

SPORT-SPECIFIC CONDITIONING CONSULTANTS

‘Sport-Specific Conditioning is our Focus, Performance is our Goal’

PERFORMANCE NUTRITION | ATHLETIC TRAINING | ATHLETE DEVELOPMENT | PERFORMANCE PSYCHOLOGY | MANAGEMENT & CONSULTING

SPORT & EXERCISE SCIENCE

The Official Newsletter of Performance Training Systems Inc.

Vol. 2, No.6: Soccer

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Dear valued clients, partners, and friends in the training community,

The team at Performance Training Systems Inc. (PTS) would like to continue thanking all of our newsletter recipients who responded via email and Facebook with their thoughts regarding our last issue. We encourage and welcome this feedback. The goal of this newsletter is to bring the ‘*Sport and Exercise Science*’ issues and concepts important to our clients and partners in a concise and educational format. Your feedback has suggested more sport-specific training program information, research reviews, and current topics. We strive monthly to bring this info to you across our many platforms: Our Web page, our YouTube Channel, and our Facebook account.

In this Soccer specific issue, we attempt to cover the issues most important for the soccer athlete. In this issue we investigate the physiological demands of the ‘Out’ positions in soccer. We explore the nutritional and hydration requirements of soccer performance in both match and practices, and we provide ‘An Integrated Approach’ to soccer related injury prevention.

In our *From the Research* column, we look at the 2010 Canadian Society for Exercise Physiology position statement on using instability to train the core, and we review the last 4 quarters of doping control on Canadian Soccer athletes through the CSA.

We also include updates from PTS; what is new with us, and how we are remaining active in the world of sport. We report on our involvement in Olympic Day 2011, our registration in the 2011 Zürich Forum, and provide feedback from PTS staff participation in local sporting and fundraising events. We hope you enjoy this issue, and please, send us your comments.

Nutrition for the Pitch: A Closer look at the Nutritional Demands of Competitive Soccer

Most serious soccer players play in one or more competitive games per week for a large part of the year and will train most days of the week, sometimes, as in training camps, twice a day. The energy demands of training must be met to maintain performance capacity and prevent the development of excessive fatigue. Those who play for fun and train occasionally will find this a good way to stay fit and control weight, but they do not face the same nutritional challenges.

Energy for match play

Football is a game of intermittent work. Players generally perform *Nutrition for the pitch continued pg 6*

Contact Us!

PTS has an email for all your questions and comments; info@performancetrainingsystems.net to help serve you better. Do you have a question about our services? About who we are? Feedback regarding this newsletter? Send your questions here!

The Varying Physiological Demands of Out Positions in Soccer

Written by Stefanie Bronson, PTS Athletic Conditioning Consultant

Soccer is a sport characterized by intermittent bouts of high intensity activity occurring throughout the duration of a 90-minute match. Players rely on energy supplied by both the aerobic and anaerobic pathways due to the varying intensities displayed throughout the game. A recent study analyzing top-level Danish soccer players determined that on average, a player will spend approximately 20% of the match standing, 40% of the match walking, 17% jogging, 17% running... *Physiological Demands of Soccer Continued pg 5*

PTS Re-launches the Home of PTS Soccer

www.performancetrainingsystems.net/PTS_Soccer.php

To coincide with the release of this soccer specific issue, we have refreshed and re-launched the Home of PTS Soccer. Targeted to the coach and athlete, this page is a one stop site for all that is soccer training! Speed, acceleration, power & more

What’s In This Issue:

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<http://www.youtube.com/user/PerformanceTraining>



<http://www.facebook.com/home.php?#!/pages/Performance-Training-Systems/139837646063181>



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We've Added New Videos to our Facebook Page!

PTS conditioning coaches have been busy in the gym, and recently we've filmed some exercise technique videos. Check them on our Facebook Page at <http://www.facebook.com/home.php#!/pages/Performance-Training->



PTS Athletic Conditioning Consultant Rides to Conquer Cancer

On June 11 and 12th, Stefanie took part in the 200-mile Ride to Conquer event, cycling from Toronto to Niagara Falls. On Saturday morning, thousands of riders left the Exhibition Centre in Toronto, ON, Canada after enjoying a buffet style breakfast to fuel them for the long journey ahead and listening to the emotional introduction speech given by the organizers of the Ride. Many riders carried yellow flags on their bikes, symbolizing their status as currently fighting the disease or as a cancer survivor.

The organization, hard work, and dedication displayed by the volunteers and local police officers to keep the riders safe, happy, and nourished throughout each day was absolutely amazing. Every stop sign and intersection was manned with a police officer or volunteering motorcyclist ensuring the safety of all cyclists. Medics, massage therapists, and chiropractors were available to all riders at the camp in Hamilton along with good food, good beer, and entertainment.

The ride on Day-Two was a flat, scenic tour along the Niagara escarpment. As riders arrived at the finish of their 200-mile or kilometer adventure, they were greeted by a large, cheering crowd and the sight of mist lifting off the Falls. In total, 4,610 people participated in this epic journey raising an astonishing \$17.5 million for The Princess Margaret Hospital, Toronto, ON, Canada.

Although Stefanie may have been a little sore and fatigued after this weekend, she would not trade this experience for anything. After over 6 months of training, she is proud to say that she successfully accomplished her goal of completing the 200-mile ride and raising almost \$6000 between herself and her mother to help fight and stop the illness that has affected many people close to her family.

Photo below: Stefanie at the Camp in Hamilton after Day One of the Ride.



New Anti-Doping Rules in Effect

Changes to Canada's Anti-Doping Program will take effect 1 March 2011. www.cces.ca/cadp

Original PTS Research

Written in 2007, 'A Theoretical Review of Patello-Femoral Pain Syndrome Etiology and a 12-month Rehabilitation Program' is a PTS original, unpublished work that may be of interest to soccer athletes and coaches. Patello-Femoral Pain Syndrome (PFPS) is a knee condition commonly afflicting current and retired soccer players. Can be downloaded at <http://www.performancetrainingsystems.net/Resources/An%20Etiological%20Review%20of%20PFPS.pdf>

From the Research:

Canadian Society for Exercise Physiology Position Stand on the Use of Instability to Train the Core in Athletic and Non-Athletic Conditioning

In efforts of delivering research based and field tested athletic conditioning strategies, Performance Training Systems Inc. (PTS) continuously reviews peer reviewed research and attempts to communicate this information to our clients and the greater training community. In addition to our Newsletter, website and Facebook page, PTS develops Position Stands as a method of distributing the science of exercise and sport training. Currently we are in the process of developing our 4th Position Paper: *The Effectiveness of Training with Unstable Equipment for Athletic Performance*. During our review of literature concerning this highly integrated and often poorly applied training approach, we have come across some very interesting research and practical training applications. Of particular interest is the Canadian Society for Exercise Physiology's (CSEP) 2010 Position Stand: *The Use of Instability to Train the Core in Athletic and Non-Athletic Conditioning*. The following is a review of this position paper.

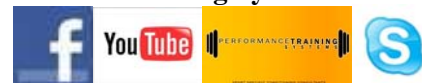
The CSEP position paper acknowledges that the use of instability equipment to train the 'core', which the authors define as the axial skeleton and all soft tissues with a proximal attachment originating to it, is an essential feature of many training programs. The authors continue to state that core stability is achieved with a combination of muscle activation and intra-abdominal pressure, with abdominal bracing showing to be more effective than abdominal hollowing in optimizing spinal stability.

The author's review of the research concluded that when similar exercises are performed, core and limb muscle activation are reported to be higher under unstable conditions rather than under stable conditions. They continue by suggesting that core muscle activation that is similar to or higher than that achieved in unstable conditions can also be achieved with ground based free weight exercises such as Olympic lifts, squats, and dead lifts.

The authors' review of the literature also reports that since the addition of unstable bases to *Continued on Pg. 3*



Performance Training Systems is on the net.



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PTS Participates in Olympic Day 2011

23 June 2011, the 117th anniversary of the birth of the modern Olympic Movement (International Athletic Congress, Paris France, 23 June 1894), is the International Olympic Committee's 'Olympic Day'.

What started in 1948, and is intended to be celebrated for the entire month of June, 'Olympic Day' aims to bring people of all ages and backgrounds, regardless of sporting ability, together to experience the values of Olympism through sport, education, and community events. This year, PTS Director Eric MacLean, and PTS Director of Performance Nutrition Arwen Hodina, M.Sc., RD, on behalf of the German Red Cross (DRK), created an Olympic Day theme at the DRK Villa Kunterbunt, Wangerooge Insel, Germany.

With the assistance of the German Olympic Academy (DOA), who provided education resources in the forms of books, interactive learning games, DVD's, and an assortment of pins, stickers and cards, our Olympic Day theme consisted of an introduction to the Olympic Sports of long-jump, and the various sprint disciplines, along with education on the value of regular physical activity, healthy nutrition and the value of community involvement.

At the end of our Olympic Day, every participant (boys and girls 6-14 yrs old) received an Olympic Day certificate, an Olympic Pin, and a set of Olympic themed stickers, and hopefully a greater understanding of the Olympic values of Respect, Friendship and Excellence, and the history of the Olympic Games.

What did you do on Olympic Day? We would like to hear from you.

Soccer Performance Profiles

You're a soccer player, you train with soccer specific exercises and drills, but do you know how your abilities rank against those in the pros, in the minors, in the NCAA? PTS has done the research; click the link to see where you stand against the best.

www.performancetrainingsystems.net/PTS_Soccer.php



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We have your Training Needs Covered



DARTFISH
 SEE. LEARN. SUCCEED.

www.performancetrainingsystems.net

Dartfish Video Analysis

Performance Training Systems uses Dartfish video analysis technology to screen and evaluate athletic movement. Contact us to book your **Free Evaluation**, and watch how simple changes can enhance your speed, power, and athletic ability!

PTS Director Runs to an Age-Group Podium

On 25 June 2011, PTS Director Eric MacLean, together with colleagues from the German Red Cross, ran in the 10th anniversary of the 10km Wangerooge Insel Westturmlauf. Eric had a finishing time of 47:35 which earned him a 22nd place finish overall and a 3rd place standing in the 25-29 year age group.

An active runner and multi-sport enthusiast this finish marks the 1st time that Eric has earned a top-3 age group result. Eric attributes this success, particularly his 3:22 final km time, to his current training style; a lower frequency approach that concentrates on interval style loading of both distance and anaerobic workloads. While working through a progressive linear design, Eric's current training plan is structured through a week to week and month to month pyramid loading cycle, where there is 1 peak each week with 1 peak every month.

This approach, in addition to the integration of 3 recovery days per week, has led to Eric's last 2 strong race performances; a 9th overall in April, and this past 3rd place Age Group finish. If you are active in endurance sport and are looking to improve your race times, contact Performance Training Systems for a program specific to you and your goals.

Photo Left: PTS Director approaching the 10km finish line.

Search Previous **SPORT & EXERCISE SCIENCE** articles from our website.

<http://www.performancetrainingsystems.net/SPORT&EXERCISESCIENCEnewsletter.php>

Performance Training Systems Inc. Director to Attend the Zürich Forum on Applied Sport Sciences

Performance Training Systems (PTS) would like to inform our clients, partners and friends in the training community that we will be attending the 2nd European Zurich Forum on Applied Sport Sciences, 31 August – 1 September 2011 at Eidgenössische Technische Hochschule Zürich (Swiss Federal Institute of Technology – ETH) at the University of Zürich.

The program for this year's event is concentrated on Sport physiology and Sport biomechanics within the context of running and cycling. PTS is attracted to this application of sport science as these two subject (Physiology and Biomechanics) areas were major research concentrations of PTS Director Eric MacLean's graduate work, and because of our continued work with endurance and multi-sport athletes.

The 2 day Forum, which includes presenters from Germany and Switzerland, has been developed as a lecture style symposium and will cover the following topics: 'The Science of Pumping Iron', 'The Power – cadence relationship in cycling', 'Current trends in running research', and 'Program Design with respect to loading in high performance sport'.

Not only does this professional education event provide the opportunity to remain up to date with what's new in the science of cycling and running, it represents the 1st European and foreign language symposium attended by PTS staff. PTS plans to use this event to help further integrate our brand and training style by networking with those in attendance.

As announced in the spring of 2011, PTS has identified Germany, Switzerland and Austria as our next target market. Attending this symposium, and others like it, represents 1 arm of our outreach strategy.

If you would like to learn more about the Zürich Forum click the link: <http://www.zfass.com/home.html>

PTS Personal Program Design

Allow the sport conditioning trainers and Dietitians at Performance Training Systems to personally develop a strength & conditioning and/or a goal orientated nutrition program for you this season. We consider your goals, your abilities, and your schedule to develop the program that is right for you, your sport, and your lifestyle.

Consultation is free! In person, over the phone or through the net, we come to you, and **We Deliver Results**. Contact us or check our programs at www.performancetrainingsystems.net

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Hydration Strategies for Soccer

When players work hard, they lose sweat – in a game on a hot day, sweat losses may reach 3 litres (L). On a cold day, though, some players will lose very little sweat. Every player's hydration needs are different and will vary with the weather over the season. Just as general training and competition strategies should be tailored for the individual athletes in accordance with their unique needs and preferences, so should their drinking and eating choices during exercise. Players, coaches, and trainers should 'fine tune' these recommendations to identify their own winning formula.

How much and when to drink?

Players should limit dehydration during training and matches by drinking water or a sports drink. Obvious opportunities to drink during a match include warm-up and at half time. During training, the coach or manager should organize drink breaks according to the weather and intensity of the season. Training allows opportunities for the players to get a feel for sweat rates and fluid needs so that drink practices can be adjusted accordingly. It is not necessary to drink enough to match sweat loss, but the amount of dehydration should normally be limited to loss of less than about 2% of body weight (ie, 1.0kg for a 50kg person)¹.

The negative effects of dehydration on high-intensity performance are greater in warm environments, so drinking practices in these conditions should be upgraded to reduce the overall fluid deficit. This may include drinking at the side-line when match-play is interrupted, or having an extra drink during training sessions. There should never be a need to drink more than the sweat loss so that weight is gained during exercise. This will not help performance and is likely to cause gut discomfort.

When do you need more than water?

Depletion of fuel stores can be an issue for soccer matches, especially for players in mobile positions or with a running game style. High carbohydrate strategies – fuelling up for the game and consuming extra carbohydrate during the match – have been shown to enhance performance in such players.

Better intake of fluid and fuel during a game may not only keep players running further and faster in the 2nd half of a match, but it can also help to maintain skills and judgement when players would otherwise become fatigued. Games are often won and lost in the last minutes of the match, and fatigued players are at increased risk of injury.

The use of commercial sports drinks with a carbohydrate content of about 4-8% (4-8g/100ml) allows carbohydrate and fluid needs to be met simultaneously in most events. The intake of carbohydrate that is generally associated with performance benefits is ~20-60g per hour. Sodium should be included in fluids consumed during exercise lasting longer than 1-2 hours by individuals during any event that stimulates high salt losses. You can recognize 'salty sweaters' by the salt rings on their clothes at the end of a hard training session on a hot day. Players who lose a lot of salt may be more prone to muscle cramps. Adding a little extra salt to food and drinks and using a higher sodium version of sports drinks may reduce the risk of cramping for these players, but probably does not benefit other players¹.

Rehydration after Exercise

Recovery after exercise is part of the preparation for the next exercise session, and replacement of sweat losses is an essential part of this process. Both water and salts lost in sweat must be replaced. Aim to drink about 1.2-1.5L of fluid for each kg of weight lost in training or matches. Drinks should contain sodium (the main salt lost in sweat) if no food is eaten at this time, but most meals will contain adequate amounts of salt. Sports drinks that contain electrolytes can be helpful, but many foods can also supply that salt that is needed. A little extra salt may be added to meals when sweat losses are high, but salt tablets should be used with caution.

Resources

¹ FIFA Nutrition for Football Guide: A practical guide to eating and drinking for health and performance

Coaches Corner: The FIFA 11

Are you a soccer coach? What soccer specific exercises do you instruct during practice sessions?

Have you heard of the FIFA 11?

The FIFA 11⁺, developed by F-MARC, FIFA's Medical and Research Centre, is a series of 11⁺ exercises that are specific to promote the development of soccer skills and athletic abilities. The FIFA 11⁺ series can be downloaded as either video or photo format in English, German, French, Spanish and Portuguese from the FIFA website. The FIFA 11⁺ can also be downloaded from PTS's Soccer training page at

http://www.performancetrainingsystems.net/PTS_Soccer.php



Our 2011 2nd Quarter PTS.net Performance Report is now Available for On-Line viewing. The aim of this report was to develop a detailed viewer profile to provide insight into who and where our brand is reaching. Download our report from

www.performancetrainingsystems.net/PressReleases.php

Performance Training Systems Webpage is under Construction

PTS would like to inform our clients, partners and friends in the training community that beginning the week of 25 April 2011

www.performancetrainingsystems.net will be undergoing updates and changes. The most significant changes will be noticed on our home page where we will be adding links to the official home page of our new German language site. Please excuse any temporary formatting errors or 'not found' notices.

Please send all comments and feedback on these changes or additions to

eric@performancetrainingsystems.net

PTS Launches Sport Concussion Web Page

In November 2010 PTS released a position stand on Sport Concussion and Return-to-Play Management. We have continued our commitment to delivering concussion education to athletes, parents and coaches by launching *Sport Concussion* on the home of Performance Training Systems

<http://www.performancetrainingsystems.net/PTSConcussion.php>

On this page you will find all sorts of resources and education materials on sport concussion and safe treatment and return-to-play policies. **Keep your Head in the Game!**

Connect with Us & Stay Informed



Find us under performancetrainingsystems



<http://www.facebook.com/?ref=home#!/pages/Performance-Training-Systems/139837646063181>



<http://www.youtube.com/user/PerformanceTraining>



info@performancetrainingsystems.net

PTS Endurance Sport Training

The 2011 multisport and endurance sport season is here. If you haven't already, now is the time to start training for your marathon, triathlon, duathlon or other endurance races this season. Let PTS help. We are experienced in training for half and full marathon, triathlon, duathlon, and multi-sport adventure races. We will work with you to develop a training schedule that delivers the results your training deserves!

For more info, contact us at

info@performancetrainingsystems.net or at www.performancetrainingsystems.net/Contact.php

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CSEP Position on Core Training Cont...

resistance exercises can decrease force, power, velocity, and range of motion they are not recommended as the primary training mode for athletic conditioning.

The authors conclude that the high muscle activation with the use of lower loads associated with instability resistance training suggests they can play an important role within a periodized training schedule, in rehabilitation programs, and for non-athletic individuals who prefer not to use ground-based free weights to achieve musculoskeletal health benefits.

It is our opinion, that while this position paper does provide a general description of 'core' stability and how it is achieved, it does not clearly discuss the complex role coordinated muscle activation patterns play in developing 'core' or postural stability in either athletic or non-athletic movements. As our upcoming position statement will address, 'core' stability involves highly developed neuromuscular components, which are not only movement but also sport-specific.

The process of skill acquisition is specific to the skill practiced. It has been argued in the literature previously that when performing exercises on an unstable surface an athlete simply improves their ability at performing an exercise on an unstable surface, and that rather than enhancing joint stability and resistance to injury, they may decrease their preventative response through a decrease in neuromuscular variability. This thought is an application of the concept of transferability, and the Specific Adaptations to Imposed Demands or SAID principle.

Athletic or sport training programs must include exercises that are transferable to the playing fields. The CSEP position stand does refer to the Olympic lifts and other coordinated whole body closed-kinetic chain movements, especially for those individuals with a higher training experience, but, in our opinion, does not stress the difference between them and exercises on unstable surfaces enough, or when which exercises are more applicable and at what volumes or intensities. It is our opinion, created in our thousands of hours spent in athletic training facilities that these recommendations are required just as much as the distribution of training technique and rationale information is.

It is our hope that with this brief review of CSEP's position paper, announcing our forthcoming position on the same topic, and providing a little of our thoughts, we have given you more to think about when it comes to training with unstable equipment for greater 'core' strength. CSEP's Position Stand can be downloaded from our website at:

<http://www.performancetrainingsystems.net/CoreTraining.php>

Behm et al. Canadian Society for Exercise Physiology position stand: The use of instability to train the core in athletic and nonathletic conditioning. *Appl. Physiol. Nutr. Metab.* 35: 109-112 (2010).

Physiological Demands of Soccer Continued.... 1.5% sprinting and the remaining time completing other movements such as skipping, jumping, or diving (4). In addition, Rienzi et al. (7) found that on average, a player will complete 19 high intensity sprints throughout a game occurring once every 4-5 minutes in the FA Premier League. Using this information, it is possible to, as Boyle suggests, create the most optimal conditioning program by replicating the intensity patterns that are observed during a match of soccer (3). A training program that utilizes high intensity interval training at similar work to rest ratios would allow players to maintain speed and endurance throughout a game.

In addition to examining the overall average physiological demands on an athlete during a soccer match, studies have been completed to compare and contrast the different movements and intensities of players in the defense, midfield, and striker position. Bloomfield & O'Donoghue (2) concluded that there is a significant difference in the time spent sprinting, running, shuffling, skipping, and standing between positions. Understanding the different physiological demands allows coaches to emphasis different components of training for players in each position, therefore allowing the player to optimize performance based on the demands of the position.

Not surprisingly, Bloomfield & O'Donoghue (2) found that strikers or forwards performed the greatest number of maximal sprints and spent the most time engaged in high intensity performance. Although strikers spent the most amount of time in high-intensity action, players in this position performed significantly fewer movements lasting longer than 15-seconds in comparison to defenders and midfielders. It was also observed, that strikers may need to be the most physically strong due to the amount of high intensity contact that occurs as the player is running for the ball and making offensive plays. Strikers were also observed to be in an increased number of game situations in which they needed to jump and head the ball to gain offensive advantage. Furthermore, due to their offensive role on the team, strikers were found to have to stop, change direction, and slow quickly while working at a high intensity. These movements produce a large amount of shearing forces on the lower limbs, which may put players in this position at a greater risk of injury. A preventive program is strongly recommended for players in this position.

Midfielders act as the link between the defenders and the forwards and therefore were found to be engaged in low to moderate intensity activity more frequently and for longer durations, and spent more time in motion than their defense and striker teammates (2). This data suggests that longer distance interval training for midfielder would be of great value.

Defenders were observed to spend less time running and sprinting, but more time moving in the backward direction (2). Similarly to the offensive strikers, the need for defenders to be strong and agile in order to compete with the offending players was evident. It was also observed that strikers and defenders are more likely to fall and get back up, which suggests additional physiological demands of these positions and the necessity of agility training.

Overall, various studies (1, 2, 5, 6, 7) have displayed the necessity of some type of interval training regime for soccer players, however, Bloomfield et al. have made it clear that due to the varying physiological demands on the players of different position, different distance and intensities would be necessary in order to properly address the specific requirements of each position. In addition, as the defenders and forward players complete a greater number of small agile movements, players of these positions would benefit from an emphasis on agility and speed training (2). Finally, as the defenders spend a significantly greater amount of time travelling in the backward direction, backward movement training and strength in the supporting muscles is of great importance to allow for increased performance and injury reduction.

Resources:

1. Bangsbo, J. (1994). Energy demands in competitive soccer. *Journal of Sports Sciences*, 12, S5-S12.
2. Bloomfield, J., Polman, R., & O'Donoghue, P. (2007). Physical demands of different positions in FA Premier League soccer. *Journal of Sports Science and Medicine*, 6, 63 – 70.
3. Boyle, M. (2004). *Functional Training for Sports*. Windsor, Ontario: Human Kinetics.
4. Mohr, M., Krstrup, P., & Bangsbo, J. (2003). Match performance of high-standard soccer players with special reference to development of fatigue. *Journal of Sports Science*, 18, 519-528.
5. O'Donoghue, P.G. (1998). Time-motion analysis of work-rate in elite soccer. *World Congress of National Analysis of Sport IV, Porto, Portugal*. Porto, University of Porto Press. 65-71.
6. Reilly, T. & Thomas, V. (1976). A motion analysis of work-rate in different positional roles in professional football match-play. *Journal of Human Movement Studies* 2, 87-89.
7. Rienzi, E., Drust, B., Reilly, T., Carter, J.E.L., & Martin, A. (2000). Investigation of anthropometric and work-rate profiles of elite South American international soccer players. *Journal of Sports Medicine and Physical*

PTS's 3 Keys to In-Season Soccer Training:

1. Frequent (2 per week) high intensity, low volume. Intensity is the key to in-season training. A 15 minute work-out is better than skipping one.
2. Work lower body strength and power in-season. Saving the legs early in the season, often results in them failing you at the end of the season. Do not let male players train the upper-body until they are finished their lower body program. Don't let your athlete's misuse their energy and time training muscle groups that have less function in soccer.
3. If athletes are too injured, sore or tired to train, they are too injured, sore or tired to play. A coach must understand the balance between work and recovery.

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Doping Control for Canadian Soccer

In a review of the Canadian National Anti-Doping Agency, the Canadian Centre for Ethics in Sport (CCES), anti-doping programme, Performance Training Systems (PTS) was surprised to find that of CCES's 4,144 tests conducted during the past 4 quarters (April 2010 – March 2011), there were 0 domestic in-, or out-of competition doping control tests conducted on male or female Canadian Soccer athletes.

In addition to this lack of testing, PTS was also surprised to find that the Canadian Soccer Association, the national governing body of soccer in Canada did not mention anything about anti-doping initiatives in their 2010 Annual Report, or have a readily available anti-doping policy on their web page. While PTS recognizes that 'doping' may not be considered a 'problem' in soccer, it is our position that all sport organizations, with particular emphasis on national bodies, to have a transparent and integrated anti-doping policy.

PTS believes that while it is not the direct responsibility of CCES to mandate the testing of soccer players in Canada (that is the CSA's responsibility), they have, along with all stakeholders in Canadian Soccer, a social obligation to pressure the CSA to develop an Anti-Doping Policy; one that advocates drug-free sport education across all playing levels and age groups and includes a monitored testing process.

The team at PTS would like to encourage all participants in Canadian Soccer and Canadian Sport to promote the anti-doping and drug free sport ideal, and to pressure their coaches, sport administrators, and local Members of Parliament to ensure that all governing sport bodies in Canada have an Anti-Doping Policy. What do you think? We'd like to hear from you.

Nutrition for the pitch cont... low intensity activities for more than 70% of the game, but heart rate and body temperature measurements suggest that the total energy demand is high. The high energy demand may be partly explained by the repeated high intensity efforts that players are called upon to perform. A top class player performs approximately 150-250¹ brief intense actions during a game. These efforts place high demands on the anaerobic energy systems, and are a major factor in the fatigue that occurs at all stages of the game. Carbohydrate is stored in the muscles and in the liver as glycogen. This is probably the most important fuel for energy production and fatigue towards the end of the game may be related to depletion of glycogen in some of the individual muscle fibres. If even a few of these are unable to contract, then sprinting ability is reduced and skill may be impaired. Free fatty acid (FFA) levels in blood increase progressively during a game and partially compensate for the progressive lowering of muscle glycogen, but this is a less effective fuel source. The physical demands during a game vary greatly between players and are related to physical capacity and tactical role in the team. These differences should be taken into account in the training and nutritional strategies of all serious players.

The total distance run by a player during a game depends on many different factors, including the level of competition, the player's position, the playing style, and fitness level of the individual. At the elite level, male outfield players typically cover about 10-13km¹, making soccer an endurance sport. The physical demands are increased by the fact that more than 600m are covered at sprinting speeds and about 2.4 km at high intensity. Over the whole duration of the game, heart rate is about 85% of the maximum rate and the oxygen demand is about 70% of the maximum oxygen uptake (VO₂max). These values suggest that the total energy cost of a game for a typical player weighing about 75kg would be about 1,800kcal. The value for players at lower levels of the game is somewhat less than this; because the VO₂max is also lower, the total energy expended will be less. Of course, heavier players need more energy for a given distance run, and energy needs also vary greatly between individuals.

Energy Demands of Training

The energy demands of training will vary depending on the intensity, frequency, and duration of the training sessions, but they will also change over the course of the season. Most players will follow a weekly cycle that involves a reduced training load to allow recovery from the previous game, days of harder training, and a reduction in training load in preparation for the next game.

In pre-season, the training load is usually at its greatest as players strive to reach full fitness for the opening games of the season. Energy demands in a training session focused on fitness may exceed those of a hard game, sessions where the emphasis is on recovery and regeneration or on skill, the energy cost will be less.

Energy Needs

The foods we eat and the fluids we drink provide for the immediate energy needs of the body as well as influencing body energy stores. Energy stores play a number of important roles related to exercise performance, since they contribute to

- Size and physique (e.g. body fat and muscle mass)
- Function (e.g. muscle mass)
- Fuel for exercise (e.g. muscle and liver carbohydrate stores)

The energy needed for training and match play must be added to the energy required for normal daily activities. This will depend on physical activity at work and on other lifestyle factors.

How much food a player needs will depend largely on the total energy needs, and there is no simple formula to predict this. Energy needs depend not only on the demands of training and match play, but also on activities outside of the game. For those who train infrequently, or where training sessions are short or easy, the energy demands will not be high. Similarly, energy needs are lower during periods of inactivity such as the off-season or while a player is injured, and players should adapt their food intake accordingly.

Resources

¹ Energy Demands for Training and Match Play, FIFA Nutrition for Football Guide: A practical guide to eating and drinking for health and performance.

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Essential Exercises to Prevent Injury of the Pitch

The following 5 exercises and variations of them should be the foundation of any soccer training program at all points in a periodized training plan.



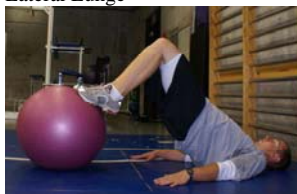
Body Squat



Forward Lunge on BOSU



Lateral Lunge



Stability Ball Hamstring Curl



Side Plank

Preventing Injury on the Pitch: *An Integrated Approach to Injury Prevention*

When the game of soccer is analysed from both a biomechanic and a physiological demand perspective, several potential mechanisms of injury can be identified. The game routinely requires athletes to exert explosive, short duration changes of speed, direction, and acceleration, efforts that when considered over the duration of a game, or any segment of a season, places varying physiological demands on an athlete's musculoskeletal and energy systems. With respect to sport related injury, this collective physical demand has the potential to lead to either chronic or acute injury. The purpose of this article is to briefly explain some of the mechanisms of soccer related injury, and to provide a sample training program to help prevent the onset of injury.

A review of the literature concerning athletic injury reveals that the knee joint has the highest incidence rate in sport, and that knee injury is a condition highly prevalent among adolescent and young adults, particularly young women. Possibly, this is due to the linked nature of athletic movements, with the knee acting as an integral component of the kinetic chain that facilitates the transfer of speed, force, power and stability through all movement patterns. When considering that the body moves in a coordinated, 'linked' fashion, a straight forward relationship presents itself within the strength of one joint, or muscle group affecting the strength or stability of another. For example, strength deficiencies in the hip musculature can lead to excessive force accumulation in the knee, low back, hips and lumbar spine. Excessive, repetitive strain can lead to compromises in joint function, and predispose an athlete to pain, and or injury in several different limb or joint segments. Often, Sports medicine professionals encounter athletes who report a knee or another movement related problem where the functional cause of that problem is not in the site of pain. The scope of this article is not to present a detailed review of all muscle or soft tissue origin and insertion points, or the relationships between fascial tension and muscle contraction length or any other of the integrated musculotendinous / musculoskeletal relationships, rather, to site these relationships as a primary cause of athletic, and soccer injury.

Sport training, regardless of the sport, however, and of particular importance in soccer training, must include exercise techniques that utilize this concept of linked movement. Closed kinetic chain exercises (Olympic lifts, free-weight exercise) are best suited to train the body as a linked system. It is the opinion of PTS that open kinetic chain exercises (eg. Seated hamstring curls), for the exception of select rehabilitation purposes, be avoided in any athletic training program.

It is commonly understood that the body responds or adapts to the demands placed on it. In the sport and exercise science literature, this is referred to as the SAID principle (Specific Adaptations to Imposed Demands). The integrated neuromuscular activation (muscle fibre recruitment, activation, and rate of firing) patterns elicited through closed kinetic chain exercises are reported to more closely induce muscle contraction patterns that occur during sport activities. With respect to soccer, exercises that mimic soccer related movements are lunges (in all directions), squats, and jumps. A combination of bi- and uni-lateral movement patterns help to train postural control through the synchronized co-contraction of multiple muscle groups. As functional control improves, an integrated training approach would apply changes of speed, direction, load, and where appropriate, stability, to stimulate greater postural demands and athletic strength, speed, and power outputs.

Training for soccer performance and injury prevention must also include the execution of these exercises at an intensity level that is specific to the demands of the athlete's season-specific training goals; muscle hypertrophy, power / speed, endurance etc, or performance demands. These varying training goals, which should be integrated through a periodized program design, can each be achieved with appropriate work to rest intervals and % of maximal voluntary contraction or repetition maximums, and where appropriate, as in energy system development, be based on positional, and competitive physiological demand profiling. For example, in the PTS article written by PTS Athletic Conditioning Consultant Ms. Stefanie Bronson 'Physiological Demands of Out Positions in Soccer', a soccer athlete performs varying intensities of aerobic / anaerobic activity during a game. An integrated program would apply these rates to a training plan, so that the training is more specific to the demands of the athlete's game. However, generally speaking, a soccer-specific energy system development program must include a combination of sprints and submax running intervals of varying distances. The closer this training reflects the demands of a match, the better the athlete will be able to transition their training to the pitch: Specific Adaptations to Imposed Demands. Remember this, and train with this concept in mind. Always!

Of particular importance to the soccer athlete, and as the research suggests, to young female soccer players, is the relationship between quadriceps and hamstring strength. The strength relationship between the Quads and Hamstrings (Q : H ratio) is known to influence the structural control of the knee joint and its surrounding tissues. The literature suggests a Q : H ratio of 2:1 as acceptable for athletic activities, particularly when returning from knee injury. Off-season training plans should aim to increase hamstring strength relative to the quadriceps however, with in-season training attempting to maintain strength profiles. It is our opinion that the more balanced this agonist antagonist strength profile of the Quadriceps and Hamstrings, the greater the athlete is prepared to prevent injury. Coordinated and balanced strength developments are best achieved through the lunge and squat exercises and their various methods.

An integrated training program must first include an athlete movement screen that assessment basic athletic movement: a walking lunge, gait, and body squat analysis are must haves in any movement screen. Further, an integrated training program must also include recovery exercises such as a stretch program and possibly the use of traditional rehabilitation techniques such as the use of foam rollers, trigger point balls, and other methods to release or prevent the accumulation of excessive tension in a muscle or muscle system.

An integrated approach never forgets that the body adapts specifically to the demands that are placed on it. This approach must consider all aspects of an athlete's training: exercise technique biomechanics, work to rest ratios, training loads and frequency, seasonal demands, 'athletic' or 'training age', which cannot be assumed to be equal to competitive level, nutrition, previous injury, and injury prevention considerations. For more detailed assistance, contact us.

This article can be downloaded as a .pdf from <http://www.performancetrainingsystems.net/SPORT&EXERCISESCIENCEnewsletter.php>