## TABLE OF CONTENTS

### FEATURES

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td><strong>BASEBALL IN-SEASON AGILITY TRAINING</strong></td>
<td>CRAIG CHEEK</td>
<td>Baseball players can greatly benefit from agility and change of direction training. Not only can the athlete practice these skills in the off-season, but a year-round program can keep them sharp and finely-tuned on the field. This article provides examples of how to implement this type of training for all baseball players effectively.</td>
</tr>
<tr>
<td>07</td>
<td><strong>IMPROVING AGILITY AND QUICKNESS FOR THE CLUB VOLLEYBALL PLAYER</strong></td>
<td>DANIEL BYRNE, MS, CSCS, TSAC-F</td>
<td>Volleyball is a sport that requires agility and quickness in both the body and the mind. When training for these skills, an often-forgotten aspect of the game is the cognitive ability of the volleyball player, so incorporating reactive drills into a training program will teach the athlete to quickly respond to stimuli. This article also provides a pre-season sample agility program to develop all aspects of agility and quickness in volleyball players.</td>
</tr>
<tr>
<td>12</td>
<td><strong>FUNDAMENTALS OF SPEED IMPROVEMENT FOR ALL SPORTS</strong></td>
<td>JOHN McNAMARA, PHD, CSCS,”D, NSCA-CPT,”D, USAW, JAMES CHUNG, YUKI MIYAZAWA, CSCS, USAW-1, AND MAX BARNHART, CSCS</td>
<td>This article provides three training strategies to be used in tandem to maximize speed improvement. The first is to physically prepare the body to be strong and healthy. Secondly, motivation plays a key role in attaining speed, so teaching the athlete to maintain a high level of arousal is essential. The third approach is to repeat sport-specific movements at a fast pace until they become embedded into muscle memory.</td>
</tr>
</tbody>
</table>

### COLUMNS

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td><strong>PERSONAL TRAINING FOR PERFORMANCE</strong></td>
<td>CHAT WILLIAMS, MS, CSCS,”D, NSCA-CPT,”D, FNSCA</td>
<td>Oftentimes trainers will focus their programs around strength, endurance, and flexibility, and will neglect to work on speed, agility, and quickness. This article describes a variety of different drills, complete with pictures and descriptions that are designed to enhance speed, agility, and quickness abilities. These example exercises vary between open and closed agility drills and work on an athlete’s acceleration, deceleration, footwork, change of direction, and explosive capabilities.</td>
</tr>
<tr>
<td>21</td>
<td><strong>TRAINING TABLE</strong></td>
<td>DEBRA WEIN, MS, RD, LDN, CSSD, NSCA-CPT,”D, AND ERIN RIZKELLA</td>
<td>Recent research shows that adding tart cherry juice to an athlete’s diet can help decrease pain, inflammation, and musculoskeletal injury after strenuous exercise. Substantial improvements in these areas can be seen by consuming 12 fl oz of tart cherry juice twice daily (equating to about 100-120 cherries). Not only is this method natural, but cherries are an excellent source of antioxidants and anthocyanins.</td>
</tr>
<tr>
<td>23</td>
<td><strong>YOUTH ATHLETIC DEVELOPMENT</strong></td>
<td>RICK HOWARD, MED, CSCS,”D, USAW</td>
<td>When developing a speed and agility program for preadolescents and adolescents, selecting open training methods and sport-specific drills will keep the workouts exciting and challenging. An effective training regimen should utilize an integrative neuromuscular program involving performance-enhancing and injury-reducing components. This type of balanced program promotes strength, power, balance, skills fitness, health fitness, and healthy exercise habits.</td>
</tr>
</tbody>
</table>
The competitive season is a critical time to enhance the physical qualities necessary for change of direction skills required in the game of baseball. These qualities can be developed throughout the year as part of a comprehensive strength and conditioning program. Overall training volume should be reduced to ensure that on-field skill does not suffer, and that the time devoted to agility training is of the highest quality. At the University of Notre Dame, athletes perform agility training for a minimum of once per week during the competitive season. It is our belief that by making it a year-round priority in the program, athletes can stay "sharp" and apply these abilities to the field of play. What follows is an overview of the in-season baseball agility training program considerations we have implemented.

Most sports skills require the ability to rapidly decelerate, react, and then rapidly accelerate, oftentimes in a different direction. Agility can be defined as the ability to explosively brake, change direction, and accelerate (3). Success is usually determined by the ability to develop high amounts of force quickly and achieve high movement velocities. In baseball, lateral speed, agility, and quickness can be just as essential as strength and speed (1,2). After a thorough analysis of the
movement requirements for the sport, it is clear that programming agility drills is one of the most effective methods for developing change of direction ability.

The focus during all agility drills should be speed and precision. During these drills, athletes move at high velocities and try to coordinate multiple tasks through various planes of movement, all at the same time. By varying starting positions and alignments, one can further challenge an athlete’s ability to react as explosively and efficiently as possible. It is imperative that proper technique is adhered to during each drill—even the slightest deviation in technique can result in slower movement speeds and decreased movement efficiency.

Technique considerations include head position, arm action, shin angles, and body alignment, among others. Athletes should be instructed to maintain a “head neutral” position with their eyes on the target. Powerful arm actions will aid in the successful execution of the movement pattern. Elbows should be close to the sides to eliminate unnecessary movements.

A “shin angle” refers to the direction an athlete applies force into the ground, and can be termed positive or negative. Simply put, positive shin angles refer to a smaller angle between the shin and the foot (accelerating) and negative shin angles refer to a larger angle between the shin and the foot (decelerating). The athlete’s ability to maintain a lower center of gravity will enable them to perform agility drills much more efficiently. The ability to transition from an action of deceleration to acceleration is greatly improved if the athlete can maintain a lower center of gravity. Increased neuromuscular efficiency and body control may also improve overall athleticism. Careful considerations of work-to-rest ratios can help maintain efficient technique throughout.

Proper planning of work-to-rest ratios will allow coaches to ensure that each repetition is completed as fast and as precisely as possible without the concern of neuromuscular or cardiovascular fatigue. All drills require a 3 – 5 s effort with a 30 – 45 s rest interval. Many facilities operate in a very dense training environment with athletes constantly on the move. One of the biggest challenges is helping athletes to understand that in a situation like this, it is fine to rest and be fully recovered before the next repetition. By training at sport-specific movement speeds with proper rest intervals, athletes can be allowed to train at levels that closely resemble the metabolic demands of the sport (1).

Not all injuries are avoidable or preventable. It is our belief that in-season agility training works in concert with our strength training to increase an athlete’s durability. Proper agility training may promote increases in flexibility and coordination, and help to decrease rehabilitation time. Agility training can serve as another tool to prepare the body for the demands of athletic competition and may help decrease the recovery time after an injury.

Based on the increased neurological demand of agility training, it should be performed when the athlete is fresh. All of the in-season agility sessions take place after a thorough dynamic warm-up and prior to a total bodyweight training session. The dynamic warm-up serves as a primer for the work ahead and ensures that all of the athletes are ready to perform with maximum effort.

Position players lift three times per week in the early part of the competitive season until midweek games begin. At the start of midweek games, the lifting schedule is reduced to two times per week. The pitchers’ lifting schedule is usually two times per week, depending on their role (e.g., starter vs. reliever) and their throwing schedule. Agility training is an integral part of the pitchers’ program and as such, they are held to the same performance standards as their positional counterparts.

Setup for the in-season agility drills require four cones in a 5 x 5 yard square (Figure 1). Typically, drills are set up so that four athletes can perform the drill, but multiple squares can be set up to allow larger groups to perform the drills at the same time. This requires 10 cones with one end cone being left open (Figure 2). Athletes will never cross paths with each other, which will allow multiple athletes to perform the drill at once; thereby enabling the coach to effectively manage a stressed time schedule, and to increase the competitive nature of each drill. Incentives can be offered to the winners of each drill on occasion to promote competition. One example is a “winner sits” incentive. An incentive should not always be afforded during training sessions, but the occasional implementation can help stimulate competition and promote maximal effort on each repetition.

Depending on the training and competitive schedule, programs typically prescribe 8 – 12 repetitions of the agility drills. This is broken down into 4 – 6 different movement patterns each performed twice, with one in each direction (Figures 3 – 6). Within each pattern is a subset of 3 – 4 movement skills that touch on the various movements required during performance of the sporting activity. Forward sprinting, backpedaling, shuffling, and diagonal sprints comprise the majority of the movement skills performed in each pattern. Verbal instruction is given immediately prior to the execution of each drill that outlines the 3 – 4 movement patterns within the drill. This forces the athlete to process the instruction quickly and practically apply the information to the drill. Each drill will start with an audible cue (e.g., whistle or “go”). The athlete’s performance will be deemed successful if each movement skill is performed correctly without knocking over any cones or falling down. If an athlete fails, they should be instructed to return to their feet as quickly as possible and finish the drill.

Agility training is just one part of a comprehensive strength and conditioning program. Based on the value of in-season agility training, the University of Notre Dame makes sure it is part of the annual plan and prioritizes it as such. It is important to keep
the repetitions low and focus on quality over quantity during the competitive season.

REFERENCES

ABOUT THE AUTHOR
Craig Cheek is entering his sixth year at the University of Notre Dame, and his second year as the Assistant Director of Strength and Conditioning. He is responsible for designing the strength and conditioning programs for the women’s basketball and baseball programs, as well as coordinating all strength camps/clinics and supervising development of a comprehensive website for the strength and conditioning department.
IMPROVING AGILITY AND QUICKNESS FOR THE CLUB VOLLEYBALL PLAYER

DANI BYRNE, MS, CSCS, TSAC-F

Strength coaches, sport coaches, and personal trainers are constantly challenged to make their athletes bigger, faster, and stronger than the competition. College strength coach and sport coach jobs depend upon the performance outcomes of their teams; and personal trainers only sell more sessions when they produce measurable results. However, while improving the physical attributes of athletes, coaches and trainers commonly overlook the importance of improving cognitive abilities. Improving agility and quickness should not simply involve the physical capabilities, but also the mental...
capabilities of the athletes. Before providing a sample agility and quickness program for volleyball players, this article will first look at movements specific to volleyball, the value of agility testing, and program considerations for training these athletes.

**AGILITY MOVEMENTS SPECIFIC TO VOLLEYBALL**

Speed is the ability to achieve a high velocity (1). Agility has been defined as the ability to suddenly decelerate, change direction, and accelerate again (1). Quickness can be considered the athlete's reactive ability (3).

Quick or reactive movements differ by sport. Volleyball is an explosive sport that requires agility and quickness of both the mind and body. Consequently, volleyball players are expected to process information quickly and make decisions that are based on a series of unplanned stimuli. Agility and quickness are required of each position on the volleyball court and impact performance in each play. Agility and quickness requirements are task-specific and vary depending on the position of each player. A middle blocker is expected to quickly adjust to a setter’s body position and determine where the attack will originate. Defensive specialists and liberos are expected to not only read the play on the other side of the court, but also to read the hands and positioning of their own blockers to make final adjustments. It is not enough to simply be “fast” or agile on the court. To be successful, the athletes need to assess the situation properly and make the correct decision regarding which direction to move.

Based on the requirements of a volleyball match, strength coaches and/or sport coaches have many angles from which to improve their athletes’ agility and quickness. As mentioned earlier, volleyball players need to be able to perceive a stimulus, respond to the stimulus, and then make a decision. A novice player will not have the experience to identify most task-relevant cues and time would be better spent training the technique involved in agility and change of direction movements. However, athletes at a more elite playing level will benefit from both the quick reaction training as well as refining their agility. Volleyball players at any position constantly move to adjust to the play that occurs on the other side of the net as well as the play on their side of the net; successful teams never stand still. This means that the more efficiently the players can change direction on the court, the better chance they have of being in the correct position to play the ball. Common movements occurring in volleyball include but are not limited to:

- Lateral shuffle
- Cross-over step
- Backpedal
- Forward sprint
- Double-leg lateral, forward, backward hop
- Single-leg take-off

**AGILITY TESTING**

Prior to beginning agility programs, coaches should test their athletes to assess whether or not the programs are effective. If an agility test is going to be added to a battery of tests, there are many sequence considerations that must be addressed, including: energy demands of the test, number of trials for each test, number of athletes participating, number of testing administrators, equipment needed, and recommended rest periods (3). As previously discussed, agility and quickness requirements vary depending upon the position, therefore, tests should mimic those movements required of each position. The most common movements for a middle blocker or an attacker are short lateral hops, double-leg take-offs, cross-over steps, and change of direction. Defensive specialists and liberos must be able to quickly shuffle laterally, backpedal, sprint, change direction, and dive in any direction. Setters often need to be the “fastest” player on the team because they often cover the most distance during a match. Setters usually have a short period of time to reach their position at the net following the service, and must often chase down errant passes. Because of the frequent movements completed by each position, a coach should choose an appropriate agility test. For example:

- Setters: Three-cone shuttle tests will assess skills used in most power sports, including body position, movement technique, acceleration, and change of direction speed (3)
- Back row (defensive specialists and liberos): T-tests will assess an athlete’s ability to adjust strides for acceleration and deceleration, change-of-direction speed, and body control while moving forward, backward, and laterally (3)
- Front row (blockers and attackers): Hexagon tests will assess body control during high force production (3)

**PROGRAMMING CONSIDERATIONS**

Once the coach has performed a base test, it is time to implement the individualized agility program. When developing the structure of an agility training session, it is important to consider the variation of drills as well as the drill distribution within a session (4). It has been shown that randomizing the variation of drills within a session is more effective than block training movement patterns (5). Blocking the drills by movement patterns may produce short-term improvements in performance, but the job...
of a coach or trainer is to prepare their athletes for a lifetime of success. Any agility drill can be varied by simply changing the distance covered, the speed utilized, or the starting or finishing position of the drill.

**PRINCIPLE OF SPECIFICITY**

Specificity refers to the method of training an athlete uses to produce a specific adaptation or training outcome (2). Coaches can replicate sport-specific movements, flooring, competitive environments, and noise levels. Indoor club volleyball tournaments are typically very loud and in very large environments with nets hanging around the courts. An athlete is going to have many environmental stimuli to interpret throughout the competition. Indoor volleyball is played on either hardwood or sport court floors, so coaches and trainers should train their athletes on similar flooring whenever possible. If the only space available is rubber flooring, use what is available, but remember that the transfer of skills may be diminished.

Coaches need to identify the most commonly utilized movements and develop their program accordingly. After determining the common movements in volleyball, a coach can choose closed skill drills to improve technique and movement patterns. It is important to progress the athletes through agility drills just as with any other complex movement pattern. Prior to expecting the athletes to move through a ladder while responding to visual stimuli successfully, coaches need to be certain their athletes can successfully navigate the ladder without added stimuli. Coaches may also challenge their more advanced athletes by stressing the appropriate energy systems by mimicking the competition with similar work-to-rest ratios. Reactive drills can be used to mimic the mental agility of a game-like situation. Coaches can choose drills such as shadowing, ball drops, verbal, or visual stimuli to improve the reactive abilities and challenge cognitive quickness. The following tips can be helpful when training for volleyball-specific agility and quickness at any experience level:

- Begin with closed drills to perfect technique, then add reactive drills as soon as the athlete can handle them
- Train the movement patterns and energy systems of each player based on their position
- Keep the distances covered short; long-distance movements are rare
- Deceleration training is an important factor when considering injury prevention and efficient movement on the court (i.e., middle blockers must decelerate quickly to reduce likelihood of stepping on the assisting blocker)

**SAMPLE PROGRAM**

Table 1 provides a sample agility and quickness program for experienced volleyball players during the early pre-season. In early pre-season, agility drills should be at their highest volume and taper off as the season approaches.
## Table 1. Sample Pre-Season Agility and Quickness Program for Volleyball Players

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>WEDNESDAY</th>
<th>FRIDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activation and Dynamic Warm-Up</strong></td>
<td><strong>Rest 30-40 s between drills</strong></td>
<td></td>
</tr>
<tr>
<td>5 meter 2-cone lateral shuffle (4x10 s each)</td>
<td>Lateral bounds (4x6 each leg)</td>
<td>Ladder drills (hopscotch, slaloms, cherry pickers, 180s) (2 sets each)</td>
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<tr>
<td>Ball drop drill (4x6 drops)</td>
<td>5 s line drills (forward and backward hops, lateral hops, scissors, and single-leg forward hops) (2 sets each)</td>
<td>5 meter M drill (cones) x6 (3 each direction)</td>
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<tr>
<td>Lateral blocking movement across the net (3 each direction)</td>
<td>Shuffle reaction ball drill (4x6 catches) (Figures 1 and 2)</td>
<td>Jump, squat, or dive drill, 10 s per set (4 x 10 s per set)</td>
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<tr>
<td>Ladder drills (one in the hole, two in the hole, ickey shuffle, two in two out) (2 sets each)</td>
<td>Star drill x4 (2 each direction)</td>
<td>Shuffle and forward reaction ball drill (4x6 tosses) (Figures 3 – 5)</td>
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<td>6 low hurdles (double-leg forward hops, double-leg lateral hops, single-leg hops, single-leg lateral hops) (2 sets each)</td>
<td>Dot drill forward and back 5-3-5 pattern (4 sets)</td>
<td>Red light, green light</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FEATURE ARTICLE

IMPROVING AGILITY AND QUICKNESS FOR THE CLUB VOLLEYBALL PLAYER

REFERENCES

ABOUT THE AUTHOR
Dani Byrne completed her internship at the National Strength and Conditioning Association (NSCA) Headquarters in Colorado Springs, CO. Byrne earned both her Bachelor’s degree and Master’s degree at the University of Northern Colorado in Greeley, CO. Byrne has coached 6 seasons of junior varsity and club level volleyball in Colorado while also working as a strength coach and wellness coordinator. She has devoted much of her career to improving injury prevention techniques for youth athletes.

Figure 1. Shuffle Reaction Ball Drill Start
Figure 2. Shuffle Reaction Ball Drill Finish
Figure 3. Shuffle Forward Reaction Ball Drill Start
Figure 4. Shuffle Forward Reaction Ball Drill Reaction
Figure 5. Shuffle and Forward Reaction Ball Drill Finish
Usain Bolt is arguably the fastest human on planet earth. His world record performance in the 100 meters was 9.58 s with a peak running speed of 45 kilometers per hour (kph) (9). Sarah, however, recently ran the 100 meters in a time of 5.95 s reaching a top speed of 98 kph (15). Sarah is a cheetah, the fastest of all land animals. Both humans and animals follow the same basic underlying principles in order to achieve high-speed performances. Mathematically speaking, both rely on stride length and stride frequency to determine speed. Furthermore, speed, agility, and quickness rely on a complex combination of several genetic, physical, psychological, and biomechanical factors. Speed is the ability to move the body in one intended direction as fast as possible (3). Agility is the ability to start (accelerate), stop (decelerate and...
stabilize), and change direction quickly, while maintaining proper posture, and quickness (reaction time) is the ability to react to a stimulus and change body position with maximum rate of force production in all planes of motion and from all body positions during functional activities (13). Given these definitions, the focus of this article will cover three fundamental factors for increasing speed: overall fitness, motivation, and high-speed practice. These building blocks can help athletes become faster through training.

For athletes to attain optimal speed, agility, and quickness, a healthy body is required. An injury or weakness of any kind will limit performance. Strong feet, legs, and core are especially important for running speed while bones, tendons, and ligaments are essential for providing a solid structure against which strong and rapid muscular forces can be exerted. For adults, a healthy body may be achieved by proper nutrition, adequate sleep, and an intelligent exercise program that adheres to the principles of training, which includes progressive overload. Athletes must physically prepare their bodies to handle the stresses of moving at high velocities while maintaining proper body stabilization and alignment in order to prevent injury.

Strength and power training using weighted resistance, as well as sport-related drills, can improve speed by decreasing the time required to produce force over a given distance (2). A key anatomical area of focus for athletes seeking to improve their speed is the core. The core (which includes, but is not limited to, the abdominals and lower back muscles) stabilizes the trunk and pelvis which are beneficial to sport-specific and general speed technique (7,10). It also serves as a bridge to transfer force from the lower body to the upper body (7). Some exercises that can be used to strengthen the core include isometric planks and exercises such as cable chops and cable lifts where athletes must resist trunk rotation by engaging the core throughout the movement. Exercises such as these may help the athlete maintain proper posture and prevent injury. Other exercises that can be used to increase an athlete’s speed include ballistic movements with no external loading, such as jump squats and jumping knee tucks. These exercises should be executed with high velocity to simulate competition and improve the rate of force production (11). Resisted speed drills which involve the athlete moving against increased horizontal or vertical loads, such as band resisted sprints and weighted vest sprints, are also very effective in improving rate of force production (5). Athletes may improve their speed by utilizing these exercises in their training regimen.

Traditional resistance training may also contribute to the development of speed if the program is designed properly. When designing programs, be sure to give your athlete an edge by training several points on the strength velocity curve continuum. For example, peak speed is achieved with very little or no resistance. Part of the training program must be done quickly with very light weights (or no weight at all). Peak power however, is achieved at medium resistance, approximately 30% of one repetition max (IRM) (1). Here, the athlete can lift medium weights moderately fast and generate a high power output. Peak strength on the other hand, is achieved with heavy resistance at loads of greater than 85% of IRM. The great thing about changing the resistance is that both heavy and light loads have been shown to increase speed by increasing type II muscle fibers which are 4 – 6 times more powerful than type I (4,16,18).

Motivation can have a tremendous impact on the speed of muscular contraction as well. It can be reasoned that neither Usain Bolt nor Sarah the cheetah, have, or ever will, reach their top running speed. The reason for this is an absence of maximal motivation. Usain Bolt will likely never run as fast as he would if his life were threatened, and Sarah is a cheetah in captivity who will never likely run as fast as she would in the wild where survival is at stake. This can be evidenced by the setting of her 98 kph record only while chasing a small stuffed animal during playtime at the San Diego Zoo.

The Inverted-U hypothesis has long been used to articulate the relationship between arousal and performance; however, the optimal arousal level for peak performance does not appear to be as standardized as previously thought. Pragmatically, arousal may be contingent on a multifaceted combination of the athlete’s tangible and intangible qualities. Upon delving further into the issue of arousal, one discovers the inherent complexity regarding its relation to performance. Not only do requisite arousal levels vary from sport to sport, but there proves to be variance between positions within the same sport. For example, in football, the offensive guard requires high arousal, the open field runner requires moderate arousal, and the quarterback likely would perform best at a low level of arousal (12). For most sports that require peak movement speed, a relatively high or above normal level of arousal appears to be essential for optimal performance (5,7,10,12). To increase arousal level prior to activity, coaches can use positive encouragement, or athletes can listen to motivating and energizing music.

The practice of very fast and efficient sport-specific movements needs to be rehearsed repeatedly so it becomes automatic. When learning sports skills, the part of the brain called the motor cortex is utilized (14). This results in uncoordinated movements, common with beginners. Over time (i.e., thousands of practice hours), the movements should become second nature, smooth, and extremely effortless. At this point, the mind has shifted to using an area of the brain called the basal ganglia (14). As a result, very little thought process is needed and physical performance speeds up via well-defined neurological pathways that are not slowed by heavier processing demands. Players should also be able to perform faster during team practice and individual skill training.

When putting together a speed program, it is important to provide athletes with a regimen that adheres to the accepted principles of strength and conditioning. The following weekly program can
be used for beginner, intermediate, and advanced athletes in any sport but should be adjusted according to the training status or skill level of the athlete.

Training for 30 min, several times a week, may be all that is needed to see improvements in speed. Day one includes practicing sport-specific movements at high speed. This is probably the most important day of the week and will likely have the greatest impact on speed improvement. For example, a hockey player can practice a short sprint toward the net and take a quick snapshot. As a coach, you can start to measure progress by using a stopwatch to see how long it takes an athlete to repeat the drill three times.

Day two includes heavy resistance training with RMs in the 7 – 10 range. This will allow the tendons, ligaments, and muscles to undergo adequate amounts of stress necessary for inducing the desired physiological adaptations so athletes can develop a stronger and more powerful body with which to execute high-speed movements.

Day three is an active rest day, during which the athlete avoids both high-intensity aerobic and anaerobic training. Whether it is a team or individual sport, the drills should be easy and include stretching and relaxation.

Day four consists of low to moderate resistance training so that a high power output can be generated. Sport-specific drills can also be enhanced using additional resistance. Examples include the use of weighted vests and heavier than normal pucks, balls, and bats. Whatever the drill or activity may be, encourage players and athletes to move as fast as possible.

Day five includes competition; if you do not have a scheduled competition on this day you can create one. You can inspire a competitive atmosphere by measuring and comparing performances from week to week.

Day six includes endurance training. This can include riding a stationary bike, treadmill, elliptical machine, swimming, jogging, or speed walking. This will help strengthen and fortify an athlete’s aerobic capacity, which contributes to the reduction of fatigue during prolonged high-speed movements.

Day seven is a total rest day and physical activity should be severely limited in order to recover from the previous week of training.

In summary, many factors can contribute to enhanced speed, agility, and quickness. The first strategy for speed enhancement includes creating a strong healthy body by consuming a balanced diet, getting plenty of rest, and utilizing an effective training program. A second strategy is to teach athletes that a relatively high, or above normal level of arousal or motivation can improve performance. The third approach involves practicing sport-specific movements at high speeds until they become automatic or second nature.

REFERENCES


Many times when designing a strength and conditioning program, the personal trainer will focus on improving muscular strength, muscular endurance, cardiovascular endurance, and flexibility. Including motor skill components that enhance speed, agility, and quickness should be considered depending on the individual’s goals, activity, or sport. This applies to all populations including weekend warriors, older adults, and youth. The personal trainer can modify many, if not all of the drills depending on the individual’s training age, fitness level, and skill level. Acceleration, deceleration, change of direction, footwork, stride length, stride frequency, and explosive capabilities are just a few of the variables that may improve when incorporating speed and agility into a training regimen (2). The purpose of this article is to define basic speed, agility, and quickness components and provide sample exercises/drills that can be incorporated into a comprehensive training program.

KEY TERMS

**Speed:** The ability to cover a specific distance or execute a movement in a short amount of time (3)

**Agility:** The ability of an individual to change direction quickly or the velocity of the body when reacting to a stimulus (3)

**Acceleration:** The process of going from a static, or near static, position and reach maximal speed as quickly as possible (2)

**Deceleration:** The ability to slow down or stop quickly while maintaining body control

**Stride length:** Can be improved through the training of sprint mechanics and is typically 2.3 – 2.5 times the leg length of the individual (2)

**Stride frequency:** The number of strides taken in a specific amount of time and distance (2)

**Closed agility drills:** These types of drills remain consistent and have a pre-determined pattern (3)

**Open agility drills:** These types of drills have limited restrictions and are performed in environments that constantly change and are not pre-determined (3)

Speed and agility drills can be incorporated using several types of equipment, including manual resistance straps, cones, hurdles, parachutes, and agility ladders. The following exercises are some examples that can be incorporated into a program to enhance speed, agility, and quickness.

**RESISTED SPRINTS**

Manual Resistance Strap (Partner) (Figures 1-2)

Components Challenged: Stride Length, Speed, Acceleration, Closed Agility

Start with one individual standing in front of the other. The person in front will have the strap around his/her waist with the other person applying the resistance from behind with the handles. Once the person in front starts running, the person with the handles should apply resistance. Apply the appropriate amount of resistance so the individual can still maintain proper sprinting technique throughout the sprint.

Parachutes (Partner) (Figures 3-5)

Components Challenged: Stride Length, Speed, Acceleration, Closed Agility

Start with the belt around the waist, the parachute will be attached behind the individual and held by a partner. As the individual starts to accelerate, the partner should slightly toss the parachute upward within the first 2 – 3 steps so the wind catches the parachute and applies the resistance. The amount of resistance will depend on the size of the parachute and wind conditions.

**LADDER DRILLS**

2 In/Out (Figures 6-9)

Components Challenged: Agility, Acceleration, Deceleration, Closed Agility

Start with both feet outside the ladder on the left side, step laterally with the right foot into the square, and then quickly follow with the left foot. Simultaneously step out of the square with the right foot, and then follow with the left foot. Both feet will be on the outside of the ladder to the right, repeat by leading with the left foot. Move through the ladder alternating the lead foot for each square.
Scissors (Figures 10-12)
Components Challenged: Agility, Acceleration, Deceleration, Closed Agility
Start standing sideways to the ladder, the right foot in the square and left foot outside the ladder positioned slightly back (staggered stance). After the scissor kick, the left foot will be in the first square and the right foot will be outside of the second square. Duplicate the same pattern while alternating the feet and quickly moving through each square forwards and backwards.

CONE DRILLS
5-Cone (Figures 13-15)
Components Challenged: Agility, Acceleration, Deceleration, Closed or Open Agility
Start in the middle of the cones. Sprint to the cone on the left, decelerate, and backpedal to the starting point. The drill is complete once each cone has been touched and the individual has returned to the starting point.

Note: Drill can be modified by changing skill (shuffle, carioca, combinations). Plus, this drill can be performed as an open agility exercise by calling out the colors of the cones so the individual must react to an audio cue.

T-Drill (Figures 16-20)
Components Challenged: Agility, Acceleration, Deceleration, Closed Agility
The T-Drill is a closed agility drill that focuses on linear speed, lateral shuffling, and backpedaling. There are four cones in the formation of a “T.” Cone A is the starting point, cone B is 10 yards directly ahead, and cones C and D are five yards apart on the left and right side of cone B. The individual starts at cone A. On the command of the personal trainer, the individual sprints to cone B and touches the base of the cone with their right hand. The individual will cut left and shuffle sideways to cone C, and touch its base, this time with their left hand. Then they will decelerate and shuffle sideways to the right to cone D, touching the base with the right hand. They decelerate again and shuffle back to cone B by touching with the left hand, making a cut, and running backwards to cone A. The drill is complete when they pass cone A.

GAMES/DRILLS
Mirror/Cat and Mouse (Figures 21-25)
Components Challenged: Agility, Acceleration, Deceleration, Open Agility
Have two individuals stand across from each other between two cones, approximately 10 yards apart. One of the individuals will move laterally back and forth trying to elude the second person. This is performed in a smaller space, so the movements should be sharp, quick, and precise.

Cat and mouse is a type of mirroring drill that uses a Velcro strap fastened around the waist of each individual. The object of the game is for the “mouse” to distance himself or herself far enough away from the “cat” so that the Velcro strap in the middle of the two individuals releases. The game can be limited to lateral movements in a specific range and distance, or can be opened up to all movement patterns. The cat must do their best to mimic and react to the movements of the mouse while maintaining close proximity.

Medicine Ball Tennis (Figures 26-27)
Components Challenged: Agility, Acceleration, Deceleration, Open Agility
Medicine ball tennis is an open agility game played on the tennis court; the general rules of tennis apply except for the game requires a rubber medicine ball that will bounce. The object of the game is to return the ball over the net with minimal steps (fast paced) before the ball bounces twice. Overhead throws and rotational throws may be used to return the ball. If the ball bounces twice before being caught and returned over the net, the individual serving is awarded a point. The first person to score 10 points (win by 2) is the winner. This can be modified depending on the desired duration of the game. Playing rally points would be another modification to help speed up the game. The size and the weight of the ball should be determined by skill level, fitness level, and size of the individuals playing. Adding a smaller racquetball or reaction ball to the game may increase the difficulty for the individuals.
BASIC SPEED, AGILITY, AND QUICKNESS DRILLS FOR THE PERSONAL TRAINER

Figure 1. Manual Resistance Strap: Start
Figure 2. Manual Resistance Strap: Sprint
Figure 3. Parachute: Start

Figure 4. Parachute: Initial Drive
Figure 5. Parachute: Finish
Figure 6. Ladder – 2 In/Out: Start

Figure 7. Ladder – 2 In/Out: Right Foot In
Figure 8. Ladder – 2 In/Out: Both Feet In Square
Figure 9. Ladder – 2 In/Out: Right Foot Out

Figure 10. Ladder – Scissor: Left Out Right In
Figure 11. Ladder – Scissor: Alternate Feet, Left In Right Out
Figure 12. Ladder – Scissor: Alternate Feet and Next Square
BASIC SPEED, AGILITY, AND QUICKNESS DRILLS FOR THE PERSONAL TRAINER
REFERENCES

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Chat Williams is the Supervisor for Norman Regional Health Club. He is a past member of the National Strength and Conditioning Association (NSCA) Board of Directors, NSCA State Director Committee Chair, Midwest Regional Coordinator, and State Director of Oklahoma (2004 State Director of the Year). He also served on the NSCA Personal Trainer Special Interest Group (SIG) Executive Council. He is the author of multiple training DVDs. He also runs his own company, Oklahoma Strength and Conditioning Productions, which offers personal training services, sports performance for youth, metabolic testing, and educational conferences and seminars for strength and conditioning professionals.
TART CHERRIES - THE NEW ASPIRIN?

The performance of athletes often rests heavily on what occurs after exercise. Several studies on tart cherries may be particularly relevant to athletes as their purported benefits include decreasing pain, inflammation, and musculoskeletal injury in individuals who perform strenuous exercise, such as long-distance running. Traditional treatments for inflammation of muscle tissue, or recovery from acute injury, have been rest, ice, compression, and elevation (RICE) and non-steroidal anti-inflammatory drugs (NSAID) (3). RICE requires a standard period of time to rest, which many athletes would like to reduce if possible. With prolonged use, NSAIDS can have unpleasant side effects that range from nausea, vomiting, and gastrointestinal ailments to more serious side effects such as kidney failure, liver failure, and ulcers (1). A natural alternative to these concerns with RICE and NSAID drugs could be as simple as introducing tart cherry juice into an athlete’s diet; tart cherries have been shown to help alleviate inflammation, improve recovery after exercise, and assist with the management of pain associated with certain conditions.

THE EFFECTIVENESS OF TART CHERRIES

In a recent study, researchers found that tart cherry juice could aid in recovery following strenuous exercise by increasing total antioxidative capacity, reducing inflammation, and limiting lipid degradation (6). In this study, recreational marathon runners consumed either cherry juice or a placebo for five days before, the day of, and for 48 hr following a marathon. Markers of muscle damage (creatine kinase, lactate dehydrogenase, muscle soreness, and isometric strength), inflammation (interleukin6 [IL-6], C-reactive protein [CRP] and uric acid), total antioxidant status (TAS), and oxidative stress were measured before and following the marathon. Isometric strength recovered significantly faster in the cherry juice group. Inflammation was also significantly reduced in the cherry juice group, and TAS was about 10% greater in the cherry juice than the placebo group for all post-supplementation measures (6).

POSSIBLE MECHANISM

Tart cherries are considered one of the highest sources of phenolic compounds (including cyclooxygenase inhibitory flavonoids and anthocyanins) and contain high levels of antioxidant and anti-inflammatory compounds (3). The levels of anthocyanins and other flavonoids in the Montmorency and Balaton tart cherry were analyzed comparatively and showed that antioxidant activities of tart cherry extracts, including juice, preserve their antioxidant capacities after processing and storage (3). One of the huge benefits of anthocyanins is their ability to scavenge oxygen free radicals. This feature makes the tart cherry a significant antioxidant food source impacting oxidative damage processes, beneficial for athletes recovering from strenuous exercise.

A study performed by researchers at the University of Vermont among healthy, exercise-naïve individuals found that tart cherry juice decreased muscle damage symptoms and strength loss after eccentric exercise-induced muscle damage (2,3). In the study, 14 male college students drank 12 fl oz of a tart cherry juice blend or a placebo drink twice daily for eight consecutive days. A bout of elbow flexion eccentric exercise was performed consisting of 2 x 20 maximum contractions at baseline to induce muscle damage. Isometric elbow flexion strength, pain, and muscle soreness were measured before and for four days after the muscle damage protocol. Strength loss and pain were significantly less in the cherry juice group versus the placebo group. For the placebo group, strength loss was 30% at 24 hr and still 12% at 96 hr after eccentric exercise. By contrast, in the cherry juice group, strength loss was only 12% at 24 hr, and strength was actually 6% above baseline at 96 hr. Most notably, there was a preservation of muscle function attributable to the consumption of cherry juice.

AS A SUPPLEMENT FOR OTHER AILMENTS

Tart cherry juice has been shown to provide health benefits in increasing restful sleep patterns as well, due to the melatonin found in the fruit (4). Cherries can also alleviate symptoms of osteoarthritis (OA) such as pain and inflammation (3). Studies have shown that patients diagnosed with inflammatory OA experience a statistically significant decrease in CRP, a measure of inflammation, when cherry juice was consumed in place of the placebo (3). In a study of twenty women ages 40 to 70 with inflammatory OA, researchers found that drinking tart cherry juice twice daily for three weeks led to significant reductions in important inflammation markers—especially for women who had the highest inflammation levels at the start of the study (3). More research would be helpful in this field so that perhaps one day, OA patients may standardly use tart cherries as an alternative, natural remedy to manage the pain associated with this condition.

HOW MUCH TO TAKE

The dosage used in recent studies shows that improvement may be seen by drinking 12 fl oz of juice, twice daily, which is the equivalent of 100 - 120 cherries per day (2,3,6). Eating cherries in their natural form, or via juice, is always the healthiest way to reap the benefits. The research studies suggest individuals consume around 80 mg of anthocyanins per day to help alleviate certain symptoms. However, if you cannot eat that many cherries, or do not like the tart taste of the juice, juice blends and extracts...
are available (tart cherries are found seasonally in various supermarkets and health food stores in summer months; however, you can buy them dried or canned year-round).

REFERENCES

ABOUT THE AUTHOR
Debra Wein is a recognized expert on health and wellness and designed award-winning programs for both individuals and corporations around the United States. She is President and Founder of Wellness Workdays, Inc. (www.wellnessworkdays.com), a leading provider of worksite wellness programs. In addition, she is the President and Founder of the partner company, Sensible Nutrition, Inc. (www.sensiblenutrition.com), a consulting firm of registered dietitians and personal trainers, established in 1994, that provides nutrition and wellness services to individuals. She has nearly 20 years of experience working in the health and wellness industry. Her sport nutrition handouts and free weekly email newsletters are available online at www.sensiblenutrition.com.

Erin Rizkalla is a graduate of the Exercise and Health Science Program at the University of Massachusetts Boston. She will be pursuing a Master of Science degree in Food and Nutrition and completing a dietetics program. She hopes to use her experience and education in spreading healthy eating and healthy lifestyle programs to those in need.
SPEED AND AGILITY TRAINING FOR PREADOLESCENTS AND ADOLESCENTS

DEFINING SPEED AND AGILITY
Speed and agility can be considered skill-fitness attributes. Speed is defined in the NSCA’s Essentials of Strength Training and Conditioning as, movement distance per unit time quantified as the time taken to cover a fixed distance (no greater than 200 m) and as the skills and abilities needed to achieve high movement velocities (1). Agility is the ability to stop, start, and change the direction of the body or body parts rapidly and in a controlled manner, and the skills and abilities needed to change movement velocities or modes explosively (1). Since speed and agility require muscle coordination and control, considerations must be taken when designing a program for preadolescents. In order to improve speed and agility for all youth, the questions addressed in this column include:

- How do we incorporate health fitness and skills fitness into programs for preadolescents and adolescents?
- What is the framework of opportunity to develop speed and agility in preadolescents?
- Where might opportunities exist for certified NSCA Members?

INTEGRATING HEALTH FITNESS AND SKILLS FITNESS
The current emphasis appears to be on health fitness, namely cardiovascular endurance, muscle fitness (strength and endurance in one category), body composition, and flexibility. Skills fitness is regarded as those attributes necessary for successful sports participation, such as speed, agility, balance, power, coordination, and reaction time. Health fitness is taught in schools for physical education, and skills fitness testing and performance are relegated to afterschool for those with athletic inclinations. The two primary issues here are that children excluded from developing motor skill proficiency in skills fitness will be less likely to achieve mastery of these skills into adolescence and adulthood. Relegating skills fitness testing and performance to afterschool for those that demonstrate aptitude discriminates against those children who have not matured as early or been exposed to opportunities to develop their skills, thereby greatly reducing the number of children and youth that participate in sports and physical activity. Implementing integrative youth physical development by incorporating integrative neuromuscular training that combines performance-enhancing and injury-reducing components (e.g., strength, power, and balance) into one fitness program promotes balanced programming for health fitness and skills fitness (3,4,6). This approach helps develop all fitness attributes simultaneously, which helps all children and youth develop health fitness, skills fitness, and healthy exercise habits for a lifetime.

FRAMEWORK FOR DEVELOPING SPEED AND AGILITY IN PREADOLESCENTS
Current models for developing athleticism, most notably Balyi’s Long-Term Athletic Development Model, contend that windows of trainability for each fitness attribute exist, especially if mastery is the desired outcome (2). While the debate continues as to whether or not the windows actually close on proficiency, the model proposed by Lloyd and Oliver suggests concurrent development of all fitness attributes throughout childhood and adolescence while encouraging development of specific attributes during certain periods of adaptation (5). This important distinction ensures appropriate development for all preadolescents and adolescents, and accounts for their maturation level, gender, and training status. This model suggests that preadolescent training should focus on speed development through plyometrics, technical proficiency, and sprint mechanics while adolescent training should focus on strength training, plyometrics, and sprint training. For agility, preadolescent training should focus on motor control movements that progress to more sport-specific patterns while adolescent training should focus on more challenging (open and unplanned) training methods as practical sports-contextual learning occurs. Special attention should be paid to the developmental period known as “adolescent awkwardness,” when adolescents may demonstrate decrements in motor performance due to the adolescent growth spurt. Coaches and trainers should include relearning of motor patterns during this stage.

OPPORTUNITY FOR NSCA-CERTIFIED MEMBERS
An excellent summary of key points for coaches was developed by Williams and Bond and suggests:

- Youth recover more quickly from high-intensity exercise and may require shorter rest periods (work-to-rest ratios of 1:1 to 1:6 are advised)
- A repeated sprint shuttle with several lanes of different lengths can serve large groups
- Sport-specific skills can also be included in the repeated sprint shuttle design, when developmentally appropriate (usually late preadolescence and adolescence)
- Improvements in speed and agility, above that attributable to normal maturation, can be gained in sessions as brief as one hour once per week (7)

Programming for speed and agility, therefore, can be included in an integrated program design, which will also improve muscle strength (an important contributor to developing speed and agility) as well as all other fitness attributes. Certified NSCA Members can be on the frontline working with sport coaches,
physical educators, and youth fitness and physical activity programs to not only improve sports performance but also promote a positive and sustainable adherence to physical activity across a person’s lifespan—a key construct of physical literacy.

REFERENCES

ABOUT THE AUTHOR
Rick Howard helped find the National Strength and Conditioning Association (NSCA) Youth Special Interest Group (SIG) and served this year as Immediate Past Chair. In addition, Howard serves on the NSCA Membership Committee and is the NSCA State/Provincial Program Regional Coordinator for the Mid-Atlantic Region. Howard is involved in many pursuits that advance knowledge, skills, and coaching education to help all children enjoy lifelong physical activity and sports participation.
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