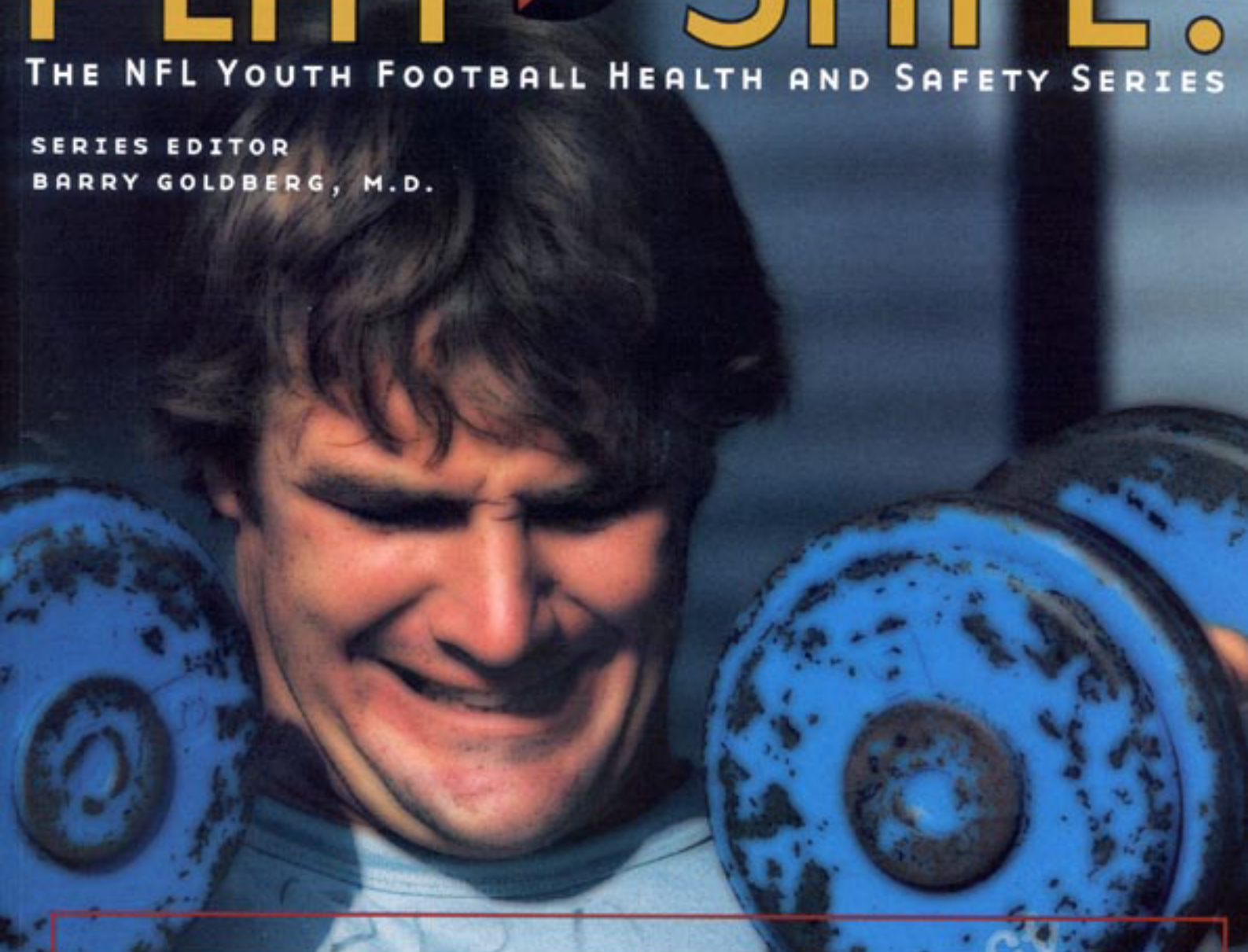


PLAY SAFE!

THE NFL YOUTH FOOTBALL HEALTH AND SAFETY SERIES

SERIES EDITOR
BARRY GOLDBERG, M.D.



STRENGTH AND CONDITIONING



BOOK **3** THREE

STRENGTH AND CONDITIONING

BOOK **3** THREE

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FROM THE SERIES EDITOR

Football is America's passion, so it is not surprising that football is the number-one high school participatory sport among boys. And increasingly, girls are enjoying the game.

For youth, high school, and college players, it is a game loved for its challenge and competition. Parents watch their children play, and coaches help teach the game. But no matter the level of involvement, all agree that football must be played safely.

The NFL and the NFL Players Association have developed this Youth Football Health and Safety series to promote the awareness of health issues related to sports participation and to maximize the safety of young athletes. *Play Safe!* is a series of four books containing relevant and practical articles, along with instructional posters distributed to school programs and youth football organizations. It is designed to help parents and coaches maximize the benefits of football for young competitors while minimizing the risks.

Four subject areas are discussed in this series:

First Aid

Communication and Awareness

Strength and Conditioning

Health Concerns For Young Athletes

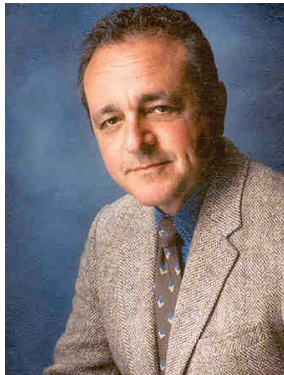
Respectively, the information for this series is provided by highly respected experts from:

- The American Red Cross
- The Institute for the Study of Youth Sports at Michigan State University
- The National Athletic Trainers' Association
- The American College of Sports Medicine

In developing this program, the National Football League and NFL Players Association are proud to have enlisted the expertise of these four leading organizations in the field of health and medicine. For the first time, these nationally renowned organizations have pooled their knowledge and informational resources to create an aggressive and exciting series to help educate young football players, coaches, and parents on the subjects of health and safety in football. The information will allow coaches and parents to advise players how to *Play Safe!* as well as optimize their enjoyment and performance.

Topics include important areas such as: immediate recognition of injury and response to emergencies, psychological management, instructional techniques, training and conditioning techniques, and pregame meal preparation and proper nutrition.

All of us involved with this worthwhile project appreciate the enthusiastic support and love of the game expressed by its fans. We are committed to working with our partners to ensure that young football players continue to *Play Safe!*



**BARRY GOLDBERG, M.D.,
SERIES EDITOR**

Dr. Barry Goldberg is the Director of Sports Medicine, Yale University Health Service, and Clinical Professor of Pediatrics, Yale University School of Medicine.

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TABLE OF CONTENTS

FROM THE NATIONAL ATHLETIC TRAINERS' ASSOCIATION	4
GENERAL STRENGTH AND CONDITIONING	5
OVERALL HEALTH BENEFITS OF TRAINING AND CONDITIONING	6
PSYCHOLOGICAL BENEFITS OF STRENGTH TRAINING	8
DISPELLING THE MYTH: "NO PAIN, NO GAIN"	9
PRACTICAL STRENGTH AND CONDITIONING	11
EASY STEPS TO ENHANCE PERFORMANCE IN YOUTH FOOTBALL	12
COMPONENTS OF A STRENGTH AND CONDITIONING PROGRAM	14
PROPER WARM-UP AND COOL-DOWN	17
INCORPORATING FLEXIBILITY	19
PLYOMETRICS HELP PLAYERS IMPROVE MUSCLE POWER	22
AGILITY TRAINING IN YOUTH FOOTBALL	24
PROPER FUEL FOR STRENGTH AND CONDITIONING	26
SHOULD YOUTH FOOTBALL PLAYERS LIFT WEIGHTS?	28
INJURY PREVENTION	30
TIPS TO PREVENT YOUTH FOOTBALL INJURIES	31
PREVENTION & TREATMENT OF OVERTRAINING SYNDROME	34
PREVENTING OVERUSE INJURIES IN YOUTH FOOTBALL	36
SELECTION, FITTING, CARE, AND USE OF EQUIPMENT	38
PREVENTING NECK INJURIES IN YOUTH FOOTBALL	40
RISKS ASSOCIATED WITH SPEARING	42
MUSCLE BALANCE: CONSIDERATIONS FOR INJURY PREVENTION	44
DESIGNING AND MAINTAINING A SAFE WEIGHT ROOM	46
INJURY EVALUATION	48
THE ON-FIELD EVALUATION OF ACUTE FOOTBALL INJURIES	49
RETURN-TO-PLAY GUIDELINES FOR YOUTH FOOTBALL	50
YOUTH FOOTBALL INJURIES	55
ACHES AND PAINS IN DEVELOPMENTALLY IMMATURE ATHLETES	59
PREVENTION AND TREATMENT OF MUSCLE CRAMPS	62

FROM THE NATIONAL ATHLETIC TRAINERS' ASSOCIATION

This series of articles is intended to educate the youth football coach about issues pertaining to strength and conditioning. The articles here tie directly to the National Standards for Athletic Coaches, including standards relating to: Injury Prevention, Care, and Management; Training, Conditioning, and Nutrition; and Skills, Tactics, and Strategies. When properly implemented, the information in this book will enable youth football coaches to enhance the health, safety, and performance of players.

The information is divided into four sections. Each section contains a series of articles written by experts in the specified topic areas.

GENERAL STRENGTH AND CONDITIONING contains three articles designed to educate youth football coaches on the benefits of a successful strength and conditioning program (the why) and the components such a program should contain (the what).

PRACTICAL STRENGTH AND CONDITIONING includes eight articles that cover specific plans and programs that youth football coaches can implement to enhance players' performance.

INJURY PREVENTION contains eight articles that discuss specific ways that youth football coaches can prevent injuries, both on and off the football field.

Finally, **INJURY EVALUATION** features five articles designed to help youth football coaches recognize and evaluate football injuries.

Certified Athletic Trainers (ATCs) wrote all of the articles. Most of these authors also hold the title of Certified Strength and Conditioning Specialist (CSCS). These authors bring a vast sampling of real-world experience to their articles. Performing their athletic training duties in a variety of work settings, these NATA members are well acquainted with the latest information about strength and conditioning and are proud to share it for this series.



THE NATIONAL ATHLETIC TRAINERS' ASSOCIATION (NATA) IS A NOT-FOR-PROFIT ORGANIZATION DEDICATED TO IMPROVING THE HEALTH AND WELL-BEING OF PHYSICALLY ACTIVE PEOPLE WORLDWIDE. THE ASSOCIATION IS COMMITTED TO THE ADVANCEMENT, ENCOURAGEMENT, AND IMPROVEMENT OF THE ATHLETIC TRAINING PROFESSION. FOUNDED IN 1950 WITH A MEMBERSHIP OF 200 ATHLETIC TRAINERS, NATA HAS MORE THAN 29,000 MEMBERS WORLDWIDE. APPROXIMATELY 92 PERCENT OF ALL CERTIFIED ATHLETIC TRAINERS (ATC) BELONG TO THE ASSOCIATION. IN 1990, THE AMERICAN MEDICAL ASSOCIATION RECOGNIZED ATHLETIC TRAINING AS AN ALLIED HEALTH PROFESSION. TODAY, IN COOPERATION WITH PHYSICIANS AND OTHER ALLIED HEALTH PERSONNEL, THE ATC FUNCTIONS AS AN INTEGRAL MEMBER OF THE ATHLETIC HEALTH-CARE TEAM IN SECONDARY SCHOOLS, COLLEGES AND UNIVERSITIES, SPORTS MEDICINE CLINICS, PROFESSIONAL SPORTS PROGRAMS, AND IN OTHER ATHLETIC HEALTH-CARE SETTINGS.



GENERAL STRENGTH AND CONDITIONING

OVERALL HEALTH BENEFITS OF TRAINING AND CONDITIONING

BY PAUL KRAWIETZ, Ed.D., ATC, LAT

TRAINING AND CONDITIONING EXERCISES, WHEN DONE PROPERLY, WILL RESULT IN BOTH PHYSICAL AND EMOTIONAL BENEFITS FOR YOUTH FOOTBALL PLAYERS.



WHAT COACHES SHOULD KNOW

- **YOUTH FOOTBALL COACHES CAN INSTILL IN THEIR PLAYERS GOOD TRAINING AND CONDITIONING HABITS THAT WILL LAST A LIFETIME.**
- **PHYSICAL BENEFITS INCLUDE BETTER HEART EFFICIENCY, IMPROVED BLOOD PRESSURE, AND MORE ENERGY.**
- **EMOTIONAL BENEFITS INCLUDE BETTER STRESS-COPING ABILITY, LESS TENSION AND FATIGUE, AND IMPROVED SELF-ESTEEM.**
- **TRAINING AND CONDITIONING ACTIVITIES SHOULD BE BOTH FUN AND EASILY UNDERSTOOD.**

Youth football coaches have a great opportunity to assist thousands of young football players by promoting active, healthy lifestyles. The activities learned by youth football players can become training and conditioning habits that will last a lifetime. Most Americans do not live active lives. Sedentary, inactive lifestyles often lead to long-term health problems such as heart disease, stroke, cancer, and obesity. Thus, youth football coaches should realize the potential impact they will have on young athletes.

Participants in youth football often do not understand the reasons for strength and conditioning programs. Youth football coaches should be aware of the overall benefits of conditioning and strength activities and be able to explain these to athletes.

- Physical benefits: gains in muscular strength and endurance, flexibility, cardio-respiratory endurance, increased lean muscle mass, and decreased body fat
- Emotional benefits: positive effects on the mind, emotions, and self-esteem

Youth football coaches can make a training and conditioning program successful by following these suggestions:

- Be positive with athletes in regard to training and conditioning.
- Do not use training and conditioning as a punishment but as a preparation for competition *and* to promote healthy lifestyles.
- Foster training and conditioning activities that athletes understand and have fun doing.
- Take the time to explain what you hope to accomplish through a training and conditioning program and why athletes need it.
- Discuss training and conditioning in the offseason with athletes, and develop reasonable fitness goals that will enhance their performance.
- Discuss the concept of overtraining or excessive training that may result in physical problems and even emotional burn out.
- Have fun—after all, football is a game.

PHYSICAL BENEFITS OF TRAINING AND CONDITIONING

- INCREASED STRENGTH OF THE HEART MUSCLE (THUS THE HEART CAN CIRCULATE MORE BLOOD THROUGHOUT THE BODY WITH FEWER BEATS)
- DECREASED BLOOD PRESSURE OR MAINTENANCE OF NORMAL BLOOD PRESSURE
- DECREASED HEART RATE (A SIGN OF A WELL-CONDITIONED ATHLETE)
- DECREASED BODY FAT
- MAINTENANCE OF BODY WEIGHT WITHIN NORMAL LIMITS
- IMPROVED SLEEP
- GREATER ENERGY RESERVE FOR WORK AND RECREATION
- IMPROVED POSTURE (BETTER PHYSICAL APPEARANCE AND THE ABILITY TO WITHSTAND FATIGUE)
- GREATER PHYSICAL ABILITY TO COPE WITH ILLNESS
- INCREASED HEALTHY LIVING HABITS (PROPER ATTENTION TO HEALTH AND FITNESS)
- IMPROVED SPORTS PERFORMANCE

EMOTIONAL BENEFITS OF TRAINING AND CONDITIONING

- BETTER ABILITY TO DEAL WITH STRESS
- LESS ANXIETY (FEAR OF THE UNKNOWN), LESS TENSION, AND LESS FATIGUE
- ENHANCED VIGOR AND THE ABILITY TO DEAL WITH THE NEGATIVE ASPECTS OF STRESS
- LESS LIKELIHOOD OF DEPRESSION (BY ALLOWING THE BODY TO RELEASE CHEMICAL ENDORPHINS THAT TRIGGER A RELAXED, PAIN-FREE STATE OF MIND)
- IMPROVED SELF-IMAGE AND SELF-ESTEEM (ATHLETES WILL LOOK BETTER AND FEEL BETTER ABOUT THEMSELVES BY MEETING FITNESS GOALS)

SUGGESTED WEBSITES:

<http://www3.utsouthwestern.edu/library/consubj/fitness.htm>

This University of Texas Southwestern Medical School Website provides a series of short, easy-to-understand articles on a variety of fitness-related topics such as Football Safety, Kids and Exercise, Preventing Sports Injuries, Sprains, Active Kids are Healthy Kids, and many more.

<http://www3.utsouthwestern.edu/library/consubj/young.htm>

This University of Texas Southwestern Medical School Website provides a series of short, easy-to-understand articles on issues related to young people.

<http://www.nata.org/main.htm>

The Website of the National Athletic Trainers' Association contains information on specific injuries, minimizing risk in athletics, lightning safety, fluid replacement, and many other interesting topics.

http://www.ncaa.org/sports_sciences/

The NCAA Website contains a sports medicine handbook that may be useful in researching issues related to sports medicine.

<http://www.acsm-msse.org/>

The American College of Sports Medicine's Website allows the youth football coach to do searches in certain areas of sports medicine.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Donatelle, R.J., Davis, L.G., Hoover, C.F., & Harding, A. (1991). *Access to Health*. 2nd Ed., Engelwood Cliffs: Prentice Hall.
Edlin, G., & Golanty, E. (1988). *Health and Wellness: A Holistic Approach*. 3rd Ed. Boston: Jones and Barlett Publishers.

PSYCHOLOGICAL BENEFITS OF STRENGTH TRAINING

BY MICHAEL J. HANLEY, M.S., ATC/L

STRENGTH TRAINING BUILDS MIND AS WELL AS BODY.

WHAT COACHES SHOULD KNOW

- **STRENGTH TRAINING HELPS FOSTER INDIVIDUAL GROWTH AS WELL AS TEAM GROWTH.**
- **COACHES SHOULD SET ATTAINABLE GOALS IN THE WEIGHT ROOM TO REINFORCE WORK.**

The weight room can be a place of tremendous psychological benefit, for both the team and individual players. A properly supervised strength training program helps the team bond by being in the same place together, working hard to achieve a common goal. Ideally, team members will help each other (such as with spotting). Individually, players learn dedication and perseverance by realizing that benefits come only to those who stay with the program and are consistent in their attendance and effort.

Youth football players also develop self-esteem by achieving strength gains and realizing individual goals set in the weight room. In addition, they gain a sense of discipline, and they'll improve their confidence levels by feeling prepared to play. The stronger, more confident player is more likely to enjoy football and stay on the team.

Many players will improve their social interaction skills as well. They are required to communicate with teammates of various personalities and backgrounds. By learning to accept others, team unity is enhanced.

There are some important concepts in building a

winning strength-training program for the young athlete:

- **SET GOALS FOR EACH PLAYER THAT CAN BE ACHIEVED.** Unattainable goals can lead to frustration. Goals that can be achieved will make the player enthusiastic about returning to the weight room and the football field. This is especially true for the new weightlifter who is weaker than some of his older and bigger teammates.
- **PROVIDE POSITIVE FEEDBACK.** This can be done in many ways, such as giving T-shirts to the players who have good attendance or work hard, and publicly posting results. It is important that players not only understand the athletic benefits to being stronger, but that improved strength is its own benefit. Acknowledging the individual and team accomplishments will reinforce the hard work and dedication being demonstrated.

Remember: perseverance, dedication, and team unity are all characteristics that can be transferred from the weight room to the football field.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

"Is Strength and Conditioning Necessary for the Youth Football Athlete?" by David Martinez in the August, 1997 Journal of Strength and Conditioning.

"Preseason Conditioning for High School Athletes" by Dr. Avery Faigenbaum in the February, 2001 Journal of Strength and Conditioning.

"Strength Training for Children and Adolescents" by Dr. Avery Faigenbaum in the October, 2000 Clinics in Sports Medicine.

DISPELLING THE MYTH: “NO PAIN, NO GAIN”

BY KEN LOCKER, M.A., ATC

THE PHRASE “NO PAIN, NO GAIN” MAY APPLY TO PROFESSIONAL FOOTBALL PLAYERS, BUT YOUTH FOOTBALL PLAYERS GET STRONGER FASTER WITH “NO PAIN, MORE GAIN.”



WHAT COACHES SHOULD KNOW

- **ATHLETES SHOULD NOT OVERTRAIN.**
- **YOUTH FOOTBALL PLAYERS SHOULD NOT PERFORM CERTAIN TRAINING AND CONDITIONING ACTIVITIES TO THE POINT OF EXHAUSTION.**
- **AN ADOLESCENT FOOTBALL PLAYER HAS PHYSICAL, EMOTIONAL, AND PSYCHOLOGICAL LIMITATIONS.**
- **WHEN DEVELOPING WEIGHTLIFTING PROGRAMS FOR YOUTH FOOTBALL PLAYERS, COACHES SHOULD RECOMMEND THE USE OF LIGHTER WEIGHTS (50-75 PERCENT) AND FEWER REPS (SIX WITH MINIMAL EFFORT BEFORE INCREASING THE WEIGHT).**
- **TARGET HEART RATES FOR AGE-APPROPRIATE ATHLETES SHOULD BE UTILIZED FOR CARDIOVASCULAR CONDITIONING.**

Do you recall your coaches shouting, “No Pain, No Gain”? The credo was to train players to the point of exhaustion. This would make you “tough.” This would make you “determined.” This would push you to work harder so you would be all you could be. That drill instructor approach may work for elite professional athletes, but youth football players should never be pushed beyond reasonable limits.

Overtraining is defined as “overloading the (body) system without adequate recovery.” Thus, the more an athlete is pushed beyond a safe training zone, the greater the potential for pain and soreness. As a result, the pain limits strength gains in young athletes.

There are several negative consequences of overtraining. For example, heavy weightlifting could injure a child’s growth plates. Children grow taller

because of growth plates at the end of bones. This process continues until about age 17. Until then, an injury to one of the growth centers can cause permanent damage. Because tendons are stronger than the growth centers to which they are attached, an injury from lifting heavy weights often damages the growth center.

Other examples of injury caused by overtraining include:

- Overuse syndromes (i.e., tendinitis, bursitis)
- Fractured bones
- Heat-related illness
- Emotional and psychological conditions

Youth football players who are not prepared emotionally or psychologically are also at risk. If pushed beyond their limits, burnout and boredom may occur. This can lead to athletes missing practices or

games because of increased illness from the stress on their immune systems. Athletes may quit or

make excuses not to participate. Sports should be fun, not stressful.

According to documented research, adolescent athletes' overall conditioning improves while training at far lower intensities than those of older athletes.

WHAT CAN A COACH DO?

- Do not overtrain athletes. Use lighter weights (50-75 percent max) and more reps. Begin at a weight with which an athlete can perform six repetitions. Increase to 10-15 reps before adding 10 percent to the weight used for the exercise.
- Always allow at least one day of rest between weightlifting sessions.
- Use age-appropriate target heart rates when performing cardiovascular conditioning drills. Target heart rate is approximately 220 minus age in years. Endurance work can be performed at a target rate of 50 percent of the maximum, and sprint work at 80-90 percent of the maximum expected heart rate. The maximum heart rate may be modified by specific medications and cardiac problems. The coach should be advised of these problems and receive professional medical advice for conditioning the youth football player with medical problems.
- Implement a variety of drills that include hopping, skipping, running, and safe plyometrics. These are safer activities for adolescent athletes. Coordination, motor skills, and good body mechanics all can be compromised during the growing years.
- Use coaching psychology techniques appropriate for the child's age. Children are sensitive to psychological stresses. Many feel unsure about their body, and fear rejection or being singled out. If coaches push these kids too hard, they won't become "tougher"—they'll restrict their progress.

"No Pain, No Gain" might be a good approach with adult football players. But youth football players are still developing and growing. For them, "No Pain, More Gain" is the best bet.



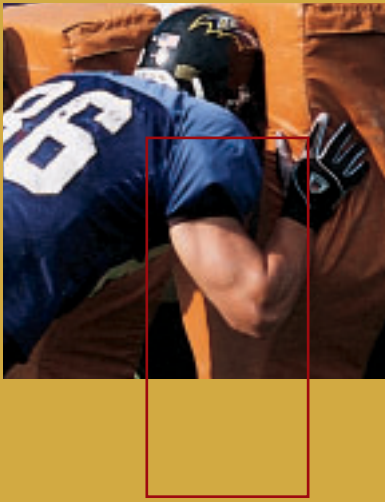
JOE PATRONITE

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Strength Training for Young Athletes. Published by Human Kinetics.

The Young Athlete. American Academy of Orthopedic Surgeons Public Information. AAOS on-line service: www.aaos.org. www.wlinfo.com. Under the header "Articles." Chapter 9: Exercise Prescriptions for Children.



PRACTICAL STRENGTH AND CONDITIONING

EASY STEPS TO ENHANCE PERFORMANCE IN YOUTH FOOTBALL

BY GAETANO SANCHIOLI, M.S., ATC, PES

BALANCE, SPEED, AND FLEXIBILITY TRAINING ARE IMPORTANT COMPONENTS OF A SUCCESSFUL YOUTH FOOTBALL PROGRAM.



WHAT COACHES SHOULD KNOW

- **YOUNG ATHLETES ADAPT QUICKLY AND LEARN TO IMPROVE BALANCE, SPEED, AND FLEXIBILITY.**
- **BALANCE, SPEED, AND FLEXIBILITY ARE THE BASE UPON WHICH STRENGTH AND ATHLETIC ABILITY ARE BUILT.**
- **INCREASING OVERALL ATHLETIC ABILITY WILL IMPROVE SKILLS IN ANY SPORT.**

When young people participate in sports, they spend most of their time practicing only that specific sport. It is important to understand that there are other areas that need to be practiced. Warm-up, flexibility, balance, and speed are important elements that need to be stressed with young athletes. Proper coaching in these areas will help reduce injuries and improve young athletes' skill levels. When asked, "How fast should I go?" coaches can respond, "Go as fast as you can, not as fast as you can't."

Youth football, for example, demands power, skill, quickness, and balance. A youth football player will not excel at his sport if he is unable to adapt to those requirements. An easy way to incorporate strength and conditioning routines—and make them fun—is to make them part of ball or coaching drills. Here are some basic ways to start including these areas in practices.

CORE STRENGTH

All players, including youth players, should have good core strength. Core strength means strong stomach muscles, but it also includes the muscles that stabilize the hips and pelvis. Players should get used to keeping these muscles tight all the time.

Tensing up the stomach while exercising, stretching, and playing will result in better, stronger football players. Crunches, leg lifts, and twisting movements will go a long way toward improving a players' game.

STRETCHING AND FLEXIBILITY

Have players do a variety of stretches to target all of the main muscle groups. It is important to focus on the *quality* of the stretches and not the quantity. Stretches allow the muscles to function more efficiently and allow for strength and power to develop. Young players should stretch before practices, after practices, and again at home to benefit the most from it.

STRENGTH

After core strength and flexibility, the next most important component of development is strength. Coaches, however, are urged not to push weight training with young, pre-junior high school athletes. Many other exercises such as pushups, pullups, and lunges using their body weight will work just as well. Balance, speed, and power exercises work well for youth athletes when they have developed a basic level of core strength and flexibility.

BALANCE

Balance has great benefits for improving overall athletic ability. Start players standing on one leg and balancing with their hands on their hips. Hold the position for 10-15 seconds and repeat or switch legs. Balance on each leg 5-10 times.

When this exercise can be completed without problems, increase the difficulty of the exercise. For instance, have players hold one leg out in front for three seconds, to the side for three seconds, and behind for three seconds, then repeat. *Tilt the head, close one eye, close both eyes, and/or swing the leg* to make the exercise harder and more challenging.

To work on upper-body balance, have players do various exercises in a pushup position. Two hands, two feet; two hands, one foot; two feet, one hand. While holding a position have another person tap or push the player to make the balance exercise more difficult. Gradually add catching and throwing a football during the drills to make it harder, more fun, and more sport specific.

SPEED AND AGILITY

Line jumping, cone jumping, and the speed ladder are fun exercises that can be worked into practice drills or into a special session at the beginning of practice. These exercises start with two-legged jumps, then progress to one-legged hops, then alternating feet. Jumps and hops are done as quickly as possible for 20 jumps or about 10 seconds. These exercises should be done in a forward/backward direction. Then add side-to-side movement, diagonal movement, and various turns (90-degree, 180-degree, etc.).

COORDINATION

Coordination will be enhanced by gradually increasing the speed of any exercise while focusing on the quality of the exercise. The speed ladder is a great tool for developing foot speed and coordination. Invent different patterns for young athletes to perform (e.g. squares, diamonds, zig/zags). Perform them fast with good form and speed; agility and coordination will improve. Don't forget to add a ball or make them more sport specific.

POWER

The final aspect of player development is power. Power comes from taking the strength and speed that have been developed and combining them in one movement. As with the previous elements, power is best developed through practice. Some examples include long jumping, high jumping, power skipping, and striding for the lower body, and medicine ball passing (forward, rotational, and overhead) and throws for the upper body.



JAMES D. SMITH

REACTION TIME

Players need the ability to initiate a movement at a high rate of speed and then perform the movement at a high rate of speed. However, fast movements must be done under control to be useful. A good way to work on improving reaction time is through practicing the skill desired often and at full speed. Some drills call for quick reaction without the aid of one of the senses such as throwing a ball at a receiver while his back is turned, then telling him to turn, find the ball, and catch it. Another drill involves having linemen react to the movement of a ball that is snapped without a verbal snap count, so that they rely less on hearing. Many computer games that kids play are helpful for improving reaction time, too.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

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Chu, D. Jumping into Plyometrics. Champagne, IL: Leisure Press, 1992.

Gambetta, V. Building the Complete Athlete. Optimum Sports Training, Inc.

COMPONENTS OF A STRENGTH AND CONDITIONING PROGRAM

BY SANDRA J. SHULTZ, PH.D., ATC, CSCS

STRENGTH AND CONDITIONING PROGRAMS ARE AN ESSENTIAL PART OF PREPARING YOUTH FOOTBALL PLAYERS FOR THE DEMANDS OF THE SPORT.

WHAT COACHES SHOULD KNOW



A BALANCED STRENGTH AND CONDITIONING PROGRAM FOR YOUTH FOOTBALL SHOULD INCLUDE ACTIVITIES THAT PROMOTE:

- **AEROBIC FITNESS THROUGH LOW TO MODERATE INTENSITY AND LONG-DURATION CARDIOVASCULAR ACTIVITIES (E.G. RUNNING, BICYCLING, SWIMMING).**
- **ANAEROBIC FITNESS THROUGH SHORT BURST ACTIVITIES (E.G. SPRINTS).**
- **MUSCULAR STRENGTH THROUGH REPETITIVE, SUBMAXIMAL RESISTIVE EXERCISES. RESISTIVE EXERCISES SHOULD ADDRESS ALL MAJOR MUSCLE GROUPS, AND SHOULD BE BALANCED BETWEEN OPPOSING MUSCLE GROUPS (E.G. BICEPS VS. TRICEPS, QUADRICEPS VS. HAMSTRINGS)**
- **FLEXIBILITY THROUGH STRETCHING TO PROMOTE FULL RANGE OF MOTION AND PREVENT INJURY. STRETCHING EXERCISES SHOULD BE PERFORMED PRIOR TO STRENUOUS ACTIVITY (BUT AFTER WARM-UP) AND AGAIN AT THE END OF THE WORKOUT.**
- **COORDINATION AND AGILITY THROUGH GENERAL AND SPORT-SPECIFIC DRILLS THAT DEVELOP QUICKNESS, BALANCE, AND MOVEMENT EFFICIENCY WITH CHANGES IN DIRECTION.**

Youth sports programs should focus not only on development of sport skills, but fundamental fitness. Football is a collision sport with inherent risk of injury. However, it is well known that poorly conditioned athletes are more prone to fatigue and the injuries that can result from fatigue.

At the youth sport level, the initial fitness level of a young person just entering an organized sports program may not be adequate to meet the demands of football practice or games. Preparatory conditioning (4-8 weeks prior to the

start of the sport) aimed at improving general muscle strength, flexibility, cardiovascular endurance, coordination, and agility can enhance skill development and prevent injury.

Strength and conditioning sessions should begin with a general warm-up and end with cool-down exercises consisting of light cardiovascular exercise and stretching. Strength and conditioning activities in the youth sports population should offer variety and fun, and promote a positive attitude toward physical fitness. They are optimally performed 2-3 times per week, on

alternating days. Progressions or increases in weight, intensity, or duration should not exceed 5-10 percent of current capacity. It is important that only one component (intensity or duration) be increased at any one time. Emphasize skill development and proper technique rather than the amount of weight lifted. Maximal effort exercises should be discouraged. Certified athletic trainers and certified strength and conditioning specialists can serve as valuable resources to youth football coaches who are developing a strength and conditioning program.

HERE ARE THE ESSENTIAL PARTS OF A SOUND STRENGTH AND CONDITIONING PROGRAM:

AEROBIC TRAINING improves cardiovascular fitness and provides a strong endurance base upon which all other fitness components (strength, speed, coordination, and agility) can be developed and improved. An athlete who is aerobically fit will have better stamina and less fatigue toward the end of practice or games, and will recover quicker from an exercise session. To improve aerobic fitness, continuous activities utilizing large muscle groups (e.g. jumping rope, jogging, swimming, or any continuous sport activity) should be performed at a moderate intensity (60-70 percent of max heart rate: approximately 220 beats minus age in years) that can be sustained for a minimum of 15-20 minutes.

ANAEROBIC TRAINING will improve energy delivery and recovery with short intense sessions of high-intensity (75-85 percent of max heart rate) activities or quick bursts of movement (e.g. sprinting off the line, running pass plays, tackling, and blocking). Football is primarily an anaerobic sport, in which a play might last 5-10 seconds, with short rest periods following each play. Training in short bursts—such as line sprints or bleacher runs—is effective in preparing for the demands of the sport. Plyometric drills (e.g. leg hops, box jumps, squat, and tuck jumps) also are excellent anaerobic training activities to improve speed and power, but should only be incorporated once a good strength and conditioning base has been developed.

STRENGTH TRAINING refers to exercises that increase the ability to exert or resist force. Strength training is safe and effective when properly designed and supervised. Strength training does not require heavy weights or expensive machinery. Moreover, young athletes often do not fit properly in these machines. Rubber tubing, medicine balls,

small free weights, and body-weight exercises are often more appropriate for this age group. In youth football players, the frequency, intensity, volume, and progression of strengthening exercises must be carefully monitored. Generally speaking, strength training in young athletes should consist of 2-3 sets of high repetition and moderate loads (i.e., a resistance exercise that can be performed for 10-15 repetitions) rather than low repetition and high loads (i.e., resistance able to be performed for fewer than 8 repetitions).

For the youth football participant, strength workouts should be limited to two times per week, with two days of rest in between workouts. Upper- and lower-body exercises can be performed on the same day (e.g. Monday and Thursday), or in a split routine (e.g. upper body on Monday and Thursday, lower body on Tuesday and Friday). As the athlete becomes stronger and more mature, strength workouts can progress to three times per week with one day of rest in between. Specific guidelines and recommendations for safe and appropriate youth strengthening programs are available from the American College of Sports Medicine, the American Academy of Pediatrics, and the National Strength and Conditioning Association.

COORDINATION AND AGILITY exercises are aimed at improving balance, movement efficiency, and reaction time. Improving balance and coordination is particularly important in young athletes. Activities should include football-specific skills and movements that improve speed off the line, lateral quickness and agility to ward off tacklers, and the ability to change directions quickly. Examples of coordination and agility exercises include dot drills, figure-eight running, cone and cutting drills, jumping rope, side shuffles, and carioca runs.

Strength and conditioning activities at the youth sport level should emphasize proper technique rather than volume or intensity. Program development should be undertaken in consultation with a trained professional experienced in strength and conditioning of prepubescent and adolescent athletes, and all activities should be properly supervised. A complete physical examination from a qualified physician should be completed prior to the start of any strength and conditioning program. If areas of weakness, deficiencies, or imbalances are noted in the examination, they often can be addressed and corrected prior to the season through proper strength and conditioning.

SAMPLE PROGRAM

WHILE THERE ARE MANY VARIATIONS IN PROGRAM DESIGN, THE FOLLOWING OFFERS A GENERAL FRAMEWORK. FOR SPECIFIC STRENGTH AND CONDITIONING ACTIVITIES AND APPROPRIATE PROGRESSIONS, PLEASE CONSULT AN ATHLETIC TRAINER, STRENGTH AND CONDITIONING SPECIALIST, OR SUGGESTED READING.

DAY	CONDITIONING ACTIVITY	SUGGESTED PLAN
MONDAY	LOWER-BODY STRENGTH WORKOUT	WARM-UP & STRETCH CORE LIFTS FOR LOWER BODY (2-3 SETS OF 8-12 REPS) COOL-DOWN & STRETCH
TUESDAY	UPPER-BODY STRENGTH WORKOUT COORDINATION & AGILITY SPEED WORK (ANAEROBIC)	FIVE-MINUTE BIKE WARM-UP STRETCHING EXERCISES CORE LIFTS FOR UPPER BODY (2-3 SETS OF 8-12 REPS) AGILITY DRILLS (2-5 DRILLS) SPRINT DRILLS (2-5 DRILLS) COOL-DOWN & STRETCH
WEDNESDAY	REST OR LIGHT AEROBIC ACTIVITY	20-30 MINUTES
THURSDAY	LOWER-BODY STRENGTH WORKOUT	WARM-UP & STRETCH CORE LIFTS FOR LOWER BODY (2-3 SETS OF 8-12 REPS) COOL-DOWN & STRETCH
FRIDAY	UPPER-BODY STRENGTH WORKOUT COORDINATION & AGILITY SPEED WORK (ANAEROBIC)	FIVE-MINUTE BIKE WARM-UP STRETCHING EXERCISES CORE LIFTS FOR UPPER BODY (2-3 SETS OF 8-12 REPS) AGILITY DRILLS (2-5 DRILLS) SPRINT DRILLS (2-5 DRILLS) COOL-DOWN & STRETCH
SATURDAY	REST OR ALTERNATIVE SPORT ACTIVITY	ENSURE VARIETY AND FUN
SUNDAY	REST	

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

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PROPER WARM-UP AND COOL-DOWN

BY SANDRA J. SHULTZ, PH.D., ATC, CSCS

NO YOUTH FOOTBALL CONDITIONING PROGRAM OR PRACTICE IS COMPLETE WITHOUT A PROPER WARM-UP AND COOL-DOWN PERIOD. BOTH ARE IMPORTANT TO ENHANCING PERFORMANCE AND MUSCLE RECOVERY, AND PREVENTING MUSCLE SORENESS AND INJURY.



WHAT COACHES SHOULD KNOW

- **WARM-UP AND COOL-DOWN FUNCTION AS TRANSITIONAL EXERCISE PERIODS THAT ALLOW FOR A GRADUAL INCREASE AND DECREASE IN ACTIVITY LEVELS.**
- **BEFORE ENGAGING IN ANY STRENGTH AND CONDITIONING EXERCISES, PRACTICES, OR COMPETITIONS, A BRIEF WARM-UP PERIOD IS VITAL TO PREPARING YOUNG FOOTBALL PLAYERS BOTH PHYSICALLY AND PSYCHOLOGICALLY. A GENERAL WARM-UP SHOULD CONSIST OF EXERCISES AIMED AT INCREASING HEART RATE, BLOOD FLOW, AND MUSCLE TEMPERATURE (E.G. JOGGING, BICYCLING, JUMPING JACKS). OPTIMAL WARMING IS ACHIEVED WITHIN 5-15 MINUTES, OR WHEN THE ATHLETE BREAKS A SWEAT.**
- **STRETCHING EXERCISES SHOULD FOLLOW THE GENERAL WARM-UP, AS MUSCLES AND TENDONS THAT ARE WARM WILL BE MORE PLIABLE AND READY TO STRETCH. A SPORT-SPECIFIC WARM-UP CAN FOLLOW THE GENERAL WARM-UP AND STRETCHING EXERCISES, USING EXERCISES AND DRILLS THAT MIMIC THE MOVEMENT AND SKILLS NEEDED FOR THAT DAY'S FOOTBALL CONDITIONING OR PRACTICE. THE SPORT-SPECIFIC WARM-UP PERIOD SHOULD BEGIN WITH SLOW AND CONTROLLED ACTIVITIES, AND PROGRESSIVELY INCREASE IN INTENSITY.**
- **THE WARM-UP SHOULD BE TIMED SO THAT IT IS COMPLETED IMMEDIATELY PRIOR TO THE BEGINNING OF THE CONDITIONING OR SPORT ACTIVITY. IF MORE THAN 15 MINUTES ELAPSES BETWEEN THE WARM-UP AND ACTIVITY PERIODS, WARM-UP ACTIVITIES SHOULD BE REPEATED TO RETURN THE ATHLETE TO A READY STATE.**
- **TO AID MUSCLE RECOVERY AND REDUCE MUSCLE SORENESS AFTER INTENSE WORKOUTS, A COOL-DOWN PERIOD SHOULD CONCLUDE THE SESSION TO ALLOW CARDIOVASCULAR AND MUSCLE FUNCTION TO RETURN SLOWLY TO RESTING LEVELS. THE COOL-DOWN PERIOD SHOULD CONSIST OF 5-10 MINUTES OF CONTINUOUS, LARGE MUSCLE GROUP ACTIVITIES (MODERATE TO MILD AEROBIC ACTIVITY) FOLLOWED BY 5-10 MINUTES OF GENTLE STRETCHING OF THE MAJOR MUSCLE GROUPS.**

WARMING-UP

Warm-up refers to a general warming of the body through large muscle group activities in an effort to ready the body for more strenuous activity.

Cardiovascular benefits include increased heart rate, blood flow, and breathing rate, which will improve oxygen delivery to the working muscles. Muscle temperature also will increase, which will make the muscles and tendons more pliable and allow them to stretch further without tearing. Collectively, these physiological changes allow the body to handle more work and reduce the potential for injury or muscle soreness.

Warm-up activities should always include a general warm-up component, and may also include a sport-specific component. The general warm-up consists of 5-10 minutes of jogging, cycling, or any continuous activity that uses large muscle groups. A good indication that the heart rate and body temperature have been raised sufficiently is when the athlete begins to break a sweat. Once sufficient warming has been achieved, flexibility (stretching) exercises should follow for the muscle groups that will be used in the sport activity. For football, this should include both upper-body and lower-body stretches.

A specific warm-up can follow, which involves activities that closely resemble the sport activity. Football-specific warm-up activities can progressively ready the muscles and joints for more ballistic or intense movements, and can begin to focus the athlete on football skills. For example, there is a big difference between general warm-up activities and exploding off the line when the ball is snapped. Sport-specific movements or skills can bridge this gap by gradually increasing the tempo and intensity of the desired skill or activity. Examples of sport-specific warm-up activities include cariocas, side shuffles, line and cone drills, and pass and run drills. Many football-specific agility activities can serve as warm-up exercises, so long as each activity is begun at a sub-maximal level, and the tempo and intensity are gradually increased during a 10- to 15-minute period.

At the completion of the sport-specific warm-up, the youth football player should be ready to begin sport activity. Warm-up activities can be used throughout practice and competition as needed to return the muscles and cardiovascular system to a ready state after periods of rest or inactivity. This is particularly important in football, where an athlete plays only one side of the line (offense or defense) or on special teams. For example, a kicker waiting on the sidelines can keep his leg flexible, warm, and ready by periodically jogging along the sideline, performing leg swings, and kicking a ball into a net.

COOLING DOWN

A cool-down period is just as important as the warm-up period and should follow any intense exercise session. When exercise is suddenly stopped, blood that has been sent to the working muscles can pool in the extremities and cause an athlete to feel dizzy or lightheaded. Cool-down activities can prevent this pooling from occurring. Also, metabolic by-products (such as lactic acid) are produced in the muscle with intense or fatiguing exercise. The longer these metabolic waste products remain in the muscle, the slower the recovery and the greater the chance for muscle soreness the next day. Because metabolic by-products are removed from the muscle via the blood, a cool-down session will help the muscle pump or flush waste products from the muscle more rapidly.

A cool-down should consist of general, continuous activities that progress from *moderate* (such as jogging, swimming, or cycling at 50 percent maximum pace) to *mild* (such as walking, swimming, or cycling at 30 percent maximum pace), gradually reducing heart rate and muscle function to resting levels. For example, if practice ends for the day with 10 all-out wind sprints, before players head to the showers, 1-2 minutes of light jogging, followed by two to three minutes of walking, and then gentle stretching, may be all that is required to aid muscle recovery.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

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INCORPORATING FLEXIBILITY

BY DANA CRAVEY, M.S., ATC

FLEXIBILITY IS KEY TO LONG-TERM INJURY PREVENTION, AND IT ALLOWS YOUNG ATHLETES TO PERFORM AT PEAK LEVELS.



WHAT COACHES SHOULD KNOW

- **FLEXIBILITY SHOULD NOT BE OVERLOOKED AS PART OF STRENGTH TRAINING.**
- **A FLEXIBILITY-TRAINING PROGRAM SHOULD ONLY TAKE ABOUT 20 MINUTES DURING REGULAR PRACTICE.**
- **FLEXIBILITY IMPROVES RANGE OF MOTION, IMPROVES THE ATHLETE'S ABILITY TO EXERT FORCE, AND REDUCES THE POTENTIAL FOR INJURIES.**
- **JUST BECAUSE AN ATHLETE IS FLEXIBLE AT ONE JOINT DOESN'T NECESSARILY MEAN HE IS FLEXIBLE AT ANOTHER—THUS, THE NEED FOR OVERALL FLEXIBILITY TRAINING.**
- **STATIC STRETCHING IS SAFE BECAUSE THE ATHLETE STOPS LENGTHENING THE MUSCLE BEFORE IT BECOMES PAINFUL.**
- **A GOOD PROTOCOL FOR FOOTBALL PRACTICE IS JOGGING OR CALISTHENICS, STRETCHING, AND SPORT-SPECIFIC PRACTICE, FOLLOWED BY A COOL-DOWN PERIOD THAT ALSO INCLUDES STRETCHING.**

Flexibility plays a vital role in strength training, but incorporating it into a strength and conditioning program often can be a challenge. For many youth football coaches, it's a time factor—they think flexibility training is too time consuming. However, stretching during the warm-up and cool-down period takes only minutes; stretching major muscle groups can take as little as five minutes. Flexibility works hand in hand with strength training to produce a more competent athlete. Together, the two components improve range of motion and the athlete's ability to exert force at each attempt—benefits that are well worth the practice time. A flexibility program often reduces or eliminates muscle spasms,

delayed-onset muscle soreness, and muscle cramps—additional benefits that make flexibility worth the coach's time and effort.

The objectives of flexibility training are to increase the range of the athlete's motion, and to reduce the potential for injuries. Flexibility is specific to each joint in the body. This simply means that just because a young football player is flexible at one joint, he isn't necessarily flexible at another. Thus, flexibility training, or stretching—in combination with strength and conditioning—is necessary for the youth football player to perform at an optimal level.

For youth football, **static stretching** is safest because the athlete stops lengthening the muscle

before it becomes painful. A static stretch, often called a hold, is a gradual stretch that is held to the point of feeling the stretch but not feeling pain. Static stretching is effective because muscles contain receptors—known as proprioceptors—that relay muscle activity to the central nervous system. When a muscle reaches a point of maximum stretch, these proprioceptors signal the nervous system to cause a reflex contraction of the muscle. After a few seconds, another set of proprioceptors signal a reflex relaxation of the muscle. This is the body’s method of preventing overstraining and tearing muscle fibers. Dynamic or ballistic stretching involves the use of quick, bouncing movements and is not recommended as an effective stretching technique because of the risk of muscle strain.

In static stretching, each muscle is gradually stretched three to four times, and the stretch is held for 10 to 30 seconds. A slow static stretch, most commonly used by fitness experts, allows the muscle to stretch farther and more safely. The key to this technique is to stretch muscles and joints to the

point a pull is felt, but not to the point of pain.

When stretching for a game or practice, it is often best to do the program both before and after the activity. After a general warm-up, athletes should stretch the major muscles of the shoulders, arms and forearms, trunk (including the back and abdominal areas), thighs, and lower legs. The purpose of the warm-up stretching is to loosen the muscles for activity. Consequently, during cool-down the muscles are very warm, so the muscles stretch more easily and maintain the stretched position longer. In general, muscles need to be stretched for a total of 2 to 5 minutes a day to obtain lasting improvements. A flexibility program should increase the range of motion gradually, and, for optimal flexibility, all major muscle groups the athlete uses during the football season should be worked. This includes both the upper and lower extremities.

While you train youth football players for strength, don’t forget that flexibility training often reduces the risk of injury while it increases the athlete’s range of motion—benefits that keep athletes in the game.

FOOTBALL FLEXIBILITY EXERCISES

These exercises make the body’s tissues warmer and more flexible. Each exercise should be preceded by a 10-minute cardiovascular warm-up. Hold each stretch in a slow, static manner for 15 seconds, with three repetitions. It is a small investment in time for a large return on injury prevention.



HAMSTRING STRETCH

A hamstring stretch is an excellent example of static stretching for the lower extremities.

To perform this stretch, the athlete should cross one leg over the other while standing. Then, the athlete slowly bends the back, lowering out-stretched hands toward the ground. The athlete should hold the position without bouncing for 10 to 30 seconds.



STANDING STRETCH

A standing stretch effectively stretches the calf and lower leg.

To perform

this stretch, the athlete should position one foot ahead of the other, and place his hands on a wall or fixed object. The athlete leans forward, keeping weight on the heel of the back foot until the stretch is felt in the upper calf.



SHOULDER STRETCH

For the upper extremities, a shoulder stretch is effective. While holding the shoulder level, the athlete places his or

her left hand on the right elbow, and then pulls the right arm across the chest. The athlete should hold the position for 10 seconds and then repeat the stretch with the opposite arm.



SEAT STRADDLE LOTUS

Sit down, place soles of feet together, and drop knees toward floor. Place forearms on inside of knees and push knees to the ground. Lean forward, bringing chin to feet. Hold for 15 seconds. Repeat three times.



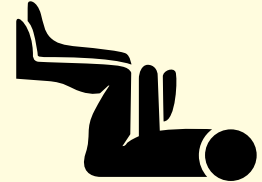
SEAT SIDE STRADDLE

Sit with legs spread; place both hands on same ankle. Bring chin to knee, keeping the leg straight. Hold for 15 seconds. Repeat three times. Repeat exercise on opposite leg.



SEAT STRETCH

Sit with legs together, feet flexed, hands on ankles. Bring chin to knees. Hold for 15 seconds. Repeat three times.



KNEES TO CHEST

Lie on back with knees bent. Grasp tops of knees and bring them out toward the armpits, rocking gently. Hold for 15 seconds. Repeat three times.



FORWARD LUNGES

Kneel on left leg; place right leg forward at a right angle. Lunge forward, keeping the back straight. Stretch should be felt on the left groin. Hold for 15 seconds. Repeat three times. Repeat on opposite leg.



SIDE LUNGES

Stand with legs apart; bend the left knee while leaning toward the left. Keep the back straight and the right leg straight. Hold for 15 seconds. Repeat three times. Repeat on opposite leg.



CROSS-OVER

Stand with legs crossed; keep feet close together and legs straight. Touch toes. Hold for 15 seconds. Repeat three times. Repeat with opposite leg.



STANDING QUAD STRETCH

Stand supported. Pull foot to buttocks. Hold for 15 seconds. Repeat three times.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

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PLYOMETRICS HELP PLAYERS IMPROVE MUSCLE POWER

BY CASEY CHRISTY, ATC, CSCS

PLYOMETRICS HELP YOUTH FOOTBALL PLAYERS IMPROVE PERFORMANCE BY INCREASING EXPLOSIVE MUSCLE POWER AND SPEED WHILE REDUCING INJURIES.



WHAT COACHES SHOULD KNOW

- **PLYOMETRICS ARE SPECIAL JUMP TRAINING AND MEDICINE BALL EXERCISES THAT CAN HELP YOUTH FOOTBALL PLAYERS IMPROVE MUSCLE POWER AND SPEED.**
- **PLAYERS NEED A SOLID BASELINE OF STRENGTH BEFORE STARTING A PLYOMETRIC PROGRAM TO PREVENT TRAINING INJURIES.**
- **YOUTH FOOTBALL COACHES SHOULD BECOME FAMILIAR WITH SAFETY CONSIDERATIONS BEFORE INITIATING A PLYOMETRIC PROGRAM. THESE INCLUDE ADEQUATE AND APPROPRIATE TRAINING PROGRESSION, WARM-UP, TECHNIQUE, LANDING SURFACE, AND TRAINING VOLUME.**

Young players need strength and flexibility to succeed on the football field. But strength is one thing, and the ability to generate it quickly and explosively is *power*. And it's power that's necessary for a ball carrier to accelerate quickly through the defensive line, or for a defender to tackle an opponent. Plyometrics can help youth football players develop that power.

WHAT ARE PLYOMETRICS?

Plyometrics, sometimes called jump training, became popular during the 1970s. Eastern European athletes who incorporated plyometrics in their training programs excelled in Olympic track and field events, weightlifting, and gymnastics, and many attributed that success to their training methods. Since then, coaches in a variety of sports—including football—have used plyometrics to improve muscle power and speed, and even to prevent injuries. Studies show

athletes who do plyometrics are four times less likely to get hurt while playing sports.

Lower body plyometrics include jumps-in-place, multiple hops, and box drills. One example is the front cone hop. In this drill, the athlete hops forward over five cones spaced a few feet apart as quickly as possible. Examples of upper body plyometric exercises include medicine ball tosses, throws, and trunk twists. A typical beginner's program may look like this:

- Ankle jumps—2 sets of 10 repetitions
- Lateral cone hops—2 sets of 8-10 repetitions
- Two-legged horizontal jumps—4 sets of 5 repetitions
- Medicine Ball Chest Pass—2 sets of 10 repetitions

Consult one of the suggested readings at the end of this section for descriptions of these and other plyometric exercises.

HOW DO PLYOMETRICS WORK?

Plyometrics are based on the rubber band principle. Your muscles are elastic, just like a rubber band, and when they are placed in a stretched position, your muscles develop stored energy—energy that can be used for a powerful contraction.

To illustrate, let's compare a plyometric exercise to shooting a rubber band. Before you can shoot a rubber band, you must first stretch it out (the stretch phase). Then once you let it go, the rubber band quickly recoils (contraction phase), thus, giving it the power to fly. The same thing happens in your muscles during a plyometric exercise.

For example, during the front cone hop, the front thigh muscles stretch as the knees bend to absorb the shock with each landing (stretch phase). The muscles then quickly recoil (the contraction phase) as with the rubber band. The result is a powerful, explosive muscle contraction that propels the athlete to the next jump. Using these types of exercises teaches muscles to fire explosively, which translates into more speed and power on the playing field.

SAFETY CONSIDERATIONS

Before starting youth football players on plyometrics, coaches need to learn some safety precautions. Plyometrics can be dangerous if not performed properly. Safety considerations include appropriate training progression, adequate warm-up, proper technique, the right landing surface, and monitored training volume. Let's take a look at each of these.

- **PROGRESSION** Players can't just begin a plyometric program—some prerequisites are necessary. A football player needs a good baseline of strength first. Four to six weeks of general strength training exercises are recommended before an athlete starts any plyometric exercises.

Beginners should start with low-level plyometrics, such as double-leg jumps in place and multiple hops and jumps. Athletes should start with jumps with two-foot landings first, to minimize stress to the ankles, knees, and hips.

Gradually, athletes can progress to more intense exercises such as single-leg landings, double-leg box drills, and depth jumps. Depth jumps involve stepping down from a box and then immediately jumping up onto another box. However, these jumps are intense and not for everybody. Only those players with extensive training experience and a sufficient strength base should perform depth jumps. Overweight athletes should avoid them altogether.

- **WARM-UP** Players should perform a five- to eight-minute light jog and then stretch out all major muscle groups before a plyometric exercise session. Power skipping (an exaggerated skipping motion emphasizing a forceful push-off with each skip) is also suggested.
- **TECHNIQUE** To prevent training injuries, coaches and athletes should learn plyometric techniques from a qualified expert such as a Certified Athletic Trainer (ATC) or Certified Strength and Conditioning Specialist (CSCS). Instructional books and videos are also available.
- **LANDING SURFACE** To minimize joint stress, perform jumps only on a padded surface or on soft grass. Training on hard surfaces such as a gym floor or a dirt field can lead to injury.
- **TRAINING VOLUME** Coaches must also monitor foot contacts—the number of times the feet strike the ground—during training sessions. Too much jumping too soon can result in overuse injuries such as ankle and knee tendinitis. Limit beginners to 60-100 foot contacts per training session, and advanced athletes to 100-150. Perform plyometrics a maximum of twice a week during the offseason and once a week during the season. And allow at least 72 hours recovery between sessions.

Plyometrics can improve a youth football player's muscle power and speed, and even prevent game injuries. However, to avoid injury during training, players must have a good strength base before starting a program, learn proper technique, and follow recommended safety precautions.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Jumping into Plyometrics 2nd edition, by Donald Chu (Human Kinetics Publishers). Video also available.

The Complete Guide to Medicine Ball Training, by Vern Gambetta and Steve Odgers (Optimum Sports Training Publishers). Video also available.

High Powered Plyometrics, by James Radcliffe and Robert Farentinos (Human Kinetics Publishers). Video also available.

AGILITY TRAINING IN YOUTH FOOTBALL

BY PATTI FLYNN, ATC, CSCS

AGILITY IS AN IMPORTANT COMPONENT OF STRENGTH AND CONDITIONING. THE AGILE ATHLETE IS QUICKER ON HIS FEET, MORE EFFECTIVE AS A FOOTBALL PLAYER, AND BETTER ABLE TO AVOID SITUATIONS THAT MAY CAUSE INJURY

WHAT COACHES SHOULD KNOW

- THE DRILLS THAT FOLLOW, APPROPRIATE TO AGE AND YOUTH FOOTBALL DEMANDS, WILL AID IN DEVELOPING AGILE MOVEMENT.

WARM-UP

A warm-up consisting of both static (typical stretching of individual muscles by holding a specific position) and dynamic stretching (movements that run muscles and joints through their full range of motion), approximately 15-20 minutes in length, is necessary before participating in these drills. Jogging should start the warm-up, followed by a full-body static stretch, paying special attention to the calves, quadriceps, hamstrings, and hip musculature. Athletes should find a position that causes them to feel a gentle stretch on the muscle and hold that position for 20 seconds. Young athletes should not force a stretch, as it could take its toll on their already pliable joints. After the static stretching is complete, athletes should do a dynamic warm-up. Toe walks, heel walks, walking knee to chest,

walking straight leg kicks (Frankensteins), butt kicks, and walking hip circles should be among the exercises included.

DRILLS

Make sure athletes stay balanced and controlled in these activities. In general, good athletic position (on toes, knees bent, head up, hands ready) should be maintained.

These drills can be done in any order. If certain drills are easier than others for youth football players, those drills should be done first. Start with the basic drills described. As young athletes become more proficient, the speed of the drill should be increased, with proper form maintained. Drills can then be made more position-specific as noted below.



DIAGRAM I: FOOT PLACEMENT FOR SIDESTEP FAST FEET IN SPEED LADDER

1. FAST FEET

Step forward with one foot, followed by the other foot to meet it. Steps should be quick and quiet. Lead first with the left foot each step, then with the right. This drill can be done on the ground, through a speed ladder, or over hurdles or cones. Perform drill forward, backward, and sidestepping.

2. SKATING DRILL

Start on one foot and push sideways to land on other foot. Landing should be soft and controlled. Push back to other foot right away. Continue hopping from foot to foot for 20 seconds. Gradually widen the distance of jump.

3. STOPS/STARTS

While performing agility drills or while running, stop and start or change direction on command. Voice commands or ball movement (e.g. simulating a snap) can be used as triggers. Athletes should stop, restart, and change direction with a minimum number of steps.

4. MIRROR

Athletes face each other, one as offense, one as defense. The offensive player performs the drill (e.g. grapevine, sidestep fast feet), changing direction (laterally or forward/backward or both) randomly. The defensive player reacts to maintain position opposite the offensive player at all times.

DIAGRAM II: SKATING DRILL

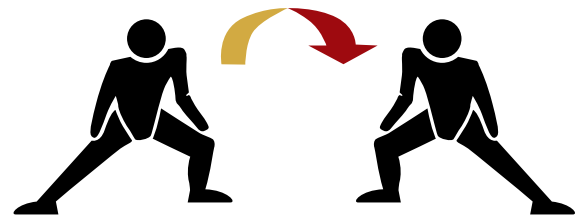
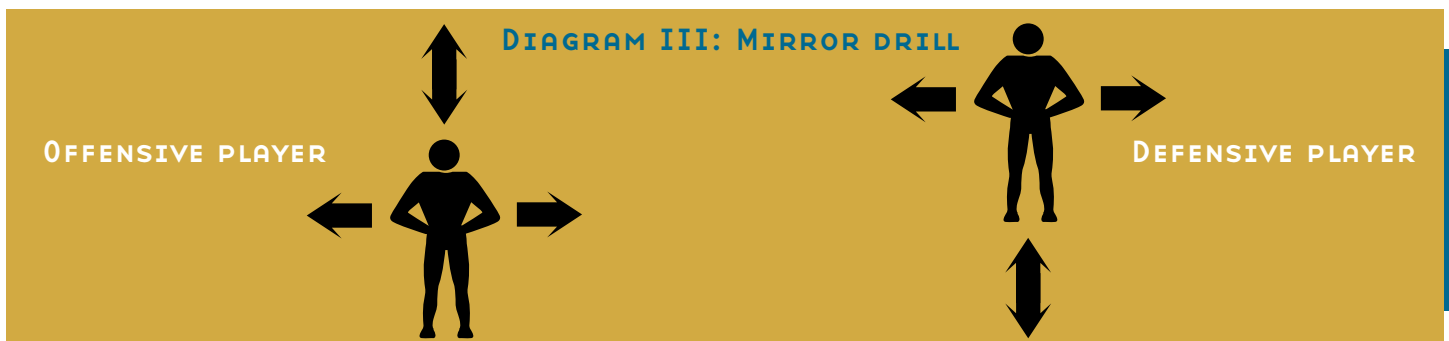


DIAGRAM III: MIRROR DRILL



POSITION SPECIFIC DRILLS

Once youth football players have mastered agility drills, the drills can be made position specific. Remember that the speed of the drill will have to slow down at first.

DEFENSIVE BACKS/RECEIVERS: Perform drills over greater distances. Catch the ball to cue changing direction. Defensive backs should go in the opposite direction they are heading (as if returning the ball after an interception) and receivers should turn 180 degrees and continue (as if catching a pass and heading upfield).

QUARTERBACKS: Perform drills with ball in hand. Throw or handoff in the middle of a drill.

RUNNING BACKS: Perform drills carrying the football. Change the arm with which they are carrying the ball when they change direction with

their feet. Using cones or hurdles helps reinforce high knees.

LINEBACKERS: Use a combination of back and lineman position-specific drills.

LINEMEN: Use football motion or voice commands with varying cadence to cue. Use shorter distances. Use arm movements as in a game during drills (e.g. blocking).

EQUIPMENT

Reference has been made to speed ladders and hurdles or cones. These pieces of equipment can be purchased through strength and conditioning suppliers. If your budget is limited, there are some alternatives. Ladders can be made out of thin rope or webbing purchased at a sporting goods store. Lines painted on the ground are also an option.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

National Strength and Conditioning Association. nsca-lift.org.

Essentials of Strength and Conditioning (available through Human Kinetics Publishing) National Strength and Conditioning Association.

Training & Conditioning magazine (available through MAG, Inc., 2488 N. Triphammer Rd., Ithaca, NY 14850).

PROPER FUEL FOR STRENGTH AND CONDITIONING

BY KEITH M. GORSE, M.Ed., ATC

PROPER NUTRITION PLAYS A VITAL ROLE IN YOUTH FOOTBALL STRENGTH AND CONDITIONING. FOR A YOUNG ATHLETE TO PERFORM AT HIS BEST, HE NEEDS A BALANCED EATING PLAN, AND HE NEEDS TO REPLENISH FLUIDS.



WHAT COACHES SHOULD KNOW

- A BALANCED EATING PLAN PROPERLY FUELS A YOUTH FOOTBALL PLAYER TO PERFORM STRENGTH AND CONDITIONING ACTIVITIES.
- CARBOHYDRATES PLAY AN IMPORTANT ROLE IN STRENGTH AND CONDITIONING.
- PROTEINS AND FATS ALSO PLAY A KEY ROLE IN BUILDING STRENGTH.
- PROPER FLUIDS ARE CRITICAL TO A SUCCESSFUL STRENGTH AND CONDITIONING PROGRAM.

Proper nutritional care is essential to strength and conditioning. The best eating plan for young football players does not differ much from a regular and balanced diet plan for other youth athletes. It should include adequate fluids and plenty of low-fat, medium-protein, and high-carbohydrate foods that provide energy and replenish the fuel and fluids used during physical activity.

CARBOHYDRATES are one of the main sources of energy for muscles. It is important that at least 65-70 percent of a young athlete's eating plan consist of foods high in carbohydrates and low in fat, such as breads, pastas, fruits, and vegetables. Fruit juices and juice drinks are also high in carbohydrates. Muscles replenish stored carbohydrates best within 1-2 hours after exercise. It is important that young athletes eat or drink 200 to 400 carbohydrate calories soon after exercise and then a few hours later. Here are a few 200-400 carbohydrate calorie suggestions:

- 1 Two pieces of fruit (banana, apple, orange)
- 2 One cup frozen yogurt with fruit topping
- 3 A bagel with jelly

- 4 A muffin (blueberry) with one cup 1 percent milk.
- 5 Bowl of cereal with 1 percent milk and fruit topping
- 6 Bowl of vegetable soup with 1 pita bread pocket
- 7 Fruit juice or fruit drink (12-16 ounces)

PROTEINS are important for the growth of muscle and the maintenance of all body tissues. It is not a major form of energy for the body, but protein does help with the development of certain chemicals that help fight infection and illness. Protein is an essential nutrient found in many foods.

It is thought that extra protein will be useful for endurance athletes as a means of replacing muscle protein used during training. Athletes require more protein than the average person; however, excessive amounts of protein will overwork the liver and kidneys, interfere with calcium absorption in bone, and will convert to fat for storage. A well-planned diet will usually supply all of the daily protein a young football player needs.

Recommendations for proper protein intake in the young athlete vary, but range from 1-2 grams/kilo-

gram of body weight. Proteins should account for 15-20 percent of a young athlete's eating plan. Foods that are high in protein are meat, poultry, cheese, and eggs. Proteins should be included in a sound diet plan that includes 3-4 meals per day. Proteins should be consumed at least 3-4 hours before physical activity. They should be eaten in small quantity with other forms of nutrients (i.e., carbohydrates) to facilitate digestion. Here are a few suggestions for a protein and carbohydrate pregame meal:

- 1 One six-ounce baked chicken breast with pasta
- 2 One six-ounce grilled hamburger with light vegetable
- 3 One scrambled egg with bowl of cereal and fruit topping
- 4 One American cheese-on-wheat pita bread sandwich with fresh fruit
- 5 Broiled chicken tenders with fresh fruit or vegetable

FAT is an essential nutrient, but it should not be consumed in great amounts. Fats serve as a carrier for the fat-soluble vitamins A, D, E, and K. It helps protect vital organs, and is a good energy source for skeletal muscles in high endurance activities.

Fats come in two different forms: saturated and unsaturated. Saturated fats are primarily found in animal products such as meat, butter, and cheese. Unsaturated fats are primarily found in plant products such as vegetable oil, nuts, and seeds. Unsaturated fats are recommended in a diet because they tend to maintain blood cholesterol levels. Total fat consumption should be 10-15 percent of a young athlete's eating plan.

More than 20 micro-nutrient elements (minerals) play an essential role in the body and must be supplied in the young athlete's diet. Below are the most essential minerals needed by young football athletes and where they are found in their diets:

- 1 Calcium is needed for bone and tooth formation, blood clotting, and muscle contraction. It is found in most dairy products.
- 2 Sodium is needed for maintenance of fluid balance. It is found in salt.

- 3 Iron is needed for metabolism and formation of hemoglobin in the blood. It is found in red meats, breads, dark green vegetables, and cereals.
- 4 Zinc is needed for normal growth and development. It is found in seafood and meats.
- 5 Fluorine is needed for strengthening bones and teeth. It is found in most drinking water.

Young football athletes need between 2,500-3,000 calories per day, and typically expend 600-900 calories per day on football activity. The typical diet plan should include 3-4 high-quality meals per day that provide the proper percentage of all nutrients needed.

It's important that athletes, parents, and coaches know that if an athlete loses weight that is not recovered with simple fluid intake, a greater number of calories should be recommended in his diet. If a weekly weight gain of one pound is desired, an exercise program that includes a diet plan of 3,500 extra calories per week might be recommended. Athletes and their parents should always read the nutrient labels on all food packages to determine the amount of calories found in those food items.

For more advice on proper nutritional care as it relates to strength and conditioning, contact a certified athletic trainer or a sports nutritionist. Proper eating habits with proper fluid intake at all times can make a young athlete strong, fast, and healthy.

Other reliable sources of nutritional information for the strength and conditioning of young football players are:

- Food and Drug Administration 888-SAF-EFOOD (723-3366)
- Food and Nutrition Information Center (301) 504-5719
- American Academy of Pediatrics (847) 228-5005
- American Dietetic Association (800) 877-1600
- ADA Nutrition Hotline (800) 366-1655 or www.eatright.org
- President's Council on Physical Fitness and Sports (202) 690-9000

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Painter, S.B., & Evans, D.M. Sports Medicine and Athletic Training. Gaithersburg, MD: Aspen Publication; July 2000; 10: 1-10: 24.
Sullivan, J.A., & Grana, W.A. The Pediatric Athlete. Park Ridge Ill: American Academy of Orthopedic Surgeons; November 1998; 33-43.
Brown, J.E. Nutrition Now. Belmont, CA. International Thompson Publishing Co.; July 1999; 29: 1-29: 16.

SHOULD YOUTH FOOTBALL PLAYERS LIFT WEIGHTS?

BY CASEY CHRISTY, ATC, CSCS

STRENGTH TRAINING PROGRAMS CAN HELP FOOTBALL PLAYERS SAFELY STRENGTHEN MUSCLES, PREVENT INJURY, AND IMPROVE PERFORMANCE, BUT ONLY IF THE PROGRAMS ARE PROPERLY DESIGNED AND ADEQUATELY SUPERVISED.



WHAT COACHES SHOULD KNOW

- **PRE-ADOLESCENT FOOTBALL PLAYERS CAN GET STRONGER, PREVENT INJURY, AND IMPROVE PERFORMANCE THROUGH A STRENGTH TRAINING PROGRAM, USING EITHER LIGHT WEIGHTS, BODY-WEIGHT EXERCISES, OR RESISTANCE BANDS.**
- **WHEN PROPERLY DESIGNED AND SUPERVISED, WEIGHT TRAINING FOR PRE-ADOLESCENTS CARRIES NO GREATER INJURY RISK THAN PARTICIPATING IN SPORTS SUCH AS FOOTBALL, BASEBALL, OR SOCCER.**
- **FOOTBALL PLAYERS SHOULD UNDERGO A PHYSICAL EXAMINATION BY A PHYSICIAN BEFORE STARTING AN EXERCISE PROGRAM AND THEY SHOULD SEEK ADVICE FROM A HEALTH OR FITNESS PROFESSIONAL, SUCH AS A CERTIFIED ATHLETIC TRAINER (ATC).**
- **COACHES SHOULD EMPHASIZE PROPER TECHNIQUE, USE OF LIGHT RESISTANCE, AND SUPERVISED TRAINING SESSIONS.**

STRENGTH TRAINING VS. WEIGHT TRAINING

Emphasize to youth football players that getting stronger doesn't have to involve using weights. Although some experts say kids as young as 9 or 10 years old can start with light weights, remember that other *resistance* options are available.

For example, young football players can use body-weight exercises (pushups, abdominal crunches, etc.) and resistance bands to build strength.

BENEFITS OF STRENGTH TRAINING

Training not only strengthens muscles, but tendons, joints, and bones—even for pre-adolescents. A stronger body not only improves football performance, it also helps prevent injury.

However, strength training will produce very lit-

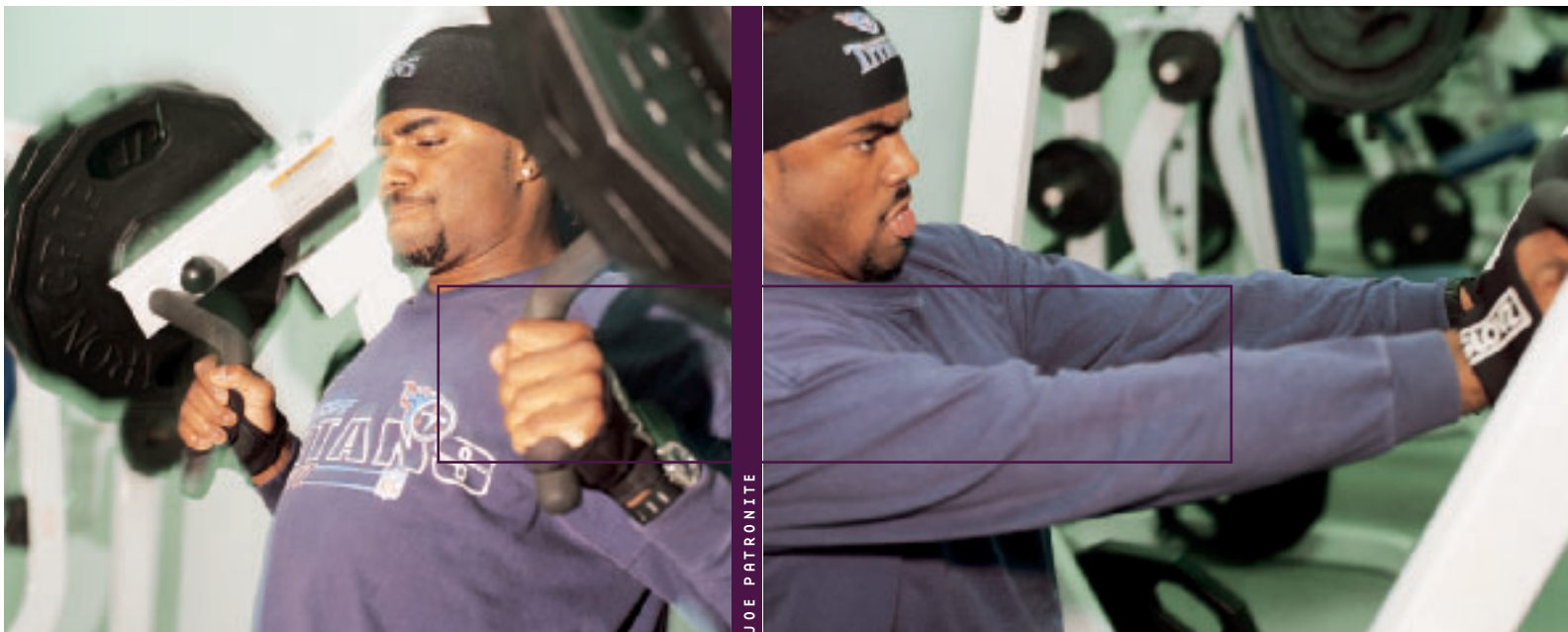
tle—if any—increases in muscle size until a boy is older. That's because pre-adolescent boys have not begun to produce hormones such as testosterone. Because testosterone is necessary for developing bigger muscles, they *will* get stronger, but they won't see bigger muscles until they reach puberty.

STRENGTH TRAINING SAFETY

Strength training, when done correctly, is safe. According to research studies, a properly designed and supervised weight training program carries no greater injury risk than playing sports such as football, baseball, or soccer. Here are some Do's and Don'ts:

- **DO ENSURE THAT PARENTS CONSULT A PHYSICIAN** before their child begins any exercise program.

- **DO SEEK THE ADVICE OF A HEALTH OR FITNESS PROFESSIONAL** such as a Certified Athletic Trainer (ATC) or a Certified Strength and Conditioning Specialist (CSCS).
 - **DO EMPHASIZE PROPER EXERCISE TECHNIQUE.** Never allow the lifter to sacrifice good form for heavier weight.
 - **DO TEACH PROPER BREATHING.** Lifters should breathe out as they lift and breath in as they lower the weight. They should never hold their breath.
 - **DO USE LIGHT RESISTANCE AND STAY IN THE 12-15 REPETITION RANGE.** Perform 1-3 sets for each exercise. Remember, beginners can use body weight exercises or resistance bands to build a baseline of strength before using light weights. And remember, body weight exercises may be too intense for some over-weight athletes, so resistance bands are recommended.
 - **DON'T USE WEIGHTS THAT ARE TOO HEAVY.** When the athlete is ready to start using weights, have him begin with a weight with which he can do at least 12 repetitions for that particular exercise. If he can't, then the weight is too heavy. Don't let an athlete try a heavier weight if he's not ready for it.
 - **DON'T OVERDO IT.** Exercises need to be done only two to three days a week on alternate days. Resting a day between workouts is essential for adequate recovery. Workouts should last only 30-45 minutes.
 - **DON'T ALLOW YOUTH FOOTBALL PLAYERS TO LIFT ALONE.** All workout sessions must be supervised by a qualified adult. Use one or more spotters to assist the lifter when necessary.
 - **DON'T ALLOW YOUR YOUTH FOOTBALL PLAYER TO LIFT MAXIMAL WEIGHTS** until he is at least 16 years old. Heavy lifting (especially overhead lifts) can injure an athlete's fragile growth plates—areas of cartilage near the joints—impairing normal bone development.
 - **DON'T ALLOW YOUTH FOOTBALL PLAYERS TO BEGIN** a weight training program unless they are mature enough to follow directions.
- In summary, remember that getting stronger not only improves performance but also helps prevent injuries. Kids *can* work out as long as coaches, athletes, and parents follow the proper precautions. Young football players need to take it slow at first, but as they reach physical maturity, they can progress into more advanced programs with greater resistance.



JOE PATRONITE

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

SportsWise: An Essential Guide for Young Athletes, Parents and Coaches, (Houghton Mifflin Publishers) by Dr. Lyle Micheli. Strength and Power for Young Athletes, by Avery Faigenbaum and Wayne Westcott (Human Kinetics Publishers). Total Training for Young Champions, by Tudor O. Bompa (Human Kinetics Publishers).



INJURY PREVENTION

TIPS TO PREVENT YOUTH FOOTBALL INJURIES

BY MARY KIRKLAND, M.S., ATC/L, CSCS KENNEDY SPACE CENTER

THERE ARE MANY THINGS TO CONSIDER IN PREVENTING YOUTH FOOTBALL INJURIES. HERE'S HOW COACHES AND PARENTS CAN PLAY A ROLE IN KEEPING THE GAME AND PRACTICE ARENA SAFE.



WHAT COACHES SHOULD KNOW

- **MAKE SURE EACH CHILD IS IN PROPER PHYSICAL CONDITION TO PLAY FOOTBALL.**
- **KNOW AND ABIDE BY THE RULES OF THE SPORT.**
- **ENSURE THE PLAYERS WEAR APPROPRIATE PROTECTIVE GEAR.**
- **MAKE SURE THE PLAYERS KNOW HOW TO USE ATHLETIC EQUIPMENT.**
- **PLAYERS SHOULD ALWAYS WARM UP BEFORE PLAYING.**
- **PLAYERS SHOULD AVOID PLAYING WHEN VERY TIRED OR IN PAIN.**
- **PLAYERS SHOULD GET A PRESEASON PHYSICAL EXAMINATION.**
- **MAKE SURE THERE IS ADEQUATE WATER OR OTHER LIQUIDS AVAILABLE TO MAINTAIN PROPER HYDRATION.**

PROTECTIVE EQUIPMENT

Protective equipment is one of the most important factors in minimizing the risk of injury in youth football. Youth football leagues recommend the following items for each player: helmet; mouth guard; shoulder pads; athletic supporters for males; chest/rib pads; forearm, elbow, and thigh pads; shin guards; proper shoes; sunscreen; and water. The equipment provided should be safe, properly fitted, in good repair, and inspected regularly. Equipment that is damaged should be discarded.

CONDITIONING PROGRAMS

Top physical performance can only be achieved by an athlete who is in top physical condition. Lack of physical fitness impairs the performance of an athlete. Coaches should know the physical condition of their athletes and set practice schedules accordingly. Supervised preseason, in-season, and out-of-season conditioning programs should be available to all athletes. A person who is educated in the conditioning of the adolescent athlete should design and monitor these programs utilizing up-to-date, scien-



CARPEY JACKSON

tifically sound advice. Cardiovascular, strength, and flexibility exercises that address the specific conditioning needs of the football player are essential to injury prevention. Conditioning also involves mental preparation, as well as developing the discipline to practice regularly, eat properly, and maintain good sleeping habits.

When playing or practicing in hot weather, players must acclimatize to the heat. It is essential that this be done gradually. With the proper conditioning program, a player can expect to be 80 percent acclimatized within 7-10 days. Final stages of acclimatization to heat are marked by increased sweating and reduced salt concentration in the sweat.

WARM-UPS

A proper warm-up is an integral part of a good conditioning regimen and should precede any strenuous physical activity. The National Athletic Trainers' Association (NATA) recommends a minimum 15-minute warm-up period before any game or practice and a cool-down period afterward. Athletes should warm up for five minutes during any prolonged breaks.

When done properly, stretching increases the blood supply to the muscles, tendons, and ligaments, and makes them more flexible. A stretching routine should include all of the major muscle groups of the body, with special attention given to muscle groups particularly stressed by the demands of the sport. Each stretch should be done smoothly and slowly, avoiding jerking motions. It should be held until tension, not pain, is felt in the muscle. See "*Football Flexibility Exercises*" on pages 20-21.

HYDRATION

The notion that water should be withheld from athletes is not only wrong, it can be harmful. The most important safeguard to the health of the athlete is the replacement of water. What is lost through sweat must be replaced.

Make sure athletes drink plenty of fluids before, during, and after practices and games in order to stay hydrated and avoid overheating. **Water must be on the field and readily available.** It is recommended that a minimum 10-minute water break be scheduled for every half hour of heavy exercise in the heat. Athletes should rest in a shaded area during the break. Dehydration of even as little as 1-2 percent of an athlete's body weight can hinder performance. More than 3 percent puts the athlete at risk for heat cramps, heat exhaustion, or heat stroke. One precautionary measure is to advise athletes to drink 2-3 cups of water for every pound lost during activity. Their body weight should be back to normal before the next workout.

Have athletes pay attention to the amount and color in their urine. They should excrete a large volume that is nearly colorless. Small amounts or dark colored urine can indicate dehydration. Appropriate sports drinks are key to limiting energy loss while remaining hydrated. They replace the electrolytes and fluid lost by the body during activity, and are especially important when exercising in hot, humid climates.

ANNUAL PHYSICAL EVALUATION FOR ALL PROSPECTIVE ATHLETES

A qualified physician should perform an annual physical evaluation prior to athletic participation.

Both the coach and parent should review the physician's documentation, as it will bring to their attention any potential medical alerts (such as asthma, diabetes, etc.). Guidelines should be established for athletes with medical alerts to insure that emergency life-sustaining medications are readily available and administered properly when needed. Any cardiac risk factors should be identified and reviewed by a physician prior to participation. In addition to the general examination, an orthopedic examination is recommended. This exam should focus on joint flexibility and range of motion, as well as an evaluation of any past injuries to the bones or joints.

TEAM PHYSICIAN/CONSULTING PHYSICIAN

Every team should have a qualified physician well versed in sports medicine available for immediate consultation.

APPROPRIATE MATCHING OF COMPETITORS

Children of the same age can vary dramatically in physical development, so health professionals often make a distinction between a child's chronological age and developmental age. In sports, a physical mismatch between competitors can lead to serious injury. Common sense dictates that young athletes be grouped according to their developmental age as much as possible, to reduce the likelihood of injury and help ensure fair competition.

PROPER TECHNIQUE

Coaches should drill athletes in the proper execution of fundamental football skills, particularly blocking and tackling. This will significantly reduce the incidence of head and neck injuries.

HIGH-QUALITY REFEREES

Try to insure that each official is certified by the National Association of Sport Officials (NASO). Every official must be fair and unbiased, and ensure that each event is played with the highest level of sportsmanlike conduct.

SAFE FIELD/FACILITY CONDITIONS

Ensure that playing facilities are properly cared for, inspected regularly, and repaired in a timely manner. Uneven terrain can contribute to sprained knees and ankles. For games played in thunderstorm conditions, follow the NATA's 30/30 rule for lightning safety, which uses the Flash-to-Bang count to determine when to go to safety. If 30 or fewer seconds elapse between the time a lightning flash is seen and thunder is heard, all individuals should be removed from the field and taken inside a safe structure. Once activities have been suspended, wait at least 30 minutes following the last sound of thunder or lightning flash prior to resuming an activity or returning outdoors. Also, try to contact the local weather service for additional advice on conditions.

BASIC FIRST AID/EMERGENCY PREPAREDNESS

Each coach should make an effort to have CPR and First Aid training. Coaches often are the first to respond to any emergency and they will need to take the proper steps to safeguard the injured athlete. Know what to do in case of an emergency, and have your emergency plans written with copies provided to all coaches. Have prearranged procedures for obtaining medical care for the injured athlete, including initiating the EMS system and arranging for ambulance service. Have a well-stocked first-aid kit on the sidelines, as well as ice for immediate care of acute injuries.

PROTOCOL FOR RETURNING FOLLOWING INJURY

An injured player should be allowed to return to action only after adherence to a standard protocol established with a qualified athletic health-care provider. Communication is imperative among athletes, coaches, parents, team physicians, family physicians, certified athletic trainers, and others regarding the status of the athlete's injury.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Childhood Sports Injuries and Their Prevention – A Guide for Parents with Ideas for Kids.

http://www.niams.nih.gov/hi/topics/childsports/child_sports.htm

National Athletic Trainers' Association. What happens if your child is injured on the sports field? Press release. 9/23/99.

Lightning Season Is Here, Learn to Protect Yourself http://nata.org/publications/press_releases/lightningseason.htm.

Heat Stress and Athletic Participation <http://www.nfhs.org/sportsmed/heat%20stress.htm>.

O'Connor, D. Preventing sports injuries in kids. Patient Care, 6/15/98, pp. 60-83.

PREVENTION & TREATMENT OF OVERTRAINING SYNDROME

BY KELLY FIALA, M.S., ATC, CSCS

OVERTRAINING SYNDROME IS AN ILLNESS ASSOCIATED WITH SERIOUS CONSEQUENCES. HOWEVER, OVERTRAINING CAN BE PREVENTED WITH PROPER RECOVERY BETWEEN EXERCISE SESSIONS.



WHAT COACHES SHOULD KNOW

- OVERLOADING RESULTS IN PHYSIOLOGICAL ADAPTATIONS, INCLUDING INCREASED STRENGTH.
- OVERREACHING OCCURS WHEN AN ATHLETE DOES NOT ALLOW FOR ADAPTATION BETWEEN INTENSE TRAINING SESSIONS.
- OVERTRAINING SYNDROME IS AN EXTENSION OF OVERREACHING.
- OVERTRAINING OFTEN RESULTS IN DIMINISHED PERFORMANCE IN CONDITIONING DRILLS AND COMPETITIONS.
- DIFFERENT CHARACTERISTICS PREDISPOSE AN ATHLETE TO OVERTRAINING SYNDROME.
- SEVERAL SIGNS AND SYMPTOMS CAN HELP IDENTIFY AN ATHLETE IN AN OVERTRAINED STATE.
- A PHYSICIAN'S DIAGNOSIS IS NECESSARY TO DETERMINE IF AN ATHLETE IS IN AN OVERTRAINED STATE.
- TREATMENT FOR OVERTRAINING SYNDROME INCLUDES SEVERAL WEEKS OF REST.
- PREVENTION AND EARLY IDENTIFICATION ARE THE KEYS TO DEALING WITH OVERTRAINING SYNDROME.

The **OVERLOAD PRINCIPLE** is based on the premise that doing more work than an athlete's body is accustomed to will cause physiological adaptations. These adaptations will allow more work to be done in the future and with greater ease. However, there are potential risks associated with overloading without allowing for adequate recovery. **OVERREACHING** occurs when an athlete does not allow adaptation to occur between bouts of intense training. This results in a

decrease in performance that might be accompanied by other psychological and physiological signs and symptoms.

If the intensity and duration of training are not reduced, overreaching will lead to **OVERTRAINING SYNDROME**. Recovery for overreaching can take two to three weeks, and recovery from the overtraining syndrome can take several months. Overtraining, also known as maladaptation, is a long-term imbalance of physical training and

TABLE 1. SIGNS AND SYMPTOMS OF OVERTRAINING

- | | |
|----------------------------------|--|
| ■ Loss of appetite | ■ Anger |
| ■ Fatigue | ■ Tension |
| ■ Sleeping problems | ■ Muscle fatigue |
| ■ Depression | ■ Abnormal sense perceptions |
| ■ Long-term muscle soreness | ■ Inability to relax, twitchy, fidgety |
| ■ Insatiable thirst, dehydration | ■ Lower resistance to common illnesses (colds, sore throats, etc.) |

TABLE 2. FACTORS THAT CAN INCREASE VULNERABILITY TO AN OVERTRAINING STATE

- | INTERNAL | EXTERNAL |
|----------------------|--|
| ■ General health | ■ Intensity of physical training |
| ■ General nutrition | ■ Volume of physical training |
| ■ Mood state | ■ Social, economic, and psychological stress |
| ■ Hereditary factors | ■ Training history |
| ■ Age | ■ Environmental conditions and time of year |
| ■ Sex | ■ Food intake |
| | ■ Sleep (quality and quantity) |
| | ■ Infections |
| | ■ Medication, alcohol, and tobacco |
| | ■ Travel (jet lag, altitude) |

TABLE 3. THE PREVENTION OF THE OVERTRAINING SYNDROME

- Incorporate *periodization*
- Allow adequate recovery time
- Progress slowly with increasing intensity and duration
- Encourage alternative activities

recovery. A physician's diagnosis of overtraining is based on the patient's history and laboratory findings, carefully ruling out other diseases. **TABLE 1** lists several of the signs and symptoms associated with the overtrained state.

Some youth football players are more susceptible to overtraining syndrome than others. Adaptation

capacity, coping strategies, and physiological properties help to determine the athlete's ability to tolerate stress. It is important for youth football coaches and players to be aware of the factors that make athletes more vulnerable to overtraining. **TABLE 2** lists both internal and external factors that may predispose an athlete to overtraining syndrome.

The best way to combat overtraining syndrome is prevention. **Table 3.** Many measures can be taken to prevent overtraining. Periodization—varying intensity and volume of training, with adequate rest—is essential in preventing overtraining. Adequate rest varies; however, it should be a minimum of 1-2 days, and as intensity increases, the number of days of rest should also increase. Adequate nutrition and sleep also contribute to the prevention of overtraining.

However, if overtraining does occur, the best treatment is rest and avoiding sports activities for approximately two weeks. After two weeks, the youth football player can resume light training. It is recommended that the player try different sports and abstain from the activity that led to overtraining. A slow progression of training should occur with careful consideration of the athlete's mental status and an alertness for signs of overtraining. Proper nutrition and sleep are required to increase the speed of recovery.

For overtraining syndrome, as with any injury or illness, prevention is the key. However, in the event that the syndrome occurs, it is important for players and coaches to be able to identify signs and symptoms of the overtrained state. If overtraining is identified early, the required recovery time is reduced.

PREVENTING OVERUSE INJURIES IN YOUTH FOOTBALL

BY CASEY CHRISTY, ATC, CSCS

OVERUSE INJURIES IN YOUTH FOOTBALL PLAYERS ARE PREVENTABLE THROUGH PROPER TRAINING PROGRESSION.



WHAT COACHES SHOULD KNOW

- OVERUSE INJURIES SUCH AS TENDINITIS, SHIN SPLINTS, AND OTHER ACHES AND PAINS ARE COMMON IN YOUTH FOOTBALL PLAYERS, ESPECIALLY AT THE BEGINNING OF THE SEASON.
- COACHES AND PARENTS SHOULD TEACH ATHLETES THE DIFFERENCE BETWEEN GETTING-IN-SHAPE PAINS AND INJURY PAIN.
- COACHES CAN PREVENT MANY OVERUSE INJURIES THROUGH A GRADUAL TRAINING PROGRESSION AND BY RECOGNIZING THE UNIQUE CHARACTERISTICS OF A CHILD'S GROWING BONES.
- ACHES AND PAINS THAT LAST MORE THAN A FEW DAYS SHOULD BE EVALUATED BY A PHYSICIAN OR CERTIFIED ATHLETIC TRAINER (ATC).

Several studies indicate nearly half of all youth sports injuries are caused by overuse, suggesting kids often try to do too much too soon.

Coaches and parents can prevent many of these injuries by following a gradual training progression, instructing athletes not to ignore pain, and recognizing the unique physical traits of a child's growing bones.

FOLLOW THE 10-PERCENT RULE

One way to prevent overuse injuries is by following the 10-percent rule. This rule simply states that each of the **FIT** components of any athletic activity should be increased by no more than 10 percent a week:

FREQUENCY—how often athletes train, practice, or play

INTENSITY—how hard athletes train, practice, or play

TIME—how long athletes train, practice, or play.

The 10-percent rule started out as a recommendation for long-distance runners regarding their weekly increases in training mileage. Coaches and parents can apply this rule to football, too. For example, to build youth athletes' cardiovascular endurance with jogging activities, increase the amount of time **or** distance they run by only 10 percent a week. Accelerated increases are likely to lead to injury.

OTHER PREVENTATIVE MEASURES

Make all changes in athletes' routines gradual. For example, adding hill running is a great way to increase workout intensity, but not if it adds too much too soon. Training surface is also important. Suddenly changing from running on grass all the time to a harder surface such as asphalt can bring about injury.



LISTEN TO YOUR BODY

Teach athletes the difference between getting-in-shape pains and pain that indicates an injury or potential injury from overuse. For example, general muscle soreness on both sides of the body (both legs, both arms) can be expected when young athletes start a new season. But if it's only soreness, the pain should go away after a few days of rest and gentle stretching exercises. However, pain only on one side of the body—or pain on both sides that doesn't go away after a few days—can indicate an injury.

DON'T IGNORE PAIN

To prevent an overuse injury from snowballing into a condition that can sideline an athlete for an entire season, don't ignore pain. If a painful condition persists after a few days or affects the athlete's playing ability, remove him from participation. Then have the injury evaluated by a physician or certified athletic trainer (ATC).

Many minor overuse injuries can be managed without losing much playing time if caught early enough.

WATCH OUT FOR GROWTH PLATE PROBLEMS

Children have fragile growth plates—areas of cartilage that eventually harden into mature bone—near all of their joints. These areas are prone to injury when athletes are young and growing. Some growth plates—such as those on the back of the heel or below the kneecap—are especially prone to injury. These areas serve as attachment sites for the young athlete's muscles and tendons. Excessive physical activity can inflame the growth centers, leading to pain and swelling. Ignoring such pain can have long-term consequences, as untreated injuries to growth plates can affect normal bone growth, cause permanent arthritis, and abnormal muscle function.

Remember: don't train kids like miniature adults. Their young and growing bodies need time to adjust to new physical activities. And when aches and pains do occur, don't treat them lightly. Young athletes are susceptible to unique injuries that, when left untreated, can lead to long-term problems.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

SportsWise: An Essential Guide for Young Athletes, Parents and Coaches (Houghton Mifflin Publishers) by Dr. Lyle Micheli.
Overuse Injuries in Children and Adolescents by Dr. John DiFiori, M.D. (The Physician and Sportsmedicine, January 1999).
Combating Overuse Injuries: A Focus on Children and Adolescents (The Physician and Sportsmedicine, January 1993)
 by Carl Stanitski, M.D.

SELECTION, FITTING, CARE, AND USE OF EQUIPMENT

BY ROBERT D. KERSEY, PH.D., ATC, CSCS

ALONG WITH PROPER CONDITIONING AND TECHNIQUE, NO OTHER COMPONENT IS AS IMPORTANT TO SAFE YOUTH FOOTBALL PARTICIPATION AS HIGH-QUALITY PROTECTIVE EQUIPMENT. TODAY'S YOUTH FOOTBALL EQUIPMENT ALLOWS FOR MAXIMAL PROTECTION, WITH MINIMAL NEGATIVE IMPACT ON PERFORMANCE. USING PROPERLY FITTING QUALITY EQUIPMENT THAT IS CORRECTLY MAINTAINED ENSURES MAXIMAL SAFETY.



WHAT COACHES SHOULD KNOW

- PROTECTIVE EQUIPMENT IS DESIGNED TO MINIMIZE EXTERNAL FORCES TO THE BODY.
- PURCHASE HIGH-QUALITY YOUTH FOOTBALL EQUIPMENT FROM REPUTABLE DEALERS.
- USE QUALIFIED PERSONNEL AND ALWAYS FOLLOW RECOMMENDED FITTING INSTRUCTIONS. NEVER LET YOUNG ATHLETES DETERMINE PROPER FIT.
- KNOW AND FOLLOW THE MANUFACTURERS' REQUIREMENTS, WHICH OFTEN LIMIT EQUIPMENT ALTERATIONS.
- TEACH AND REQUIRE PROPER USE OF ALL PROTECTIVE EQUIPMENT.
- TEACH ATHLETES TO CONDUCT DAILY EQUIPMENT CHECKS, IN ADDITION TO FREQUENT AND REGULAR EQUIPMENT CHECKS BY THE COACHING, ATHLETIC TRAINING, OR EQUIPMENT STAFF.
- ALWAYS KNOW AND ABIDE BY THE EQUIPMENT RULES FOR YOUR SPECIFIC AREA AND LEAGUE.
- WHENEVER PROTECTIVE EQUIPMENT DIRECTIONS/INSTRUCTIONS ARE MISSING, CONTACT THE MANUFACTURER FOR GUIDANCE.
- CONTACT A PROPERLY QUALIFIED SPORTS HEALTH-CARE PROFESSIONAL, SUCH AS A CERTIFIED ATHLETIC TRAINER (ATC), FOR ADDITIONAL ASSISTANCE AND/OR INFORMATION.

Although rules vary with the level of competition and geographic region, certain equipment is required, while other gear is optional. Required youth football equipment generally includes: a helmet with facemask, mouthguard, shoulder pads, hip pads, thigh pads, knee pads, and a tailbone pad. Optional protective equipment may include: neck collars and knee braces. Items not detailed here include: jerseys, pants, footwear, protective eyewear, rib pads, and upper extremity padding.

REQUIRED EQUIPMENT

HELMET AND FACEMASK: All helmets used in youth football should meet minimum safety standards and be labeled as such (NOCSAE). The helmet and facemask protect the bones and soft tissues of the head, face, and, most important, the brain.

Always follow manufacturer guidelines. Each athlete has unique head dimensions, so individual fit is critical. Generally, helmets should fit comfortably snug. Check regularly for proper fit, including bladder inflation. Always inspect the helmet shell for cracks, and for excessive wear on interior padding, chin straps, rivets, screws, and snaps. Check the facemask for exposed metal. Recondition all helmets as specified by the manufacturer (typically every two years for youth helmets).

SHOULDER PADS: Shoulder pads should protect the upper torso and shoulder regions. As with helmets, proper fit of shoulder pads is critical to their effectiveness and should always follow manufacturer guidelines. Athletes should be able to reach up and out without impinging their neck. Be sure the inner padding covers the shoulder tips (acromions), and the outer shell protects the front and sides of both shoulders. The pads must completely cover both shoulder blades (scapulae) and the breast plate (sternum). Regular inspections should identify problem equipment. Annual reconditioning is recommended.

MOUTHGUARDS: A properly fitted, high-quality mouthguard assists in preventing many oral and facial injuries, as well as limiting concussions. Most youth football athletes use the boil and bite



(thermoplastic) mouthguard. These relatively inexpensive items are generally effective. After selecting the appropriate-sized mouthguard, do not allow over-trimming as this practice may limit its effectiveness. Custom mouthguards are efficient options, but costly.

PADDING: Youth football leagues typically require hip, thigh, and knee pads, as well as a tailbone pad for all participants. When properly fitted and used, these effectively protect specific body regions from contusion. Proper placement of these pads is imperative.

OPTIONAL EQUIPMENT

NECK COLLARS: Various forms of prophylactic and postinjury neck collars are available to football athletes. Fitted correctly, neck collars may effectively limit hyperextension (head back), but may not properly limit lateral flexion (side to side) or rotation (twisting). Always follow manufacturers' guidelines for fitting and application.

KNEE BRACES: Prophylactic knee braces have been in use for more than 20 years. When applied properly to adult football players, they can reduce knee sprains. Little research has been done with regard to the use of knee braces in youth football.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Athletic Protective Equipment: Care, Selection, and Fitting, by Scott Street and Debrah Runkle (McGraw-Hill, 2000).
Principles of Athletic Training, by Daniel Arnheim and William Prentice (McGraw-Hill, 2000).
Introduction to Athletic Training by Sue Hillman (Human Kinetics, 2000).

PREVENTING NECK INJURIES IN YOUTH FOOTBALL

BY CASEY CHRISTY, ATC, CSCS

PROPER TACKLING TECHNIQUE, STRONG NECK MUSCLES, AND THE RIGHT EQUIPMENT CAN HELP YOUTH FOOTBALL PLAYERS AVOID SERIOUS NECK INJURIES.

WHAT COACHES SHOULD KNOW



- **NECK INJURIES IN YOUTH FOOTBALL CAN RESULT IN PARALYSIS AND EVEN DEATH.**
- **PLAYERS SHOULD AVOID LOWERING THE HEAD WHEN MAKING A TACKLE AS THIS CAN RESULT IN SERIOUS INJURY. INSTRUCT PLAYERS TO KEEP THEIR HEADS UP WHEN TACKLING AND INITIATE CONTACT WITH THE SHOULDER.**
- **YOUTH FOOTBALL PLAYERS MUST ALSO STRENGTHEN THEIR NECK MUSCLES AND WEAR AN APPROVED, PROPERLY FITTED HELMET TO AVOID INJURY.**



SAM STONE

Serious neck injuries in football are rare—about 1 in every 100,000 players. Even one neck injury is one too many. That's because neck injuries can result in paralysis and even death. Here's how you can protect youth football players.

TEACH PROPER TACKLING TECHNIQUE

Instruct players to keep their heads up and initiate contact with their shoulder when making a tackle. Lowering the head and using it as a battering ram is asking for trouble. The reason for this is simple: When your head is upright, your seven neck bones are aligned in a natural, curved pattern, which protects you from injury. That's because your neck can better absorb impact in this position.

However, when you put your head down, your neck bones become stacked. And when a player makes a headfirst tackle in this position, the head stops but the rest of his body keeps moving, compressing his stacked neck bones. If the force is strong enough, the neck bones buckle and serious damage to the spinal cord can occur. Remind

players to hit with their heads up. They should see the jersey number of the player they are tackling.

STRENGTHEN NECK MUSCLES

The stronger a player's neck muscles are, the less likely it is that he will be injured. But point out to your players that doing neck exercises is in no way a substitute for proper tackling technique. Although neck machines are available, you really don't need any special equipment.

Here are some tips on how to strengthen the neck simply by using a towel.

NECK FLEXION—With the player in a seated position, stand behind him, roll up a towel, and place it across his forehead. Holding on to both ends of the towel, instruct the player to bend his neck forward slowly, bringing his chin toward his chest while you offer mild resistance. Have him pause and slowly return to the starting position. Don't allow him to hyperextend the neck when bringing the head back up. He should simply stop when the head is in its natural, upright position and repeat. Perform 2-3 sets of 10 repetitions.

NECK EXTENSION—Have the player begin with the neck in a partially flexed position by lowering his chin toward his chest. Stand in front of him and place the towel across the back of his head. Have him lift his head back into the upright position while you apply mild resistance. Don't allow him to hyperextend his neck. Have him stop when his head is in its natural position and then repeat. Perform 2-3 sets of 10 repetitions.

LATERAL NECK FLEXION—With the player seated and his head in its natural, upright position, stand on the right side of him facing the side of his head. Place the towel across the left side of his head, over his ear. While applying mild resistance with the towel, have him tilt his head to the left, bringing his left ear toward his left shoulder. Return to the starting position and repeat. Perform 2-3 sets of 10 repetitions, then repeat with the other side.



JONATHAN DANIEL

Finally, make sure players use only helmets approved by the National Operating Committee on Standards for Athletic Equipment (look for the "NOCSAE" label on the back), and make sure these helmets are properly fitted.

Remember, although not all neck injuries are preventable, proper tackling technique, keeping the neck muscles strong, and using the right equipment will greatly reduce players' chances of serious injury.

For more information on preventing neck injuries in youth football, consult a physician or a certified athletic trainer (ATC).

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Minimizing Liability Risks of Head and Neck Injuries in Football, by Jonathon Heck et al. (*Journal of Athletic Training*, Volume 29, No. 2, 1994).

Recommended Procedure for Football Helmet Fitting Session is available from Schutt Sports (1-800-637-2047), manufacturer of football helmets.

Prevention of Cervical Spine Injuries in Football, by Kenneth Fine, et al. (*The Physician and Sports Medicine*, Vol. 19, No., 10, October 1991).

RISKS ASSOCIATED WITH SPEARING

BY SANDRA J. SHULTZ, PH.D., ATC, CSCS

YOUTH FOOTBALL COACHES SHOULD EDUCATE PLAYERS ABOUT FUNDAMENTAL FOOTBALL SKILLS, PARTICULARLY THE PROPER EXECUTION OF BLOCKING AND TACKLING.



WHAT COACHES SHOULD KNOW

- **SPEARING, DEFINED AS HEADFIRST CONTACT WITH THE HEAD LOWERED AND THE NECK FLEXED, IS ILLEGAL AND DANGEROUS.**
- **SPEARING IS THE MAJOR CAUSE OF CERVICAL SPINE INJURY (CERVICAL FRACTURE, DISLOCATION, AND QUADRIPLÉGIA) IN FOOTBALL.**
- **COACHES WHO TEACH THEIR ATHLETES TO TACKLE OR BLOCK WITH THE HELMET ARE PLACING THEIR ATHLETES AT EXTREME RISK FOR SPINAL INJURY, PERMANENT PARALYSIS, AND EVEN DEATH.**
- **TEACHING PROPER TACKLING AND BLOCKING TECHNIQUES IS THE KEY TO PREVENTION OF HEAD AND SPINE INJURIES IN FOOTBALL.**

THE FOLLOWING RECOMMENDATIONS ARE PROVEN TO REDUCE THE RISK OF SPINAL INJURY DURING BLOCKING AND TACKLING:

- **EDUCATE PLAYERS ON THE POTENTIAL RISKS ASSOCIATED WITH TACKLING AN OPPONENT WITH THE HEAD LOWERED.**
- **COACHES SHOULD INSTRUCT PLAYERS TO MAKE CONTACT WITH THE HEAD UP (“SEE WHAT YOU HIT” APPROACH) AND NEVER WITH THE TOP OF THE HEAD OR HELMET.**
- **INITIAL CONTACT SHOULD NEVER BE MADE WITH THE HELMET/HEAD. INSTRUCT PLAYERS NEVER TO LOWER THEIR HEAD IN AN ATTEMPT TO DELIVER A BLOW TO AN OPPONENT.**
- **COACHES AND OFFICIALS SHOULD INSTRUCT PLAYERS NEVER TO USE THEIR HEADS AS BATTERING RAMS WHEN BLOCKING OR TACKLING.**

The risk of spinal injuries in football has decreased dramatically since 1976, when rule changes eliminated the head as the primary and initial contact point for blocking and tackling. However, it is natural for a young athlete—especially one who is smaller—to develop a head first-tackling technique to improve his leverage against large players if he is unaware of the risks and not properly instructed.

Although death or quadriplegia at the youth sport level are rare, the risk steadily increases with intensified impact forces as the athletes get bigger and stronger. Education and instruction should begin early to teach proper skills before bad habits develop.

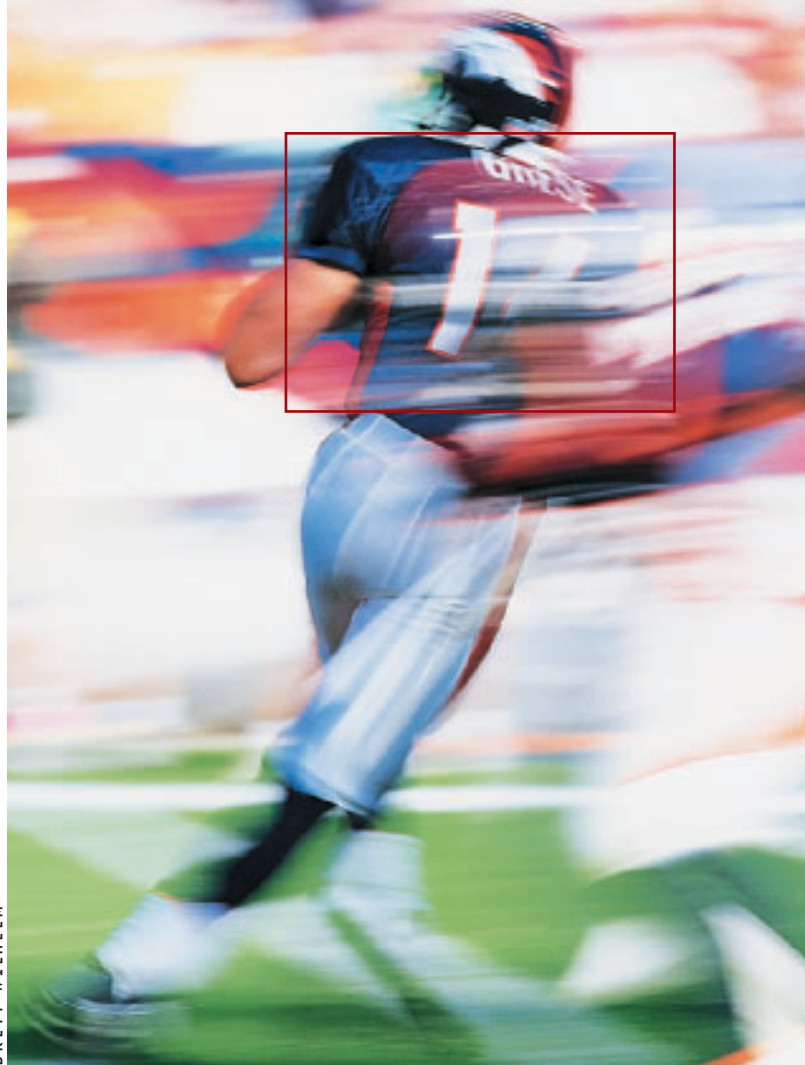
Spearing is characterized by headfirst contact, with the head lowered and the neck flexed. When contact is made in this fashion, the neck is straightened without the normal curvature of the spine. As a result, vertical forces through the head that are normally dissipated by the neck muscles are instead transmitted through the spinal column.

If the vertical force exceeds the tensile or compressive strength of the straightened spine, the vertebral column can collapse or buckle, resulting in compression fractures or fracture dislocations. If a fractured or dislocated vertebra intrudes into the spinal canal, permanent spinal cord injury and paralysis can result.

According to the National Center for Catastrophic Sport Injury Research, this method of tackling or blocking—resulting in axial loading of the spine—was found as the direct cause for 36 football fatalities and 30 permanent paralysis injuries in a single year before new rules and instruction had been introduced.

The key to avoiding catastrophic neck injury associated with spearing is prevention. Since 1976, rule changes, improved equipment, improved strength and conditioning programs, and athlete education have greatly reduced the incidence of neck injuries. Experts agree that the most effective prevention strategy is teaching proper technique.

The Inter-Association Task Force for Appropriate Care of the Spine-Injured Athlete recommends that



BRETT WILHELM

players, parents, and coaches all participate in educational programs, beginning in youth leagues and other football developmental programs and emphasizing a “see what you hit” technique for blocking and tackling. The task force also recommends that these educational programs be repeated at regular intervals and constantly reinforced.

Football is one of four sports that represent the greatest risk for head and spine injury of all of youth sports. Although it is recognized that football is a contact sport and not all injuries can be avoided, many serious injuries can be prevented through proper education. Research clearly indicates that the incidence of catastrophic head and neck injury has decreased dramatically through prevention strategies.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Proctor, M.R., & Cantu, R.C., *Pediatric and Adolescent Sports Injuries: Head and Neck Injuries in Young Athletes*. *Clinics in Sports Medicine*. 19(4); 693-715, 2000.

Mueller, F.O., & Diehl, J.L. *Annual Survey of Football Injury Research 1931-2001*. From the National Center for Catastrophic Sport Injury Research. Chapel Hill, NC. <http://www.unc.edu/depts/nccsi/SurveyofFootballInjuries.htm>.

Kleiner, D.M., Almquist, J.L., Bailes, J., Burruss, T.P., Feuer, H., Griffin, L.Y., Herring, S., McAdam, C., Miller, D., Thorson, D., Watkins, R.G., & Weinstein, S. *Prehospital, Care of the Spine-Injured Athlete: A Document from the Inter-Association Task Force for Appropriate Care of the Spine-Injured Athlete*. Dallas, Texas. National Athletic Trainers' Association, March 2001.

MUSCLE BALANCE: CONSIDERATIONS FOR INJURY PREVENTION

BY KELLY FIALA, M.S., ATC, CSCS

IN YOUTH FOOTBALL, MUSCLE BALANCE IS ESSENTIAL FOR INJURY PREVENTION AND ENHANCED PERFORMANCE.

WHAT COACHES SHOULD KNOW



- **MUSCLE BALANCE IS THE STRENGTH, POWER, OR ENDURANCE OF ONE MUSCLE GROUP RELATIVE TO ANOTHER MUSCLE GROUP.**
- **RECOMMENDED RATIOS HAVE BEEN ESTABLISHED FOR SEVERAL MUSCLE GROUPS THAT WORK IN OPPOSITION (E.G. BICEPS AND TRICEPS).**
- **NO MORE THEN A 10-PERCENT DEFICIT SHOULD EXIST BETWEEN MUSCLE GROUPS OF THE RIGHT AND LEFT SIDES.**
- **LEG STRENGTH TO BODY WEIGHT RATIOS INDICATE POTENTIAL BODY SPEEDS.**
- **RATIOS ARE NOT ABSOLUTE GUIDELINES.**
- **DIFFERENCES IN MUSCLE BALANCE SHOULD BE BASED ON INDIVIDUAL VARIATIONS, SPORTS PLAYED, AND PREVIOUS INJURIES.**

MUSCLE BALANCE plays a critical role in injury prevention and performance enhancement. As a youth football coach, you should consider three types of muscle balance: agonist and antagonist muscles, contralateral muscles, and lower body strength to body weight ratios.

An *antagonist* muscle works in opposition to the prime mover, also called the *agonist*. Agonist and antagonist muscle groups (e.g. biceps and triceps) are not always equal in strength. Several studies have been conducted to determine appropriate standards for agonist/antagonist muscle strength ratios. These recommendations are listed in Table 1.

For example, a youth football player who can lift 100 pounds with his quadriceps during knee extension should be able to lift 66 pounds with his hamstring during knee flexion (see *Knee [Extension: Flexion]* in Table 1). In addition, this athlete should be able to lift equal amounts with his triceps during elbow extension and biceps during elbow flexion

(see *Elbow [Flexion: Extension]*).

Here's another way to look at the information: The gastrocnemius (the largest muscle of the calf of the leg) and soleus (a broad flat muscle of the calf of the leg, situated under the gastrocnemius) should be able to lift three times as much during plantar flexion (extension of the ankle) as the tibialis anterior (the shin) does during dorsiflexion (foot flexion) (see *Ankle [Plantar flexion: Dorsiflexion]*).

However, it is *not* advised for adolescents to perform a 1RM, the maximum amount of weight an athlete can lift only one time. Therefore, it is best to use a *predicted* 1RM. After warming up, a youth football player can predict his 1RM by selecting a weight he feels he can lift 6-8 times. After performing the maximum amount of lifts for that weight, he can plug the weight and repetitions into the following equation:

Predicted 1RM = lbs or kg / [100% - (number of reps x 2)]

For example, if an athlete can lift 80 kg for 10

TABLE 1. RECOMMENDED STRENGTH RATIOS

JOINT (ACTION)	MUSCLES	STRENGTH RATIO
Ankle (Plantar flexion: Dorsiflexion)	Gastrocnemius, soleus: tibialis anterior	3:1
Ankle (Inversion: Eversion)	Tibialis anterior: peroneals	1:1
Knee (Extension: Flexion)	Quadriceps: hamstring	3:2
Hip (Extension: Flexion)	Spinal erectors, gluteus maximus, hamstring: iliopsoas, rectus abdominus, tensor fascia latae	1:1
Shoulder (Flexion: Extension)	Anterior deltoid: trapezius, posterior deltoids	2:3
Shoulder (Internal rotation: External rotation)	Subscapularis: supraspinatus, infraspinatus, teres minor	3:2
Elbow (Flexion: Extension)	Biceps: triceps	1:1
Lumbar Spine (Flexion: Extension)	Psoas, abdominal: spinal erectors	1:1

repetitions, the following is true:

Predicted 1RM = 80 kg / [100% - (10 x 2)]

Predicted 1RM = 80 kg / [100% - 20%]

Predicted 1RM = 80 kg / [80%]

Predicted 1RM = 80 kg / [0.80]

Predicted 1RM = 100 kg

After making the calculations, comparisons between muscle groups can be made.

In youth football, it is important to remember that these values should be used as general guidelines and not absolute standards.

The term **CONTRALATERAL** refers to both right and left sides of the body. Contralateral muscles should be similar in strength. However, some contralateral muscles or muscle groups have discrepancies in their strength. These discrepancies should never exceed a 10-percent difference.

The final standard of muscle balance that youth football coaches should be aware of is the relationship of **LOWER-BODY STRENGTH** to body weight. The guidelines established for lower-body strength are based on leg press and squat performances.

Youth male football players should be able to leg press about 1.5 times their body weight and squat weights equal to their body weight. Again, these guidelines are based on the outcomes of a few studies and should not be viewed as absolute standards. Differences in muscle balance should be based on individual variations, sports played, and previous injuries. This testing should be done on mature adolescents only.

In addition to strength, **MUSCULAR ENDURANCE** is a key factor in injury prevention. Muscular endurance is the ability to perform repetitive muscular contractions for an extended period of time. Typically, as strength increases, endurance increases as well.

A clear understanding of a youth football player's general trends of strengths and weaknesses of muscle groups is essential to the design of an appropriate resistance-training program. Weak muscles should be strengthened by exercising with greater frequency and volume. Give these weaker muscle groups priority by placing them at the beginning of the workout.

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Baechle, T. (Ed.). *Essentials of Strength Training and Conditioning. Human Kinetics: Champaign. 2000.* (Chapter 24: Muscle Balance by D. Wathen).

Moore, J., & Wade, G. *Prevention of Anterior Cruciate Ligament Injuries. National Strength and Conditioning Association Journal. 11(3): 35-40. 1989.*


Grace, T. *Muscle imbalance and extremity injury. A perplexing relationship. Sports Medicine. 1985 Mar.-Apr.; 2 (2): 77-82.*

DESIGNING AND MAINTAINING A SAFE WEIGHT ROOM

BY MICHAEL J. HANLEY, M.S., ATC/L

PLANNING, PROPER SUPERVISION, AND ATTENTION TO DETAIL ARE ALL PART OF KEEPING THE WEIGHT ROOM SAFE AND FREE FROM INJURY HAZARDS.

WHAT COACHES SHOULD KNOW

- 
- **STATIONS FOR EXERCISES MUST BE SPACED APART FAR ENOUGH TO ALLOW FOR ADEQUATE FLOW AND HAVE ENOUGH ROOM FOR BOTH THE LIFTER AND SPOTTER.**
 - **THE WEIGHT ROOM FLOOR MUST BE CLEAN AND FREE FROM MOISTURE AND LOOSE OBJECTS.**
 - **ALL WEIGHTS AND MACHINES MUST BE CHECKED REGULARLY.**
 - **RULES SHOULD BE POSTED AND ENFORCED TO CREATE A SAFE AND DISCIPLINED ATMOSPHERE.**

Safety must be the primary concern when designing the layout of a weight room for youth football players. Injuries can occur not just from lifting, but also from tripping over loose weights or collars, horseplay, or lifting stations being too close to each other. As you develop a strength-training program, consider these factors:

FLOOR SURFACE

Wood, tile, rubber, and carpet are all surfaces that may be in your weight room—and each has its own potential for injury. With wood floors, inspect to make sure there are no splinters, loose boards, or loose or protruding nails or screws. Tile should be kept clean and dry. Moisture from drinks or water being tracked in, or chalk dust, can make the floor slippery. Rubber floors, particularly those that have interlocking pieces, can develop gaps and become a tripping hazard. If the weight room is carpeted, see that the carpet is free of tears and protect high impact areas with throw mats and padding.

CLEANLINESS

Make sure all loose weights, plates, and collars are

off the floor and stored on the appropriate racks or trees. Do not allow athletes to throw their gym bags, jackets, or towels on the floor in the lifting area. The lifting area should be mopped and vacuumed daily. Weight benches should be sprayed with a disinfectant daily. To prevent spills, do not allow food or drink (except water in an appropriate area away from the lifting stations).

EQUIPMENT LAYOUT

There should be adequate room for both lifters and spotters. A lifter should have room to land in case he needs to bail out of a lift. For example, when using eight-foot-square Olympic platforms, allow at least four feet between platforms.

PROPER INSTRUCTION

Both the lifter and spotter should receive instructions and demonstrate understanding of what to do for each lift they are asked to perform or spot. Have instructions on how to perform each lift at the different stations. Many strength machines already have a diagram and instructions on the proper technique. Post safety guidelines prominent-



ly around the weight room. Instruct the athletes to unload the weight bar after each lift. Have them unload the bar evenly from each side to prevent the bar from tipping over and having the weights fall off the opposite side. Always use collars with barbells, and have lifters wear weight belts—especially for heavy lifts.

It's a good idea to match up players of similar size and lifting ability, so the spotter can safely handle the weight if the lifter gets in trouble. Instruct the lifters not to drop or throw the weights unless they need to bail out, and have them return the weights and dumbbells to their proper racks immediately after completing their lift. Be sure to have each athlete do an individualized program and to stay aware of the special precautions and programs for players who are not physically mature.

PROPER SUPERVISION

Never allow youth football players to lift unsupervised or without a spotter for those lifts requiring

one. All of the coaches supervising should try to be certified in CPR, First Aid, and Disease Transmission.

ATTIRE AND CONDUCT

Do not allow horseplay. More players will get injured in the weight room from fooling around than from lifting. Stress to your football team the discipline necessary to lift properly and safely. Only proper clothing such as shorts, T-shirts, and sneakers should be worn while lifting.

EQUIPMENT CHECK

In addition to inspecting the floor surface, check all weights and machines daily. Be attentive to frayed or squeaky cables. Make sure that all floor- or wall-mounted machines are secure. Look for any loose nuts or bolts. See that none of the plates have cracks in them. All equipment should be regularly maintained—oiling the machines and pulleys, checking the grips and pads, etc. Trained personnel should do any repairs to the machines or equipment.

MORE READING

www.fitnessworld.com.

The Strength and Conditioning Journal.

www.strengthtech.com.

GO ONLINE AT WWW.NFLHS.COM/HEALTH



INJURY EVALUATION

THE ON-FIELD EVALUATION OF ACUTE FOOTBALL INJURIES

BY MARY KIRKLAND, ATC, KENNEDY SPACE CENTER

HERE ARE SOME TIPS FOR RAPID ASSESSMENT OF ON-FIELD INJURIES AND ACTIONS TO TAKE FOR PROPER CARE OF THE YOUTH ATHLETE.

WHAT COACHES SHOULD KNOW

IN ORDER OF THEIR IMPORTANCE, THE COACH'S ON-FIELD EVALUATION MUST RULE OUT:

- 1 **CARDIOVASCULAR AND RESPIRATORY DISTRESS/CESSATION**
- 2 **HEAD OR SPINAL COLUMN LIFE-THREATENING TRAUMA**
- 3 **EXCESSIVE BLEEDING**
- 4 **FRACTURES**
- 5 **JOINT DISLOCATIONS**
- 6 **OTHER SOFT TISSUE TRAUMA (SPRAINS, STRAINS, CONTUSIONS, LACERATIONS)**

When a youth football player incurs an acute injury, the coach's ability to assess the situation properly and make the right decisions often can minimize the severity of the situation.

The chart beginning on page 51 will assist the youth football coach in determining the best course of action when presented with an acute, on-field injury. Here are some important considerations:

- 1 **STABILIZE** is defined as immobilizing (preventing movement) of the athlete or injured body part.
- 2 **MINOR INJURIES** equate to no swelling; full, pain-free range of motion (movement); and no pain with use of the injured body part, including full weight bearing during sport-specific activities.
- 3 When in doubt, always await medical assistance in order to move or stabilize the injured athlete safely.
- 4 Having a certified athletic trainer (ATC) or physician on the sidelines, when possible, is of significant value.

ALL UNCONSCIOUS ATHLETES SHOULD BE MANAGED AS IF A FRACTURE OR DISLOCATION OF THE CERVICAL SPINE EXISTS UNTIL THESE INJURIES CAN BE RULED OUT.

For more information, read the first book in this series, *First Aid*.

MICHAEL ZAGARIS



RETURN-TO-PLAY GUIDELINES FOR YOUTH FOOTBALL

BY MARY KIRKLAND, ATC, KENNEDY SPACE CENTER

THE YOUTH FOOTBALL COACH SHOULD USE A COMMON-SENSE APPROACH WHEN DETERMINING WHEN IT IS SAFE FOR A PLAYER TO RETURN TO ACTIVE STATUS.

WHAT COACHES SHOULD KNOW



- YOUTH FOOTBALL COACHES SHOULD TRY TO INVOLVE A CERTIFIED ATHLETIC TRAINER (ATC) OR PHYSICIAN WHEN DECIDING IF AN ATHLETE SHOULD REMAIN IN THE GAME OR BE REMOVED FROM PLAY.
- COACHES MUST PLACE THE PLAYER'S HEALTH AND SAFETY ABOVE ANY PRESSURES FROM PARENTS OR THE ATHLETE TO RETURN TO PLAY.
- A PLAYER SHOULD HAVE FULL FLEXIBILITY AND STRENGTH RESTORED IN THE INJURED AREA—EQUAL TO THE UNINVOLVED SIDE—BEFORE RETURNING TO PLAY.
- SEVERAL FACTORS CAN SLOW HEALING AND DELAY RETURN TO PLAY.
- A WELL-BALANCED PRESEASON CONDITIONING PROGRAM WILL DECREASE THE YOUTH FOOTBALL PLAYER'S RISK OF INJURY, AND DECREASE THE REHABILITATION TIME IF AN INJURY OCCURS.

After a youth football player has sustained an injury, the coach will determine his ability to return to play with the assistance of a certified athletic trainer (ATC) or a physician. The following guidelines will help the coach determine how and when to bring the player back to full competition only if the injury is minor. **With any serious injury, the final determination must lie with the athlete's physician.**

- The player's health and safety is the coach's number-one priority.
- The coach must not be swayed by pressure from parents or the athlete. The decision must be based on whether the athlete can participate in a healthy, pain-free condition.
- Full range of motion, flexibility, and strength equal to the uninvolved side are the ideal return-to-play requirements. Normal function must include **pain-free motion** of the injured area while the athlete is at rest and while per-

forming the required motions of his position.

- **When in doubt, keep him out**—If you are unsure of when to return the youth football player safely to the practice/competition, seek the advice of a certified athletic trainer (ATC) or physician to determine his playing status. Helpful guidelines are provided beginning on page 51.

The coach's best plan of action in an injury situation is to have an allied health professional such as a Certified Athletic Trainer (ATC) or a medical physician to evaluate the injury, assess its severity, and determine whether the player can safely return to play.

If there is any doubt as to the severity or nature of the injury, refer to a physician.

"When in doubt, keep him out"

If you are unsure of when to return the youth football player safely to the practice/competition, the best decision is the most prudent one.

ON-FIELD INJURY EVALUATION AND RETURN-TO-PLAY CRITERIA

INJURY	SIGNS AND SYMPTOMS	INTERVENTION & RETURN TO PLAY
AIRWAY BREATHING OR CIRCULATION DIFFICULTIES/CESSATION	<ul style="list-style-type: none"> -LACK OF BREATHING -LACK OF PULSE -LOSS OF CONSCIOUSNESS 	<ul style="list-style-type: none"> -CHECK AREA FOR SAFETY -CALL EMS -INITIATE CPR (SEE PLAY SAFE, BOOK 1: FIRST AID)
CONCUSSION	<ul style="list-style-type: none"> -LOSS OF CONSCIOUSNESS -AMNESIA -MENTAL CONFUSION/DISORIENTATION -LOSS OF COORDINATION -DIZZINESS -RINGING IN THE EARS -OBVIOUS MOTOR IMPAIRMENT -HEADACHE -NAUSEA/VOMITING -VISUAL DISTURBANCE 	<ul style="list-style-type: none"> -STABILIZE THE NECK -CALL EMS -REMOVE FACEMASK IF CONDITIONS DETERIORATE -DO NOT REMOVE HELMET OR SHOULDER PADS -BE PREPARED TO INITIATE CPR WITH JAW THRUST -FOR "MOBILE CONCUSSION" (PLAYER COMES TO SIDELINE)—OBSERVE UNTIL EMS ARRIVES -AWAIT TRANSPORT BY EMS -PHYSICIAN ASSESSMENT REQUIRED -PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY
HEAD AND NECK TRAUMA	<ul style="list-style-type: none"> -PAIN IN SPINE AT LEVEL OF INJURY -NUMBNESS, TINGLING, OR BURNING SENSATION RADIATING THROUGH ARMS -SENSATION OF WEAKNESS IN ARMS -BLURRED VISION -CONFUSION -HEADACHE -DISORIENTATION -DIZZINESS -LACK OF COORDINATION -NAUSEA -UNCONTROLLED EYE MOVEMENT -RINGING IN THE EARS 	<ul style="list-style-type: none"> -STABILIZE THE NECK -CALL EMS -REMOVE FACEMASK IF CONDITIONS DETERIORATE -DO NOT REMOVE HELMET OR SHOULDER PADS -BE PREPARED TO INITIATE CPR WITH JAW THRUST -AWAIT TRANSPORT BY EMS -PHYSICIAN ASSESSMENT REQUIRED -PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY
BURNER	<ul style="list-style-type: none"> -IMMEDIATE PAIN -BURNING OR "ELECTRIC SHOCK" SENSATION -INVOLVED ARM HANGS LIMPLY AT PLAYER'S SIDE -DECREASED STRENGTH ON INVOLVED SIDE -DECREASED SENSATION ON INVOLVED SIDE 	<ul style="list-style-type: none"> -NO IMMEDIATE RETURN TO PLAY UNLESS THERE IS COMPLETE RESOLUTION OF SYMPTOMS AS DETERMINED BY ATC OR PHYSICIAN -PHYSICIAN ASSESSMENT REQUIRED -PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY

INJURY**SIGNS AND SYMPTOMS****INTERVENTION & RETURN TO PLAY**

LACERATION WITH
EXCESSIVE BLEEDING

- OBVIOUS OPEN WOUND
- PROFUSE BLEEDING
- PAIN
- PALLOR
- WEAK PULSE
- WHITE OR BLUE AREA DISTAL TO THE INJURY

- CALL EMS; WEAR PROTECTIVE GLOVES
- CONTROL BLEEDING WITH COMPRESSION
- REMOVE FROM FIELD WITH MEDICAL ASSISTANCE
- CONTINUE COMPRESSION WHILE AWAITING EMS TRANSPORT
- WATCH FOR PALLOR, WEAK PULSE
- BE PREPARED TO INITIATE CPR
- PHYSICIAN ASSESSMENT REQUIRED
- PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY

FRACTURE

- PAIN AT FRACTURE SITE
- CREPITUS (CRACKING/CREAKING SOUNDS)
- POSSIBLE DEFORMITY
- LOSS OF FUNCTION

- STABILIZE WITH SPLINT
- CALL EMS
- REMOVE FROM FIELD ONLY WITH MEDICAL SUPPORT
- APPLY ICE FOR 15 MINUTES WHILE AWAITING EMS TRANSPORT IF NO BONE IS VISIBLE
- PHYSICIAN ASSESSMENT REQUIRED
- PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY
- PHYSICIAN MAY APPROVE USE OF PADDING TO PROTECT INJURED AREA ON RETURN TO PLAY

JOINT DISLOCATION

- PAIN
- DEFORMITY
- LOSS OF JOINT FUNCTION (MOVEMENT)
- SENSATION/CIRCULATION DEFICITS BELOW SITE OF DISLOCATION

- STABILIZE WITH SPLINT OR SLING
- DO NOT TRY TO REPLACE DISLOCATION
- CALL EMS
- REMOVE FROM FIELD WITH MEDICAL SUPPORT
- APPLY ICE FOR 15 MINUTES WHILE AWAITING EMS TRANSPORT
- PHYSICIAN EVALUATION REQUIRED
- PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY

ACROMIOCLAVICULAR
SEPARATION

- PAIN AND TENDERNESS OVER AC JOINT (SHOULDER)
- ELEVATION OF AC JOINT
- MOVEMENT OF AC JOINT IF DOWNWARD PRESSURE APPLIED

- STABILIZE WITH A SPLINT
- CALL EMS
- REMOVE FROM FIELD WITH MEDICAL SUPPORT
- APPLY ICE FOR 15 MINUTES WHILE AWAITING EMS TRANSPORT
- PHYSICIAN EVALUATION REQUIRED
- PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY
- PHYSICIAN MAY APPROVE USE OF PADDING TO PROTECT INJURED AREA ON RETURN TO PLAY

INJURY	SIGNS AND SYMPTOMS	INTERVENTION & RETURN TO PLAY
SIGNIFICANT JOINT SPRAINS (LIGAMENTS)	<ul style="list-style-type: none"> -GROSS DEFORMITY -SUSPECTED FRACTURE/DISLOCATION -SIGNIFICANT SWELLING -SIGNIFICANT OR PERSISTENT PAIN -SIGNIFICANT LOSS OF MOTION -DECREASED SENSATION -JOINT INSTABILITY -SUSPECTED MALALIGNMENT OR STRUCTURAL ABNORMALITY -PAIN WITH MOVEMENT 	<ul style="list-style-type: none"> -STABILIZE JOINT -CALL EMS -REMOVE FROM FIELD WITH MEDICAL SUPPORT -APPLY ICE FOR 15 MINUTES WHILE AWAITING EMS TRANSPORT -PHYSICIAN EVALUATION REQUIRED -PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY
MINOR JOINT SPRAINS (MUSCLES, TENDONS)	<ul style="list-style-type: none"> -NO SWELLING -FULL, PAIN-FREE RANGE OF MOTION (MOVEMENT) AND STRENGTH -MINIMAL PAIN WITH USE OF THE INJURED BODY PART, INCLUDING FULL WEIGHT BEARING DURING SPORT-SPECIFIC ACTIVITIES 	<ul style="list-style-type: none"> -IF NOT SYMPTOMATIC, ATHLETE MAY RETURN TO PLAY -CONTINUE TO OBSERVE FOR DEVELOPMENT OF SIGNS/SYMPTOMS -IF SIGNS/SYMPTOMS OF MORE SIGNIFICANT SPRAIN OCCUR, STOP PARTICIPATION—PHYSICIAN EVALUATION AND CLEARANCE REQUIRED
SIGNIFICANT STRAINS (MUSCLES, TENDONS)	<ul style="list-style-type: none"> -POPPING, SNAPPING, OR TEARING SENSATION -SUDDEN PAIN -MUSCLE WEAKNESS -DISCOLORATION -DIMINISHED FLEXIBILITY -PAINFUL MOVEMENT -DEFECT IN MUSCLE 	<ul style="list-style-type: none"> -STABILIZE THE AREA -CALL EMS -REMOVE FROM FIELD WITH MEDICAL SUPPORT -APPLY ICE FOR 15 MINUTES WHILE AWAITING EMS TRANSPORT -PHYSICIAN EVALUATION REQUIRED -PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY
MINOR STRAINS (MUSCLES, TENDONS)	<ul style="list-style-type: none"> -NO SWELLING -FULL, PAIN-FREE RANGE OF MOTION (MOVEMENT) AND STRENGTH -MINIMAL PAIN WITH USE OF THE INJURED BODY PART, INCLUDING FULL WEIGHT BEARING DURING SPORT-SPECIFIC ACTIVITIES 	<ul style="list-style-type: none"> -IF NOT SYMPTOMATIC, ATHLETE MAY RETURN TO PLAY -CONTINUE TO OBSERVE FOR DEVELOPMENT OF SIGNS/SYMPTOMS -IF SIGNS/SYMPTOMS OF MORE SIGNIFICANT STRAIN OCCUR, STOP PARTICIPATION—PHYSICIAN EVALUATION AND CLEARANCE REQUIRED

INJURY**SIGNS AND SYMPTOMS****INTERVENTION & RETURN TO PLAY****SEVERE ABDOMINAL INJURIES**

- PAIN OR DISCOMFORT THAT INCREASES IN ABDOMEN
- RIGIDITY AND SPASM OF ABDOMINAL MUSCLES
- BLOOD IN URINE OR STOOL
- VOMITING
- PAINFUL URINATION
- SHOULDER PAIN OR DIFFICULTY BREATHING
- DIZZINESS
- PALLOR, WEAK PULSE

- STABILIZE ON THE FIELD
- CALL EMS
- REMOVE HELMET IF NO HEAD OR NECK INJURY SUSPECTED
- BE PREPARED TO INITIATE CPR
- PHYSICIAN EVALUATION REQUIRED
- PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY

SEVERE CHEST INJURIES

- DIFFICULTY BREATHING
- SHORTNESS OF BREATH/INABILITY TO CATCH BREATH
- PAIN INCREASING IN CHEST
- VOMITING/COUGHING UP BLOOD

- STABILIZE ON THE FIELD
- CALL EMS
- REMOVE HELMET IF NO HEAD OR NECK INJURY SUSPECTED
- BE PREPARED TO INITIATE CPR
- PHYSICIAN EVALUATION REQUIRED
- PHYSICIAN CLEARANCE REQUIRED FOR RETURN TO PLAY



MICHAEL ZAGARIS

YOUTH FOOTBALL INJURIES

BY MARY KIRKLAND, ATC KENNEDY SPACE CENTER

IF THEY KNOW WHAT TO LOOK FOR, YOUTH FOOTBALL COACHES CAN RECOGNIZE THE MOST COMMON FOOTBALL STRENGTH AND CONDITIONING INJURIES—AND HELP THE PLAYER.

WHAT COACHES SHOULD KNOW



- YOUTH FOOTBALL COACHES SHOULD BE ABLE TO RECOGNIZE THE MOST COMMON INJURIES.
- INJURIES MAY BE EITHER ACUTE (OCCURRING SUDDENLY) OR CHRONIC (OFTEN RESULTING FROM OVERUSE).
- COACHES CAN LOOK FOR SEVERAL THINGS WHEN DETERMINING THE SEVERITY OF A YOUNG FOOTBALL PLAYER'S INJURY, AND WHETHER THE ATHLETE SHOULD BE REMOVED FROM PLAY.
- USE THE RICE (REST, ICE, COMPRESSION, ELEVATION) APPROACH WHEN TREATING ACUTE YOUTH FOOTBALL INJURIES.

It's important to be able to recognize the most common injuries in order to have them evaluated by a certified athletic trainer or physician, then progress with treatment.

ACUTE (RAPID ONSET) INJURIES

CONTUSIONS (BRUISES)

DEFINITION—A direct blow or repeated blows to a player's body, crushing underlying muscle fibers and connective tissue without breaking the skin. The underlying blood vessels are damaged, causing pain, muscle spasm, ecchymosis (bruising), tenderness, swelling, and decreased range of motion (ROM) and function.

SEVERITY—Is determined by the force of the impact, the size and shape of the object causing the bruise, and the part of the body receiving the blow. Most contusions are minor and heal quickly without taking the player out of the game—but severe contusions can cause deep tissue damage and lead to complications and/or keep the player out of play for months. A common rule of thumb is that the greater the pain and loss of function, the greater the severity of injury.

TREATMENT—To control pain, bleeding, and inflammation, use the RICE (Rest, Ice, Compression, Elevation) formula. If possible, have a Certified Athletic Trainer (ATC) or physician evaluate the injury.

RETURN TO PLAY—Look for return of normal range of motion and strength equal to the uninjured side during both rest and sport activities. The use of some type of padding to protect the area is recommended to avoid reinjury. For severe contusions, an evaluation by an athletic trainer or physician is required so that proper rehabilitation can be instituted. Return to play should be decided by a medical professional.

POTENTIAL COMPLICATION—Myositis ossificans. The formation of bone (calcium deposit) within or around a muscle can occur as a result of chronic, repeated irritation of the bruised area. If a contusion is not healed and pain free within 2-3 weeks, medical assessment is essential.

STRAINS (MUSCLE TENDON PULLS/TEARS)

Muscles or their tendon attachments are stretched to the point that their fibers start to tear. This can happen when the athlete lifts a heavy weight or suddenly overextends a muscle. It results from the

USE RICE FOR ACUTE INJURY

R = REST RESTING AN INJURED AREA IS NECESSARY TO ALLOW THE BODY TIME TO GET THE EFFECTS OF TRAUMA UNDER CONTROL AND TO AVOID ADDITIONAL STRESS AND DAMAGE TO THE INJURED TISSUE. SLINGS, BRACES, BOOTS, AND CRUTCHES ARE DEVICES COMMONLY USED TO ASSIST RESTING THE INJURED BODY PART. THE PERIOD OF REST REQUIRED WILL VARY DEPENDING ON THE SEVERITY OF THE INJURY. YOUTH FOOTBALL PLAYERS WHO DO NOT REST AN ACUTE (SUDDEN, TRAUMATIC) INJURY CAN PROLONG THE INFLAMMATION PERIOD AND INCREASE THE HEALING TIME REQUIRED, THEREBY DELAYING RECOVERY.

I = ICE ICE APPLIED PROMPTLY TO AN INJURY CAN SLOW DOWN OR MINIMIZE SOME OF THE INFLAMMATION (THE REDNESS, SWELLING, AND PAIN THAT FOLLOW AN INJURY). EXAMPLES OF ICE TREATMENT INCLUDE USING AN ICE BAG OR ICE BUCKET FOR 15 MINUTES OR AN ICE MASSAGE FOR 7-10 MINUTES. IF THERE EXISTS A HYPERSENSITIVITY TO COLD, A THIN, DAMP TOWEL CAN BE USED BETWEEN THE SKIN AND THE ICE. IN ORDER TO AVOID FROSTBITE, BE AWARE OF THE TIME ELAPSED; ICE APPLICATION MUST NOT EXCEED 20 MINUTES. WHEN USING AN ICE PACK, USE LIGHT TO MODERATE COMPRESSION. **NOTE: HEAT SHOULD ONLY BE APPLIED AFTER YOU ARE SURE BLEEDING AND SWELLING HAVE STOPPED COMPLETELY. OTHERWISE, A PLAYER'S RECOVERY TIME WILL BE PROLONGED.**

C = COMPRESSION COMPRESSION INVOLVES THE APPLICATION OF AN ELASTIC WRAP OR SIMILAR ITEM AROUND THE INJURED AREA. ITS PURPOSE IS TO HELP CONTROL SWELLING AND TO PROVIDE MILD SUPPORT. **NOTE: ANY WRAP SHOULD BE APPLIED CAREFULLY. TOO TIGHT A BANDAGE CAN CONSTRICT OR INTERRUPT VITAL CIRCULATION TO THE AREA.**

E = ELEVATION THE INJURED AREA SHOULD BE RAISED AS MUCH AS POSSIBLE ABOVE THE LEVEL OF THE HEART. THIS ELEVATION PROMOTES THE LESSENING OR ELIMINATION OF SWELLING.

overstretching or overstressing of a muscle, sustaining a violent/strong contraction against heavy resistance, or muscle imbalance between the agonist and the antagonist muscle groups (Example: Quads vs. Hams). The most common sites for strains are the back, thigh, groin, and shoulder—typically large muscle groups used for sudden, powerful movement.

RECOGNIZING LEVELS OF SEVERITY—MILD (first degree), **MODERATE** (second degree), and **SEVERE** (third degree). Strains are graded into three groups by level of severity:

- 1 **MILD STRAINS**—The muscle/tendon is stretched or pulled slightly (microscopic tears). The athlete will experience some discomfort during use of the involved muscle, but will retain normal or near-normal range of motion and strength. These strains are usually only a nuisance, and with rest and RICE therapy (see above) repair themselves easily.
- 2 **MODERATE STRAINS**—These involve a greater degree of muscle fiber destruction and produce not only sharp pain, but also loss of power and movement. Usually the athlete hears or feels a snap or tear. Symptoms include pain, spasm, weakness, swelling, inflammation, and loss of flexibility.
- 3 **SEVERE STRAINS**—These result when the muscle or tendon is completely ruptured, often incapacitating the youth football player. A snap or tear is felt, along with significant pain and loss of function. Signs and symptoms are the same as with a moderate strain, but with greater

intensity. A visible or palpable gap or defect is noted in the muscle.

TREATMENT AND RETURN-TO-PLAY—Mild strains require only RICE therapy (see above). Athletes may return to play when range of motion and strength have been recovered, and sport-specific function is normal. When more severe strains occur, physician evaluation and specific rehabilitation are required. Severe strains may require immobilization or surgical correction. Return to play then should be dictated by a physician.

POTENTIAL COMPLICATION—In younger athletes, the muscles and tendons are stronger than their growth plates (epiphyses), which have not closed. An epiphyseal fracture, which can cause growth disturbance, may appear to be a strain or sprain. The tendon attachments to the bones may fail, causing an avulsion (breaking off) of a piece of bone along with the tendon.

This requires immediate intervention by a physician.

SPRAINS (LIGAMENT TEARS)

Sprains involve the tearing of ligaments (the bands connecting bones). Sprains are most often the result of sudden force—typically a twisting motion—that the surrounding muscles aren't strong enough to control. As a result, the ligaments, which usually wrap around a joint, get stretched or torn. Like strains, sprains can range from minor tears to complete ruptures. **But sprains tend to be more serious:** Not only do they often take longer to heal, but

a torn ligament can throw bones out of alignment, causing damage to surrounding tissues. The ankle is the most frequently sprained joint. The knee, too, is vulnerable—because it must absorb twisting stresses every time the body rotates from the hips.

RECOGNIZING LEVELS OF SEVERITY—

MILD (first degree), **MODERATE** (second degree), and **SEVERE** (third degree).

- ① **MILD SPRAINS**—These involve minor stretching or tearing of the ligament. The athlete will experience some discomfort during use of the involved joint, but will retain normal or near-normal range of motion, strength, and function. The ligament is not weakened significantly, and treatment is symptomatic.
- ② **MODERATE SPRAINS**—These involve a greater degree of ligament destruction, producing varying degrees of pain, swelling, and instability. The athlete may hear or feel a snapping or popping sensation as well as having a sense of something giving way at the time of injury. Symptoms include localized pain, swelling, instability, weakness, inflammation, and loss of function.
- ③ **SEVERE SPRAINS**—These result when the ligament is completely ruptured, causing significant joint instability. A snap or tear is felt, along with loss of function. The signs and symptoms are the same as with a moderate sprain, but with greater intensity. With third-degree sprains, initial pain may be felt, but as swelling and inflammation increase, pain will increase.

TREATMENT AND RETURN TO PLAY—Mild sprains require early RICE therapy. Athletes may return to play when motion, strength, and sport-specific function have returned to normal. When more severe sprains occur, physician evaluation is required to determine the degree of damage and potential associated injury. Initial immobilization and rehabilitation may be required. Severe sprains may require surgical intervention and bracing to establish stability. Physician permission is required before return to play is permitted.

POTENTIAL COMPLICATION—Avulsion fracture. The tearing of a piece of bone along with the ligament can occur with severe sprains. Immobilization will be required along with weeks of rehabilitation.

FRACTURES

DEFINITION—A direct blow or impact to a bone that causes it to break. The break may occur to the

long bone, or a piece of bone may be torn away (avulsed). In younger athletes, a fracture to the growth plate can occur.

RECOGNIZING LEVELS OF SEVERITY—A bone may break and remain in normal position or it may be pushed to an abnormal alignment, sometimes causing an obvious deformity. The broken bone also can cut through the skin, which will expose the bone to infection.

TREATMENT—To control pain, place ice over the area for 15 minutes unless the bone is exposed. Splint the site, including the joint above and below the break if this can be done without pain. Be sure the splint allows for blood circulation. Fractures require immobilization in a cast followed by rehabilitation. Some fractures require surgery to establish correct alignment.

RETURN TO PLAY—Complete healing of the bone, with a return of full joint motion and muscular strength, is required. A physician must clear a return to participation.

POTENTIAL COMPLICATIONS—Bone deformity can occur, causing abnormal function. Fractures of the growth plate can cause abnormalities of growth. Open fractures can cause bone infection.

DISLOCATIONS

DEFINITION—A direct force or impact can dislodge a bone from its normal position in a joint. The bone may come out only partially; this is called a subluxation. If the bone comes completely out of the joint, a true dislocation has occurred.

RECOGNIZING LEVELS OF SEVERITY—A dislocation will tear the surrounding structures that maintain the bone's normal position. A fracture also may occur in the joint or in the bone. Blood vessels and nerves can potentially be injured.

TREATMENT—To control pain, apply ice to the area and attempt to immobilize the site if this can be done without pain. Do not try to replace the bone in proper position. This should only be done by a medical professional. Dislocations may require immobilization and surgical intervention. Rehabilitation is essential after the injury, and protective bracing may be required.

RETURN TO PLAY—The dislocated bone must heal after being replaced in its normal position. All motion needs to be returned to the joint and muscle strength regained. A certified trainer can assist with the rehabilitation. A physician must determine when the athlete is ready to return to active participation.

POTENTIAL COMPLICATIONS—Dislocated joints may remain unstable and require bracing and surgical repair.

CHRONIC (DELAYED ONSET) INJURIES

Overuse injuries occur from the repetitive application of submaximal stresses to otherwise normal tissues. Overtraining and exposure to excessive levels of physical activity can present an increased risk of injury. If not managed properly and efficiently, overuse injuries can affect normal physical growth and maturation. Prevention is the key. Gradual rather than sudden increases in stresses and intensity can usually avoid physical breakdown. Early identification and modification of the training program can minimize time lost from sport.

STRESS FRACTURES—These are micro fractures that occur when bone is subjected to frequent, repeated stresses, such as in running, and the rate of bone breakdown exceeds the rate of bone repair. Stress fractures are a form of overuse injury, and they occur most frequently in the tibia, fibula, and pars interarticularis (part of the vertebra) in young athletes. Focal bone pain with impact or activity is the primary complaint. Ignored, a stress fracture can break and cause a true fracture.

TENDINITIS—This involves inflammation of a tendon, usually caused by overuse.

EXAMPLES INCLUDE:

- ① **PATELLAR OR QUADRICEPS TENDINITIS**—increased pain in the front of the knee with running, jumping, and squatting activities.
- ② **SHOULDER TENDINITIS**—increased pain in the shoulder with throwing or weightlifting.
- ③ **ACHILLES TENDINITIS**—increased pain along the Achilles tendon (posterior ankle/heel) with running/jumping activities.
- ④ **EPICONDYLITIS**—inflammatory response to overuse of either an elbow flexor or an extensor muscle group (attachment to the medial or lateral epicondyle of the humerus at the elbow); pain increases during throwing, blocking, or gripping activities.

SHOULDER IMPINGEMENT—This is a condition in which the rotator cuff impinges on the acromion and coracoacromial ligament. The weakened rotator cuff allows the humeral (shoulder bone) head to move upward in the socket rather than remaining centrally located in the shoulder joint. The result is inflammation of tendons, muscles, and bursae of the

shoulder. Pain with motion, particularly with the arms above the shoulder, occurs.

OSGOOD-SCHLATTER DISEASE—This is the partial avulsion of the tibial tubercle below the knee at the insertion of the patellar tendon). It results when the tubercle is subjected to traction forces by the patellar tendon insertion, causing painful swelling in the area of the tubercle.

Osgood-Schlatter Disease sometimes occurs spontaneously without excessive traction. A similar problem can occur in the area where the Achilles tendon inserts in the heel.

PERIOSTITIS (SHIN SPLINTS)—This is an overuse injury that occurs in athletes involved in ballistic activities and those that involve rapid deceleration. It may be caused by a strain of the anterior or posterior tibialis muscles at their tibial origin. Pain is usually diffuse along the front of the lower leg.

LOWER BACK INJURIES—EXAMPLES INCLUDE:

- **SPONDYLOLYSIS**—Stress fracture of the pars interarticularis, located on the vertebrae of the spine. Local persistent back pain results. When spondylolysis occurs bilaterally, a secondary condition known as spondylolisthesis may result.
- **SPONDYLOLISTHESIS**—The forward slipping of one vertebra over another. Typically found in linemen secondary to repetitive flexion and hyperextension forces on the lumbar spine.

Signs and symptoms associated with these two include lower back pain, possibly radiating into the buttocks/posterior thigh, swelling, muscle spasm, decreased range of motion of the back, and pain with back hyperextension.

There are many factors contributing to athletic injuries. These include, but are not limited to, the athlete's growth, prior injury history, inadequate conditioning, muscle/bone anomalies, and the athlete's maturity level. Additional factors that can contribute to an injury include doing too much too soon, inadequate rest between practices/games, improper technique, and running on uneven or hard playing surfaces. When the coach has questions regarding recognition, care, treatment, and rehabilitation of these common strength and conditioning injuries, he should seek the advice of a certified athletic trainer (ATC) and/or a physician familiar with sports injuries.

Overuse injuries will heal completely with early recognition, appropriate rest, rehabilitation, and a correction of the cause of the injury. **Ignoring the symptoms of an overuse injury can cause permanent injury.**

ACHES AND PAINS IN DEVELOPMENTALLY IMMATURE ATHLETES

BY SANDRA J. SHULTZ, PH.D., ATC, CSCS

IN DEVELOPMENTALLY IMMATURE ATHLETES, OVERUSE INJURIES ARE BECOMING MORE COMMON THAN ACUTE INJURIES. PAIN AND OTHER SYMPTOMS MAY APPEAR GRADUALLY AND THERE IS NOT ALWAYS A KNOWN EVENT AS THE CAUSE. WITH A YOUNG ATHLETE WHOSE BONES ARE STILL GROWING, COACHES NEED TO BE ALERT FOR BONE AND JOINT INJURIES. BONE AND JOINT INJURIES RESULTING FROM REPETITIVE STRESS MAY HAVE CONSEQUENCES ON LATER GROWTH AND DEVELOPMENT.



WHAT COACHES SHOULD KNOW

ATHLETES SHOULD BE REFERRED FOR MEDICAL EVALUATION IF THEY EXHIBIT ANY OF THE FOLLOWING:

- **CONSISTENT OR INCREASING PAIN OR DISCOMFORT LASTING MORE THAN THREE TO FIVE DAYS**
- **PAIN, SWELLING, TENDERNESS, OR THE FORMATION OF A RAISED BUMP ON THE BONE SURFACE NEAR THE ATTACHMENT OF MUSCLE**
- **PAIN NEAR THE ATTACHMENT OF THE MUSCLE WHEN THE MUSCLE IS STRETCHED OR CONTRACTED**
- **ACUTE OR INTERMITTENT JOINT PAIN OR SWELLING**
- **CLICKING OR CATCHING IN A JOINT**
- **RECURRING HIP OR GROIN PAIN WITH NO RECALL OF A SPECIFIC INJURY**
- **PAIN THAT INCREASES WITH WEIGHT BEARING OR LOADING OF A JOINT (SUCH AS JUMPING, LANDING, OR RUNNING)**
- **ANY TENDERNESS NOTED OVER THE BONE FOLLOWING A LIGAMENT INJURY OR JOINT SPRAIN**
- **ANY MODERATE OR SEVERE LIGAMENT INJURY**
- **BACK PAIN THAT COMES ON GRADUALLY OR OCCURS WITH ACTIVITY**



PETER NECOMB

not seen in the older adolescent and adult population. If these injuries are not recognized and treated early, they can result in long-term disability and affect growth and development. Common growth injuries include:

APOPHYSITIS is an inflammation of the bone where a muscle attaches. In the skeletally immature athlete, this insertion point can become inflamed and painful as a result of repetitive muscular contraction and stress. In early stages, these injuries can be mistaken for muscle strains or tendinitis. If symptoms are ignored or unrecognized, a portion of the bone can be avulsed (i.e., pulled off) following a forceful contraction of the muscle. Common sites for these injuries include muscle attachments at the elbow, hip, front of the knee below the knee cap (commonly known as Osgood-Schlatter's disease), and the groin. Symptoms include pain, swelling, tenderness, or the formation of a raised bump on the bone near the attachment of the muscle. The area may also be painful when the attaching muscle is stretched or contracted.

EPIPHYSEAL INJURIES include fracture or separation of the bone's growth plate. Growth plates are found primarily in the long bones of the upper and lower extremities (arms and legs). Forces that would normally result in joint sprains (i.e., ligament injury) in an adult can result in disruption of the bone's growth plate in an adolescent. As a result, any moderate or severe ligament injury in a youth player should be evaluated by a physician to rule out injury to the bone. Injuries to the growth plate require immediate medical attention. Disruption of a growth plate can stunt limb growth or result in bone deformity. Symptoms include joint pain and swelling, bone tenderness, crepitus (crackling, grating, or grinding sensation) with joint movement, and deformity.

CARTILAGE INJURIES The cartilage surface overlying the end of a growing bone is also susceptible to injury as a result of repetitive stress (e.g. chronic compression of a joint surface caused by improper throwing, lifting, or running mechanics). Conditions at the elbow and knee, known as osteochondritis dessicans, are often seen in young athletes. These are characterized by degeneration of the joint surface leading to avascular necrosis (tissue death). The specific cause is often unknown. The athlete may complain of gradual onset of pain, periodic joint swelling, clicking or catching in the joint, or tenderness near the joint surface.

The youth football player who is still growing is more susceptible to bone and joint-related injuries because of an immature skeleton. During growth, bones grow faster than tendon and ligaments, which can cause decreased flexibility. Decreased flexibility can lead to increased risk for muscle, tendon, and ligament injury.

Youth football coaches should be educated about general bone growth and development, and appreciate the musculoskeletal areas susceptible to injury in young athletes. Musculoskeletal areas that are particularly susceptible to acute and chronic injury in young athletes include:

- The growth plate at the end of long bones (epiphysis)
- The joint surface (articular cartilage)
- The insertion site of major tendons to the bone (apophysis)
- All bones
- Because some athletes fail to report their pain or symptoms, coaches should carefully watch for changes in behavior (motivation and attitude toward participation) and performance (e.g. limping, favoring one side or body part, etc.)

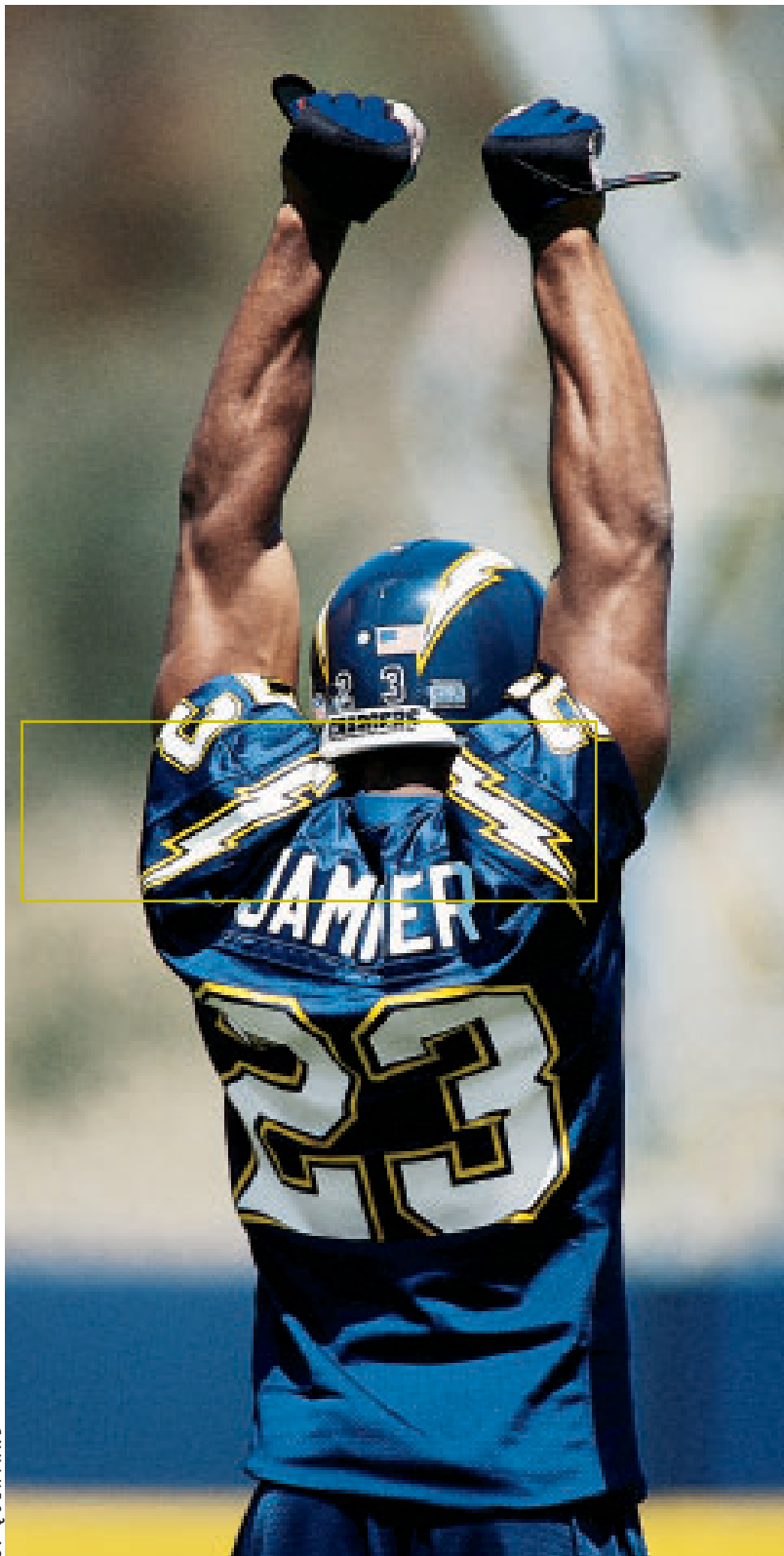
The adolescent athlete who has yet to reach full skeletal maturity represents unique injury concerns

CHRONIC SYNOVITIS OF THE HIP JOINT is characterized by chronic irritation and inflammation of the joint capsule. There often is no specific incident of injury, and symptoms can appear gradually. With chronic swelling of the joint capsule, blood flow can be compromised and cause degeneration of the surface of the hip joint. Because swelling is deep in the joint, it is not easily observed or recognized. Pain may feel like a groin strain, or appear to be a dull ache or pain around the knee.

MUSCLE AND TENDON INJURIES: During growth spurts, the bone grows first, followed by lengthening of the muscles, tendons, and ligaments. As a result, growing football players will often go through a period of decreased flexibility. Inflexibility may increase the risk for muscle and tendon strains, particularly overuse type injuries. Symptoms of muscle and tendon injuries include pain with passive stretching and active contraction of the affected muscle. The athlete may also complain of local tenderness, pain, and swelling over the injury site, depending on severity. Decreased range of motion, strength, or a palpable defect in the muscle may also be noted.

BACK PAIN, while a common complaint in adults, is rare in youth. Presence of back pain may indicate serious underlying injury, and should be carefully evaluated by a physician.

Overuse injuries of the bones, muscles, and joints are the most common injuries seen in developmentally immature athletes. Overuse injuries appear gradually and may not result in extreme pain, swelling, or dysfunction. As a result, some young athletes will fail to report these injuries for fear they will not be allowed to play. Youth football coaches should be aware of the changes in bone, cartilage, ligament, and tendon that occur during growth, and the unique susceptibility of these structures to injury in young athletes. Early recognition is the key to successful treatment and the prevention of life-long musculo-skeletal problems.



S. QUINTARD

MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Micheli, L.J., Glassman, R., & Klein, M. *Pediatric and adolescent sports injuries: The prevention of sports injuries in children.* *Clinics in Sports Medicine.* 19(4); October 2000.

Patel, D.R., & Nelson, T.L. *Adolescent Medicine: Sports Injuries in Adolescents.* *Medical Clinics of North America.* 84(4); 2000.

Shultz, S.J., Houglum, P.A., & Perrin, D.H. *Assessment of Athletic Injuries.* Human Kinetics Publishers, Champaign IL. 2000.

Sideline Preparedness for the Team Physician http://www.sportsmed.org/pdf/sideline_preparedness_2001.pdf

PREVENTION AND TREATMENT OF MUSCLE CRAMPS

BY MARY KIRKLAND, M.S., ATC/L, CSCS KENNEDY SPACE CENTER

MUSCLE CRAMPS IN YOUTH FOOTBALL PLAYERS CAN BE PREVENTED, BUT WHEN CRAMPS DO OCCUR, SEVERAL STRETCHES CAN BE USED TO TREAT THEM.



WHAT COACHES SHOULD KNOW

MUSCLE CRAMPS GENERALLY OCCUR IN THREE DIFFERENT MUSCLE GROUPS:

- QUADRICEPS (FRONT OF THE THIGH)
- HAMSTRINGS (BACK OF THE THIGH)
- GASTROCNEMIUS (CALVES)

COMMON CAUSES OF MUSCLE CRAMPS INCLUDE:

- MUSCLE FATIGUE/OVEREXERTION
- DEHYDRATION/ELECTROLYTE IMBALANCE
- INFLEXIBILITY
- HIGH-INTENSITY TRAINING

THE INITIAL TREATMENT OF THE CRAMPING YOUTH FOOTBALL PLAYER ON THE FIELD INCLUDES:

- Gently stretch and massage the cramping muscle, holding it in stretched position until the cramp stops, approximately 15-30 seconds (see examples on page 63).
- If caused by overheating or dehydration, try to cool the athlete and provide water or a sports drink in order to replenish fluids, glucose, and electrolytes. DO NOT USE SALT TABLETS.
- If the athlete has generalized severe cramping (in nonexercising muscle groups) or has localized cramping accompanied by confusion, loss of consciousness, or other central nervous system disorders, the condition must be treated as a medical emergency. Call EMS and transport the athlete to the hospital.

PREVENTION OF EXERCISE-ASSOCIATED MUSCLE CRAMPS:

Youth football coaches should advise the player to:

- Be well conditioned (most cramps occur early in the season).
- Regularly stretch muscles prone to cramping. The best stretch technique is as follows:
 - A. Do a 10-15 minute cardiovascular warm-up prior to stretching.
 - B. Slowly move the body part into the stretch position. Only go until you feel a stretch... not a sharp pain.
 - C. Hold the stretch *without bouncing* for 10-15 seconds.
 - D. Repeat 3 times.
- Maintain adequate nutrition—eat plenty of carbohydrates in order to keep your muscles energized.

- Stay hydrated—drink plenty of water or a sports drink before, during, and after your practice or competition (see fluid pyramid below).
- Reduce exercise intensity and duration, if necessary.

FLUID PYRAMID:

GENERAL ACTIVITY/LESS ACTIVE

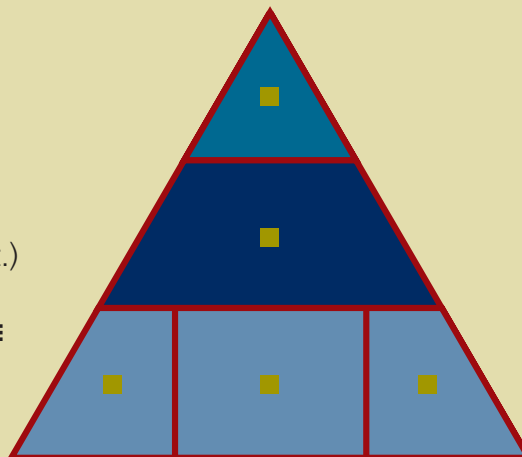
8-10 cups of fluid per day (64-80 oz.)

GENERAL ACTIVITY/MORE ACTIVE

At least 10-12 cups of fluid per day (80-96 oz.)

BEFORE, DURING, AND AFTER EXERCISE

(minimum amounts)



BEFORE:

2 cups of fluid (16 oz).

DURING:

½-1 cup of fluid (4-8 oz.) every 15-20 mins.

AFTER:

Fluid equivalent to body weight lost

PASSIVE STRETCHING RESULTS IN ALMOST IMMEDIATE RELIEF OF THE CRAMP. RECOMMENDED STRETCHES TO TREAT CRAMPING:

QUADRICEPS CRAMP

Stand supported against a wall or another player. Pull foot to buttocks. Hold for 10-20 seconds or until cramp subsides.



HAMSTRING CRAMP

Sit with legs together, feet flexed, hands on ankles. Bring chin to knees. Hold for 10-20 seconds or until cramp subsides. (This position may also be used to reduce calf cramps simply by pulling the foot/toes back toward the body.)



CALF CRAMP

Kneel on left leg; place right leg forward at a right angle. Lunge forward, keeping the back straight. Stretch should be felt in right calf. Hold for 10-20 seconds or until cramp subsides.



MORE READING

GO ONLINE AT WWW.NFLHS.COM/HEALTH

Muscle cramp http://orthoinfo.aaos.org/fact/thr_report.cfm?Thread_ID=270&topcategory=Sports

Skeletal Muscle Cramps During Exercise http://www.physsportsmed.com/issues/1999/11_99/schwellnus.htm

Medline Plus Health Information—Muscle Cramps <http://www.nlm.nih.gov/medlineplus/ency/article/003193.htm>

Pain, cramps and charley horses <http://www.mayoclinic.com/invoke.cfm?id=SC00004>

NATA Position Statement: Fluid Replacement for Athletes <http://www.nata.org/downloads/jat/jt0200/jt020000212p.pdf>

Gatorade Fluid Pyramid http://www.gatorade.com/products_perform/thirst_quench/fluid_pyramid.html

