

Introduction

This report will examine the factors that must be considered in training for soccer player Cristiano Ronaldo- a forward for Spanish Club Real Madrid and the Portugal national team, to determine how and the extent to which performance can be affected.

The Nature of Soccer

Soccer, also known as 'football' is a competitive sport played by 2 teams in which a number of 11 players each compete to get the ball into the opponent's goal. The team that has the highest score at the end of the 90-minute game wins. However, if both teams end with the same number of goals, a draw can be declared or depending on the format of the competition, the game goes into extra time or a penalty shootout. Soccer involves the use of a round ball that cannot be deliberately handled with hands or arms during play except by the goalkeepers. Players mainly use their feet to strike or pass the ball, however other body parts such as their head and torso may be used as well. Players other than the goalkeeper are referred to as 'outfield players'. They are categorised into strikers or forwards, who aims to score the goals; defenders, whose role is to prevent the other team from scoring; and midfielders, who attempts to get a hold of the ball in order to pass it to the forwards.

Energy Systems used in Soccer

The break-down of the energy systems used in soccer are: 50% Anaerobic- Adenosine Triphosphate/ Phosphocreatine System (ATP/PC), 20% Lactic Acid system and 30% of the Aerobic system. Below is a table that analyses the importance of energy systems to the performance used in soccer.

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	Alactacid System (ATP/PC)	Lactic Acid System	Aerobic System
Description	<p>As soccer requires intensive bouts of muscular contractions (of the hamstrings, quadriceps, gastrocnemius, gluteus maximus and other muscles) during sprinting and kicking, the energy is hence taken from a high-energy compound called Adenosine Triphosphate. This is because ATP is stored in very small amounts in the muscles and only lasts for 10-12 seconds, making ATP/PC the predominant energy system in soccer. The other energy systems will then proceed in replacing it once depleted. After the energy is used, ATP converts into Adenosine Diphosphate (ADP). However, ADP can resynthesise back into ATP with the aid of phosphate from Creatine Phosphate (CP), which is the energy's source of fuel.</p>	<p>The Lactic Acid System is the breakdown of carbohydrates, existing in the forms of either glycogen stored in the muscle or glucose in the blood, used to resynthesize ATP. This energy system is first activated when CP proceeds to find energy elsewhere after depletion and is called glycolysis. This can occur during training sessions that involve 400-800m runs. Also in soccer, as the forward is expected to be constantly on the lookout for the ball, Ronaldo would often be jogging or spirting on numerous occasions throughout the game. However as there is ample opportunity to slow down during the game if the ball is on the other side of the field, there is a sufficient supply of oxygen meaning that the lactic acid levels will not proceed to rise as much. Therefore, as maximal effort is not required for a prolonged amount of time, the athlete would be using up only 20% of this system.</p>	<p>Being a forward in soccer requires one to follow all shots, receive clearance passes from midfielders or stay one pass away from the other forwards with the ball in order to score a goal. These activities require large amounts of oxygen to ensure the continuation of muscle contraction during movement. However, the aerobic system works to fill up the muscle cells with oxygen rich blood at a gradual pace rather than provide the oxygen supply immediately. Which is why soccer players tend to use about 30% of this energy system during play as soccer involves a lot of continuous movements such as jogging/running throughout the entirety of the 90 minute game. In terms of its source of fuel, it is taken from carbohydrates, fats and protein in which is used to produce energy. ATP production is slower compared to the other energy systems but the athlete is provided with an endless supply of it.</p>

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<p>Duration that the system can operate</p>	<p>The Alactacid System provides the athlete with an immediate energy response to 95-100% maximum effort in high intensity activity such as sprinting and scoring a goal. This can only last for 10-12 seconds before the next system is activated as ATP supplies in the body are limited.</p>	<p>During performance, near maximal effort causes exhaustion in a matter of 30 seconds whilst an effort of 70-80% will last for 3-4 minutes. Soon after, fatigue is induced entailing a decrease in performance. Sore muscles can then result as a consequence to prolonged exercise and oxygen will be needed for recovery. Also due to the extremely high intensity of effort required to run after/with the ball, the athlete will then move into the Aerobic system.</p>	<p>The aerobic system supply is endless at low to moderate levels of intensity (less than 70%). This is important for soccer players as matches tend to last up to 90 minutes hence requiring long durations of running and other physical activity.</p>
<p>Cause of fatigue</p>	<p>The cause of fatigue for the ATP/PC energy system is from the limited stores of ATP in the body (90 grams, used up in 1-2 seconds) and PC (120g in 8-10 secs).</p>	<p>Build-up of lactic acid from the use of carbohydrates as fuel can cause fatigue. Also the faster and higher in intensity, the quicker the build-up of lactic acid. Furthermore, an increase in hydrogen ions and acidosis can also contribute to feelings of lethargy in athletes.</p>	<p>Depletion of glycogen levels- the main fuel for muscles, and carbohydrates will make the body tire and thus decrease performance. The body's source of fuel then moves on to fats once all of the carbohydrates have been depleted. However, as a result of this, the athlete will undergo fatigue as there is a higher level of oxygen needed for fat. The body's temperature as well as rate of respiration also increases subsequently.</p>
<p>Process and Rate of recovery</p>	<p>The process of recovery that occurs typically after sudden movement to/with the ball and before a goal kick is characterised with an</p>	<p>The process of recovery begins in the liver where lactic acid reconverts to glycogen to be used as a source of fuel again. This</p>	<p>The process of recovery in the aerobic system depends on the duration of physical activity. In the case of a short training</p>

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	increased breathing rate as PC is replenished with oxygen present. The athlete will experience a 50% rate of recovery in approximately 30 seconds and 100% in approx. 2 minutes. This will ensure one to be able to better focus in order to execute a goal shot successfully.	process takes approx. 30 minutes to an hour	session, the body is able to make a quick recovery as glycogen stores don't fully deplete. However, if used for hours like in a 90 min soccer game, it can take up to 48 hours to fully replenish (through adequate dietary intake) as glycogen levels are fully depleted.
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Types of Training and Training Methods

Aerobic Training

The types of aerobic training are:

1. Continuous training

Continuous training involves training for long durations at moderate intensity (70-85%) which can last from 30 minutes to 2 hours. Athletes can build their endurance through jogging, continuously running for 2km or at least 1 hour at a time, several days per week. Athletes may also benefit from engaging in both types of continuous training, that is, long, gradual distance training and high intensity activities at moderate duration. This will lessen the boredom of having to do the same type of aerobic training every week. With this type of training, heart rate is elevated and maintained which is important to forwards as players can travel up to 13 km during a 90-minute game. This will also place substantial demand on the cardiovascular system leading to increased muscular endurance and therefore improve performance as the athlete is used to training at prolonged levels.

2. Aerobic interval training

In aerobic interval training, the athlete is required to engage in a range of high intensity bouts of activity that can reach the athlete's max VO₂ for moderate durations, which is followed by recovery periods in between. The rest period should be short, lasting for 20 seconds or less. Rest intervals should also be active by means of walking or jogging slowly in order to remove the accumulated lactic acid in the blood, in turn, permitting athletes to train for longer periods. An example is running for 1200m followed by a half a lap walk. This process is then repeated 4-5 times. Through this training method, athletes will be able to effectively overload the anaerobic threshold and develop

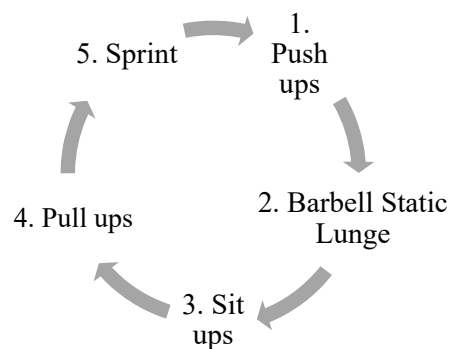
aerobic endurance. Performance can be improved by the increased adaptations in the aerobic metabolic systems in the muscle and through adapting the nervous system to the movement patterns practised in game.

3. Fartlek training

‘Fartlek’- another term for speed play, is a combination of interval and continuous training which involves the athletes engaging in both anaerobic and aerobic activity. Through participation in training of varying speed, intensity and undulating terrain, forwards can prepare themselves for sudden sprints, stops, jogs, change in direction and acceleration that will occur during competition. Random use of speed and intensity such as sprinting for 5-10 seconds and repeating it every 3 minutes or sprinting up a hill then jogging back down may also help to improve performance. This can be in the form of higher alertness when the ball is elsewhere on the field and the athlete is engaged in low activity or sudden bursts of energy for attack when the ball is close.

4. Circuit Training

Circuit training involves the athlete completing a succession of activities of different movement patterns and muscle groups. This enables cardiovascular and aerobic capacity improvements to be derived while elevating heart rate and thus performance. Athletes are also able to build their potential to make positive developments in mobility, muscular endurance/stamina, strength and flexibility. The two types of training are fixed resistance, that is, the completion of a fixed amount of actions e.g. 20 sit ups. And individual resistance, of which there is a time limit and is conducted based on the individual’s ability to complete tasks. Such as in 1 minute, an athlete completes 60 sit ups while another completes only 30. Ronaldo may find that it is more suitable to do individual resistance training as he is more skilled than other players. Below is an example of a circuit program the athlete could engage in.



Anaerobic Training

Anaerobic training requires maximal effort to be put into high intensity but brief workouts followed by short rest periods that prevent full recovery (less than 2 minutes) of systems that provide oxygen. Normally, the activities undertaken are associated to a heart rate in excess of 85% of its maximum capacity.

1. Anaerobic Intervals and Types of Anaerobic Training

The use of quick anaerobic intervals in sets and repetitions also aid in overloading the anaerobic energy systems. Completing maximal effort repetitions that last for less than 25 seconds can help in improving ATP-PC systems of energy supply while efforts lasting up from 20 seconds to 1 minute can increase the body's tolerance to lactic acid. This is referred to as short anaerobic and medium anaerobic training. The third type of anaerobic training- long anaerobic (lasting for 1-2 minutes) also develops the lactic acid as well as the aerobic systems in the body. This is due to the limited recovery sessions in between reps and sets that does not allow for all the lactic acid to be removed from the body. The body will therefore be functioning with increased levels of lactate in the blood. In time, this will improve the athlete's tolerance significantly and thus improve performance during game.

Strength in Soccer

With anaerobic training, strength is improved. Soccer players, especially forwards, require strength to kick the ball -whether short or long distances- into the goal and fight off defenders. It is essential that all major muscle groups, particularly the lower body and core are trained to meet the physical demands during play. Strength training should be ground-based e.g. lunges, squats, push-ups, chin-ups, with use of bodyweight or free weights as resistance. Performance can be improved from having increased strength in ways such as high energy levels, greater explosiveness, better stability and agility.

Speed and Power in Soccer

Through anaerobic training, athletes can also develop their speed and power. Power movements such as jump squats, high pulls, push presses and plyometric drills should be incorporated into training programs. Sprinting and ladder drills are effective ways at building up speed and agility as both are invaluable skills needed to improve performance.

Flexibility

Increasing one's flexibility levels can provide a positive effect on an athlete's performance significantly. Flexibility is the range of movement of joints and body parts of which can allow for greater range of motion in soccer if used effectively. Not only does this allow the athlete to take bigger steps when sprinting, the muscles are also enabled to stretch much more during movement without the fear of overstretching. This of course prevents injury and muscle soreness to athletes. Moreover, good flexibility can improve the body's mechanical efficiency, (which increases the rate of success for goal kicks), relaxation of muscles and tightening of muscles that both help in easing the nerves before and during game. On the day of competition, flexibility related exercises should be conducted as a part of warm up and cool down. The types of stretches are:

1. Static Stretching

By slowly stretching out a muscle to a position and holding it for about 10-20 seconds, the stretch reflex mechanism is prevented hence allowing for it to be stretched to the utmost possible length. Athletes may find that static 'active' stretching (utilising own muscular effort to hold a position e.g. standing on one leg and holding the other leg out in front) is better than static passive stretching.

2. Ballistic stretching

Ballistic stretching involves bouncing or swinging a body part repeatedly e.g. bouncing up and down repeatedly to touch the toes, and is suitable for advanced athletes only. It uses the momentum of a moving body or limb in an attempt to force it beyond its normal range of motion. This type of stretching is effective for ballistic and explosive movements used in soccer.

3. Proprioceptive Neuromuscular Facilitation (PNF)

PNF stretching is the lengthening of a muscle against a resistance. It is mainly done with another partner who urges a body part to do an isometric stretch against contraction/relaxation e.g. a supine hamstring stretch. This enables the stretched muscles to be contracted isometrically then relaxed for about 20 seconds before another PNF stretch is conducted. As a result, range of movement is improved hence allowing for better execution of kicks when scoring a goal.

4. Dynamic stretching

Dynamic stretching means to continuously move the muscles in movements experienced in soccer, such as kicking. It reduces the muscle's tightness and is mainly used in warmups.

Strength training

During strength training, muscular contraction is restricted by a calculated resistance in which builds strength and causes muscle hypertrophy resulting in greater force to be produced during a maximal contraction. This is due to the increased muscle fibres involved in the movement creating resistance. Coordination in terms of the timing of contractions allows for strength to be enhanced in both muscle and within the nervous system. Tendons and ligaments may also strengthen as a result of strength training, making the athlete abler to resist injury. Athletes can create resistance by using free weights, fixed machine weights and elastic or hydraulic forces. A persons own body weight, elastic bands and weight machines can also serve as sufficient means of resistance.

To obtain the following, the number of sets and repetitions need to be followed: 2-6 reps and 4-6 sets with greater resistance to build muscular strength, 6-12 reps and 3-4 sets with lighter weights to develop power and 15+ reps to increase muscular endurance. Furthermore, isotonic, isometric and isokinetic contractions can be used during strength training sessions e.g. squats for isotonic contractions. With effective use of strength training, performance can be improved by way of more accurate goal kicks and ability to fend of defenders during competition.

Principles of training

Progressive Overload

Constant progressive overloading by athletes is important in improving their gains in fitness over time. This can only occur by increasing the load, that is, duration spent on and intensity of training loads (resistance) or increasing weights once the body adapts to the current regiment. Soccer players may therefore be able to run effortlessly from 30 minutes to an hour without stopping as their aerobic capacity is improved from the heart's increased efficiency at pumping blood to the working muscles. With constant progressive overload in terms of aerobic training, strength and power; performance will be improved as the athlete's body increases in muscle hypertrophy and is well adapted and prepared to meet the demands required in soccer e.g. running and performing other related activities for 90-minutes. As a result, resting heart rate is decreased and the athlete's oxygen uptake/lung capacity is greater. However training for progressive overload needs to take place on a fixed schedule in order to not lose the progress of training based on the principle of reversibility.

Variety

By using the same drills, routines and techniques constantly week after week, athletes are certain to get bored, lose motivation and their desire to continue training. Thus, it is crucial for there to be variety in training as it can make it more enjoyable while also being able to complete training goals and allow for athletes to feel challenged. Variety in aerobic training can be achieved by using Fartlek (with use of cones, ball passing and kicking practices), interval and continuous games and different training environments i.e. different soccer fields, gyms and beaches/ sand. On the other hand, strength training for legs can be achieved by using different equipment such as machine weights, elastic bands, and resistance programs. Performance is therefore improved as athletes are more motivated to perform their best during competition. In addition- the increasing improvements in aerobic and strength ability cultivated through the vast variety in training processes.

Moreover, training should be specific to the role of a forward in soccer in order to develop the skills required to dribble and score a goal. Specific aerobic or anaerobic training can also increase the amount of slow and fast twitch fibres in the body hence making the athlete abler to perform endurance activities and movements that involve sudden bursts of energy. Additionally, training in aerobic thresholds (70% of max. heart rate) and anaerobic thresholds is important in developing the athlete's fitness levels and ability to exert bursts of power i.e. sprinting, when required.

Warm-Up

A 10-minute warm up can help to prepare the body by stimulating the cardio respiratory system and increasing blood flow to the working muscles while also mentally preparing the athlete for competition. Normally a warm up will include a combination of the following: basic aerobic activity, specific stretches to the legs in particular, calisthenics and skill rehearsal i.e. kicking. Also from the increase in body temperature as a result of warm up, the athlete's muscles, ligaments and tendons become suppler and elastic which reduces the risk of injury. Motor neurons required during performance may also be activated after a warm up. This can improve performance as the body is prepared to meet the varied physical demands and skills needed during soccer.

Cool-Down

After a training session or competition, athletes should cool down by participating in aerobic work like jogging and stretching to minimise muscle soreness and stiffness from strenuous activity. This is achieved by allowing the body time for blood to travel to the heart instead of the muscles. Also, with

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the oxygenated blood removing waste formed during activity, the body is able to then replenish its energy stores required for the next match that may occur a few days after. Moreover, cool down will also help to disperse and metabolise lactic acid concentration in the body. This will then improve the performance of the next soccer match as the body has recovered from the previous game properly.

Other principles of training that athletes should take into consideration include- specificity, reversibility and training thresholds as it may help improve performance.

Physiological Adaptions

As a result of training, the body learns to adapt or adjust to the levels of stress imposed on it hence enabling the body to perform in a more relaxed manner at the degree of stress experienced.

Stroke Volume and Cardiac Output

Stroke volume is the amount of blood ejected by the left ventricle during a contraction. More training will result in an increased stroke volume which is a healthy and good sign to the athlete. Higher cardiac output, that is, the amount of blood pumped by the heart per minute from greater stroke volume, can push out more oxygen-rich blood into the arteries and towards the working muscles. At the same time, the ventricle walls of the heart expands from constant training at aerobic thresholds, leading to more powerful contractions, which ensures less blood to remain in the ventricle. This can improve aerobic performance as the athlete is able to run for longer periods of time and at a faster rate.

Haemoglobin Levels

Haemoglobin is used to circulate oxygen around the body by absorbing oxygen at the lungs then carrying it to the working muscles via the blood stream. Through consistent training, haemoglobin levels increase, thereby increasing the oxygen carrying capacity of the substance and allowing for performance to be improved. This can be in the form of longer periods of activity with lower levels of fatigue. However, in order to further increase haemoglobin levels, athletes should partake in altitude training; as the less oxygen there is the more haemoglobin needs to be produced. This is especially important to maintain the same standard of performance in high-altitudes countries as the athletes would in their home countries. With insufficient training in other countries with high altitude levels, athletes may find it difficult for their body to adjust when the time comes to play competitively.

Fast and Slow-Twitch Muscle Fibres

In soccer, both slow-twitch and fast-twitch muscle fibres are utilised. During specific endurance activity that engage the aerobic system, slow-twitch fibres are used as it contracts and releases energy slowly. This makes the athlete less susceptible to fatigue. Thus, by increasing red muscle fibres, players can last throughout the 90-minute game and attain their desired results. On the other hand, soccer also relies on fast twitch muscles to perform sudden bursts of movement and contractions. So by increasing the volume of white muscle fibres through specific anaerobic training that are also different in variety like sprints and resistance training, future contractions can be done more quickly and athletes will be able to utilise anaerobic sources of energy for longer periods of time. This can improve performance in related anaerobic activities such as sprinting to the ball, dribbling a ball past defenders and executing a bicycle kick or goal shot.

Other physiological adaptations that occur as a result of training includes resting heart rate, oxygen uptake and lung capacity, and muscle hypertrophy.

Psychological Strategies

Psychological strategies are important in enhancing motivation and managing anxiety. These strategies include:

Concentration

Concentration is the ability to comprehend movement and awareness to the context of a soccer match and focus on actually doing the task rather than thinking about doing it. By putting one's focus on a particular activity e.g. penalty shot, their thoughts will be able to concentrate more on the execution of the kick. This emboldens athletes to adjust to different situations and block out external stimuli and distractions- like the audience, through maintenance of connection of the task at hand. Therefore, managing anxiety levels and increasing the success rate of a particular task e.g. penalty shot in soccer. In soccer, forwards would often find that there would be times when concentration levels are low and intervals when high concentration is required. So in order to improve concentration that can be used at any stage throughout the game, athletes should participate in training that focuses on the process e.g. kicking the ball past the goal line with the correct technique, rather than the outcome.

Attention Skills (Focusing)

Attention or focusing is when athletes use their senses to perceive their current situation by opening their minds with clarity in order to focus on what is important. Athletes can develop their ability to widen or narrow their attention skills through training and improvement can be achieved by blocking out distractions and using positive self-talk during competition.

Visualisation/ Mental Imagery

Visualisation or mental imagery is the technique of picturing one aspect of a performance before doing it, such as a penalty kick. By using this technique, athletes can improve the minds familiarity with the desired motion as well as attain optimal concentration and arousal through a clear mind. Furthermore, with the additional practice provided, performance can be improved from enhanced motivation as the athlete has imagined the penalty kick to be successful. Naturally, this can also manage anxiety levels since the athlete is familiar with what to do and will not feel stressed about failing as they have already visualised the successful kick mentally.

Mental Rehearsal

Mental rehearsal of a whole soccer performance allows one to manage anxiety (through coping strategies) and arousal levels, gain confidence, experience the actions required, concentrate and enhance motivation to perform well. In addition, it helps to prepare the athlete for competition in both mind and body as well as offer additional practice right before commencing. Through mental rehearsal, the need for full dependence on physical training is reduced as imagining an action produces electrical activity in the muscles involved which contracts without visibly moving. The brain is also heightened to a level which improves the athlete's problem solving skills, ability to produce alternative solutions and make decisions during the actual game. Furthermore, as the feelings of anxiety experienced during performance is replicated during mental rehearsal, anxiety levels can be further managed as the athlete is already exposed to such feelings.

Relaxation Techniques

Relaxation techniques are important in attaining optimal arousal by controlling the high levels of arousal that will aid the athlete in remaining calm and composed in stressful situations without being under-aroused, in turn, managing anxiety levels. This is because when athletes are relaxed, their respiration rate, heart rate and blood pressure decreases; allowing them to become less focused on the outcome and more focused on the actual performance. Motivation is therefore increased while anxiety is reduced, leading to an improved overall performance. Relaxation techniques that could be

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used in order to manage anxiety includes progressive muscular relaxation, meditation and centred breathing. Right before the game, Ronaldo could choose to listen to music and joke around in order to distract himself from worrying and then become focused when the game starts. Moreover, by making soccer seem more stressful and difficult than it is in real life, Ronaldo will be able to get comfortable and remain calm with being under pressure, especially since he is a very renowned athlete.

Goal-setting

By having short and long term goals, athletes are provided with a reason to persevere with training for soccer as well as motivation, commitment, direction or redirection if focus is lost. Goals should be SMART (Specific, Measureable, Attainable, Relevant & Time-Bound) in order to effectively enhance motivation by helping to improve weaknesses. The more realistic the goals are; the less anxiety the athletes will have in completing them. Realistic short terms goals can be to train 4 times a week with breaks in between or to engross in mental rehearsal of a penalty kick once a day. As a result of achieving these short-term goals, motivation is greatly enhanced, in turn making athletes more likely to train harder and achieve higher goals while improving performance in the process. On the contrary, long-term goals normally reflect the desired position of what the athlete would want to achieve eventually; such as being able to represent the Australian soccer team at the Olympics and getting a bronze, silver or gold.

Nutritional considerations

In soccer, what athletes eat will directly affect their energy levels, recovery, performance and health. In order to enhance performance, athletes would need to follow the basic dietary aims of having an adequate energy, fluid, vitamin and mineral intake as well as ensuring a correct balance of energy sources by avoiding unnecessary fat and carb intake.

Below are some nutritional considerations athletes in soccer should consider in order to enhance performance.

Pre-Performance

To prepare for competition, optimising carbs in the muscle and liver is of utmost importance and should be incorporated into meals 1-2 days before competition and combined with exercise taper. This is important since carbs get stored as glycogen in the body and are used as an energy source for both endurance and high intensity activities required in soccer. Sufficient glycogen stores are needed

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to minimise the potential for fatigue and is important as soccer matches last for 90 minutes. However, even though soccer players are consuming large amounts of carbs before competition, it is not to the extent of carb loading for it is said to be effective only in events lasting longer than 90 minutes i.e. marathon. Soccer players should consume complex and nutritious carbs such as bread, cereal and pasta but should avoid excess refined carbs like soft drinks or sugar. Although, refined sugar can be useful in topping up energy intake, it is detrimental to an athlete's health in large amounts. By making sure enough fuel is ready in the body to be converted into energy, performance can be done at its highest potential both physically and mentally.

In addition, athletes should consume a carb rich meal e.g. pasta, that is low in fat and fibre and moderate in protein as these nutrients digest slowly and may cause stomach discomfort during physical activity. This meal should be taken 3-4 hours before the event while a liquid meal supplement should be consumed 1-2 hours before competition. As hydration is important for optimal performance, lots of fluid intake i.e. water, is important as it can be lost via sweat. Athletes should consume 500-600 mL of fluid 2-3 hours before and 250-300 mL 15 minutes before the game starts. Small amounts of good fats like nuts and avocado can also be consumed as it serves as an energy source for low intensity activity such as jogging across the field. High amounts of bad fats consumed e.g. butter and cream, will only lead to storage of body fat i.e. obesity, which will then decrease performance. Therefore, by consuming appropriate levels of carbs, water and lipids, performance can be improved significantly.

During Performance

During half-time, it is crucial for athletes to drink fluids in order to prevent dehydration for it can be detrimental to athletic performance in terms of decreased aerobic ability and mental function. This can occur even if only 2% of the starting body weight is reduced. Fluid can be in the form of water or sports drink which can help in providing additional carbs to the athlete or sodium as most is lost through sweat. A melted ice block may also be consumed for it contains sugar that can be used as a source of energy. In addition, athletes may ingest solid carbohydrate rich foods such as a banana or sports bar in order to provide additional fuel to last for the next 45 minutes of activity. Therefore, by consuming the right foods and liquids during half-time, athletes will be able to reach peak performance.

Post-Performance

During post performance, it is extremely important to consume certain nutrients within 30 minutes to recover the body from strenuous activity. In order to restore the muscles' and liver's exhausted fuel, glycogen stores would need to be replenished through intake of carbohydrates. Carbohydrates may also help in revitalising and maintaining the immune system by reducing the risk of athletes catching an infectious illness. Drinking water or drinks with high glycaemic index to replace 125-150% of fluid and electrolytes lost in sweat over the next 2-4 hours is also important in replacing current and ongoing fluid deficits.

In addition, consuming a sufficient amount of protein to revitalise and maintain adequate muscle function. By increasing the amount of amino acids, the body will be able to quickly repair and regenerate the damaged muscle tissues and cells as well as manufacture enzymes that contribute to the release of energy. Sources of protein from lean meat, poultry or low fat dairy products are healthy options for dietary intake. However too much protein (over 20g) may limit appetite which may reduce the capacity to meet complete energy needs. This is especially relevant to the athlete if there is another soccer match in the next few days. Therefore, by consuming the right nutrients after a soccer game or training, post-performance needs can be met.

Conclusion

In conclusion, by examining the factors to be considered in soccer, including the energy systems, training methods, principles of training and physiological adaptations, psychological strategies and the dietary requirements of pre, during and post-performance, Ronaldo will be able to determine the extent to which performance can be affected.

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