

Performance Nutrition

The Basics

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a division of Maximum Energy Corp.

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What do you need?

Nutritional performance is a complex subject. There are many variables that you have to manage effectively in order to achieve optimal nutritional performance. To simplify the subject we should define two primary areas of discussion:

1) On-The-Bike Nutrition

2) Off-The-Bike Nutrition

On-The-Bike Nutrition

Your nutritional needs On-The-Bike vary by three primary variables:

- 1) Time on the bike;**
- 2) Pace;**
- 3) Environmental Conditions.**

One nutritional product or strategy does not fit all situations!

What is Happening On-The-Bike?

Before describing how to manage nutritional performance On-The-Bike we should first describe some basic nutritional principles such as glycogen depletion, hydration and natration.

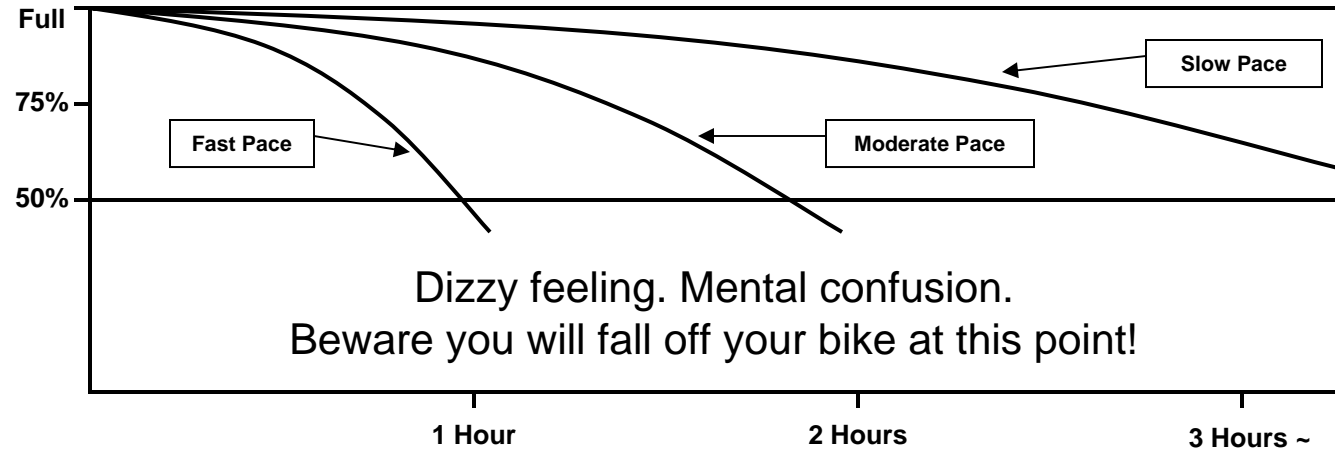
Glycogen Depletion

Think of your muscles as mini fuel tanks that store fuel in the form of Glycogen. Glycogen is simply stored energy that is created from digested food and nutritional supplements.

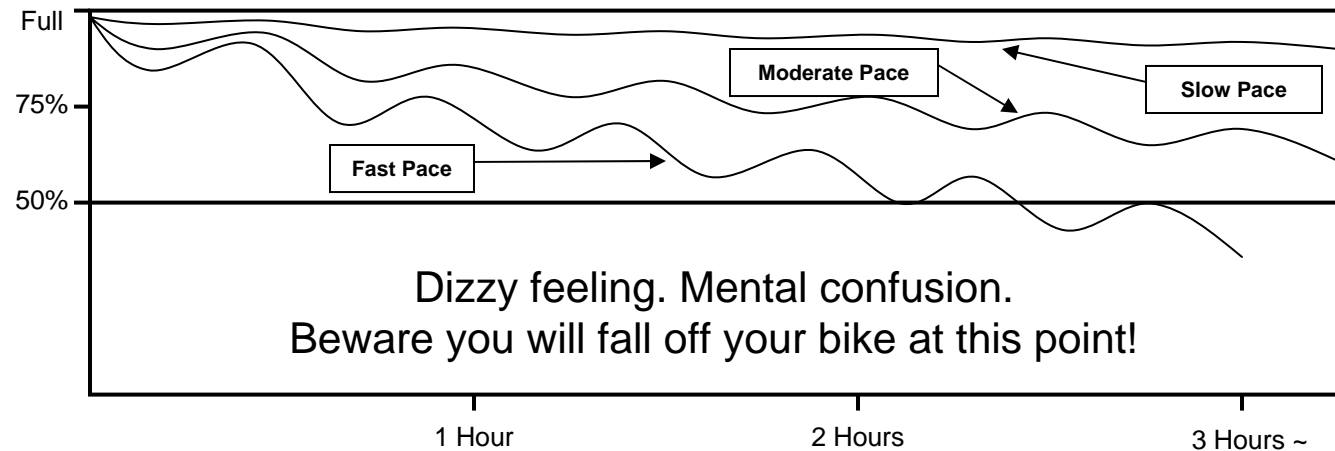
Glycogen depletion occurs as soon as you begin to exercise and will continue until you reach the point of serious energy depletion, at which time you will feel dizzy and will be forced to stop exercising. This is commonly called “bonking.”

How Long Can You Stay On-The-Bike?

Glycogen levels while drinking water



Glycogen levels while taking a nutritional supplement and water



Hydration

Hydration

Hydration is how your body manages its fluid balance. Your body is made up of 50% to 70% of water depending upon your age and how much muscle and fat you have.

Muscle tissue generally has more water than fat tissue. Your body must maintain a certain water balance in order for you to remain healthy and exercise at a high level.

Water is primarily lost through sweating, but also by breathing and urinating. A key sign of dehydration is a dry mouth, dark colored urine, and under extreme conditions overheating and exhaustion.

Drinking water is obviously how you counter balance fluid lost during exercise.

Natration

Natration

Natration is how your body manages its electrolyte concentration. Key electrolytes are sodium, potassium, magnesium and other trace elements.

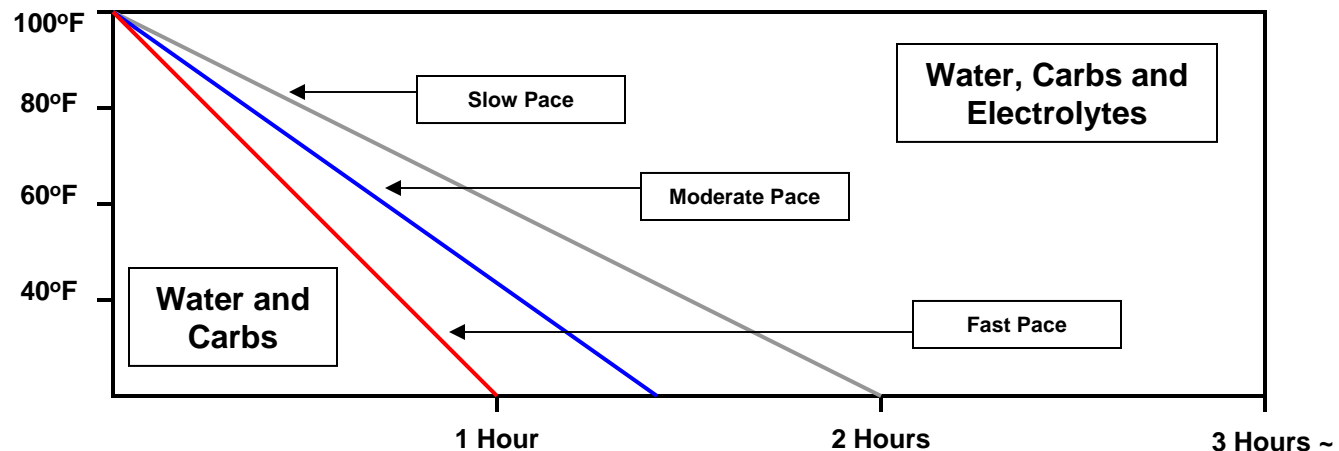
Electrolytes play an important role in maintaining fluid balance. As you sweat you lose water and electrolytes.

If for example, you only drank water without electrolytes and exercised for a long time you could become hypo-natramic. Hypo-natremia under extreme conditions could be misdiagnosed as dehydration. Drinking water will only worsen the condition as more electrolytes are washed out of your system. Signs of this condition are dizziness, cramping, nausea, confusion and eventually coma possibly death.

How to Manage Multiple Variables On-The-Bike

Each bike ride will have different variables of duration, pace and environmental conditions. Evaluating your nutritional needs to meet these conditions can become a competitive advantage in cycling. Few cyclists spend the time to understand how to manage these variables effectively.

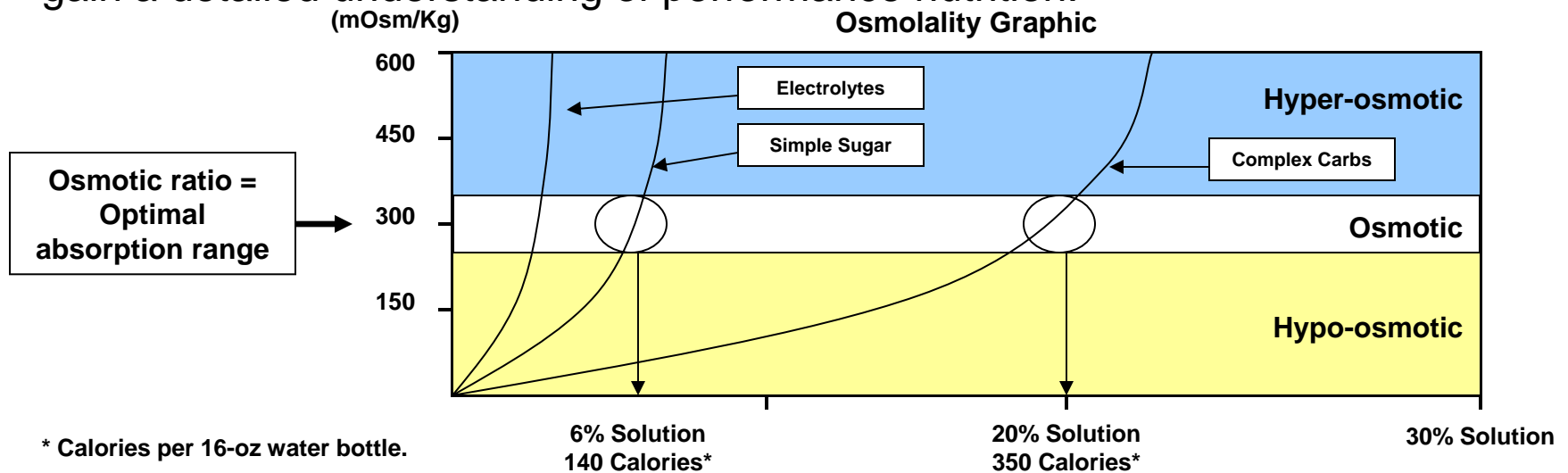
The chart below provides a general approach to managing these variables.



Generally Understanding Is Not Good Enough

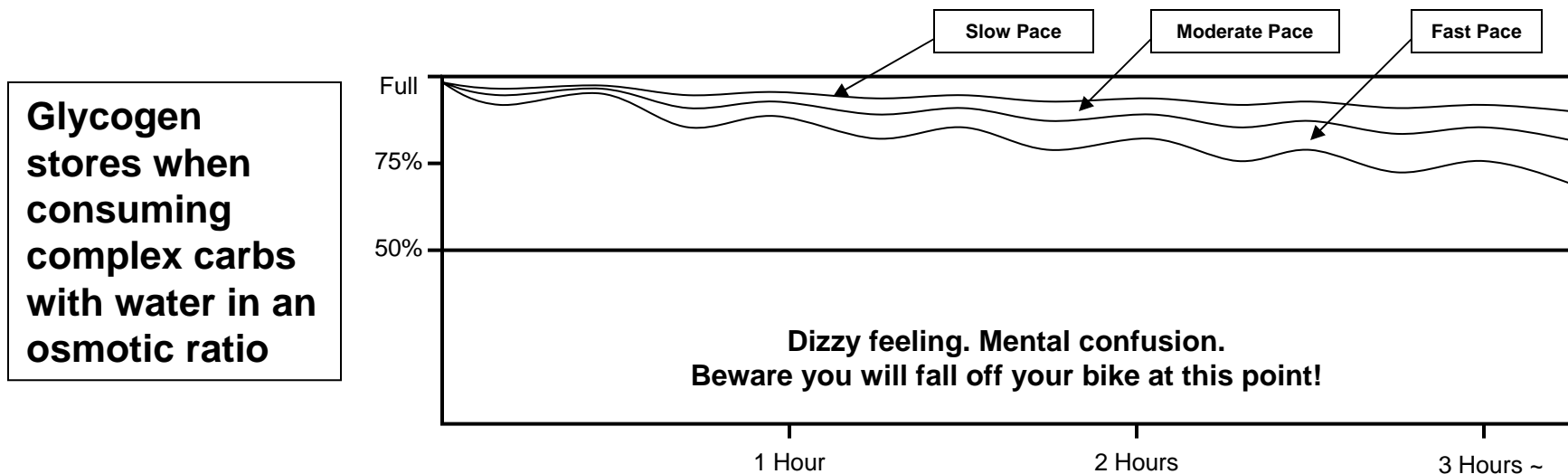
It is pretty simple to understand that electrolytes are more important as temperature, humidity and time on the bike increase. This does not address the key questions of “How much do you consume?” and “In what form do you consume the calories and/or electrolytes?”

Osmolality is a key metric that every athlete needs to understand in order to gain a detailed understanding of performance nutrition.



What Kind of Calories To Consume On-The-Bike

The optimal way to continually replenish glycogen stores is to consume a high ratio of complex carbs. Complex carbs will allow your body to absorb a higher number of calories as compared to a nutritional supplement with a high degree of simple sugars.



What Is My Complex to Simple Sugar Ratio

Now that you understand the higher absorption benefits of complex carbohydrates versus simple sugars how do you manage this in the real world?

Every nutritional product has a Nutrition Facts or Supplement Fact summary on the label. See the example below for quickly determining the complex to simple sugar ratio of any product.

Nutrition Facts	
Serving Size	
Amount Per Serving	%DV*
Total Fat Xg	X%
Sodium Xmg	X%
Total Carb 100g	X%
Sugars 50g	
Protein Xg	X%
* Percent daily values (DV) based on a 2,000 calorie diet.	

50 grams of Sugars
—————→ **50% Simple Sugars to Complex Carbs ratio**
100 grams of Total Carbs

More is Not Better

The precise concentration of your sports drink is very important. Nutritional supplements that are designed at an osmotic ratio in water will provide optimal absorption of calories while you are on your bike.

Over concentrating your nutritional supplement will create a hyper-osmotic drink that can cause gastrointestinal distress and will cause decreased performance. The problem with over concentration is that your body needs water to balance the osmolality of the nutritional supplement in your stomach before it can be fully digested. If you do not drink enough water, then your body will try to pull the water from other parts of your body in order to complete the digestion process.

Consuming solid foods or gels while on the bike is not recommended for this same reason. Your body will have to spend precious energy to digest the solid food and once it is in your stomach it is hard to know how much water to drink to balance the osmolality.

Less Than Osmotic is Simply Suboptimal

Under concentration of your sports drink is not seriously detrimental other than you will consume less calories, which means lower performance.

There is an interesting psychology around nutritional supplements. Many people think you have to cut your nutritional supplement by 50% of the recommended osmotic ratio. This psychology came about since many cyclists go out on-the-bike with nutritional supplements in both water bottles or they carry only one water bottle and it is loaded at the recommended osmotic ratio. If the cyclist does this and rides for a long duration and/or at a fast pace they are likely to become dehydrated. The reaction to becoming dehydrated has caused many cyclists to cut there nutritional supplements in half.

IT IS IMPORTANT TO UNDERSTAND THAT OSMOTIC RATIO NUTRITIONAL SUPPLEMENTS ARE DESIGNED TO PROVIDE OPTIMAL CALORIC ABSORPTION AND ARE GENERALLY NOT EFFECTIVE AT MAINTAINING HYDRATION.

How Should You Manage Hydration and Calories

The best way to manage hydration and optimal caloric loading is to go out with two water bottles: 1) one water bottle with nutritional supplement mixed with water in an osmotic ratio. 2) fill the other water bottle with straight water.

This way you can focus on consuming the nutritional supplement as fast as possible while on the bike to maximize calories and drink water as needed to manage your hydration based on the conditions.

If you cut your water bottle by 50%, then you will be forced to drink possibly more water than you need to gain the full effect of the calories.

For shorter rides under 1.5 hours you should take one water bottle and adjust the concentration to meet the conditions. I.E. a range of 100% concentration for low temps to a 50% concentration for hot temps.

How Should You Manage Electrolytes

Adding electrolytes to your nutritional supplement will dramatically reduce your caloric absorption rate due to your body's low tolerance for electrolytes.

Electrolytes, however, are important for competing in long duration events and high temperature environments.

The way to manage electrolytes is to consume an electrolyte and complex carb nutritional supplement when riding longer than 1 to 2 hours. As temperatures climb and as the duration of the ride increases, then increased supplementation such as taking salt tablets may be necessary in order to consume enough electrolytes to stay in balance.

Do You Need Protein On-The-Bike?

Protein is effective in providing some caloric value, but should primarily be considered as a muscle repair supplement. The amino acids in protein are effective at repairing torn muscle tissue, however, this is generally not necessary On-The-Bike.

Another problem with consuming protein while On-The-Bike is the nitrogen by product that is produced when digesting the amino acids. The nitrogen by-product will end up in your kidney and accumulate until you can clean your kidneys by urinating.

Carbohydrates on the other hand are very efficient at providing high caloric value and have no by-products other than carbon dioxide.

Protein should be considered an Off-The-Bike nutritional supplement.

Off-The-Bike Pre-Ride

There are two typical problems with pre-ride preparation.

- 1) Either you start the ride with food on your stomach, which will slow your performance as energy is required to complete the digestive process;
- 2) Or you start the ride with less than full glycogen stores due to insufficient nutritional loading prior to the event.

How to correct these problems and increase performance:

- Eat no meat or heavy milk products within 1-2 hours before the ride;
- Stick to fruit, breads and other fast digesting foods and drink plenty of water;
- Or drink a liquid mixture of complex carbs and protein (keep protein at 20% or less of the total).

Off-The-Bike Post-Ride

Replenishing burned glycogen stores and repairing torn muscle tissue after a ride are key objectives after a ride.

If you pushed yourself hard on the bike, you should finish slightly dehydrated and significantly depleted of glycogen.

IT IS IMPORTANT TO DRINK A NUTRITIONAL SUPPLEMENT WITHIN 30 MINUTES AFTER GETTING OFF THE BIKE IN ORDER TO SPEED RECOVERY. THIS IS MORE IMPORTANT FOR MULTI-DAY EVENTS.

A good post-ride nutritional supplement should contain complex carbohydrates and protein (keep protein at 40% or less to prevent overloading your kidneys with nitrogen)

Ride Hard! Replenish Well!

With this knowledge of basic performance nutrition you are ready to develop a nutritional strategy that is able to manage multiple variables and provide optimal performance.