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SPECIAL FEATURE

Dr. Tim Dornemann, Ph.D, Director of Sports Performance

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Dr. Tim Dornemann completed his B.S. degree at Rockford University, M.S. at the University of North Carolina, and Ph.D at the United States Sports Academy. He is an Associate Professor and coordinator of the exercise science program at Barton College. In addition to his academic responsibilities, Dr. Dornemann is also the director of sports performance and oversees the strength and conditioning programs for all 21 athletic teams. His research interests include exploring the use of vibration training and rotary inertial training for athletic development.

Dr. Dornemann volunteers as the director of educational programs for Sports Performance Sciences (SPS), an organization that conducts performance-enhancement education programs internationally and develops conditioning programs combined with character development programming domestically. Two of the projects Dornemann developed for SPS have been published by Linus Publishing – "PowerRev 'Four Laws of Victory' Character Development Program: Build Successful Teams and Athletes by Teaching Lessons That Transcend Sports" and "PowerRev Youth Athletic Development Program: Building Champions in Sports and in Life." He also has written a third book, "Russian Vibration Training: The Mikheev Method," published by Heathy Learning.

Through the international branch of SPS, International Performance Sciences, Coach Dornemann has worked with the Philippine Olympic Committee and India national wrestling team. He currently serves as a member of the United States Sports Academy's national faculty and has taught for the sports academy in Malaysia and Thailand.

Dr. Dornemann is a Certified Strength and Conditioning Specialist (CSCS) through the NSCA, an NASM Performance Enhancement Specialist and Corrective Exercise Specialist, and a Level II NASE National Association of Speed and Explosion Certified Speed Specialist (NASE-CSS).

Dr. Dornemann coordinates the NASE-Barton College certification program to provide students with valuable information on all aspects of speed improvement and completion of the NASE Level I Certification.

Maintaining Speed During the In-season Period

The positive effects of nearly nine months of off-season training and conditioning to improve specific football skills, general conditioning levels, speed-strength, muscle weight gain, fat loss, flexibility, agility, injury prevention, and playing speed have now been put to the test with one month of in-season play. The in-season maintenance period has arrived and changes are needed to limit the loss of linear and multi-directional speed. Due to time restraints, strategy sessions, and preparation for specific opponents, coaches reduce the volume and intensity of the conditioning phase in general and enter into a maintenance mode. As a result, some "detraining" does occurs over a period of 6-16 weeks. Studies of NFL players have shown that by Super Bowl Sunday, the overall fitness level of players has declined dramatically. This also occurs at the University and high school level. Although there is little research evidence, it is clear that speed of movement also declines due to injuries, decreased ground reaction force (GFR), longer ground contact times (GCT), and decreased speed endurance resulting in the inability to execute repeated sprints at the same speed throughout the game.

The Physiology of Detraining

It is well known that skeletal muscles have the ability to dynamically adapt to variable levels of functional demands. This occurs as a reaction to both intensive training and periods of inactivity. In the absence of sufficient stimulus, muscular detraining occurs within a period of only 2-3 weeks and is characterized by decreased capillary density. According to the findings of Mujika and Padilla (2001):

> "Arterial-venous oxygen difference declines if inactivity continues beyond 3-8 weeks. Rapid and progressive reductions in oxidative enzyme activities bring about a reduced mitochondrial ATP production. These changes are related to a reduction in VO2max observed during long-term training cessation. Muscular characteristics remain above sedentary values in the detrained athlete but usually return to baseline values in recently trained individuals. Glycolytic enzyme activities show nonsystematic changes during periods of training cessation. Fiber distribution remains unchanged during the initial weeks of inactivity, but oxidative fibers may decrease in endurance athletes and increase in strength-trained athletes within 8 weeks of training stoppage. Muscle fiber cross-sectional area also declines rapidly in strength and sprint athletes. Force production declines slowly and in relation to decreased EMG activity. Strength performance in general is readily maintained for up to 4 weeks of inactivity, but highly trained athletes' eccentric force, sport-specific power, and recently acquired isokinetic strength, may decline significantly."

These changes *begin* when conditioning activity declines; never reaching the extreme levels described above that occur from complete inactivity. It is rare for modern-day coaches and athletes to completely eliminate a specific training program during the in-

season period except in the advent of certain injuries and illnesses. The fact remains, however, that there is considerably less time during the in-season period for programs such as speed-endurance, speed-strength, and speed training. Consequently, some loss of speed does occur, but considerably less than would be expected with a complete absence of these types of training programs.

Detraining actually occurs faster than training gains and is noticeable in 1-2 weeks as sports skills requiring speed-strength are performed less efficiently. Research has revealed that speed-strength losses are a result of decreases in motor recruitment as the body is no longer capable of utilizing the same number of motor units. Losses in speed and quickness have also been documented. According to Tudor Bompa (2009), speed tends to be the first ability affected by detraining as the power capabilities of muscle contraction diminish.

Fleck (1994) investigated the detraining effects in 28 college football players during a 16-week competitive season. The subjects were divided into a linemen or a non-linemen group (all other players) to determine the influence of player position on detraining. Players were tested immediately before and after the in-season period on a series of practical, football-related field tests, and on specific lab tests for isokinetic strength (shoulder abduction and leg extension), anaerobic capacity, and aerobic power. The field test results showed significant decreases in the bench press for both groups and significant decreases in flexibility and vertical jump for the non-linemen group. The standing long jump and 20-yard shuttle run showed declines in performance for both groups. Maximal anaerobic capacity basically remained unchanged while aerobic power increased by approximately 6 percent.

The nervous system is sensitive to detraining and the motor unit is one of the first to deteriorate. Research indicates that with prolonged detraining, fast-twitch muscle fibers used to produce forceful muscle contractions during the start and acceleration phase of a short sprint would be expected to decrease (Ross & Leveritt, 2001). Soon, the amount of ground reaction force (GRF) an athlete can generate declines since fewer motor units are recruited. Applying less GRF shortens the length of a single stride and negatively affects stride rate and speed during all four phases of a short sprint (The Start, Acceleration, Maximum Speed, and Deceleration phase).

The effects of detraining on speed endurance (the speed of executing repeated short sprints) in football is also a major concern as the season progresses and less attention is devoted to sport-specific repeated sprint ability (RSA) anaerobic training designed to expedite recovery between sprints and eliminate the negative effects of fatigue as the game progresses.

Most of the negative effects of detraining discussed previously can be avoided or limited through the use of an in-season maintenance program and tapering, as long as training intensity stays near the same level. On the other hand, training volume (time devoted to each session) can be markedly reduced with little negative effect. The March, 2007 issue of *Sports Speed Digest* (Vol. 3, Issue 9) presents an in-season maintenance program

designed to eliminate the detraining effect in football, soccer, rugby, field hockey and other sports. The type, frequency, duration, and intensity of speed-strength training, plyometrics, speed endurance training, sprint-assisted training, and general conditioning are described are below to prevent loss of speed and quickness .

In-Season Maintenance of Playing Speed

An in-season speed maintenance program requires attention to detail as coaches develop a regular routine that does not disrupt the normal practice session. In general, this requires a minimum of one weekly weight training session, one plyometric and one sprint loading workout, and one neuromuscular training session (sprint-assisted training).

Table 1 shows the speed training emphasis needed to maintain GRF, ground contact time (GCT), and speed endurance using 15-20 minute sessions. The minimum amount of extra practice time is well worth the effort and will prevent loss of speed and a decrease in individual and team performance as the season progresses.

Table 1 In-Season Maintenance Program to Prevent Loss of Playing Speed

Training Emphasis	In-Season Maintenance Load
Ground Reaction Force (GRF)	Two weight training sessions weekly, and one 15-minute session of plyometrics and sport loading that focuses on exercises to maintain GRF in both a vertical and horizontal direction (see Table 2). Weight training must be performed with an intensity of *more* than 80 percent of each athletes' 1RM (> 80 of 1 repetitions maximum).
Ground Contact Time (GCT)	Two 15-minute sprint-assisted workouts weekly (5-8 towing pulls each session with full recovery between each repetition).
Speed Endurance	Two repeated sprint ability (RSA) training sessions weekly with careful record keeping on the distance covered, repetitions, sets, and rest interval between repetitions.
Flexibility	Daily sessions of sport-specific dynamic stretching at the beginning of practice and 5-10 minutes of static stretching following each weight training session.

A list of weight training, plyometric, and sprint loading exercises are shown in Table 2. One vertically-directed and one horizontally-directed exercise from each of the three areas is recommended 1-2 times weekly during the in-season period.

To maintain proper sprint mechanics in the start, acceleration, and maximum speed phase of a short sprint, 3-4 of the sprinting form drills described below can be used as part of the dynamic warm-up session each practice three times weekly:

A-Skip. A-skips involve the key glute and hamsrings muscle groups so vital to propelling the body upward and forward during the sprinting action. Skipping occurs with high knees and a mild pawing action during the backward pull. Arm action is similar to movements in sprinting.

Table 2 Strength Training Activities to Maintain Increases in Ground Reaction Force

Strength Training Program	Exercises*	GCF Direction (V and H*
Weight Training: Free weights, Machines (Minimum Hypertrophy Program)	Olympic Lifts: Clean Jerk, Snatch Dead Lift Squats - front, Squats - Back Ankle Press/Toe Raises Barbell hip thrust Single-leg kick back Single reverse leg press Walking Lunge Reverse Lunge (Barbell & Back) RDL's	V V V V V V V V V H H H H H
Plyometrics	Squat Jump Split Squat Jump Double Leg Bounds Lateral Cond Jump Pike Jump Double Leg Jump Double Leg Speed Hop Side Jump and Sprint Double & Single Leg Zig-zag Single Leg Stride Jump Box Jumps Lateral Bound Running Bound	V V V V V V & H V & H H H V V H V & H
Sprint Loading	Harness and Release Hand-held Release Speed Sack Start Resistance Parachute Resistsnce Austin Leg Drive Machine Austin 5-Station Leg Drive Weighted Sled Staircase Sprinting	V & H V & H V & H H & V V & H V & H V & H V & H

*Distance Skip***. F**orward speed skipping down the field for 20-60 yards emphasizes the application of maximum GRF and a natural stride to the next foot strike.

Butt Kickers. From a jog, the lower leg is allowed to swing back and move toward, rather than kick the buttocks. The upper leg moves very little. The heel is allowed, not forced, to come up to the butt.

Wall Slide. From a jog, the action is the same as the butt kickers, except the heel of the recovery leg must not travel behind the body. Imagine a wall of glass running down your back and you do not allow the heel to break the glass. This action will produce knee lift without forcing the action. When done properly, the heel moves close to the buttocks.

Maximum Speed Wall Runs. Athletes stand several feet in front of a wall with both hands supported in front with a forward lean that allows the knee to be driven forward and upward to complete the knee drive. A single powerful knee drive is executed with the right leg, before quickly switching to a left leg knee drive to complete one cycle. The head, shoulders, and hips remain aligned at all times. After an acclimation period , athletes complete 3-4 steps before resting and preparing for the next sequence. This drill emphasizes the correct form exhibited during the acceleration phase and allows coaches to make "on the spot" changes .

Cycling. Leaning against a wall, bar, or any support, one leg is cycled through in a sprinting manner. Emphasis is on keeping the leg from extending behind the body, allowing the foot to approach the butt during recovery, and pawing the ground to complete the action. Ten cycles with each leg make up one set.

Down and Offs. From a high knee position, the emphasis is on decreasing ground contact time by hitting the ground with the ball of the foot and getting off as quickly as possible. In turn, the effort on the ground should bounce the leg up into the high knee position. Ten down and offs make up one set.

Pull-Throughs. Extending the leg in front of the body like a hurdler, the leg is then brought down and through ground contact in a power motion. Ten pull-throughs with each leg make up one set.

Pose. Proper body alignment, arm action, and knee lift are emphasized and corrected by a coach as the athlete runs forward at 1/2 speed.

A minimum speed maintenance program requires little extra practice time. Using sprinting form drill movements as part of the dynamic stretching session adds no additional time. One session weekly to maintain GRF and one to avoid changes in GCT can be completed in approximately 30 minutes. A second maintenance session can be added if needed.

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FROM CHUMP TO CHAMP: The Making of Sports Champions

This column covers all aspects of speed training. Send your question to NASE, P .O. Box 1784, Kill Devil Hills, NC 27948 or e-mail naseinc@earthlink.net,

Strengthening the Hamstring Muscle Group

Q How important is hamstring strength? How can this muscle group be strengthened?

A Numerous studies have linked hamstring strength in general, the strength imbalance between the hamstrings and quadriceps of each leg, and imbalance from one leg to the other to increased injuries and a decline in sprint performance. A study of elite sprinters and the muscle strength of the hip extensors and knee extensors and flexors, was conducted to determine a possible relationship between strength deficits and subsequent hamstring injury within 12 months of testing. The testing method involved muscle strength that simulated the specific muscle action during the late swing and early contact phases when sprinting (Sugiura, et. al, 2008). Researchers revealed a solid connection between hamstring injuries and muscle weakness during the *eccentric* action of the hamstrings and weakness during the *concentric* action of the hip extensors when testing occurred at the slower speed of 60°/s. A side-to-side comparison for injured sprinters revealed that the injury always occurred on the weaker side. In addition, differences in the hamstrings-quadriceps and hip extensors-quadriceps strength ratios were also evident between uninjured and injured limbs, and this was attributable to deficits in hamstring strength. The weakness of the hamstring muscles is also the most common factor involved in hamstring strains. Re-injuries to the hamstrings are also common and require special care as athletes end the rehabilitation period and re-enter the training schedule. The presence of localized discomfort on hamstring palpation immediately after return to play increased the incidence of re-injury fourfold (De Vos, 2014).

The hamstrings may be the weakest link of sprinters and team sport athletes. Few athletes possess near equal strength in both muscle groups. Exceptions include some elite sprinters, power lifters such as former world champion Dr. "Squat" Fred Hatfield, and some defensive backs in football. In over 35 years of speed camps and clinics, we have seen only one athlete who possessed equal strength. The large majority of athletes failed to meet the minimum recommended standard of attaining a hamstring strength equal to 75 percent of quadriceps strength.

It must be noted that most comparisons of quad and hamstring strength are done using concentric measurements only. Since the hamstring group functions both eccentrically and concentrically during the act of sprinting, perhaps additional investigations would be beneficial to determine optimal levels of eccentric hamstring strength when ballistically loaded as they are in sprinting.

The Olympic Lifts and the leg curl are very effective in improving hamstring strength. The straight-leg dead lift is also effective. Stiff legs seem to create a stronger stimulus on the gluteus maximus muscle and result in higher maximal activation of the hamstring musculature (Wright, et. al. 1999). Isometric exercises are also effective since the angle of exertion can easily be altered. One key exercise is performed by lying on the back with one foot extended to a point several feet up a wall (different angles are used). A downward isometric pull with a straight leg is exerted and held for 8-10 seconds, repeating the exercise three to five times before moving to the opposite leg. This downward pull is similar to the "paw down" movement used during the sprinting action.

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A similar dynamic exercise (hip-ups) can be performed by lying on the back with one heel of a foot placed on a bench or box. The box or bench height should allow the athlete to begin the exercise with both the knee and hip placed at a 90 degree angle. The opposite leg should be extended and lie straight on the ground beside the bent leg on the box. The exercise is initiated by having the athlete attempt to "pull the heel of the elevated leg toward the buttocks of that same leg." The hamstring contraction will effectively lift the athlete off the ground by extending the hip. The opposite straight leg simultaneously flexes at the knee and swings up until the knee is directly above the eyes as the athlete's body rocks up onto the shoulders. The action of both legs mimic the knee and hip angles during sprint toe-off.

Sprint-resisted training (weighted suits, vests, or pants) requiring athletes to sprint backwards is also an effective program for extra loading of the lower extremities. Strength Coach, Bob Otrando, recommends that defensive backs in football end each workout with repetitions of backward sprinting to also improve back pedaling skills. Training loads should be kept light enough to allow athletes to reach a high backward sprinting speed. Backward sprinting repetitions with added weight are also an important aspect of improving the speed-strength of the hamstring muscle group.

Roller skates or inline skates are unique methods of training muscle groups at the hip, knee, and ankle (gluteus, hamstrings, quadriceps, calf muscles) responsible for the drive phase of sprinting. Three areas of conditioning are recommended using skates:

1. Move the hips and legs in all directions while holding onto a chair and completing 8-12 repetitions. Athletes progress to three sets over a period of 3 weeks.

2. High speed sprint-assisted drills using surgical tubing and both forward and backward movement.

3. High speed skate leg cycling with athletes holding on to a support and moving the legs as fast as possible in a back and forth motion, completing 3-5 sets of 3-12 repetitions with maximum rest (full recovery) between each set. After an initial adjustment period, athletes are able to complete each set without holding on.

De Vos RJ, Reurink G, Goudswaard, F, Moen MH, Weir, A, and Tol JL. 2014. Clinical findings just after return to play predict hamstring re-injury, but baseline MRI findings do not. *Br J Sports Med* Sep;48(18):1377-84.

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WHAT RESEARCH TELLS THE COACH ABOUT SPRINTING

Form Differences Between Sprinters and Distance Runners

Bushnell, Tyler, and Lain Hunter. 2007. Differences in technique between sprinters and distance runners at equal and maximal speeds. *Sports Biomechanics:* Vol 6, Issue 3, August.

Abstract

In the finishing kick of a distance race, maximizing speed becomes the focus even if economy may be sacrificed. If distance runners knew how to alter their technique to become more sprint-like, this process could be more successful. In this study, we compared the differences in technique between sprinters and distance runners while running at equal and maximal speeds. Athletes consisted of 10 Division I distance runners, 10 Division I sprinters, and 10 healthy non-runners. They performed two tests, each consisting of a 60-m run on the track: Test 1 at a set pace of 5.81 m/s, while Test 2 was maximal speed. Video was collected at 180 Hz. Significant differences ($P < 0.05$) between the sprint and distance groups at maximal speeds were found in the following areas: speed, minimum hip angle, knee extension at toe-off, stride length, contact time, and recovery knee at touchdown. In Test 1, sprinters and distance runners displayed many of the same significant differences. The control group was similar to the distance group in both trials. As distance runners attempt to sprint, the desired adjustments do not necessarily occur. Distance runners may benefit from biomechanical interventions to improve running speed near the end of a race.

Hamstring Neuromuscular Training and Strength and Sprint Mechanics

Mendiguchia, J. et. al. 2015. Effects of hamstring-emphasized neuromuscular training on strength and sprinting mechanics in football players. *Scandinavian Journal of Medicine and Science in Sports.* 30 December 2014Full publication history DOI: 10.1111/sms.12388

Abstract

The objective of this study was to examine the effects of a neuromuscular training program combining eccentric hamstring muscle strength, plyometrics, and free/resisted sprinting exercises on knee extensor/flexor muscle strength, sprinting performance, and horizontal mechanical properties of sprint running in football (soccer) players. Sixty footballers were randomly assigned to an experimental group (EG) or a control group (CG). Twenty-seven players completed the EG and 24 players the CG. Both groups performed regular football training while the EG performed also a neuromuscular training during a 7-week period. The EG showed a small increases in concentric quadriceps strength (ES = 0.38/0.58), a moderate to large increase in concentric (ES = 0.70/0.74) and eccentric (ES = 0.66/0.87) hamstring strength, and a small improvement in 5-m sprint performance (ES = 0.32). By contrast, the CG presented lower magnitude changes in quadriceps (ES = 0.04/0.29) and hamstring (ES =

0.27/0.34) concentric muscle strength and no changes in hamstring eccentric muscle strength (ES = –0.02/0.11). Thus, in contrast to the CG (ES = –0.27/0.14), the EG showed an almost certain increase in the hamstring/quadriceps strength functional ratio (ES = 0.32/0.75). Moreover, the CG showed small magnitude impairments in sprinting performance (ES = –0.35/–0.11). Horizontal mechanical properties of sprint running remained typically unchanged in both groups. These results indicate that a neuromuscular training program can induce positive hamstring strength and maintain sprinting performance, which might help in preventing hamstring strains in football players.

Hamstring and Quadriceps Strength and ACL injuries in Female Athletes

Myer, Gregory, Ford, Kevin R, Barber Foss, Kim D Liu, Chunyan Nick, Todd G., Hewett, Timothy. 2009. The Relationship of Hamstrings and Quadriceps Strength to Anterior Cruciate Ligament Injury in Female Athletes. *Clinical Journal of Sport Medicine*: January, Vol. 19, Issue 1.

Abstract

Objective: To determine the association of quadriceps and hamstrings strength to anterior cruciate ligament (ACL) injury risk in female athletes. The primary hypothesis was that there would be decreased knee flexor and increased knee extensor strength in female athletes who went on to ACL injured status (FACL) compared to uninjured female (FC) and male (MC) control subjects.

Study Design: Matched case control.

Setting: Institutional Biomechanics Laboratory.

Participants: Prospectively measured FACL (n = 22) female athletes who subsequently suffered confirmed non-contact ACL ruptures (16 during soccer and 6 during basketball play) were matched (1:4 ratio) to female controls (FC; n = 88) using limb (dominant or non-dominant), pubertal status, sport, and nearest height and mass. In addition, male controls (MC) were matched (1:1 ratio) to FACL to serve as a secondary comparative control. Assessment of Risk Factors: Isokinetic (concentric) knee extension/flexion strength (300 degrees/s).

Results: FACL subjects had decreased hamstrings strength compared to MC (15%; 95% CI, 1 to 27%; *P*= 0.04). FC were not different from MC in hamstrings strength. Conversely, FACL subjects did not differ compared to the MC in quadriceps strength, and the FC demonstrated decreased quadriceps strength relative to MC (10%; 95% CI, 3 to 18%; *P* = 0.01).

Conclusions: The results of this investigation indicate that female athletes who suffered ACL injury subsequent to strength testing had a combination of decreased hamstrings strength but not quadriceps strength compared to males. In direct contrast, female athletes who did not go on to ACL injury had decreased quadriceps strength and similar hamstrings strength compared to matched male athletes

MUSCLE IMBALANCE TESTING

Muscle Imbalance can be detected using the following fields tests: *right and left leg stride length scores, right and left leg kickback scores, right and left leg extension (quadriceps), right and left leg curl scores (hamstrings), and right and left leg speed hops*. These test scores can be analyzed for muscle imbalance to obtain a more clear picture of how evenly speed-strength has been developed throughout the body. Since it is clear that muscle imbalances negatively affect speed of movement, more and more athletes and coaches take the time to compare dominant and recessive limb strength using various weight training exercises and other tests. In the absence of force-plate technology to measure ground reaction force (GRF) during the four phases of a short sprint (the start, acceleration, maximum speed, and deceleration), these test provide the best indicator of imbalances. Stride length differences comparing those recorded after a right-foot push-off the ground to those after a left-foot push-off may be the most revealing of GRF variations. Once a difference is noted, speed-strength training programs can be altered until both sides of the body possess near equal strength.

The major focus on muscle imbalance in the past has been between joint agonists and antagonists such as the quadriceps (generally well developed in sprinters) and hamstrings (underdeveloped in most athletes). Numerous activities and exercises produce strength increases in agonistic muscle groups without a corresponding increase in the antagonistic muscle group. It is difficult to determine just how much a quadriceps-hamstrings imbalance and upper body imbalances of this nature affects speed in short sprints.

Although the type of imbalance discussed above needs to be corrected, there is also an equally important imbalance in team sport athletes that is known to negatively affect the start, acceleration and maximum speed phase of a sprint. *Contra lateral imbalances,* the speed-strength and power differences in the same muscle groups on the right and left side of the body, exist in many athletes. The dominant side (right arm for the right-handed athlete and left leg used for the one foot takeoff in right-handed basketball players), for example, gets more repetitions (jumps, throws), more use in daily chores, and is favored throughout life in all kinds of movements. These and other factors contribute to both the development of one side (upper and lower arm and leg) and to the underdevelopment of the other side. Although the prime movers in sprinting tend to become well developed as a result of normal sprint training, the fact remains that these and other muscle groups may be much more developed on one side of the body than the other. Such imbalances affect every phase of sprinting and must be corrected if an athlete is to reach their maximum speed potential.

It is relatively simple for coaches to identify the weaker side muscle groups and make the correction by improving the speed-strength of that limb through weight training, plyometrics, and sprint loading exercises.

Finding the 1RM for a Speed-strength Exercise

After a general warm-up period and several minutes of dynamic stretching (upper and lower

body), the five steps listed below are used to find the 1RM of specific muscle groups using the specific weight-room strength tests mentioned above. Right and left leg speed hops and stride length scores are determined on a track or grass field area.

1. Complete two easy sets of 9-10 repetitions in the same exercise for which you are determining the 1RM (repetitions maximum).

2. Rest 4-5 minutes before placing an amount of weight on the bar equal to the closest estimate (not overestimate) of the maximum amount of weight that can be lifted for only one repetition. Complete one repetition with that weight using proper form and a "spotter."

3. Rest 3-4 minutes and adjust the weight upward or downward and complete a second attempt with the new weight.

4. Rest 4-5 minutes to full recovery before adding or removing weight and making a final attempt to locate the 1RM.

5. Record the 1RM to the nearest 5-10 pounds.

COACHES HEALTH

The Truth About the Benefits of Multivitamins

Over fifty percent of all Americans take some type of vitamin or mineral supplement on a regular basis. Most individuals do this in the belief that these pills are necessary to prevent or cure a variety of ills, correct dietary deficiencies, or provide an insurance policy against improper nutrition. And, still others, athletes and non-athletes, consume large amount of specific vitamins under the pretense that "if a little of something is helpful, a lot is even more beneficial. This megavitamin approach of consuming 10-100 times the recommended daily intake can lead to hypervitaminosis and produce toxic side effects. As shown in Table 1, the body already has an adequate reserve storage system for key vitamins and minerals to prevent health problems. This reserve capacity helps prevent deficiencies when one fails to eat right for a few days or weeks. With few exceptions, individuals who experience toxicity from an overdose of a specific vitamins or minerals are involved in heavy supplementation. Producing toxic reactions from food alone is extremely rare.

The question asked over and over for decades is whether *the $12 billion spent per year on vitamins and minerals produce any health benefits?* A recent study of multivitamins by Johns Hopkins researchers *shows that there is no proof of benefit, but there is evidence of possible harm from high doses of certain vitamin supplements.* In an editorial in the *Journal Annals of Internal Medicine* titled "Enough Is Enough: Stop Wasting Money on Vitamin and Mineral Supplements," Johns Hopkins researchers reviewed evidence about supplements, including three recent studies:

- An analysis of research involving 450,000 people, which found that multivitamins did not reduce risk for heart disease or cancer.

- A study that tracked the mental functioning and multivitamin use of 5,947 men for 12 years found that multivitamins did not reduce risk for mental declines such as memory loss or slowed-down thinking.

- A study of 1,708 heart attack survivors who took a high-dose multivitamin or placebo for up to 55 months. Rates of later heart attacks, heart surgeries and deaths were similar in the two groups.

Table 1. Extent of Body Reserves of Nutrients and Health Consequences of Depletion

Nutrient	Time to deplete	Potential health implications
Amino acids	3-4 hours	Although you awake each morning with amino acids depleted, no health consequences occur.
Calcium	2,500 days	Most of the body's calcium storage is in the skeletal system; drawing on this storage supply for long term periods will adversely affect the bones.
Carbohydrates	12-15 hours	Short-term depletion causes no problems because the body can shift to protein and fat for energy. Long-term use of protein for energy can cause serious health problems.
Fat	25-50 days	Adipose tissue, the body's greatest reserve source of fuel, provides approximately 100,000-150,000 kcal of energy.
Iron	125 days (women) 750 days (men)	Women have a smaller reserve capacity because of monthly loss of iron during menstruation.
Sodium	2-3 days	After prolonged sweating without food intake, muscle cramps, heat exhaustion, and heat stroke may occur.
Vitamin C	60-120 days	Most excess intake of this water-soluble vitamin is excreted in urine.
Vitamin A	90-360 days	Excess intake of this fat-soluble vitamin is stored in the fat cells.
Water	4-5 days	Death

Researchers concluded that multivitamins do not reduce the risk for heart disease, cancer, cognitive decline (such as memory loss and slowed-down thinking) or early death. It was also noted that prior studies found vitamin E and beta-carotene supplements to be harmful, especially at high doses.

According to Larry Appel, M.D., director of the Johns Hopkins Welch Center for Prevention, Epidemiology and Clinical Research, "Pills are not a shortcut to better health and the prevention of chronic diseases," Consuming a healthy diet, maintaining normal body weight, and reducing the intake of saturated fat, trans fat, sodium, and simple carbohydrates (sugars) are known to offer protection from disease and chronic and degenerative illnesses. The

exception is supplemental folic acid for women of child-bearing potential, Appel says. “Folic acid prevents neural tube defects in babies when women take it before and during early pregnancy. That’s why multivitamins are recommended for young women.” The Centers for Disease Control and Prevention recommends that all women of reproductive age get 400 micrograms of folic acid daily. The amount of iron in a multivitamin may also be beneficial for women of child-bearing potential.

The Other Side of the Coin

Although most studies show little or no benefit from multi-vitamin and mineral supplementation, there is some other evidence to the contrary. According to JoAnn Manson, professor of medicine at Harvard Medical School, “To say that multivitamins have no benefit is an oversimplification. “The Physicians’ Health Study II found a significant reduction in cancer incidence.”In that trial—which randomly assigned roughly 14,600 men aged 50 or older to take Centrum Silver or a placebo for 11 years—the vitamin takers had an 8 percent lower risk of cancer than those who took the placebo. The study found a 12 percent lower risk of cancers other than prostate, men 70 and older experienced an 18 percent reduction in cancer, the incidence of cancer increased in men who had a lower intake of fruits and vegetables, there was a 27 percent lower risk of a new cancer in men who had been previously diagnosed with cancer.

Summary

Although some conflicting evidence remains, it is clear that vitamin and mineral supplementation is not a shortcut to improved health and preventive disease. The best approach is to eat a healthy diet, maintain a desirable body weight, reduce the intake of saturated fat, trans fat, sodium, and simple carbohydrates (sugars: sucrose, glucose, fructose, and lactose). It may be worth taking an ordinary multivitamin to get enough vitamin D, vitamin B-12, and (if you could become pregnant) folic acid. A multi-vitamin may also lower the risk of cancer in men, but the jury is still out in women. The real key is to follow a healthy diet which will provide you with all vitamins and minerals needed.

Source: Ann. Intern. Med. 159: 806, 2013; Ann. Intern. Med. 159: 797, 2013; Ann. Intern. Med. 159: 850, 2013; JAMA 308: 1871, 2012.

A Quick Look at the New Nutrition Facts Label

The Food and Drug Administration (FDA) requires companies to utilize the new labels on packages by July, 2018.

1. Features a Refreshed Design

• The “iconic” look of the label remains, but we are making important updates to ensure consumers have access to the information they need to make informed decisions about the foods they eat. These changes include increasing the type size for “Calories,” “servings per container,” and the “Serving size”

declaration, and bolding the number of calories and the "Serving size" declaration to highlight this information.

•. Manufacturers must declare the actual amount, in addition to percent Daily Value of vitamin D, calcium, iron and potassium. They can voluntarily declare the gram amount for other vitamins and minerals.

• The footnote is changing to better explain what percent Daily Value means. It will read: "*The % Daily Value tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice."

2. Reflects Updated Information about Nutrition Science

• "Added sugars," in grams and as percent Daily Value, will be included on the label. Scientific data shows that it is difficult to meet nutrient needs while staying within calorie limits if you consume more than 10 percent of your total daily calories from added sugar, and this is consistent with the 2015-2020 Dietary Guidelines for Americans.

• The list of nutrients that are required or permitted to be declared is being updated. Vitamin D and potassium will be required on the label. Calcium and iron will continue to be required. Vitamins A and C will no longer be required but can be included on a voluntary basis.

•. While continuing to require "Total Fat," "Saturated Fat," and "*Trans Fat*" on the label, "Calories from Fat" is being removed because research shows the type of fat is more important than the amount.

• Daily values for nutrients like sodium, dietary fiber and vitamin D are being updated based on newer scientific evidence from the Institute of Medicine and other reports such as the 2015 Dietary Guidelines Advisory Committee Report, which was used in developing the 2015-2020 Dietary Guidelines for Americans. Daily values are reference amounts of nutrients to consume or not to exceed and are used to calculate the percent Daily Value (% DV) that manufacturers include on the label. The %DV helps consumers understand the nutrition information in the context of a total daily diet.

3. Updates Serving Sizes and Labeling Requirements for Certain Package Sizes

• By law, serving sizes must be based on amounts of foods and beverages that people are actually eating, not what they should be eating. How much people eat and drink has changed since the previous serving size requirements were published in 1993. For example, the reference amount used to set a serving of ice cream was previously 1/2 cup but is changing to 2/3 cup. The reference amount used to set a serving of soda is changing from 8 ounces to 12 ounces.

•. Package size affects what people eat. So for packages that are between one and two servings, such as a 20 ounce soda or a 15-ounce can of soup, the calories and other nutrients will be required to be labeled as one serving because people typically consume it in one sitting.

• For certain products that are larger than a single serving but that could be consumed in one sitting or multiple sittings, manufacturers will have to provide "dual column" labels to indicate the amount of calories and nutrients on both a "per serving" and "per package"/"per unit" basis. Examples would be a 24-ounce bottle of soda or a pint of ice cream. With dual-column labels available, people will be able to easily understand how many calories and nutrients they are getting if they eat or drink the entire package/unit at one time.


NEW LABEL / WHAT'S DIFFERENT
Servings: larger, bolder type
Nutrition Facts
8 servings per container
Serving size 2/3 cup (55g)
Amount per serving
Calories 230
% Daily Value*
Total Fat 8g 10%
Saturated Fat 1g 5%
Trans Fat 0g
Cholesterol 0mg 0%
Sodium 160mg 7%
Total Carbohydrate 37g 13%
Dietary Fiber 4g 14%
Total Sugars 12g
Includes 10g Added Sugars 20%
Protein 3g
Vitamin D 2mcg 10%
Calcium 260mg 20%
Iron 8mg 45%
Potassium 235mg 6%
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.
Serving sizes updated
Calories: larger type
Updated daily values
New: added sugars
Change in nutrients required
Actual amounts declared
New footnote
FDA

2017

NASE - CSS CERTIFICATION RENEWAL

(Maintaining Certification as an NASE Certified Speed Specialist)

Name (Print as you want your name to appear on the certificate) _____
Date of Certification ____/____/___ **Institution** (If applicable) _____
Mailing Address _____ **City** _____ **State** ____ **Zip**_____
Tel. _____ **E-mail** _____**Current Position/Title** _____

PAYMENT ($39.00; add $39.95 to renew your membership if it has expired)
____ **Make** check/money order payable to NASEINC !
____ My NASE Membership is: ___ Current ___ Not Current (If your membership has expired, add $39.95 to the Renewal fee and submit $78.95 to NASEINC)

Criteria Since Last Certification

In recognition of the extreme dedication and time constraints placed on many of its certified members, the NASE uses a practical approach to ensure continued growth and development as the main means of maintaining NASE - CSS certification as a certified speed specialist. The purpose of the 36-month renewal program is to encourage members to remain current and be aware of new concepts, principles, theories and techniques in the area of speed improvement.

Every 36 months (3 years), applicants complete and return this *Renewal Application Form* after recording key activities that occurred since their previous certification date. Renewal criteria are met when certified members accumulate a total of **25 points** from the choices listed below. Applicants may request credit for other activities via e-mail, mail, or telephone. Example: Continued employment in the area of strength and speed for three years since the previous certification plus 5 points from other categories meets the standard. Any combination of areas listed below can also be used.

	Points
1. A current membership in the NASE is required	
2. Continued employment in Strength, Conditioning, Speed, Related Area	1, 2, 3, years - 10,15,20
3. Attendance at an NASE or other National Symposium	10
4. CEU'S (up to 10)	0 - 10
5. Article(s) submitted for publication in the *Sports Speed Digest*	*5*
6. Article(s) published in other journals, or book Chapters	10
7. College/University Course*	5
8. Program/Course development (attach Syllabus)	3
9. Presentation at a national conference	5
Other: TOTAL (25 or more circled)	____

* Course-related fields: Anatomy, Physiology, Athletic Training, Physical Therapy, Exercise Physiology, Strength and Conditioning, Performance Enhancement, Fitness, and others.

INSTRUCTIONS: Circle the points above; include support data if available, return the form to: NASE, P.O. BOX 1784, KILL DEVIL HILLS, NC 27948 with your fee. Make check/money order to:

NATIONAL ASSOCIATION OF SPEED AND EXPLOSION
HEADQUARTERS: P.O. Box 1784, Kill Devil Hills, NC 27948
Tel. 252.441.1185 Website: naseinc.com e-mail: naseinc@earthlink.net

NASE MEMBERSHIP: $39.95 Per Year

NASE MEMBER BENEFITS

Increase Knowledge & Learn New Techniques

Learn from the only national association devoted entirely to the improvement of speed in short sprints for sports competition.

Obtain Access to a dynamic website

Stay current through the Naseinc.com website containing articles, videos, and other information on speed improvement for team and individual sports updated regularly. Access over 55 back issues of *Sports Speed Digest* with hundreds of articles by leading experts.

Begin Key Networking

Utilize an on-line forum with directed topics for the exchange of ideas and networking with other team sport coach (age group, high school, University, and Pro), Strength and Conditioning coaches, Personal Trainers, Athletes and Parents, and Physical Therapists involved in training athletes throughout the world.

Receive the Quarterly Publication of Sports Speed Digest

The 12-16 page *Sports Speed Digest Quarterly, published in January, April, July, and October.* contains articles by leading experts on speed improvement for football, basketball, baseball, field hockey, rugby, softball, soccer, tennis, and other sports.

- Lead articles on speed improvement techniques
- Q & A and other Columns: Chump to Champ, Speed Improvement for Young Athletes, Coaches Health
- What Research Tells the Coach about Speed Improvement
- Analysis and practical application of the latest research findings

Discounts

Receive discounts on Registration Fees for selected symposiums and clinics.

Certification (Certified Speed Specialists - NASE CSS) and Professional Advancement

Become a recognized expert as a speed coach by completing the NASE prestigious Certification Program in Speed and Explosion for school, university, pro and age-group coaches in all sports, strength and conditioning coaches, personal trainers, athletic trainers, and undergraduate and graduate students. Experienced coaches begin with the NASE advanced Level II certification.

Level I Certification (online course) for inexperienced coaches and undergraduate students,

Level II Certification (online course) for experienced coaches and graduate students,

Self-study Level II certification for experienced coaches who prefer to avoid taking an online course on the computer and prefer to prepare on their own after receiving materials and other resources.

Optional Add-on Features

The NASE fee of $39.95 covers a one-year NASE membership. and is **required before** adding on Option I: *Premier OR Option 2: Premier Plus.*

* To register and buy one of the three yearly NASE Memberships online, use this direct link:

http://www.naseinc.com/product-category/membership/

Nase Membership ($39.95)

Premier Membership ($159.95)

What you get in addition to the NASE benefits listed above:

Discounts on Registration Fees for selected symposiums and clinics.

Video Library access to educational videos to help you and your client, with hundreds of videos updated monthly.

Podcast access with top speed and strength coach, Larry Jusdanis. These Interactive podcasts will be held monthly.

Premier Plus ($219.95)

What you get in addition to the NASE benefits listed above

Discounts on Registration Fees for selected symposiums and clinics.

Video Library access to educational videos to help you and your client, with hundreds of videos updated monthly.

Podcast access with top speed and strength coach, Larry Jusdanis. These Interactive podcasts will be held monthly.

Athlete Programming with access to unlimited athlete programs for your reference. Some of these programs have generated the fastest players at the NFL and CFL combines.

Consultation with one 30 minute phone call with a NASE certified speed coach. You may ask us anything you like about training for speed and strength.

Name _____Title_____

Address _____ State _____Zip _____

Tel _____ e-mail _____

_____ $39.95 (NASE ANNUAL MEMBERSHIP ONLY)

_____ $159.95 (Premier Membership - Includes NASE Membership), OR

_____ $219.95) (Premier Plus Membership - Includes NASE Membership)

TOTAL _____ You can pay online OR return this form with a check or money order for $39.95 to NASEINC, Box 1784, Kill Devil Hills, NC 27948.