in mind. The next method requires the coordinated co-contraction of all the neck muscles (Figure 3b). The set-up is the same as above, but this time the subject moves their arms in an arc while attempting to maintain a proper chin tuck. The subject starts with their hands to their front and then moves to the far right, then to the far left, and then back to center. Care should be taken to ensure the subject does not move their head during this exercise. A typical compensatory movement pattern will be rotation and/or sidebending toward the elastic band. A 6 – 10 second count is typically sufficient time to complete each repetition. Again, sets and repetitions should be established with endurance in mind. The final method for training is a partner-assisted method. The set-up is identical to the two methods above except the partner will hold the ends of the elastic band and walk in a random pattern with the subject following while maintaining

a chin-tuck. All of the above exercises can be made more functional (and difficult) by the subject wearing their helmet, NVG's, etc.

The importance of proper neck strength cannot be overemphasized in the tactical community. The deep neck flexors are not isolated by traditional training methods and should be assessed in all personnel—whether they complain of neck pain or not. The assessment and training methods outlined above are simple and require little in the way of specialized equipment or space and can be easily performed at the individual operator level. †

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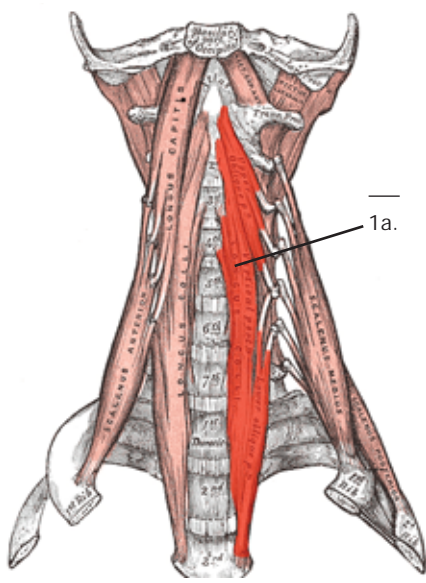


Figure 1a. Longus Colli Muscles

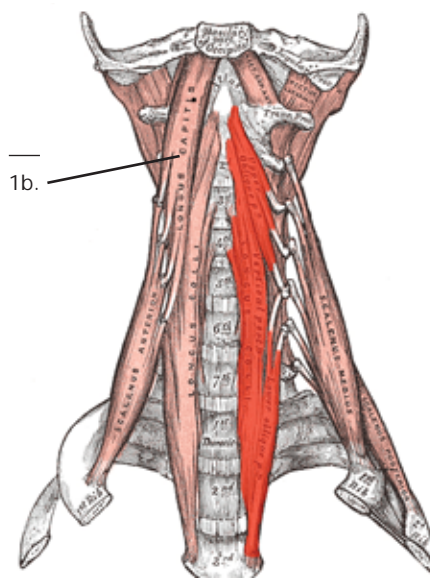


Figure 1b. Longus Capitis Muscles



Figure 2a. Normal



Figure 2b. Chin-Tuck



Figure 2c. DNF Assessment Demonstrating Proper Muscle Action



Figure 2d. DNF Assessment Demonstrating SCM Compensation



Figure 3a. Dynamic Neck Training—Seated Method



Figure 3b. Dynamic Neck Training—Co-contraction Method

## Debriefing the Body: Unload to Reload Tactical Fitness

By Andrew Vontz

When NFL players have made it through the final snap of the season and the crowds have gone home, they don't wake up the next day and do maximum strength workouts in the gym. Their bodies need time to heal from the punishment a season on the gridiron has placed upon them before they begin to aim towards an even higher apex of fitness for the following season and the challenges it will bring. Service members completing a tour of duty and leaving theater find themselves in a similar situation. They have endured some of the most physically and mentally taxing environments the human organism can face and need time to heal the aches, pains, and injuries that they have accrued from their time in theater. In order for service members to be even stronger and more battle fit when they next deploy, they should first debrief their bodies upon completing a tour. Suspension Training® bodyweight exercise provides service members with the ability to unload their bodyweight and heal while maintaining the movement patterns critical to success in operational environments, and then build a higher peak of fitness on top of a rested, healed body.

The day-to-day rigors of today's challenging operational environments include carrying hefty rucks, diving, crawling, and sometimes dragging buddies out of harm's way. This places a tremendous strain on service members' necks, shoulders, knees, ankles, and other joints and connective tissue. Like NFL players who dial down their training following a long, hard season, service members exiting theater should dial back training intensity if they seek to attain a higher level of performance and operational readiness during their next deployment. Achieving this worthy end requires unloading the body to reduce stress on joints, connective tissue, and musculature. Only then will the body heal, reload, and be ready for more. "You need to heal your body and make sure it's in balance before increasing the intensity and duration of training bouts," says Dr. Joe Martin, DC, director of military education for Fitness Anywhere and a former Navy SEAL operator.

Upon leaving theater, where training equipment may be at a minimum, service members can be tempted to jump right back into conventional weight training and "beach lifting" using free-weight or machine movements like bench pressing, lat pulldowns, skullcrushers, biceps curls, and machine leg extensions. But these movements don't successfully approximate the axial loading and transverse plane strength demands that service members face in theater. Instead, they tend to amplify stress on already over taxed joints and drive the body into a state of debt that will be more and more difficult to fully recover from unless a corrective course of action is taken. "Hitting the deck with an 80lbs ruck and then having to push yourself back up isn't the same as doing a traditional bench press where your chest is isolated and the core, legs, and rest of the body aren't engaged," says Dr. Martin. "Service members returning from theater tend to do too much too soon and are so beaten down from traditional deployment that they're not fit to do conventional strength training." Injured service members may be even more tempted to jump into the weight room and hit it hard thinking that it's the best way to get stronger for the next deployment. However, it isn't the best way.

"For the first month, let the body heal. Use bodyweight-based training that mirrors the movements you did downrange and slowly build up your strength and fitness," says Dr. Martin. Suspension Training® bodyweight exercise allows users to modify the amount of resistance used during any exercises with a step towards or away from the anchor point. Exercise difficulty can be further modified by increasing or decreasing the stability challenge of movements by moving the feet closer together or farther apart or doing unilateral movements. During that critical first month back from deployment, Suspension Training® allows service members to help their bodies remember, rehearse, and improve the movement patterns critical to success in theater without overtaxing their bodies or placing unnecessary strain on their tired, worn down bodies. "Bodyweight-based training on the TRX allows tactical operators to unload the resistance and begin rehabilitative strength and conditioning at a very low level of intensity and eventually scale up to whatever level of fitness they need for the activities they participate in."

Service members cherish getting to spend time away from theater engaged in the athletic pursuits they enjoy whether those activities are weight training, playing on a softball team, running, or participating in triathlons. While the temptation to jump right into these activities post-deployment can be downright irresistible, Dr. Martin advises that service members follow his suggestion of at least a month of lower intensity body-weight-based training before taking up these activities again. “If you’re participating in a sport or want to lift weights, first

make sure you’re doing what needs to be done to rehabilitate yourself and maintain the operational strength and conditioning you need to succeed in theater. Heal your body, make sure it’s in balance, and maintain the movement patterns you developed to do your job successfully in theater. Only then should you cut loose and take up other activities.” Ultimately, following this strategy builds service members who will be fit for duty and less likely to get injured in theater when they re-deploy. †



The graphic features a dark background with a silhouette of a person in a dynamic pose on the left. In the center, there is a large, faint circular graphic resembling a target or a stylized 'X' with a vertical line through it. The text is white and arranged as follows:

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Craig Hempel, CSCS, received his Bachelor's Degree in Health and Exercise Sciences in 2009 from the University of Oklahoma. Craig has spent the last year working as a performance coach at Velocity Sports Performance in Coppel, TX. He is currently enrolled at Texas Woman's University pursuing a Master's of Science Degree in Exercise and Sports Nutrition and also is working on becoming a registered dietitian.

### *CPT Paul C. Henning, MS, CSCS*

CPT Henning is currently a PhD candidate in exercise physiology within the department of nutrition, food & exercise sciences at Florida State University. Paul is a member of the ACSM (American College of Sports Medicine), NSCA (National Strength and Conditioning Association), and is CSCS certified. He is currently in the Army Reserves after spending four years on active duty. He completed two tours to Iraq in support of OIF (Operation Iraqi Freedom). Paul has a Bachelor's degree from East Stroudsburg University in Pennsylvania and a Master's of science degree from Florida State University.

### *Andy V. Khamoui, MS, CSCS*

Andy is currently a PhD student at Florida State University. He serves as a member of the Muscle Research Laboratory investigating skeletal muscle responses to nutritional and exercise interventions. Prior to arriving in Florida, Andy completed his Bachelor's and Master's degrees in Kinesiology at Whittier College and California State University, Fullerton, respectively. Andy is also a Certified Strength and Conditioning Specialist through the NSCA.

### *Andrew Vontz*

Andrew Vontz writes about functional training and people, places, and things at the limits of human experience. Based in San Francisco, he has written cover stories for Men's Fitness, Spin, Real Fighter and many other publications. His work has also appeared in The New York Times Bestseller, Hollywood Interrupted as well as Rolling Stone, The Los Angeles Times Magazine, Outside, Bicycling and dozens of other magazines. A lifelong cyclist and adventurer with a passion for exploring the mental, physical, and spiritual underpinnings of human performance, he programs functional training for cycling, endurance sports and life at [www.drillit.tv](http://www.drillit.tv). Follow him on Twitter @vontz.

### *Maj Eric Wilson, PT, DSc, OCS, SCS, CSCS, FAAOMPT*

Dr. Eric Wilson is a physical therapist with the United States Air Force. In addition to being a Certified Strength and Conditioning Specialist (CSCS), he is board certified in both orthopedic and sports physical therapy, holds a basic certification in electro diagnostic testing, and is fellowship trained as well as a Fellow in the American Academy of Orthopedic Manual Physical Therapists. He is the only physical therapist in the United States to hold these combined credentials. Dr. Wilson is a graduate of both the Flight Surgeon and Dive Medical Officer courses and is currently stationed at Little Rock Air Force Base in Arkansas. Prior to being a physical therapist, he was a paratrooper with the US Army's 82nd Airborne Division. As an infantry NCO, he served as a scout/sniper team leader and a rifle squad leader and fought in Iraq during Gulf War I.



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