

PRE AND POST NUTRITION FOR ENDURANCE EVENTS

UNDERSTANDING THE IMPORTANCE OF FUELING PROPERLY

IMPORTANCE OF FUEL

- Maintain the proper balance of Carbohydrates, Protein and Fat
 - Understanding the importance of fuel intake and electrolyte replacement.
 - The difference in fuel pre event vs. post event
 - Understanding how fuel affects your training and events
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HOW THE BODY USES FUEL

- The foods you eat provide energy (Fuel) in the form of carbohydrate, protein and fat.
- The body can store some of these fuels in a form that allows your muscles an immediate source of energy.
- Carbohydrates → broken down into glucose (main source of energy for the body) → glucose (can be used immediately) → or stored in the liver and muscles as glycogen.
- During exercise → muscle glycogen is converted back into glucose (fuel for muscle fibers)
- Or the LIVER → converts glycogen back into glucose and releases it into the blood stream.
- Glucose is BRAIN energy or Nervous system

CAPACITY

- There is a limit
- The muscle and liver can hold about 1,800-2,000 calories worth of energy or enough fuel for about 90-120 minutes of continuous exercise.

Muscles: 300-400 grams glycogen or 1,200-1,600 calories

Liver: 100 grams glycogen or 400 calories

- However, the faster the pace, the more CHO the body uses
- “Hitting the Wall” = depleting muscle glycogen. The liver can kick in but it is limited.
- For exercise greater than 90 minutes, an athlete must replenish throughout the endurance event.

WHAT ABOUT FAT?

- Fat can also be used as energy.
- Low to moderate intensity. 65% or less of your aerobic capacity → fat is used for energy.
- Fat is stored as triglycerides in adipose and fat tissue is broken down into fatty acids. FA → blood → muscles (but this process is very slow and requires oxygen)
- Fat can hold as much as about 100,000 calories even for a lean athlete.
- Fat burns in the flame of carbohydrate. The body uses carbohydrate to burn fat.

PROTEIN FOR ENDURANCE

- The body does not rely on protein as a source of energy.
- It will use protein to build, maintain and repair body tissues. It also helps synthesize enzymes and hormones.
- Protein supplies only 5% of the body's energy.
- In under feeding the body can use amino acids within the skeletal muscle to provide glucose. (Starvation, rapid weight loss diets)

CARBOHYDRATE FOR THE ENDURANCE ATHLETE

- Critical for for endurance athlete!

How to tap into the power of carbohydrate

1. Eat a carbohydrate rich diet
2. Take advantage of the “carbohydrate window” immediately after training.
3. Load up on carbohydrate rich foods 3 days before long events.
4. Consume sports drinks, gels and other carbohydrate rich foods during exercise/ training.

* Athletes need to build up their muscle glycogen stores

HOW MUCH ENERGY?

Carbohydrate (60% of calories)

- One hour per day training – 3 grams CHO per pound body weight (6-7gm/kg)
- Two hours per day training – 4 grams CHO per pound body weight (8-9gm/kg)
- Three hours per day training – 5 grams CHO per pound body weight (10-11gm/kg)

150 pound athlete: 400-700 grams carbohydrate

Protein (15-20% of calories)

- .55 to .75 grams protein per pound body weight (1.2-1.7 gm/kg)

150 pound athlete: 82-115 grams protein

Fat (At least 20% of calories)

- .5 grams fat per pound body weight (1 gm/kg)

150 pound athlete: 68-70 grams fat

* 5-15 minutes before the event, drink 8oz of water or fluid

TIMING

If your event is in 3-4 hours → meal that contains carbohydrate, protein and fat

If your event is in 2 hours → mini meal or snack that contains carbohydrate and protein

If your event is in 1 hour → FLUID (carbohydrate)

If your event is 5min to 10min → fluids and energy gel



FUELING STRATEGIES

In advance:

Start by eating a balanced diet.

Experiment with foods that you tolerate.

The week Before:

Carbohydrate loading, works better for men than women.

Try and decrease carbohydrate the first 2 days the week before event, concentrate on more protein and fat, while still trying to maintain exercise training.

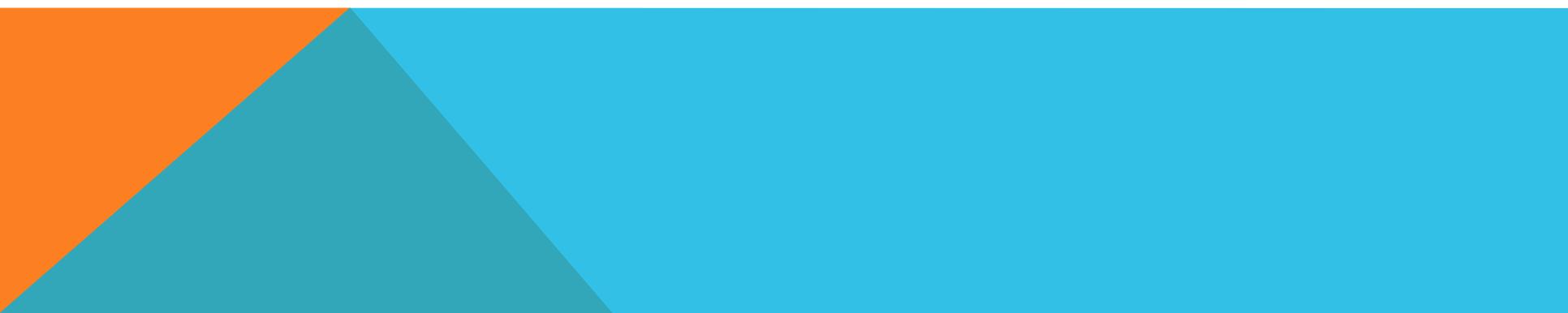
The next 3 days, increase carbohydrate and decrease training to help load the muscles with glycogen. (Aim for about 10 grams carbohydrate per kg.)

This can help increase endurance by about 20%. 3 days of high carbohydrate intake is optimal!



THE DAY BEFORE

High carbohydrate foods.

- Drink a healthy beverage with each meal and snack. Don't over drink.
 - Avoid beans, broccoli, cabbage, radishes, and other gas causing foods.
 - Avoid high fiber foods, such as raw fruits and vegetables with thick skins, bran cereals, nuts and seeds.
 - Avoid sugar alcohols. These may cause diarrhea.
 - Limit/avoid alcohol.
 - Plan ahead, what you will eat and your refuel options.
 - Try and eat and drink before bedtime.
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WHEN TO FUEL AND REFUEL

- Eat Breakfast, it will top off your glycogen stores (brain fuel) that may have depleted overnight.
 - Fuel throughout exercise with carbohydrate to prevent depletion of glycogen stores.
 - Begin fueling within 30 minutes after starting the event/activity, if the event is longer than 90 minutes.
 - General rule: Consume 30-60 grams CHO every hour that you exercise.
 - The body will need at least 200-300 calories per hour.
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FLUIDS

Dehydration will stop you in your tracks. It is more important than FUEL!

On a warm day the average person will have a sweat loss of about 2-4 pounds of water per hour.

- If water content in the body drops → blood volume drops → heart will pump less blood with every beat → less blood is delivered to exercising muscles → lactic acid builds up.
- Risks of dehydration during exercise: increase core body temp., less heat is being carried to the skin where it can evaporate as sweat, your body tries to work harder, heart rate increases, all of these things can lead to heat exhaustion, heat stroke and death!!

WHAT TO DRINK!

Rule of thumb....

- Drink every 15-20 minutes from the start of your workout.
 - Do not rely on thirst!
 - Water is acceptable for workouts/events lasting 30-60 minutes.
 - If the pace increases for longer than 60-90 minutes, use a sports drink.
 - Use a sports drink with 6-8% of carbohydrate (helps replenish glycogen stores) and electrolytes (helps absorb and retain water, helps maintain proper blood sodium levels, and stimulates thirst).
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HOW MUCH FLUID?

Drink 2-8oz at a time. But try and drink in gulps ... one gulp is about 1oz.

- For young athletes → 2 gulps is 1oz.
- Sweat rates vary per person. It is best to weigh yourself before and after an event to know how much fluid you lose during events.
- Also monitor urine, are you urinating after an event? What color is the urine?

HOURLY SWEAT RATE:

1. Body weight pre and post exercise is taken (nude)
2. Every pound lost equals 16oz fluid, every Kg. lost is about 1 liter of fluid
3. The formula is assuming there is no urine output.

Example:

Pre exercise weight: 70kg

Post exercise weight: 68.5kg

Volume of fluid consumed during event: 1 liter (1kg.)

Exercise: 2 hours

Fluid deficit in the body: $70\text{kg} - 68.5\text{kg} = 1.5\text{kg}$ or 1.5 liters

Total sweat loss: $1.5 + 1$ liter (consumed during exercise) = 2.5 liters

Sweat rate (liters/hour) = $2.5 / 2$ hours = 1.25 liters/hr (DRINK to match sweat loss = .31 liters (310ml) every 15 minutes)

RE-HYDRATE

Drink at least 2.5 cups fluid for every pound lost during exercise.

- Choose water and fluids you enjoy.
- Carbohydrate rich beverages are a great way to replenish fluids and carbohydrates, immediately after events/activities.



SODIUM

Over drinking water is very common. It can lead to hyponatremia.

- Extra fluid without the right balance of electrolytes can cause fluid build up in the brain which may lead to changes in mental status, loss of coordination, seizures and coma.
- Gaining weight during exercise can be a sign of drinking too much water.
- 1 liter of fluid loss means the average athlete loses about 800-1,300mg sodium per hour.
- Assume about 1,000mg of sodium per 1 liter of sweat loss. One liter = 4 cups → every pound loss during exercise due to body-water loss is equivalent to about .5 liters or two cups.

REFUELING

Refuel with carbohydrates within 15 minutes of finishing the event/activity.

- The longer you wait to refuel the less glycogen you store and the longer it takes to recover.

- Aim for .5 to .75 grams carbohydrate per pound (1.1 to 1.65 gm/kg)

150 pound athlete would need about 75-112 grams carbohydrate

- 50 grams carbohydrate is a good rule to follow AS SOON AS POSSIBLE

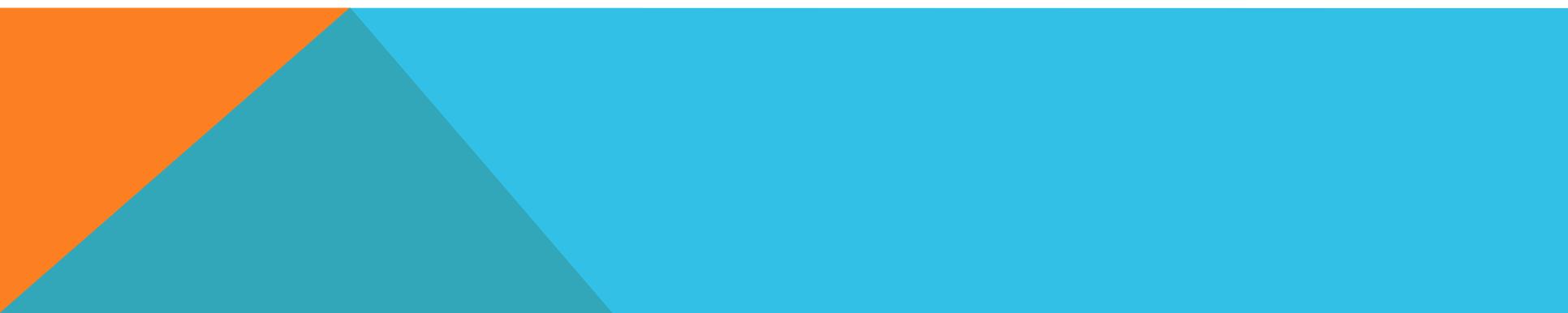
- Follow up with a balanced (carbohydrate, protein and fat) meal within 2 hours.

- Moderate to high glycemic index foods (ripe banana, mango, orange juice, sports drink, cornflakes, white rice, oatmeal, white or wheat bread and smoothies)

- Aim for foods with 10-20 grams protein after the event



IN CLOSING

- All athletes have individual needs, base recommendations on the athlete.
 - Weather plays a large role in fueling.
 - Keep it real. Realistic recommendations should be used for each athlete.
 - Food is the best way to fuel, however, in some cases beverages, powders and gel/ supplements may be used.
 - No ONE athlete is the same. The athlete needs to listen to their body.
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Questions?

THANK YOU!

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