

## Introduction

As a Triathlete, you are always faced with the question “What to eat?” Ask 10 experts the question and you’ll, without a doubt, get 10 different opinions. As coaches, we attempt to not only advise on the “what” to eat, but also to address the overlooked questions of “when” and “how” to eat. As you’ll see below, the “what” cannot be answered without the “when” and “how” aspects taken into account.

[For example: SUGAR..... There are times when it is very beneficial to endurance athletes and times when it should be avoided. More on this later.]

In conveying info on nutrition, we could literally overwhelm you with thousands of things. But to make a more lasting impression on any **one** athlete’s diet, we have chosen just 5 to harp on. Why 5? Well, these seem to be the most frequently asked questions, the most abused practices, and the changes that will make the **BIGGEST DIFFERENCE** in terms of improving one’s performance. So big that we don’t want these 5 to get lost among thousands of other ‘merely good’ things that we could advise. These are the big ones. Follow these suggestions and you’ll notice a difference with your racing and your health.

Know that any discussion on nutrition for an endurance athlete is merely a discussion on **RECOVERY**. The goals of your 'intake' are to **fuel you** for optimum performance and to **help you recover** from the workouts that it'll take you to get there.

### **5 things that you can do to assure that your diet is serving your endurance efforts.**

**1-Meal-time:** Eat like a cow.

**2-Protein:** Recovery’s best friend.

**3-Carbs:** Load This...

**4-Fat:** The Good, The Bad, & The Ugly.

**5-Raceday:** Timing is everything.

## 1-Meal Time: Eat Like A Cow

When we say “eat like a cow”, we are referring to: #1-timing of intake and the #2-manner of intake.

On manner (#2), it’s real simple, CHEW YOUR FOOD! We gone from being your coach to your mother now, right? Seriously though, people inhale their food making their body work far too hard at what their teeth should’ve done. As a result they get fewer nutrients, feel as though they need to eat more and then proceed to do so.

On timing (#1), know that cow's graze & so should we. You've heard it before I'm sure, but you want to eat **several small meals a day** rather than a few big one's. Why? Insulin Response. Insulin is the hormone that determines which calories are used and which get stored (yep, as fat). Several evenly spaced meals in a day deter drastic peaks in blood sugar from drastic hypo-glycemic levels and, thus, moderate insulin release. It's akin to keeping your fuel tank leveled off rather than very empty or very full.

While we are on 'timing', let's speak on another big "no-no". **NEVER skip breakfast!** (OK, I'm sounding like your mom again.) It really is the most important meal of the day. Here's why.

There is a very destructive enzyme in your body called **Cortisol**. Cortisol is a stress enzyme that is released when the body is under external or internal stress. Work/school related stress/anxiety- causes cortisol release. Training stress causes cortisol release. Racing causes a big release. A lack of nutrients causes cortisol release (more on this when we get to protein). And a lack of sleep will cause cortisol release.

Cortisol is destructive because it suppresses recovery & immune function by breaking down muscle tissue into an amino-acidic state. This alters your body's pH state creating a good environment for infection & sickness. Also, breaking down muscle tissue will prevent recovery which hinders performance.

One of the largest cortisol-release scenarios is when a body is **fasting** (ie: energy demand in the face of a lack of nutrients/blood-sugar). Upon waking in the morning, you have just finished fasting for 8 hours, and your "cortisol-clock" is running. Moral of the story...**NEVER skip breakfast.**

## 2-Protein: Recovery's Best Friend

When we exercise-both intensively (hard) and extensively (long), we break down muscle tissue (called micro-trauma). Protein is responsible for building and repairing that tissue. When protein breaks down into amino acids, this fuels the repair work of your muscles. Protein is more of a building-block than a fuel source.

**There are 3 things that you must consider when talking about protein.**

**1-How much?**

**2-What type?**

**3-When?**

The question of "how much" can be answered in 2 parts. How much per day? How much at once?

**How much per day?** - an endurance athlete should be looking at getting around .65 to .85 grams of protein per pound of lean-body-mass. This is much higher than what the outdated USRDA will tell you for an 'average' individual. And who, exactly, is 'average' in their activities/stress levels any more?

To calculate your lean-body-mass: multiply your weight x your % of body fat = there's the weight of the fat you carry. Subtract this from your weight to get your "lean-body-mass".

Take this lean-mass and multiply by .65 to .85. There's your range. So a guy who's 160lbs at 10% body fat subtracts 16 from 160 to get 144lbs.  $144 \times .65$  to  $.85 = 93$  to 122 grams per day (no matter what the USRDA suggest). More than you thought, huh? Keep in mind that this is for an endurance athlete *in training*.

**How much at once?**-Your body can absorb about 17 to 30 grams *at one time* depending on many factors (size, metabolism, current activity state, time of day, etc...) Thus, you must spread out your servings. I find that this is best done using foods like peanuts, tuna, chicken breast, yogurt, milk, protein bars, protein shakes, jog-mate, and (the easiest for post-exercise) amino-acid tablets.

Your need for protein arises at two critical stages. The first is 70-90 minutes into a workout and then IMMEDIATELY following a long or hard workout or race. At these times, I find it is best to have a fuel source with protein that has been added or take amino-acid tablets w/ a carb-drink solution.

Remember that muscle damage due to a workout and then the resulting cortisol release is highest during this "absorption window" of 30 to 60 minutes following hard efforts. (More on this later.)

**What type?**- Proteins types are ranked on a P.E.R. Scale [Protein Efficiency Rating] that measures the "bio-availability" of the protein to the body. The higher the % available in a given period of time, the better the source/type of protein. Here's the run-down:

Highest PER Values- **egg albumen protein and ion-exchange whey protein.** (These are simple pre-digested proteins that break down faster into a more useable state. They're found in protein powders, mixes, and bars.) Note: these break down INTO amino-acids, so aminos are higher than the highest PER proteins. Whey proteins are best used **after** an intense workout due to a higher concentration of glutamine. Glutamine aids in recovery.

Medium PER Values- meat, chicken, fish, and simple whey blends (like milk).

Lowest PER Values- soy-based proteins & other vegetable-based proteins. (Although these can be very beneficial to auto-immune function and women's hormonal health, they are not the best for muscle recovery from athletic stresses.....so vegetarian athletes beware.) Soy-based proteins are best used **during** exercise because there is less chance of degrading into ammonia, which can lead to premature muscular fatigue.

**When?**- Again, realize that the 'when' is just as important as the previous 2 factors.

## During Exercise:

Once exercise goes beyond 90 minutes it will be necessary to incorporate protein into the fuel mix. After about 90 minutes of exercise, our bodies begin utilizing protein as a partial fuel source for energy demands. After the first 70-90 minutes of exercise, and until you stop exercising, about 5%-15% of the calories you burn will come from protein. Technically, this process is called gluconeogenesis. This process is unavoidable and if you don't provide protein in your fuel, your body will literally scavenge it from your muscles. It's something called catabolism, also known as "protein cannibalization," and it'll cause premature muscular fatigue while you exercise (due to excess ammonia production). It also can cause post workout soreness, in addition to compromising your immune system in the long run. Drinking a fuel that contains both complex carbohydrates and protein (in the proper ratios <sup>1</sup>) will go a long way to helping preserve your hard earned lean muscle tissue and preventing production of excess ammonia.

## After Exercise:

Let's go back to the 'absorption-window'. The Protein window (that 60 minutes following exercise where protein absorption is greatest) mimics the glycogen window of blood-sugar absorption. So one of the rules of good recovery nutrition is that protein should be ingested WITH carbs (4:1 Carbs to Protein ratio) immediately following extensive or intensive exercise. **An ideal post-training habit is to ingest a bottle of your favorite carb recovery drink with amino acid tablets.**

The million dollar question is: **"Why, is this so important?"** one may ask. Well, here's what happens if you don't.

You go on a long run or ride (or a 'brick workout' of an 1.5 hours or more). The minute you finish your body switches from energy-production mode to recovery mode. This recovery mode begins with a drop in your heart rate. In the **ABSENCE** of much needed sugar and protein, your body searches for easily accessible fuel sources to begin the recovery process. Not being able to find simple (ie: "easily accessible"-mono-sacharide) sugar calories, your body searches elsewhere by secreting, you guessed it, cortisol into the blood stream. This reverses the muscle-building process breaking **down** muscle-tissue **back** into amino-acids to use as a **fuel-source** rather than using them as a **building block**. (An extreme example of this is the malnourished or anorexic body that we've all seen. In that case muscle has been relied on...out of necessity...for calories & fuel.)

If you haven't guessed it, this is a VERY BAD thing to happen....yet it happens so often with endurance athletes. **This whole, negative process is called a CATABOLIC process & your body literally cannibalizes itself in the quest for energy.**

This is also what's happening when you **"bonk" ...running out of blood sugar**. I used to think that you could train without blood-sugar just by visiting that state of hypoglycemia often enough. You can no more train to

operate without fuel than Jeff Gordon can train to win Daytona on an empty tank. The lesson: **NEVER BONK**, you're doing more harm than good.

So the CATABOLIC process & state is the exact **opposite** of the state you do want to be in.... an **ANABOLIC** state. You remain anabolic by ingesting protein and sugar after exercise. This one thing I can't preach enough.

\*\*\*As a side-note, this is also the problem with most fad diets, they restrict calories to the point that the body remains catabolic and loses muscle tissue. Less muscle mass means less of an engine to burn what we all want to have only a little of ....**FAT**. Sure one can lose weight on one of these. The problem is that a greater % of that lost weight is muscle, rather than fat.

Here's what happens in an **ANABOLIC state**. You exercise & then immediately ingest sugar and protein. You've replenished glycogen and the amino acids your body needs to inhibit cortisol release and repair traumatized muscle tissue. Lean body muscle mass increases and recovery can begin sooner, placing less of a demand on your body. This promotes more complete recovery for future workouts in the days (weeks/months) to come.

**Training is all about stress/recovery methods and cycles. Everyone knows how to stress the body. It doesn't take a coach to teach you that. Our job is to teach you the value of recovery through simple rest-sequencing, recovery-nutrition, and "active-recovery" techniques** (such as 45 min. trainer-spins and ez Quick-bricks).

## 3-Carbs: Load this...

As we all know, carbs are king when it comes to fueling the body in all forms of endurance exercise. However, carbohydrates can enhance performance or hinder it, depending on what type is used and how much is used. Misinformed athletes continue to misuse simple sugars, or to use too many complex carbohydrates prior to exercise, during exercise, and after exercise.

Sugar is defined as a monosaccharide or a disaccharide. The shorter the chain length of a carbohydrate, the higher it raises the solution osmolality (the solution concentration of particles carrying an electric charge) in the stomach. Simple sugar must be mixed in weak 6-8% solution or they will sit undigested in the stomach and not pass the gastric lining. This can possibly create sour stomach, cramps, or flatulence. Maltodextrin is multiple sugars hooked together, allowing from 18% to 24% solution immediately in transit to the liver. In the liver, it is returned to the energy cycle as muscle glycogen. **Taking in complex carbs (rather than simple sugars) means getting more fuel per volume of liquid and having that fuel get through the stomach faster and with less gastrointestinal distress.**

The Amylose-Amylopectin content of maltodextrin or potato starch is very similar in its chemistry to human stored glycogen. Therefore the "**Gold-Standard**" carbohydrate source for energy drinks, bars, or gels originates from longer-chain carbohydrates (Maltodextrins). Maltodextrins enable more caloric volume to

cross the gastric lining with less distress to the competing athlete. Sports drinks or gels containing simple sugars need to be extremely diluted to match body fluid osmolality. A concentration this weak will unlikely allow enough calories (most are up to 100 calories at a 6-8% solution) to be available to working muscles on an hourly basis.

**What the above means is that complex carbohydrates are superior to simple sugars in that they allow more volume of calories to get into the bloodstream from the gastrointestinal tract than anything containing simple sugars does.** The biggest problem is that once only a minimum (it doesn't take much) of the short chain sugars are present in the blood channels, a "Sugar/Insulin Spike" occurs, this is then followed by traumatic blood-sugar below-fasting depression or "Bonk". Because complex carbohydrates may enter at a relatively high 15-20% solution, the typical crashing "Bonk" is not as low as the simple sugar "Crash". There are several studies that show that glucose (a simple sugar) causes a greater drop in blood sugar levels (even BELOW fasting baseline levels!) than complex carbohydrates. **Simply put, simple sugars are a very inefficient fuel source. Trying to use simple sugars to fuel your exercise is kind of like trying to heat your home burning newspapers in the stove. They are hot but very short-lived. If you want to keep warm you'd have to constantly add more and more newspapers to the fire...highly inefficient!**

The other question people always seem to ask is in regards to the glycemic index (GI) of various carbohydrates. **Prior to exercise, this is critical unless the pre-workout meal is completed three hours before exercise, thus allowing insulin levels to return to baseline.** After exercise begins, glycemic index impact on insulin release is moderated DURING exercise and is inhibited because sympathetic nervous system hormones are generated in a low depleting blood sugar environment. In other words, the body has a highly effective way of regulating insulin during exercise. Processed simple sugars are usually in the 95-110 GI range, while processed complex carbohydrates are generally in the 110-130 GI-range. During exercise Glycemic Index is not a factor unless one consumes more than the liver can return to the energy cycle. This is a maximum of about 280 carb calories per hour. <sup>2</sup>.

## 4-Fat: The Good, Bad, and the Ugly...

Well we all know why fat is bad. It gets stored by our body, weighs us down, and makes traveling under self-propulsion (run & bike) harder. Fat will keep you more buoyant in the water and may not hinder your performance in the pool as much as it does on land.

**The BAD-** You've heard it before...Saturated fat is too complex to be broken down. That's why the body elected to store it in the first place.

**The GOOD-** Yes, there are GOOD fats. Look at it this way, in very extensive periods of training, energy demand is high and can sometimes exceed (due to a raised metabolism in this period) the number of calories that you're taking in (ie: catabolic). Fat can be useful. While each gram of protein & carbohydrate has 4 calories,

**each gram of Fat has 9 calories.** That's twice as much energy per gram!! And fat calories cause very little insulin-rush which mean that it has a "slower-burn".

Unsaturated fats balance meals, help with immune function, and regulate ANABOLIC hormones that allow you to optimally recover. Seek fats that are light in color and more liquid-like at room temperature. Canola, olive, flaxseed, and omega-6 oils can be great sources of fat and even offset some of the negative effects of the "bad" fats.

**A word on weight loss:** It's somewhat appropriate here to insert information on weight loss since this weight is, after all, largely comprised of fat. Know that every pound of fat is an excess of 3500 calories. So if you are someone who can benefit (race faster) by losing weight...you'll need to create a deficit. You don't want to create the deficit all in one or two days. Putting your body in 'starvation mode' signals enzymatic responses that can make life very UN-enjoyable for you.

Allow the deficit to occur gradually. You may need to actually count your calories for 5 days to see where you are. It's safe to assume that you naturally require about 1600 to 2200 calories each day just to live. Training demands about 600 to 1000 calories each hour.

So if you're 'Joe-average' and require 2000 calories in a day....and trained for 1.5hours (1200 calories 'spent')...that's a demand of 3200 calories. Ingesting 2700 calories created a deficit of 500. Do this for 7 days ( $500 \times 7 = 3500\text{cal.}$ ) and you've lost a pound.

"ONE POUND in 7 days"...I hear the moans. That's about as fast as you want to lose it, a pound a week. No faster. Any faster (or any more of a deficit), and you'll lack the energy needed to train. Even worse, you may become catabolic

## 5-Raceday-Timing is everything:

Ahh race-day. The sun seems to shine a little brighter and there is a certain crispness in the air. Nutrition on race-day will be determined by the length of the event and, thus, the intensity of it. Nerves can often alter digestion rates on the day of a race, so know this going into it.

We'll look at a few standard distances and look at how to prepare nutritionally before, what to do during, and what to take in after. Here goes:

**Sprint Distance**-(event duration: 55min to 1:50) Fast and furious is the name of this game which means heart-rates here will be high. Keep this in mind when thinking of digestion. Your body will need blood in the muscles rather than in the stomach.

**Prior a Sprint:** I find that a breakfast of 250-300 calories or less is just about right. This could be a bagel, un-cooked oatmeal, or a Sustained Energy drink. Eating three hours before the races seems to work best for most people.

**During a Sprint:** Water or a sports-drink are your tools as there's not much time for anything else.

**After a Sprint:** Within 30 minutes, make certain to get in around 20-30g of protein with 400+ calories of a carbo-recovery drink. Then later, drink plenty of water to re-hydrate and take in a balanced meal.

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**Olympic Distance**-(event duration: 1:55 to 3:50) This is a more paced event where blood-sugar begins to run out around the time your ready to finish. The game-plan for this distance will be affected by how much above that magic 2-hour range you finish. Approximately two hours has been proven to be when low blood sugar starts affecting performance.

**Prior to an Olympic:** Increase the amounts for a Sprint race (see above) within reason, up to 400 calories 3 hours prior to race start. Also, I shy away from juices before a race at any distance. The simple-sugar/acid is just too much for me and burns if I end up tasting it again. I'll stick with the same foods as before a sprint....just a little more of them.

**During an Olympic:** As mentioned earlier complex Carbs are king when it comes to a fuel source. The maximum amount of calories that most people can absorb is about 280 cal / hour (see chart below). This should primarily be a fuel source that contains maltodextrin in about 20-24 oz of water. After the 70-90 minute time frame, be sure to include protein in your solution (this can be in the form of amino acid tablets or premixed fuels containing protein)

**After an Olympic:** Again, within 30 minutes, make sure that you ingest some amino-acids or 20-30g of protein and a sports drink. Some solid food such as a bagel, a Powerbar, or fruit is also a good idea.

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**Half-Ironman or Longer:** So you've taken the plunge and registered for a 4+ hour race or longer. In an event like this the 'what to eat during' is even **more** important. The blood sugar that you have at the start will long be gone before you cross the finish.

**Prior to a Half or Full Ironman:** The temptation is to load-up the morning before one of these. However, avoid the temptation by eating a breakfast that's extremely balanced in terms of protein, carbs and fat. Do this about 3 hours before the start of the race. Stay away from excessive sweets before a long event. You'll need complex, rather than simple, carbs for a 'slower-burn' and as little

insulin spike as possible. (For this reason, waffles or pancakes w/ syrup are definitely OUT before this type of race....as are jellies, juices, honey-buns and other extreme sweets.)

Opt instead for oatmeal, whole wheat toast w/ butter, whole grain cereals and the like with some eggs. Peanut butter before one of these is a personal favorite of mine.

Eating an hour before an event will cause blood glucose and insulin levels to rise, free fatty acids fall, and the body's rate of carbohydrate oxidation is elevated. This means that when exercise starts, the exercising muscle spends more muscle glycogen at a faster rate than had calorie consumption been delayed until 10-30 minutes after the start. By eating 3 hours or more before an event muscle glycogen stores are remarkably spared by lowering the rate of muscle-glycogen carbohydrates recruited for producing energy. Not eating carbohydrates 3 hours or more prior to an event may enhance performance efficiency by as much as 20%.

**During a Half or Full Ironman:** The magic numbers here are around the 280 cal/hour (see chart). Heart-rate levels are predominantly aerobic in events that last this long. The word "aerobic," has Latin roots meaning "with oxygen". This means to tap into the almost limitless energy supply that we all carry with us....FAT....we must remain "aerobic", with oxygen to metabolize **and use** this complex fuel source.

SUGGESTED MAXIMUM CARBS PER HOUR		
WEIGHT	MAX CHO GRAMS/HOUR	K/CALS
110	48	192
121	53	212
132	58	232
143	62	248
154	67	268
165	72	288
176	77	308
187	82	328
198	86	344

But here's the catch. DON'T miss this. **Fat provides energy for the body in a physiological state made possible by glucose...sugar.** Look at it this way, when you start a fire, the wood (fat) is what provides the slow, steady release of heat (energy). You enable & accelerate this reaction using lighter fluid (sugar).

Or, as Mark Allen's coach puts it: **"When an endurance athlete fatigues in a race, it is due to the loss of available glucose (sugar) necessary to sustain the conversion of fat to energy in the aerobic muscle fiber."** Dr. Philip Maffetone

Your body can get this glucose from gels, drinks, or solid food. When going long, everyone has their own, personal favorite. Trial and error will help you find yours. But PLAN ahead your 'during the race' intake.

**After a Half or Full Ironman:** Same thing. Sports drink & Amino-Acids immediately after. Then introduce some solid food with plenty of water (as you probably have lost several pounds of water in a 4 to 15 hour event). Then try to get a balanced meal within 5 hours. Try to intentionally take in extra fat. Remember, in the next few days and weeks, your body will still be trying to recover and requiring calories to do so. Immune function is especially suppressed after a race like this.

## A word on electrolytes for longer events:

Nearly all of us have experienced the stomach bloating that occurs in a long race as a result of taking in so many carbs on the fly. Often, this bloating causes nausea and makes you feel as though there is a 'UNIT' of water in the tummy.

I've struggled with this on occasion a few times. First, I thought that it was the sweetness of the carbs that I ingested. I tried brand x, y, and z. No dice. Then, I noticed something after speaking to others who'd faced the same issue. The more I sweated, the less my stomach allowed the carbs/sugars/fluid to pass through. The key??? **Electrolytes.**

Everyone is different. However, I've found that without electrolytes, **NOTHING** gets past my stomach wall. And it sits there, giving me symptoms of a bonk and dehydration. This is due to the absence of absorption of calories and fluid. Now I am a heavy and salty sweater. This is why it is worse on hot sweaty days.....There are fewer electrolytes to help the stomach do its job.

**The answer: Electrolyte tablets.** One per hour in long events has helped me. But again, EVERYONE is different. So practice in training before you attempt it in a race. Electrolyte drinks can help to this end as well. But your goal in ingesting during a long event is caloric intake.

Often, In Ironmans around the world, the #1 reason for a trip to the medical tent is NOT dehydration, rather, it's the OVER-hydration of liquids that dilutes electrolyte levels (mainly salt) causing a condition called **hyponatremia**. Hyponatremia can make bonking look like a trip to Disneyworld. You do NOT want this to occur! It assures you'll do a fair bit of walking at the end of your next long distance race. **TAKE IN ELECTROLYTES!!**

**To conclude**, I want to leave you with my very own **top-10 list**. These are, in my not-so-humble opinion, the most important, performance enhancing things (that you can easily turn into habits). These can make the biggest difference in your training and racing, and these tips are practical to apply.

- 1. Never skip breakfast!**
- 2. Eat smaller, evenly-spaced meals/snacks throughout the day.**
- 3. Strive to eat a portion of protein about the size of the palm of your hand and a serving of complex carbs only a little larger than your palm, at every meal.**
- 4. Take a multi-vitamin daily. (& extra E and C would help as well)**
- 5. Avoid saturated fats and SEEK unsaturated ones.**
- 6. Never “bonk” in a workout!**
- 7. Within 30-45 minutes after a workout, ingest some glucose drink and protein (or Branch-chain amino acids).**
- 8. Drink water all day whether you’re thirsty or not.**
- 9. Attempt to avoid sweets...except right-before, during, and right-after a training session.**
- 10. Take in 250-350 calories per hour in any race longer than 2.5 hours and don't forget to take in some salt regularly, too.**

And above all...have fun.

## **Nutrition with Jeff**