

Enhancing Safety in Youth Rugby

These guidelines were written for USA Rugby by its Medical & Risk Management Committee: Lyle J Micheli, MD, Chairperson; Sue Bercuk, DC, EMT-IV, CCSP; Barb Bond; Dick Borkowski, EdD; Darlene Connors, RN; David Johnson, MPT, CSCS; Kerry McCabe, MD; Julie McCoy, MD; Steve Marshall, DHD; Dale Sutherland, MD; Merrick Wetzler, MD.

In the past several years USA Rugby has devoted much of its effort to increasing youth rugby participation in this country. Grants from the International Rugby Board (IRB) have enabled USA Rugby to create promotional materials, hire a full-time Youth Manager, and host clinics and camps to demonstrate the game and how it is played safely at the youth level. These monies have also been used to establish clubs and leagues at high schools, YMCAs, boys and girls clubs, and local parks and recreation departments across the United States. USA Rugby now has 27 Youth Development Officers (YDOs) throughout the U.S.

Philosophy

USA Rugby's philosophy in the area of youth development is that teaching non-contact rugby to youth will provide a safer environment for those same rugby players as they get older and continue on at the contact level in high school and college.

There is a risk of injury in any contact sport. Like any responsible sports governing body, USA Rugby is trying to minimize this risk and enable as many people as possible to learn this game in a safe and wholesome manner.

The adoption of modern sports medicine by the rugby community is especially important today as we try and promote our sport, particularly at the high school level. School administrators must be convinced that our sport is safe if they are to accept it into their school athletic programs.

Evidence suggests that rugby is safer than sports such as football or wrestling. The fact that there is no padding *reduces* the risk of injury because it discourages players from tackling recklessly. That there is no blocking in rugby explains why there are far fewer knee injuries in rugby compared to football.

Rugby is a growing sport and each year attracts more participants, coaches, and referees. We are making sure our sport grows in a controlled manner by ensuring that coaches and referees are certified and well-trained.

Rugby is one of the world's top three participation sports and is the national pastime in countries such as South Africa, Wales, and New Zealand. Parents in these countries have no more qualms about putting their children in youth rugby programs than U.S. parents have about entering their kids in youth football programs.

We believe that rugby will increasingly be regarded as a vigorous, physically demanding sport that can be played safely by Americans of all ages. As part of its mandate to provide safety resources, USA Rugby presents the accompanying information on enhancing safety in youth rugby.

INJURIES IN YOUTH RUGBY

Rugby injuries are the same as those seen in any contact or collision sport. They include muscle sprains, ligament strains, bone fractures, lacerations (cuts), and contusions (bruises).

The mechanisms of acute rugby injuries are identical to those of general pediatric trauma cases. In other words, the sprained ankle of a youngster who tumbles down the stairs at home is no different from the adolescent rugby player's sprained ankle.

These injuries should be managed identically, with the criterion for rehabilitation being complete restoration of strength, range of motion, and balance.

Sometimes, however, a lack of concern is shown toward young athletes' sports injuries. Injuries on the sports field are too often dismissed as "just part of the game." At best, this laissez-faire approach delays recovery, prevents return to full function, and predisposes the young athlete to reinjury. At worst the athlete may not be able to play the sport again and may carry long-term debilitating injuries into adulthood.

Growth Plates

Because of the mechanism of growth, young athletes are vulnerable to unique injuries caused by a fall, a twist, or a turn. Because the "growth plates" at the ends of the long bones are softer than the main part of the bone, they are susceptible to injury, particularly during the growth spurt of adolescence.

If a growth plate is injured, the affected bone may stop growing while the growth plate heals leading to long-term dysfunction. The ankle, elbow, and wrist joints all have two main bones, and injury to the growth plate of one may upset the delicate interaction between the two bones and cause joint dysfunction. Worse than complete fracture of the growth plate is a partial injury to it. When this happens, the bone may grow at a peculiar angle and cause serious problems.

Injuries in youth sports can have serious consequences, especially if untreated. It is important that coaches and parents alike not dismiss injuries as "just part of the game" – in rugby or any other sport. The team's medical coordinator should see to it that an injured youth rugby player receives medical attention from a qualified physician, and preferably, one trained in sports medicine. In the meantime, injury symptoms can be minimized using RICE (Rest, Ice, Compression, Elevation).

When Emergency Treatment is Needed

In the following circumstances an injured athlete must be immediately taken to the closest hospital emergency room:

- Obvious deformity of any bone.
- Localized tenderness or pain, especially in a joint.
- Any alteration in consciousness.
- Drowsiness.
- Disorientation.
- Persistent vomiting.
- Pupils of unequal size.
- Leakage of clear fluid from nose or ears.
- Eye injury involving altered vision.
- Seizure.
- Pains in the neck after impact.
- Deep wound with bleeding.
- Breathing difficulties after blows to the head, neck, or chest.
- Any injury accompanied by severe pain.

PREVENTING INJURIES IN YOUTH RUGBY

The key to preventing injuries in any sport is identifying and addressing the risk factors associated with it. In rugby these risk factors include coaching, equipment, playing surface, and conditioning.

Coaching

The most effective way to prevent injuries in youth rugby is to ensure that all programs are headed by trained coaches. At the very least, coaches should be certified by USA Rugby, have training in first aid and CPR, and should have an emergency plan in the event of serious injury.

Youth rugby coaches need to be aware that many of their players will have come from other collision sport disciplines and should be aware of the ramifications of this. In particular, they should be aware that former football players need coaching in proper rugby tackling technique so as to avoid injury. They must be taught the difference between hitting with the head and driving through the opponent – the revered tactic in gridiron football of “hitting on the numbers” – and the rugby tackle which is meant to stop the forward momentum of the opponent, control him and, if possible, capture the ball. They must be “coached out” of entering rucks and mauls head first as they might if they were entering a football pile-up. Both the gridiron tackle and the block are not only ineffective in rugby, but also dangerous. They must be taught proper scrum techniques to prevent scrum barging and collapse. To reduce the risk of neck injuries in scrums, coaches should employ the use of a “scrum sled” to coach rugby forwards in the ways of scrummaging.

Conditioning

Proper conditioning is an effective way to prevent unnecessary injuries and coaches should provide preseason conditioning programs. Compared to those in good shape, unfit rugby players are far more likely to trip and sprain an ankle during a game or even sustain a growth plate fracture.

Rugby is a “mixed” aerobic/anaerobic sport. There are short bursts of intense activity within a basic framework of ongoing aerobic demand. It is unlike gridiron football, which is primarily anaerobic or “short burst” in its oxygen demands. The football player who converts to rugby must increase cardiovascular endurance.

A simple test of fitness for a rugby team is to see if it can maintain a moderate jog around the rugby field for a period of 40 minutes, interspersed with 10-20 yard sprints every few minutes. This rugby-specific interval training not only helps players attain the type of fitness that improves their game performance - it also prevents injuries. Too many injuries occur in the second half and can be attributed directly to lack of fitness as fatigued muscles give way and allow a twist or fall to occur.

Weight training and stretching are also very important for the rugby player. Particular attention should be paid to strengthening the base of the neck and shoulders, areas where many rugby injuries occur. Specific strengthening exercises for the back and base of the torso are required for proper scrummaging. While use of machines such as Nautilus are convenient, a properly designed program with free weights is just as effective. Controversial in the past, strength training is now considered by sports medicine experts to be essential for all athletes – young ones included.

Stretching must also be emphasized, given the demands for rapid flexibility, bending, twisting and turning in such activities such as covering a loose ball or getting up quickly from a maul or ruck. The technique that appears most effective at this time is yoga-like stretching that involves gradually moving into the stretched position and holding that position for a period of between 20 and 30 seconds.

Officiating/Refereeing

Youth rugby refereeing may be more difficult than mediating more experienced players. Unfortunately, when a ref is assigned to a youth match, there is no guarantee that the respective scrums know what they are doing, be that from inadequate experience or training. Moreover, there may be a significant imbalance between teams regarding strength, technique and/or experience.

If we are to play safe from dangerous situations, it is incumbent on the ref to learn how to mitigate these imbalances in the name of safety and adjust the game so that it can be played safely and for fun.

The following suggestions from David Kirchoff, Coach of Redwood High School Rugby Club are for referees who encounter inexperienced players in the front row:

1) Before the match, the first thing the ref needs to do is talk to the respective coaches to determine the experience level of the players, especially the scrums. With these perceptions noted, he can anticipate any necessary adjustments.

2) When the first scrum comes together, the ref must require the scrum to hold the mark (which in its own right can be a good indicator of the players' ability to control the scrum). Then, while the scrummage is held steady, the ref should circle the scrum and check for proper binding - specifically, that the tight head is not wrenching down on his opposing loose head, that the loose head is firmly and squarely packed in, head under his opposite tight head's chest instead of his arm pit and with his free arm bound on to the tight head or braced on his knee for additional support in holding the front row up.

Also, quickly check the wing forward binding - many young, enthusiastic wing forwards bind their outside arm on the knee, calf or thigh of their prop, in effect tripping them, thereby encouraging the scrum to collapse. Further, check to make sure the second row's shoulders are engaged with their prop's buttocks instead of their kidneys and that the second row's hips are lower than their shoulders. Finally, the ref should look into the tunnel to see that the second rows have their chins pulled through, a simple move for all scrummaging forwards that makes sure they can see where the ball is and more importantly, straightens the backs.

3) With these checks completed, the ref can allow the first scrum to proceed. Aside from helping to establish good scrummaging technique, this inspection will also let youthful enthusiasts know who is in charge for the course of the game.

4) The quick whistle. Anytime the scrum appears dangerous - whether that be barging, the tight head dropping his opposing loose head, head butting, the hooker slipping his binds to put downward pressure on his opponent, or the scrum is beginning to go down - blow the whistle and warn or penalize the offenders or at least sort things out. In English under-19 play, refs blow the whistle anytime they see the front row shoulders drop lower than their hips, an indication that things are moving toward the edge. When a ref sees this happen, he should blow the whistle sharply and straighten it out.

5) When confronted with two really inexperienced or imbalanced scrums, stack them in by bringing the front row together first, then the seconds, and finally the back row. Bringing the front row together first relieves much of the pressure, allows better binding, and creates a steady platform before adding all the pressure from the other five scrummagers. This technique often sorts out particularly aggressive or inexperienced scrums, in effect teaching them proper binding and scrummaging while playing the game.

6) If all else fails, the ref should prohibit any pushing in the scrum. Bring the scrum together, have it hold the mark during the put-in and strike, including channeling the ball out. Although not very elegant, it does work in the sense that it is impossible for the scrum to collapse if there is no push. I first saw this technique used in the highly competitive Greater Public Schools league (Sydney, Australia) where a serious front row accident precipitated a response from the parents of the boys in the league prohibiting any push in the scrum.

7) Do not play the advantage if it looks dangerous. Mostly this refers to late tackling, but it also refers to offside infractions, particularly within the 10-yard zone when players are offside in front of the kick and are preparing to munch the player receiving the kick.

8) The referee should aggressively penalize any sort of dangerous tackling, be that high tackling, spearing, tackling without wrapping or late.

Nutrition/Ergogenic Aids

The importance of good nutrition for top performance in any sport cannot be over stressed and is often overlooked. This is especially true for an extremely demanding sport such as rugby.

There are no miracle diets or magic potions that make young athletes perform better. Vigorous exercise demands nothing except increased energy, which can be found in the familiar four food groups, and more water.

Young rugby players do not need extra protein, minerals, amino acids, or anything else if they are eating a balanced diet. Supplementing these nutrients is unnecessary, expensive, and potentially harmful.

Like non-athletes, athletic youngsters perform best on a high-carbohydrate, low-protein diet.

A wholesome diet emphasizing carbohydrates (55-65 percent total calories) with a small amount of meat or other protein as the "accompaniment" (10-15 percent total calories) and fat for the remaining calories (25-30 percent total calories) is appropriate for all young athletes. This diet should comprise foods from all the main food groups, including at least 6-11 servings of bread, cereal, rice, and pasta; 3 to 5 servings of vegetables; 2 to 4 servings of fruit; 2 to 3 servings from the meat, poultry, fish, dry beans, eggs, and nuts group; and 2 to 3 servings from the milk, yogurt, and cheese group.

The essential daily nutrition requirements for young athletes can be attained using the guidelines provided in the U.S. Department of Agriculture's "Food Guide Pyramid" system.

Known as ergogenic aids, supplements and especially steroids should be discouraged *in the strongest possible terms* by youth rugby coaches and parents.

Proper Hydration

Proper hydration is the most frequently overlooked aid to athletic performance. It is important that all rugby players, especially younger ones, drink plenty of fluids. Because players are not thirsty does not mean their body doesn't require rehydration. Children are especially vulnerable to dehydration that can contribute to heat cramps, heat exhaustion, and heat stroke.

In order to prevent the higher injury rates associated with dehydration, young rugby players should be encouraged by their coaches to drink fluids at a normal intake level starting about 24 hours before the match, as well just prior to kickoff and during the match. This is acceptable to referees as long as it does not interfere with or delay play from resuming unless required by the player.

Teams are encouraged to designate non-playing individuals to keep fluids readily available and bring them out to players as needed. When a match is played in hot and humid conditions, it is recommended that the clubs ask the referee to have general water breaks during each half (such as the midpoint - 20 minutes) to keep players hydrated.

Sports drinks such as Gatorade and Exceed are not necessary for young athletes unless they are engaged in *extremely* strenuous activity such as weekend sevens tournament in hot weather. However, their palatability encourages young athletes to drink fluids during hot weather when they might otherwise ignore the need.

Playing Time

Coaches should limit their players' playing time to allow for recuperation of stamina and strength. This will vary by player, but the following playing time limits are provided as a guideline:

- In a 24 hour period - 140 minutes
- In a 48 hour period - 170 minutes
- In a 72 hour period - 200 minutes

Playing Conditions

Injuries in youth rugby can also be reduced if there are proper and safe playing conditions, which includes fields free of potholes, glass, or other debris, and padded posts. Severe ankle injuries can be prevented by simply rolling the field the night before the game. The cost of having this service performed is well worth the price. Youth rugby clubs should also make every effort to arrange for their matches to be played on fully sodded fields, and should water hard fields on the night preceding matches. The Laws of the Game of Rugby (www.irb.org) provide specific guidelines for field preparation.

Equipment/Kit

Players should comply with the Kit requirements found in the Laws of the Game. In particular, boots and studs (cleats) should follow the prescriptions of the Laws of the Game (www.irb.org).

The American Dental Association recommends mouth guards, which help prevent injury to the mouth, teeth, lips, cheeks and tongue. Mouthguards also protect against blows that might otherwise cause concussions or jaw fractures. Even when a mouthguard is worn it is possible for a tooth to be knocked out; however, wearing a mouthguard will reduce the severity of tooth injuries. As a conservative safety precaution, it is recommended that mouthguards be worn by all athletes during practice and competition of contact and collision sports.

Mismatches

Competitive matches between high school and adult clubs are to be discouraged because of discrepancies in size, strength, and experience, which may result in injuries. Possible exceptions include soft-contact instructional matches. Common sense should be brought to bear to avoid unequal competition.

HEAD & NECK INJURIES

Head and neck injuries can be among the most serious in sports because they involve the brain, spinal cord, or surrounding nerves, which are responsible for thought, movement, and sensation. Severe injuries to the head and/or neck can cause death or permanent disability. Fortunately, serious head and neck injuries are rare in rugby.

Anyone involved in a collision sport such as rugby, should know how to respond in the event of a head and neck injury.

Responses to head and neck injuries should be virtually identical. Athletes with head injuries who are unconscious and all athletes with neck injuries require **emergency medical attention**. Never move an athlete with a suspected neck injury. An athlete with a head injury who is conscious also requires medical assistance and should be taken to the local hospital emergency room.

When faced with a serious head or neck injury, do not spend time trying to ascertain the cause or type of injury. All are caused by similar events and have similar symptoms and signs. The key to managing a serious head or neck injury is to minimize the immediate damage and call for qualified assistance.

Head Injuries: What To Do

Do not:

- Remove an athlete's head protection until a spine injury has been ruled out
- Try to revive the athlete or clear an athlete's head using smelling salts or ammonia, as the strong smell may cause the athlete to jerk his or her head

When the athlete is conscious:

- Send for medical assistance
- Move the athlete out of harm's way
- If qualified, monitor the ABCs (Airway, Breathing, and Circulation), provide rescue breathing or CPR where necessary, and treat for shock

When the athlete is unconscious:

- Send for emergency medical assistance
- Stabilize the athlete's head and neck
- If qualified, monitor the ABCs (Airway, Breathing, and Circulation), provide rescue breathing or CPR where necessary, treat for shock, control any heavy bleeding, and immobilize any fractures or unstable injuries

Neck injuries: What To Do

- DO NOT try to move the athlete
- Send for emergency medical assistance.
- If qualified, provide rescue breathing or CPR in an unconscious athlete, using "jaw thrust" method only.
- Immobilize the athlete's head and spine.
- Treat for any heavy bleeding.
- Monitor the pulse and heart rate.
- Stabilize any other fractures, dislocations, sprains, or strains.

CONCUSSION

Managing concussion properly can be difficult because there are no visible signs. In the hurly-burly of a rugby game, a concussion could be mismanaged. If a concussed player is allowed to continue playing and receives another blow to the head, there is the possibility of the potentially fatal "second impact syndrome." It is very important for the person responsible for medical coverage during a youth rugby game to go out of their way to detect and respond appropriately to concussions in sports. Fortunately, severe concussions are relatively rare in youth rugby.

Symptoms

Concussions are generally classified as mild/first-degree, moderate/second-degree, and severe/third-degree, depending on their symptoms. These symptoms may be present in varying combinations.

A first-degree/mild concussion makes the player feel confused and dazed and experience slight amnesia. To detect first-degree/mild concussion, ask the athlete what time it is, what the score is, or how he or she got to the field that day. Any hesitation in answering any of these questions probably means the athlete is mildly concussed.

Second-degree/moderate concussion may cause unconsciousness for a few seconds or several minutes.

Third-degree/severe concussion means any lapse of consciousness for more than five minutes. The severity of the concussion depends on the force of the impact. If a basketball player falls and her head hits the gym floor, she might sustain a first, second, or third degree concussion - it just depends on how hard her head hits the playing surface.

What To Do

If there is any doubt about the severity of a head injury, treat it as a third-degree/severe concussion!

1st degree/mild concussion/

2nd degree/moderate concussion

- The player must be taken out of the game.
- Observe and assess every twenty minutes for delayed symptoms such as headache, dizziness, and confusion.
- If signs and symptoms persist but do not worsen, take the athlete to an emergency room for evaluation within two hours.
- If signs and symptoms worsen, re-classify as a third-degree/severe concussion.

3rd degree/severe concussion

Neck injury should always be assumed in the case of a third-degree/severe concussion. Until spinal injury is ruled out, the game must stop and athlete not moved. Breathing or pulse should be checked while someone calls a hospital and an ambulance. If pulse and breathing are normal, wait for the athlete to regain consciousness. Do not remove a helmet. If, on regaining, consciousness, the athlete complains of neck or back pain or of numbness in the arms or legs, do not move him! This is an emergency situation. If none of these symptoms are present, wait until the player is ready to move and help him to a kneeling position. When he is able to stand, help him to his feet and assist him to the sideline, carefully watching his progress. If the athlete can't walk, call for a stretcher or litter. If necessary, wait until an ambulance arrives.

Return To Action

IRB regulations stipulate that any youth rugby player who has a first-degree/mild concussion should be taken out of the game.

The player with a second-degree/moderate concussion should be taken out of the game and evaluated by a neurosurgeon at a medical facility. This player should not practice or play for a period of three weeks.

A player with a third-degree/severe concussion should be transported to an emergency department by ambulance and receive a thorough neurological examination. They should be prohibited from practicing or playing rugby for a minimum of three weeks.

HEAT INJURIES

Younger athletes are more susceptible than adults to the two main types of heat-related disorders: heat exhaustion and the much more serious heatstroke.

Heat exhaustion is caused by dehydration and salt loss. Athletes with heat exhaustion become cool and damp while running a normal temperature, and often feel dizzy and tired. They should be given plenty of fluids and should rest in a cool, shady place.

Heat stroke is caused by a disruption of the body's heat regulation system. The athlete becomes hot and dry, turns bright red, and runs a high fever. He or she may also act irrationally, often aggressively. Rapidly cooling the athlete with ice water, towels soaked in ice-cold water, and fanning must treat heat stroke. Any young rugby player who suffers heat stroke should be taken to a hospital immediately for observation.

Lowering The Risk Of Heat-Induced Injuries

Exercise intensity: Youth coaches should reduce training intensity when temperature is hotter than 70° F.

Fluid replacement: Coaches should provide unlimited drinking water and players should be encouraged to drink a cup of water 15 minutes before training and one and a half cups at twenty to thirty minute intervals throughout practice (younger, smaller athletes will need slightly less). After practice, it's not enough that kids drink to quench their thirst because this only replenishes one-third to one-half of fluid losses; they should be encouraged to drink more than they think they need.

Clothing: Appropriate clothing for training in the hot weather is lightweight, single-layer, and absorbent. As much skin as possible should be exposed to air and sweat-saturated articles should be changed. Coaches should anticipate warmer weather and the team should have a lighter-weight, short-sleeved uniform available for such situations.

Fitness levels: Players should start the season as physically fit as possible. A pre-season conditioning program will give young players a good baseline fitness level. Players should not be expected to begin training in hot climates after a long layoff.

BLOODBORNE INFECTIONS

The risk of acquiring HIV or hepatitis B while playing rugby is negligible. Nevertheless, the potential for spread in rugby, however minimal compared with other risk factors, is accepted and youth rugby clubs should follow the recommendations developed by the world rugby governing body, the IRB. These can be found at www.irb.org.

MEDICAL COVERAGE

Each youth team should have its own mechanism for the proper assessment and care of emergency injuries. One individual should be responsible for maintaining a medical kit that must be brought to all home matches. That individual should also have emergency medical training of at least the E.M.T. II level. This "medical coordinator" should carry a cellphone, and know the accessibility of emergency medical care - including the phone number of the ambulance corps, police, fire, or rescue unit that will be covering the area - before his or her team gets on the field. The ideal person for this is a certified Athletic Trainer.

PLAYER MEDICAL INFORMATION FORM

All players should have their parents complete a "Medical/Surgical Care/Emergency Treatment and Personal Medical Information Form". This form provides important information to medical personnel and clubs for both player treatment and emergency contact notification. The club should maintain a set of these forms and keep them available field-side for all matches. The player should also keep a copy of the form and have it with him or her whenever they play a match for another club or are involved in representative (all-star) play.

PROPOSED RULE CHANGES

The Medical & Risk Management Committee of USA Rugby encourages vigorous discussion of rule changes that might enhance the safety of youth rugby - especially those that would make the scrum safer. The following are some of the changes to scrum play that have been proposed:

- 1) Limit the maximum drive to 5 meters. This will prevent wheeling and collapse.
- 2) Depower the scrum by requiring front rows to engage separately and then have second rows and loose forwards bind in. This has been previously suggested by Australian rugby safety officials. This rule would allow engagement to occur under controlled conditions. Additionally, it should produce a more stable platform and prevent collapse.
- 3) No drive during scrummaging in B & C side games. While this would reduce the scrum to more of a hooker battle, it would also dramatically reduce the incidence of collapse. Scrummaging skills would still be learned and techniques developed in a less dangerous situation. B & C sides are usually chosen because of the lack of experience at this level combined with inconsistent referee knowledge particularly at collegiate B & C games.

SUMMARY

Anyone who has been involved in U.S. rugby in the last quarter century cannot help but be struck by the winds of change sweeping through the sport. We have begun to emulate our rugby brethren in other countries who are taking a much more professional approach to the game, but which in the U.S. has traditionally been characterized by an informal attitude toward coaching, training and officiating. All of us now realize that if the U.S. is to compete more successfully in the international arena we must adopt a more rigid adherence to discipline and organization, which includes the adoption of modern sports medicine principles and practice.

RESOURCES FOR SAFER RUGBY

- 1) USA Rugby Medical & Risk Management Committee <http://www.usarugby.org>
- 2) American Orthopedic Rugby Football Association (AORFA) <http://www.sechrest.com/ortho/aorfa/>
- 3) "Preventing Rugby Injuries". Proceedings of the 'International Conference on Rugby Injuries, Boston, MA – 1988. Available from Steve Cohen (609-714-2203).
- 4) "Suggestions on Safe Rugby" by David Kirchoff, Coach, Redwood H.S.R.F.C. <http://members.aol.com/Wags40/index3.html>
- 5) The Sports Medicine Bible for Young Athletes (SourceBooks, 2002) by Lyle J. Micheli, MD
- 6) The "School Sports Safety Handbook" (LRP Publications) by Richard P. Borkowski, EdD, CAA. <http://www.epru.org/safety/index.php>.
- 7) "Rugby Training and Fitness Techniques" by Dr. Kevin Tipton of the UTMB Galveston R.F.C.: <http://www.utmb.edu/rugby/>
- 8) "Rugby Tough" (Human Kinetics) edited by Drs. Bruce Hale and David Collins. Available at: <http://www.humankinetics.com>
- 9) "The Athlete's Kitchen" (Human Kinetics) by Nancy Clark, M.S., R.D.
- 10) Miscellaneous websites with information about rugby fitness, nutrition, training, rugby skills: <http://www.homestead.com/rugbycoach/>
<http://www.eurekastreet.com/rcn/ahcoach.htm>
<http://www.rugbycoach.com/>