HIGHFIVE

£2.99

Nutrition Guide

Depletion of the body's carbohydrate stores and loss of fluid impairs sports performance , slows recovery and is detremental to your immune system.

When you train long and hard, you must pay special attention to your body's needs for liquids and carbohydrate. Correct hydration and carbohydrate feeding will increase your performance far more than the lightest race shoes or most hi-tech clothing.

As part of High5's ongoing research to provide you with leading edge nutrition that will ethically increase your performance, a number of studies measuring the performance of top athletes have been conducted. Part of the study involved athletes working at race pace while measuring their carbohydrate intake and fluid loss.

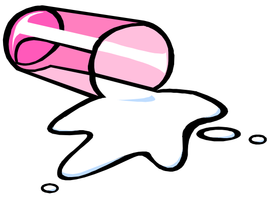
After 20 years of well-documented research, we found that every one of the leading athletes under test failed to consume enough carbohydrates and fluids before, during and after the event. This added minutes to their race performance and prolonged their recovery period by days.

WE DON'T WANT YOU TO FALL INTO THE SAME TRAP. IN FACT WE WANT YOU TO PERFORM AT YOUR BEST,

so we've have taken this opportunity to put together a nutrition and hydration guide that will substantially increase your performance.

INSIDE:

Dehydration – the invisible creeping enemy



If you train and race you sweat. The higher the temperature, the longer you race and the faster you race, the more you sweat.
To enable you to perform at your best you need to replace the fluids that you loose through sweat. Don't let drinking and feeding take second place. The graph on page 2 shows the effect on your performance as you loose fluids, which are not replaced.
No matter how experienced you are or how well trained or how determined you might be, **IF YOUR FLUID INTAKE IS LESS THAN YOUR FLUID LOSS YOUR PERFORMANCE WILL SUFFER AND YOU WILL FIND THE GOING FEELS A LOT HARDER.**

Even in cool conditions you will still loose a large amount of fluid through sweat. One part of our recent lab tests measured the effect of the temperature on fluid loss. At 16ºC, cool summer temperatures, the athletes sweated **2 litres per hour** (equivalent to over 2 large drink bottles) over a ½ marathon distance event. Everyone sweats at different rates, but these rates of sweat loss are normal. Remember these tests were conducted at 16ºC in the shade, if you are training or competing in sunny conditions your skin temperature and sweat rate will increase significantly.

Independent research shows that typical sweat loss when running (16ºC) would be 1.4 litres per hour. Note: when you are running, cycling and swimming your rate of sweat loss will be impossible to predict, as any sweat will evaporate away or be totally invisible such as when swimming.

It is important to note that during our recent scientific study the athletes were cooled with a large fan and they drank whenever they

SPECIAL POINTS OF INTEREST:

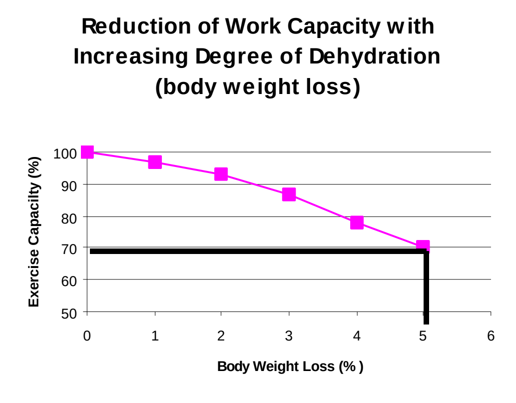
- *Dehydration can damage your health*
- *Water is NOT the best re-hydrator*
- *Carbohydrate is the fuel for sport*
- *Protein will aid your recovery*
- *Keeping yourself hydrated and planning your carbohydrate intake will increase your performance more than spending £000's on the best bike or latest components*

Dehydration – the invisible creeping enemy

liked. It should have been easy for them to stay hydrated, as unlike event conditions, unlimited cool drinks were available at all times. In fact, they did **NOT** manage to replace the fluid that they lost through sweat. At 16ºC (relatively cool conditions), they had an overall fluid deficit of 3.5 litres (= 3.5 kg reduction in body weight). Referring to the graph, for a 70kg athlete, this resulted in a percentage weight loss of 5% and a performance **decrease of 30%**. And this only relates to the performance loss due to dehydration.
If you want to perform at your best, you must aim to replace **ALL** of the fluids that you loose through sweat.

If you do let yourself become de-hydrated your blood can thicken to a tar like consistency so imagine how hard your heart has to work just to pump it around your body and keep you alive

Don't wait until you're thirsty. Thirst is your body's way of telling you are already de-hydrated. If you want to compete at your best in every race, you



must start the battle against dehydration even before you start the event. Sipping 500ml of High5 Isotonic, EnergySource or Hydro-Source before you start will give you an energy boost at the start and begin the process of re-hydration.

Why not drink water? Because water will cause you to urinate and it dilutes the salts in the blood which brings on a condition called hyponatremia. So take care of the basics and sip 200ml of a properly formulated sports drink such as those from High5 every 15–20 minutes.

IF YOU FALL BEHIND WITH YOUR FLUID INTAKE IN THE EARLY STAGES OF THE EVENT, YOU WILL NEVER BE ABLE TO CATCH UP IN THE LATTER STAGES. Listed at the end of this guide are a few tips on how to maximise your hydration and minimise your fluid loss.

Carbohydrate is the Fuel for Sport

Carbohydrate is the fuel for sport. 20 years of independent research confirms it. **Believe it!**

During any endurance event, carbohydrate is the main fuel that your body will use to get you over the finish line. This applies equally to the fastest and slowest athlete.

During exercise your body uses both carbohydrate and fat as fuel. The ratio of fat to carbohydrate depends on genetic factors, your fitness level and your running speed.

It is a myth that you can train your body to run predominately on fat. To give you some idea of just how much you rely on carbohydrate take a look at the table on the right. This is the results of a recent lab test involving highly trained endurance athletes. The most interesting point to note is the ratio of fat to carbohydrate at different heart rates. Most people during a marathon will be working at an average heart rate of 135 to 160 beats per minute.
Endurance training does help your body become more efficient at using fat and carbohydrate, however, even the very best ultra fit athletes still use more than 90% carbohydrate.
For every athlete, fat is always available but they only have enough carbohydrate to last for 90 minutes.

FAT used for fuel	CARB's Used for fuel	HEART RATE (bpm)
35%	65%	124
26%	74%	142
10%	90%	159

Unlike a car, as your carbohydrate fuel tank progressively empties, you get slower and it gets harder and harder and eventually impossible to maintain the same speed (or in some cases keep going at all), for runners this is hitting the wall cyclists call it bonking.

The good news is that you can increase the amount of carbohydrate fuel that you have stored before the event (see the Carbo-loading section) and you can "top up" your carbohydrate fuel tank as you are competing by using High5's EnergySource, EnergyBars or EnergyGels. This will keep you running for longer and make a big difference to your event performance.

Carbohydrate is the name of the game.
Don't let it run out!

HighFive Isotonic or EnergySource will provide all your carbohydrates before you start, on route and when you finish.

The more you have, the quicker you'll be

Carbohydrate Loading

Carbohydrate loading is a technique used to "over fill" your fuel tank before an event.

Without a proper recovery nutrition strategy, it can take 48 hours to fully re-fill your carbohydrate fuel tank after a hard training session. You should therefore reduce your training load in the days prior to an event (taper). This will ensure that your carbohydrate fuel tank has not been partly emptied by your last training effort. A short run in the days leading up to an event is OK.

It is possible to maximise your carbohydrate fuel tank by 'carbohydrate loading' before the event. This should normally be done in the 3 to 4 days leading up to the event. The best way to do this is to 'graze' and eat very often in small amounts. You should eat foods that are high in carbohydrate, low in fat and low in protein (meat & fat slow the rate of absorption of carbohydrate). High5's EnergyBars and SportsBars are a perfect solution. They will ensure that your carbohydrate fuel tank is filled to the max before your event.

At this stage you cannot eat too much carbohydrate, but you can eat too much bulky carbohydrate. Try to switch to high carbohydrate foods with low bulk after lunchtime the day before the event. This way, there is a good chance that everything will have passed through your system and you will not feel bloated or need a toilet break during the event.

Low bulk high energy foods would include High5 EnergySource, EnergyBars, SportsBars and EnergyGel. These should be used in addition to your normal high carbohydrate diet. An advantage of using a drink such as EnergySource to boost your carbohydrate levels is that it will also maximise fluid levels.

Breakfast and before the Start

It may look and smell appealing, but don't drink tea/coffee or have a fried breakfast. Fat and Protein slow the absorption process, so breakfast should be at least 2 hrs before the start. This will make sure that everything has been digested before you get underway. Choose a light high energy breakfast and do not drink tea or coffee (unless you are following caffeine boosting protocol). If you don't like to eat before a race, we would also suggest that you eat a HighFive EnergyBar and sip bottle of High5 EnergySource or Isotonic drink.

You can take your drink during breakfast and finish it off on the way to the event. You should pause drinking 1½ hour before the start, so that any drink will have passed through your system and you will not want to urinate before the off.
15 minutes before the start have another EnergyBar and 350ml litre of EnergySource or Isotonic. It will boost your hydration levels and provide you with 700cals of first classs energy.

During the Event – the fuel to keep you going

During the event, you can maximise your performance by:

1. Make sure that you remain fully hydrated.

2. Consume 65g-75g of carbohydrate per hour to constantly top up your carbohydrate fuel tank as you race.

Consuming more carbohydrate than this will give you no advantage. Worse, if you consume substantially more carbohydrate than this you may risk cramps caused by body fluids moving to your stomach to aid digestion.

The best way to get the fluid and carbohydrate that you need is to use a sports drink such as High5 Isotonic or EnergySource. These are easy to 'get down', stable in your stomach and quickly absorbed. Also properly formulated sports drinks contain sodium, which helps with the absorption of the drink. **Water** alone is **NOT** a good way to replace fluids, as it does not contain any carbohydrate or salts. It passes through you and not into your working muscles where it is needed urgently.

The amount you need to drink changes according to the weather and event conditions, but your carbohydrate requirement remains at 65-75 grams/ hour. Drinking EnergySource or Isotonic (mixed at their normal concentrations) may not give you the exact quantity of fluid and carbohydrate that you need. It is possible to **Mix-And-Match** all High5 products to provide the perfect balance. See the Mix-and-match section on page 3.

It depends on the quality of the event as to the number of drinks stations provided by the organisers. In some

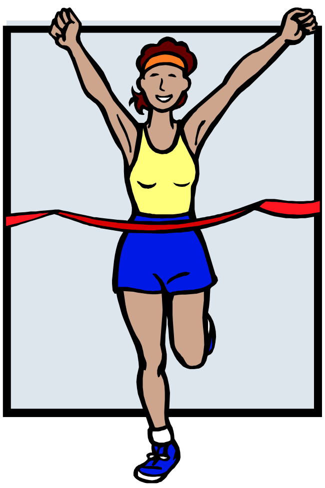
During the Event – the fuel to keep you going

you have plenty of stations, in others there are few. This means that you will need to carry some fluid with you. For most people this will mean carrying a drinks bottle in a bottle belt. If the weather is warm / humid then 500ml of drink will not be enough, you may need 600 ml to 750 ml per hour. Drinking during a run is much more difficult than in most other sports. Unless you intend to pause at the drinks stations, it is very difficult to drink more than 120 ml (a couple of cups with some spillage) when you are on the move. If you are well hydrated and fully fuelled up before you start, then you are likely get through drinking from cups, without having to pause at the drinks stations. If you were not fully hydrated, then you would need to pause at the drinks stations to take on a larger quantity of drink. The best choice you can make is to take a bottle belt with 500 ml bottle out onto the course. The advantage of a bottle belt is that you can briefly pause at each drinks station to re-fill the bottle and sip the drink as you run. This method is much easier on your stomach and means that overall you can drink more.

Don't drink water by itself, if you do only want to drink water then consume an Energy Gel or Energy Bar as well. A bottle belt can be used to carry Gels, Bars and water.

Carbohydrate Fluid Balance – the working recipe

If you imagine that your stomach is a liquidizer. You swallow a sports drink, followed by a couple of gels, followed by a sports bar, followed by some water. There may also be the partly digested remains of your late breakfast. Your stomach will then contain a soup made up of protein, carbohydrate and fat. For the best performance the protein and fat content of this ***SOUP*** should be as low as possible so as not to cause stomach cramps and interfere with the absorption of the carbohydrate – the fuel to be used for your sports activity.



There is, however, no advantage in consuming too much carbohydrate during an event and producing too high a concentration in your stomach (by making the soup too thick). There are two rules to consider:

1. 65g to 75g / Hr - Consuming more than 65g to 75g of carbohydrate per hour will not give any additional benefit and may cause gastric distress as your body cannot process more.

2. The 10% Rule - If the concentration of the carbohydrates in your stomach goes above 10% (that's 50g of carbohydrate in every 500ml of liquid in your stomach), then this will reduce the amount of liquid that can be absorbed by the body to replace that lost through sweat.

This is not a problem in normal life and it is normally not a problem when competing over short distances or in very cold conditions where sweat loss is limited. However, in a endurance event where you will be sweating a lot and for a relatively long period of time, particularly in warm / humid conditions, every care should be taken to avoid any level of de-hydration.

Using High5 Isotonic or EnergySource mixed according to the suggested strength means you don't have to think about the 10% rule. Its automatically done for you if you mix the drinks to their suggested strength.

If you use High5 EnergyGel or EnergyBar, in addition to a sport drinks (which also contains carbohydrate), then you must **ALSO** drink **water** with the gel or the bar to keep the concentration of carbohydrate in your stomach below 10%. This amount of water required with each High5 product is shown in the **Mix-And-Match** table.

Try not to get too paranoid about the 10% figure. It is something that you should aim to stay below during an event. From a practical point of view, when riding you can consume EnergyGel or EnergyBar and water at slightly different times. The special carbohydrates in the High5 product range also mean that you can often go over the 10% figure, without any serious reduction in the amount of liquid that can be absorbed. However, as you cannot be sure exactly what is in your stomach at any one time, it is better to stay on the conservative side and aim to stay below 10%.

Mixing and Matching High5 Products

Remember you need to consume between 65g & 75g of carbohydrate per hour to perform at your best. You can either use a single High5 product or combined products to meet this requirement.
You can see from the table on the right, that in order to consume 65g of carbohydrate per hour you would need to drink 650ml (0.65 litres) of EnergySource (10% solution). But if you only drink 325ml of EnergySource, then this would only give you 32g of carbohydrate and you would then need to make up the shortfall with another product. This may mean consuming two EnergyGels giving an additional 36g of carbohydrate or an Energy Bar (and don't forget the water to replace sweat loss).
When training and racing you just need to keep an aproximate mental note of the total carbohydrate and fluid you are consuming in drinks, bars, gels etc. Also the carbohydrate that you consume in each hour doesn't need to be exact. If for instance, if you are short on carbohydrate in one hour, you can take a little more the next - as long as you do not overdo it.

Product	Size	Carbo-hydrate (grams)	Protein (grams)	Water Required (ml)
EnergyBar	65 gram	49	2	500
EnergyGel	26 gram	18.0	-	75
EnergySource	500 ml	50.0	-	500
EnergySource	750 ml	75.0	-	750
SportsBar	55 gram	38.6	2.8	400
Isotonic	500 ml	36.8	-	500
Isotonic	750 ml	55.2	-	750
ProteinBar	50 gram	24.0	13.0	-
ProteinRecovery (mixed with milk)	500 ml	65.0	47.0	-

Maximise your adaption to training – the refueling window

Muscles cells are most receptive to reloading carbohydrates up to 2 hours after a workout.
After training and competition hydration and carbohydrate feeding are as important as hydration and feeding during the event. When you have finished, your body and muscles have to recover and rebuild so they're ready for the next training session or race.

Recovery is many things and includes:

- The **repair and enhancement** of your muscle and aerobic systems which **takes place after training**.
- The **refilling** of your carbohydrate **fuel stores** within the muscle and liver cells.
- The return to normal of your body's immune system.

As an athlete you want your training to increase your power, strength and prolong your endurance after each training session. The way to continually improve is to recover properly after every race and training session. To do this you need to provide your body with the nutrients that it needs to develop the cardiovascular and muscle systems that are synonymous with top athletic performance.
Whether you are competing at elite level or just walking to the shops you are exercising your aerobic system and using your muscles which are 80% protein. The various amino acids in protein form the enzymes inside the muscle fibres and the connective tissue that supports and binds them together.
The stress of any good training session targets the weak muscle fibres which results in the weaker cells splintering. The weak muscle cell membranes are shredded and protein oozes out and becomes part of a protein pool that is used for the creation of new, fitter and stronger cells.
But, if there is not enough protein available your body will continue with the process of rooting out the weak cells but instead of using the protein from the pool, it breaks down good muscle cells to make new good muscle cells. This is a bit like **taking 3 steps forward and 2 back** – an unnecessary waste of training time and loss of performance.
By using High5's Protein Recovery drink and Protein Recovery Bars within the 20 minute refueling window you will refill carbohydrate stores and flood your body with the first class proteins you need to get fitter, stronger and faster. With these recovery products you can stop good muscle cells from being broken down and get the best from each and every training session.

After the Event – the 20 minute refueling window

And there's more, by eating and drinking HighFive Recovery after training gives you a double benefit. Carbohydrates boost the production and release of insulin which is a tissue-building hormone and protein boosts it even more. **A higher insulin level means quicker carbohydrate storage**. Years of research has proved that taking ½ gram of protein per kilogram of bodyweight along with the carbohydrate after exercise promotes a greater increase in insulin levels than ingesting carbohydrate alone. The result is that the muscle carbohydrate stores are re-filled quicker.

Bodyweight (kg)	Protein Req'd (grams)	Carbohydrate Req'd (grams)
60	30	90
70	35	105
80	40	120
90	45	135
100	50	150
110	55	165

After Training – EAT
Research has indicated that for optimum recovery you should eat 1½ grams per kilogram bodyweight of carbohydrate with ½ gram per kilogram of a quality protein within 20 minutes of exercise.
Sometimes this is not practical or even possible so at High5 we've made it easy for you by providing you with supernutrition that you can carry and use anywhere. The Protein Recovery Bar only weighs 50g but provides your hardworking muscles with 13 grams of Protein and 24 grams of carbohydrate. Eaten within minutes of finishing, this bar will give you a brilliant headstart to full recovery. A 500ml ProteinRecovery drink mixed with skimmed milk or water provides you with a huge 72 grams of carbohydrate and a massive 32 grams of protein in a drink that tastes incredible. After hard training or an extended period of exercise drinking a second recovery drink will make sure that all that hard work does not go to waste and by enabling you to get the maximum fitness gains.

Glutamine Aids Recovery
ProteinRecovery contains the 'conditionally essential' amino acid Glutamine peptide which has been shown to increase muscle carbohydrate synthesis and promote protein synthesis and inhibit protein breakdown in muscle and improve your immune system.

Supplements for Endurance and Injury Prevention

Joint Protection is a MUST.
During any movement or exercise of the body connective tissue such as cartilage, tendons and ligaments is constantly being broken down and replaced with new and better tissue. This is a normal everyday process. However, sports and fitness activities increase the speed of tissue breakdown. The more intense activities, such as running, cycling and swimming the faster the body's repair process must work to keep the joints healthy and working properly.
The speed of repair of connective tissue is only average in the young and gets progressively worse with age. To fuel the body's natural repair process, High5's nutrition experts have made use of the latest research to formulate their **Joint Protection Formula**.
HighFives joint protection formula can increase the production of connective tissue and cartilage by 170%. HighFives joint formula contains the following ingredients.**Glucosomine.** Used to make GAGs (long chain sugars), a main component of connective tissue and a building block of synovial fluid (joint lubricant). It plays a major part in the elasticity and resilience of healthy cartilage. Without it your joints become sore and overstressed.
Unfortunately the speed at which the body can manufacture Glucosamine is limited and decreases with age.
Chondroitin. Cartilage rich in Chondroitin is elastic and highly resistant to friction and impact forces. Chondroitin also plays an important part in the supply of nutrients to your joint cartilage, which has no blood supply.

MSM because Cell regeneration requires constant supplies of bio-avaiable sulphur to fulfil the natural healing process. In the western diet organic sulphur is lost during food

Supplements for Endurance and Injury Prevention

processing. MSM is a natural occurring form of organic sulphur.

EPA / DHA OMEGA-3 FATS have been shown to reduce joint inflammation and immune reactions. Unfortunately our western diet is very low in OMEGA-3 FATS, providing a typical EPA/DHA intake of only 0.1 grams per day which is less than 10% recommended by the British Nutrition Foundation.

VITAMINS A, C & E to prevent Free Radical damage. Free radicals are highly reactive molecules that attack cells and have a harmful effect on the immune system and the healing process. Exercise increases the level of free radical activity in the body, leading to muscle soreness, stiffness and slower recovery. Vitamins A, C and E are very powerful antioxidants that soak up free radicals.

HighFives Joint Formula also contains the natural anti inflamatories, Bromelain, Papain, Niacin and Curcumin.

Other Supplements

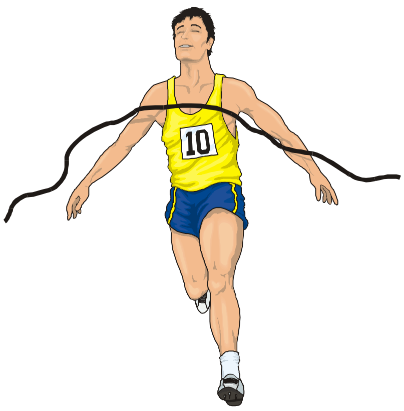
PHOSPHATES

Muscles use phosphate to make the chemicals that are used to control muscle contractions. Excess phosphate also prevents an increase in muscle acidity and will help increase the supply of oxygen from the red blood cells into the muscles.

CHOLINE is a vitamin like compound, which all cells need to function normally. It comes from foods such as nuts, wheat germ, organic meats and egg yolks.

Nerve cells do not actually touch muscles; there is a tiny gap between them. To get the muscle fibre to contract, the nerve cells must start by sending a chemical across the gap. The chemical is called Acetylcholine. Without this chemical, the muscle fibre will not contract. When you swim, bike or run, hundreds of nerve cells send out Acetylcholine "commands", making the muscles work hard. Nerve cells use Choline to manufacture Acetyl**choline**.

Research indicates that during during training or events that last longer than 2 hours, Choline gets "used up" by the nerve cells and the concentration in the blood stream falls, limiting production of Acetylcholine and therefore reducing the ability of the nerves to stimulate the muscles. Athletes taking part long training rides or in a ½ or a full marathon are likely to experience a significant drop in their Choline levels. A study showed that after a marathon, Choline levels were 50% below normal.



CARNITINE

Carnitine metabolises fats and increases the energy of every one of your cells. By increasing the speed of muscular contractions and building resistance to fatigue carnitine extends the time you are able to work at your maximum.

CAFFEINE

Research has shown that caffeine can substantially benefit performance in short distance races. With a dosage of 4.5 mg per kilogram of bodyweight, it gave a 20% improvement during interval workouts at 100% VO2 Max. In another test runners working at 91% maximum heart rate (typical 10k run pace) kept going for 31 minutes with a caffeine boost, as opposed to 22 minutes without.

Some research has been carried out on longer distance activities in Canada. They shown that cyclists who took caffeine showed greater strength and endurance at the end of a long ride.

Although caffeine can act as a diuretic, new research indicates that it does not increase the risk of dehydration when taken less than one hour before exercise, or during exercise. You should therefore avoid taking caffeine the day before or the morning of an event. That includes large quantities of tea and coffee.

Coming Soon

AthleteSpecific Multi Vitamin and Minerals

Athlete Specific Antioxidants

Q10 Energy Booster

Fat Metaboliser

HMB

Glutamine

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Hydration and Carbohydrate Feeding Tips

Remember that if you use High5 Isotonic or EnergySource you will get the fluid and liquids that you need. A sports drink will be mixed at the correct concentration so you will not have to think about the 10% rule.

- Drink lots of liquids the day before the event. High5 Isotonic and EnergySource taste great and are easy to get down and will provide an additional carbohydrate boost.
- Do not drink beer, alcohol or tea and coffee the day before as these will de-hydrate.
- Avoid drinking tea and coffee for breakfast as these will dehydrate.
- Superhydrate by Drinking a bottle of High5 Isotonic or EnergySource for breakfast at least 2 hrs before the start. Avoid drinking large quantities of drink in the 1½ hours before the start to avoid wanting to have a toilet break on the start line or in the early part of your event.
- Drink 300ml to 500ml of High5 Isotonic or EnergySource 15 minutes or <u>less</u> before the start. Any drink taken at this time will not have a chance to pass through your system before the start. When you are competing, your desire to urinate will be reduced.
- Remember to drink early in the event, even if you are NOT thirsty. If you do not start early you will find it impossible to catch up with your hydration needs later.
- Take a couple of sachets of High5 Isotonic or EnergySource or Gel with you, in case you have to re-fill your drinks bottles.
- If you do not want to stop at the drinks stations or you find it difficult to drink a lot at one time, then take a drinks bottle and belt with you onto the course. If you can get one of the new ones that have elasticated grips for carrying Gels.

HIGH5

The World's Best Tasting Sports Drinks and Bars

Who Says So?
You Do!

High5 is a long established Sports Nutrition Company. High5 products are the results of years of advanced scientific nutrition research. Their products are made from natural, GM free and BSE free ingredients.

High5 is dedicated to produce energy drinks, bars and supplements that ethically increase performance in athletes of all ages and abilities

If you have any queries about the products and their use, please contact High5.

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