Avoiding "The Wall": Fueling for Triathlon Training and Race Day

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In practice—variety of clients, from ED to weight loss to athletes. I see mostly athletes

Frequently Asked Questions

- O How does food affect my performance as a triathlete?
- Training and game day—what balance of nutrients do I need to perform and feel my best?
- During training and race day:
 - Water or sports drink? How much?
 - Gels, carbs, or protein?
 - O How many calories and how often?



-Poor nutrition: ways it effects you: hit the wall, GI distress, dehydration effects, etc. -"My bod is a hot rod"

Keys to Performance

- Maximize and maintain fuel (glycogen) supplies
- Maintain and optimize hydration and electrolyte balance
- Prevent protein breakdown and maximize synthesis
- Efficient and timely recovery from prior bout of exercise
- Train the gut









- Carbohydrates are the body's preferred fuel source for high-intensity and prolonged endurance exercise.
- O Carbohydrates are a major limiting factor in endurance performance.
- O What happens when we don't give our bodies enough carbs?
 - We bonk
 - O Long term: We risk compromising our muscle stores.



Carbohydrates from food broken down into glucose in the body

Can be used for immediate energy

Any glucose not used immediately for energy goes into liver and muscles in the form of glycogen

During exercise:

Muscle glycogen is converted back to glucose to fuel the muscles. Liver glycogen is converted back to glucose and released into the bloodstream

Muscles can also use some of this glycogen.

On average, body stores 1500 to 2000 calories from glucose in the form of glycogen.

1200-1600 calories in muscles

300-500 calories in liver

On average, body stores 5-20 calories from glucose in the bloodstream.

Brain and central nervous system utilize quite a bit of glucose during exercise and at rest (brain takes priority!).



Another main source but as we said, not quite as efficient as carb. What it has going for it—we have a lot of it!



-Low intensity—fat is preferred fuel source because ATP demand is low and oxygen is readily available. As intensity increases, body becomes more reliant on carbs because they're oxidized more efficiently, and because ATP production is higher.

-Duration—body may shift to higher oxidation of fats once carb stores become depleted.

-interestingly, women tend to oxidize more fatty acids during moderate intensity endurance sports, possibly because they have more type 1 (slow-twitch) muscle fibers.

Water

- Most important nutrient
 - 60% of body is water
 - 75% of skeletal muscle is water
- Functions of water
 - O Makes up plasma, which delivers nutrients to tissues
 - O Maintains body temperature and pH
 - O Maintains blood circulation and pressure
 - Supports energy processes



Sodium=the one we focus on because we see biggest losses in athletes.



Now that we've talked a bit about why each nutrient is important, let's talk about the guidleines for each one. Important point. These are guidelines. They're informed by science and best practices in sports nutrition. Personal needs vary based on various factors, including workout frequency and intensity, event (sprint vs. olympic vs ironman), etc.



-we train our muscles, our heart, and our mental capacity. Critical to train gut!! -general healthful—may be adequate for shorter distance, lower intensity training and races.

-weight loss? Generally best when you're not training for a specific event.

-eating the right amount of carbs to maximize glycogen stores. But also figuring out the best ones to eat and when to avoid GI distress

Daily Nutrient Needs

Carbohydrate

Type of Activity	Recommend Carb Intake (g/kg body weight)	Estimated needs for 150 lb (68 kg) athlete
Very light training	3-5 g/kg	204-340 grams/day
Moderate Intensity	5-7 g/kg	340-476 grams/day
Moderate to high-intensity endurance exercise (1-3 hours per day)	6-10 g/kg	408-680 grams/day
Moderate to high-intensity exercise (4-5 hours per day)	8-12 g/kg	544-816 grams/day

General health and to support training. This and maybe some preor mid-workout carb and fluids may be all you need if you are a recreational athlete and race shorter distances.

Daily use----fiber should be a priority. 25 grams women, 38 grams men. May need to dial that back a few days before big trianing day or race.

Very light—skill work or low intensity training

Moderate intensity (60 minutes per day)

-Race day or long training workout—60-70% of calories from carbohydrate

-Studies show that male endurance athletes generally get enough. Females are more likely to fall short of guidelines.



Protein—elite level tested in men, who may have higher needs.Not used for energy as much but key for recovery and muscle mass.

Fats: generally have adequate stores but dipping below 20%not great for overall health. Effects on performance not clear.



Looking for wholesome carb sources in the daily diet as much as possible. Whole grians, fruits, veggies, low fat dairy, etc.

Pre-Workout Carbohydrates						
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Time	Grams of Carb/body weight	Example based on 150 lb (68 kg) athlete	Foods that would meet requirement			
4 hours before	4 g/kg	270 g of CHO	1 large bagel + 1 banana + 1 Tbsp jelly + 1 Tbsp PB + 20 oz sports drink			
3 hours before	3 g/kg	200 g of CHO				
2 hours before	2 g/kg	130 g of CHO				
1 hour before	1 g/kg	70 g of CHO	1 slice of bread + 1 banana + 1 Tbsp PB + 1 tsp honey			

Priority one is getting enough carbs each day. We top off glycogen pre-workout with some more carbs when possible.

Studies have found that, compared to a fast, 200-300 grams of carb taken 2-4 hours before exercise improves endurance.

Key point—meals get smaller closer to event time.

Further away—may play with a bit more protein or a little bit of fat. Closer to start time—simpler carbs.

Might not be able to get all of this in and that is okay—studies show carbs during workout are more effective than pre-workout, although the greatest benefits are seen when the two are combined.



Gatorade=about 16 ounces



Carb loading-useful for events 90 minutes or longer. Improves endurance by about 20%

Considerations—this is a lot of carbohydrate! Have to space it out to get them all in. -low-fiber foods may help prevent gut distress and also make it easier to get it all in -may benefit from eating a little less fat for same reason.

-Athletes may feel a little stiff or bloated. These sensations should go away with exercise. This is because body stores 3 oz of water with every 1 oz of carb.

Ladies: We oxidize more fat and less carb in endurance exercise than men. Especially important for women who are carb loading to eat enough calories!! One study found that women had to increase energy intake by 34% to achieve optimal muscle glycogen stores.

Even if you can't get 10-12 grams per kilo of carbs, just adding a serving or two at each meal may help. You can also sip on sports drink between meals to add carb.

Intra-Workout Carbohydrates

Recommended Carbohydrate Intake
No need!
Small amounts of carbohydrate or mouth rinse
30 grams/hour
60 grams /hour
Up to 90 grams/hour (multiple transportable carbs)

If you are working out for an hour or more (or more than 30 minutes for very high intensity activity), you may benefit from carbs during your workout. This will ensure that your blood sugar stays steady, prolong endurance, and keep your brain happy. You have to base this to some extent on how you feel and your projected finish time. If you're doing a sprint and it's been an hour but you'll be done soon, may be just fine as long as you ate enough carbs leading up to race. You could also do a bit of sports drink or similar on the bike to give you a little boost.

-NOTICE ANYTHING DIFFERENT from daily guidelines and pre-workout guidelines? Intraworkout carbs are not based on bodyweight—the guidelines are more universal. Reference: Bars average 40-60 grams of carb. Gels ~25 grams of carb. -Factors to consider—tolerance, sport rules/regulations, intensity, etc. -Multiple transportable carbs=sources more than one type of sugar molecule (example: glucose and fructose as opposed to just glucose). Some studies have found MTCs improve carb oxidation and delay fatigue. Seem to be most beneficial for longer events but any distance can use them.

-MTCs also optimize gastric emptying and intestinal absorption.

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Gels, blocks, beans, bars, and sports drinks—convenient, and you know what you are getting.

-Gels and solids (chews, etc.): Portable, very carb dense. Can cause GI distress in up to 20% of endurance athletes.

-Drinks-combine carb with electrolytes

-could be based on race course to some degree. Drink may be easier on bike, or if aid stations stock it on the runs along the way.

-You can also do real food, although not always as practical. Some people like fruit pouches, honey, candy, etc. SHOULD BE LOW IN FAT, PROTEIN, FIBER



- Start early—45 to 60 minutes into a race.
- O Gels/chews should be taken with at least 6-8 ounces of water.
 - Never mix a gel with a sports drink.
 - oToo much sugar→GI distress
 - ORule of thumb: Avoid sports drinks for 20-30 minutes before and after gels
- O Drinks—about 4-8 ounces every 15-20 minutes
- ALWAYS TEST DURING TRAINING!

-Rules are based in large part on preventing GI distress. If you are prone to gut trouble, this one is for you.

-Drinks—one concern is that some athletes may not tolerate the volume. Train the gut, taking big gulps as possible. Swish?

Cooler liquids go down easier and empty from the stomach faster.

May be beneficial to train with a variety of brands, etc.



4:1 has been shown in studies to be a good balance for recovery and muscle protein synthesis



- Replace too much fluid
 - O Hyponatremia risk
- Optimal water replacement
 - Optimal performance
 - Optimal thermoregulation
- Inadequate fluid replacement
 - Poor performance
 - Heat injury (cramps, heat exhaustion, heat stroke)

Fluids: Key word balance

Optimo	Optimal Hydration					
	Physiologic Function	Response				
н	eart rate	Lower				
St	roke volume	Higher				
C	ardiac output	Higher				
SI	in blood flow	Higher				
C	ore temperature	Lower				
P	erceived exertion	Lower				
P	erformance	Better				

Endurance performance is impaired when dehydration >2% of body weight As you can see here, poor hydration affects performance in a number of ways. The heart has to work harder, the body cools less efficiently, and you feel more sluggish.



- Sweat Rate: women < men, child < adult</p>
- Hyponatremia risk: women >men, old >young
 - Lower total body weight
 - Higher marathon time
 - Lower sweat rate
- Old age: lowers thirst drive
- Alcohol: delays rehydration
- Adequate rehydration requires electrolyte replacement



-Overhydration is typically more dangerous than dehydration. Hyponatremia is not common but can be deadly. Dehydration should be minimized as much as safely possible, but not avoided at all costs.

-Hyponatremia: Low blood sodium level



Adequate intake is set for everyone, not particularly athletes. Liters—includes not just water.

Recommendations—drink to thirst all the way to estimate fluid losses



- Sweat Rate Equation:
 - O During a 2-hour workout:
 - OPre-weight: 140#
 - OPost-weight: 138#
 - Fluid intake: 32 ounces of water and sports drinks
- 140-138=2 lbs=32 oz of fluid lost
- 32 oz of fluid consumed
- 32+32=64 ounces of sweat lost in 2 hours
- O Drink 8 oz of fluid every 15 minutes, or double current intake to maintain weight

If, like me, you're a data nerd, One good way to estimate needs is the sweat rate equation.

Weights: Obtain nude weights before and after exercise, naked (ideally) or in minimal clothing and after towel drying off any water or sweat.

Can also estimate post-race hydration status by gauging urine color. Urine should be color of lemonade. Darker=drink more.



Why electrolytes: Some electrolytes lost in sweat and urine. Electrolytes help with fluid balance, muscle contraction, nerve function, etc. Water without electrolytes increases risk of hyponatremia. Many gels also contain electrolytes. Check label



And now that we're through the general guidelines, let's get a bit more specific about putting it into practice.s

Priorities—top of muscle glycogen stores, ensure adequate hydration, minimize GI distress

Three Days Pre-Race

- Limit alcohol
- Avoid unfamiliar foods
- Avoid high-fiber foods because they're harder to digest
- Avoid fatty foods because they're harder to digest



- Resist the urge to gorge yourself! Doing so can make you sluggish
- Stick to easily digested carbs and lean protein
- Drink plenty of fluids (especially in hot weather or if you had to fly to your event)
- Skip pasta dinner unless you trained with pasta
 - Other options: rice, baked potato, bread, tortillas
- If you are carb loading, you may benefit from spreading carbs throughout day
 - Some find it easier to front-load carbs pre-race day

Easily digested carbs and lean protein—white rice and chicken breast work for me. Fluids—some studies show that women especially may benefit from front-loading some sodium, particularly in hot conditions, during the high hormone phases of the menstrual cycle.

Race Morning Fueling Strategies

- Eat what you practiced!
- Foundation: Easily digestible carbs
- A little protein, minimal fat
- Eat 3-4 hours before event if possible
 - O 30 minutes pre-race—1/2 a banana, sports drink, energy chews
- Not up that early?
 - O Bedtime "breakfast" and a morning mini meal

Protein/fat low to minimize gi distress. Lower fiber as well -If you travel for races, be sure to know your routine.

Race Morning Fueling Strategies

- O Drink 16-20 ounces of water or sports drink 2-3 hours before race
- O 4-8 ounces of water 0-10 minutes pre-race
- O HAVE FUN!!





- You're overwhelmed by balancing training needs with needs for overall health.
- You need help putting theory into practice.
- You are prone to bonking or GI distress.
- You find that you fatigue easily or recover slowly.
- You have a chronic medical condition, like diabetes, IBS, or IBD.
- You need help staying accountable.

Does that seem like a lot? A dietitian can help take the guesswork out of fueling. Accountability—Terrain article, interviewed some cycling, running, and tri coaches and all said how common it is for nutrition to fall by the wayside. Help take guessowork out of fueling and keep you on track.

Questions?

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O WE HAVE PRIZES!

• Visit https://www.surveymonkey.com/r/6GSFQN6 and complete a quick 6-question survey by Monday, 3/27, for a chance to win a free resting metabolic rate test!



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