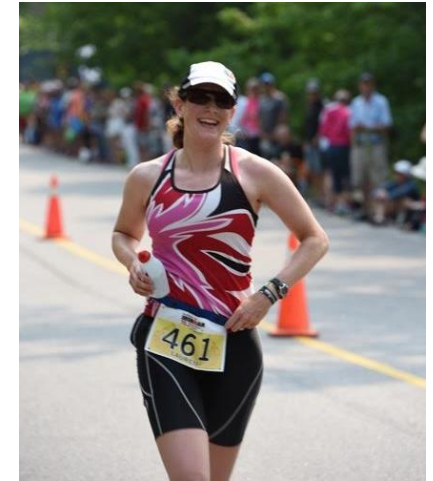


Food for Fuel

Nutrition for Triathletes



Lauren Tucker, Registered Dietitian
IOC Sports Nutrition Diploma



POTENTIAL TO DISCOVER



Dietitians of Canada
Les diététistes du Canada

#NutritionMonth



Outline

- 1) What is a healthy diet?
- 2) Nutrition during training
 - Energy Availability
 - Carbs, protein, fats
 - Vitamins & Minerals
- 3) Nutrition during competition
 - Carb loading
 - Pre-race meal
 - During the race
- 4) Hydration
- 5) GI issues
- 6) Meal Planning Tips
- 7) Useful Resources

What is a healthy diet?



What is a healthy diet?

Recommended Number of Food Guide Servings per Day

Age in Years	Children			Teens		Adults			
	2-3	4-8	9-13	14-18		19-50		51+	
	Sex			Girls and Boys	Females	Males	Females	Males	Females
Vegetables and Fruit	4	5	6	7	8	7-8	8-10	7	7
Grain Products	3	4	6	6	7	6-7	8	6	7
Milk and Alternatives	2	2	3-4	3-4	3-4	2	2	3	3
Meat and Alternatives	1	1	1-2	2	3	2	3	2	3

The chart above shows how many Food Guide Servings you need from each of the four food groups every day.

Having the amount and type of food recommended and following the tips in *Canada's Food Guide* will help:

- Meet your needs for vitamins, minerals and other nutrients.
- Reduce your risk of obesity, type 2 diabetes, heart disease, certain types of cancer and osteoporosis.
- Contribute to your overall health and vitality.

What is One Food Guide Serving?

Look at the examples below.



Fresh, frozen or canned vegetables
125 mL (½ cup)



Leafy vegetables
Cooked: 125 mL (½ cup)
Raw: 250 mL (1 cup)



Fresh, frozen or canned fruits
1 fruit or 125 mL (½ cup)



100% Juice
125 mL (½ cup)



Bread
1 slice (35 g)



Bagel
½ bagel (45 g)



Flat breads
½ pita or ½ tortilla (35 g)



Cooked rice, bulgur or quinoa
125 mL (½ cup)



Cereal
Cold: 30 g
Hot: 175 mL (¾ cup)



Cooked pasta or couscous
125 mL (½ cup)



Milk or powdered milk (reconstituted)
250 mL (1 cup)



Canned milk (evaporated)
125 mL (½ cup)



Fortified soy beverage
250 mL (1 cup)



Yogurt
175 g (¾ cup)



Kefir
175 g (¾ cup)



Cheese
50 g (1½ oz.)



Cooked fish, shellfish, poultry, lean meat
75 g (2½ oz.)/125 mL (½ cup)



Cooked legumes
175 mL (¾ cup)



Tofu
50 g or 175 mL (¾ cup)



Eggs
2 eggs



Peanut or nut butters
30 mL (2 Tbsp)



Shelled nuts and seeds
60 mL (¼ cup)

Oils and Fats

- Include a small amount - 30 to 45 mL (2 to 3 Tbsp) - of unsaturated fat each day. This includes oil used for cooking, salad dressings, margarine and mayonnaise.
- Use vegetable oils such as canola, olive and soybean.
- Choose soft margarines that are low in saturated and trans fats.
- Limit butter, hard margarine, lard and shortening.



Food Trends

FOOD PYRAMIDS



CLASSIC 1970S



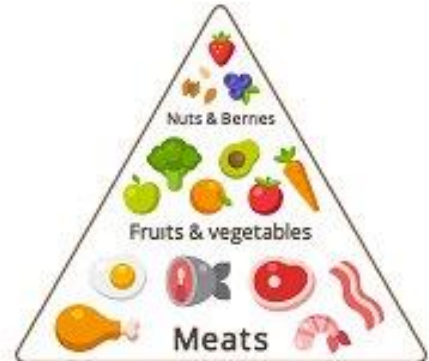
CONTEMPORARY



"MY PLATE"



KETO



PALEO

LCHF diets and performance in elite athletes

December 26, 2016 | Asker Jeukendrup

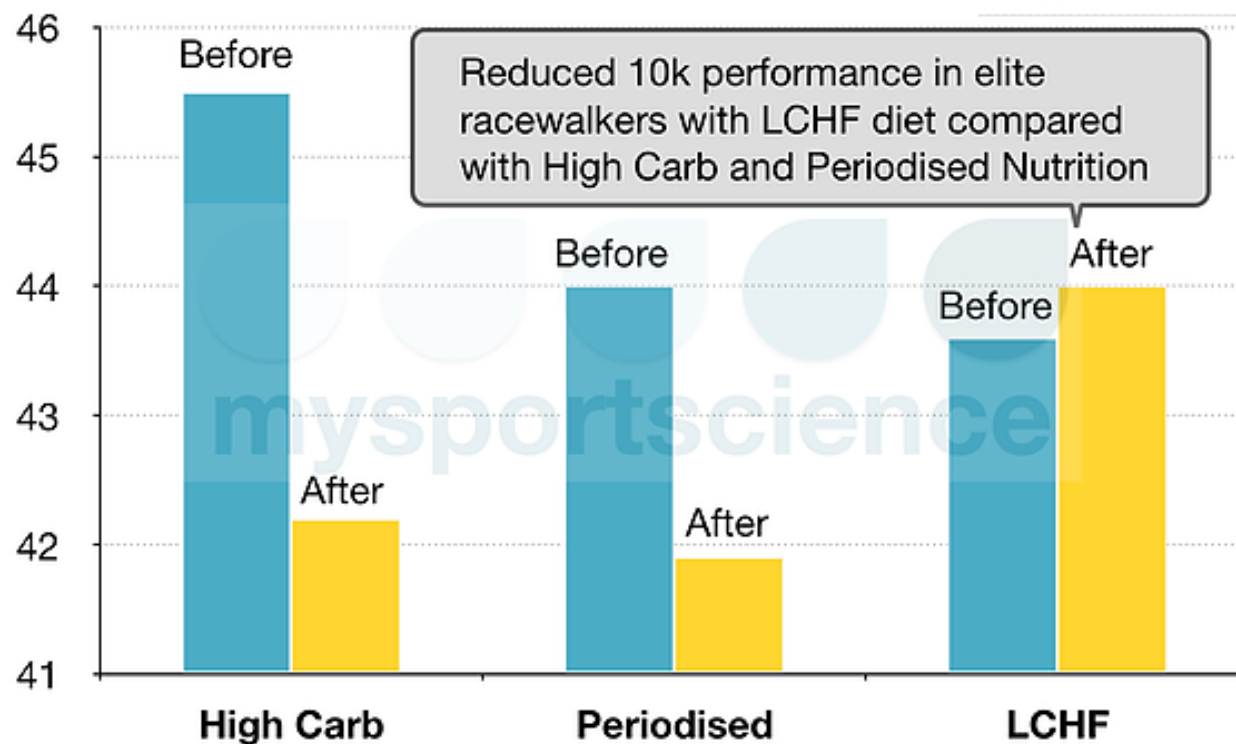
HCLF diet compared with High Carb and Periodised Nutrition



@jeukendrup

www.mysportscience.com

Time (min)



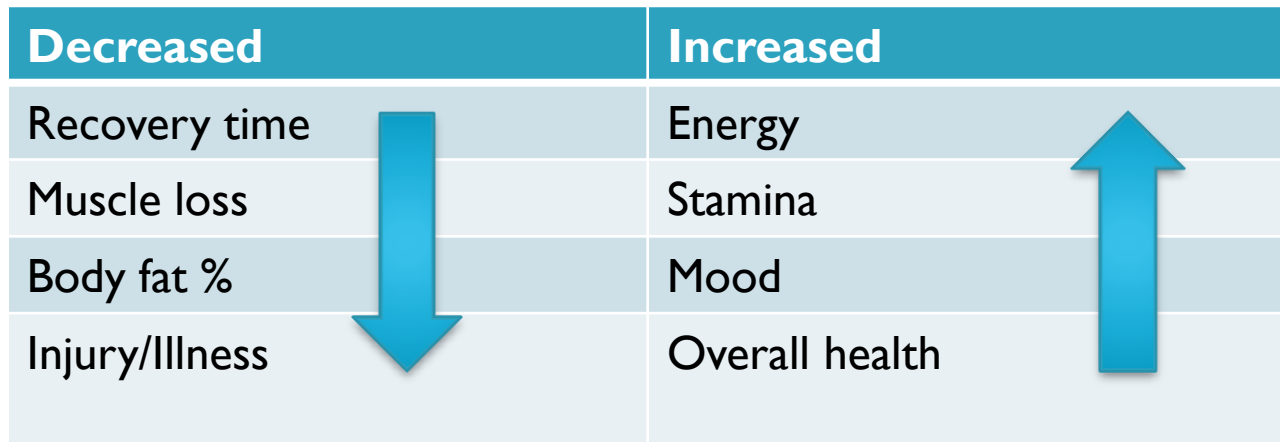
Reduced 10k performance in elite racewalkers with LCHF diet compared with High Carb and Periodised Nutrition

Burke et al J Physiol in press 2017

Nutrition is the 4th component in Triathlon

Benefits of Daily Good Nutrition:

Decreased	Increased
Recovery time	Energy
Muscle loss	Stamina
Body fat %	Mood
Injury/Illness	Overall health



Nutrition Guidelines for Training

Nutrient	Recommendations
Energy intake	45 kcal/kg LBM + energy expenditure
Carbohydrates	
Training level:	
Light (skill based)	3-5 g/kg/day
Moderate (1 hour)	5-7 g/kg/day
High (1-3 hours of moderate to high intensity)	6-10 g/kg/day
Very High (4-5 hours of moderate to high intensity)	8-12 g/kg/day
Protein	1.2-2.0 g/kg/day
Fat	20-35% of energy intake
Iron	10-31 mg/day (females) 10-14 mg/day (males)
Calcium	1000-1200 mg/day
Vitamin D	600 IU/day



Energy Availability

- Many studies that look at triathletes food intake have found that they are not meeting their energy needs.
- Over time this can impact performance, metabolism, menstrual cycles, bone health, mood, and cause nutrient deficiencies, fatigue, inflammation and increase risk for infections and injury.

Energy Availability (45 kcal/kg LBM + energy output)

Example of low Energy Availability:

80 kg athlete with 10% body fat (or 8 kg)

Lean body mass = 72 kg

Training program = 1000 kcal/day

Energy intake = 3000 kcal

Energy availability = $3000 \text{ kcal} - 1000 \text{ kcal} / 72$

= 28 kcal/kg LBM

Example of adequate Energy Availability:

80 kg athlete with 10% body fat (or 8 kg)

Lean body mass = 72 kg

Training program = 1000 kcal/day

Energy intake = 4200 kcal

Energy availability = $4200 \text{ kcal} - 1000 \text{ kcal} / 72$

= 44 kcal/kg LBM

Energy Expenditure During Exercise – Ratio of Nutrients

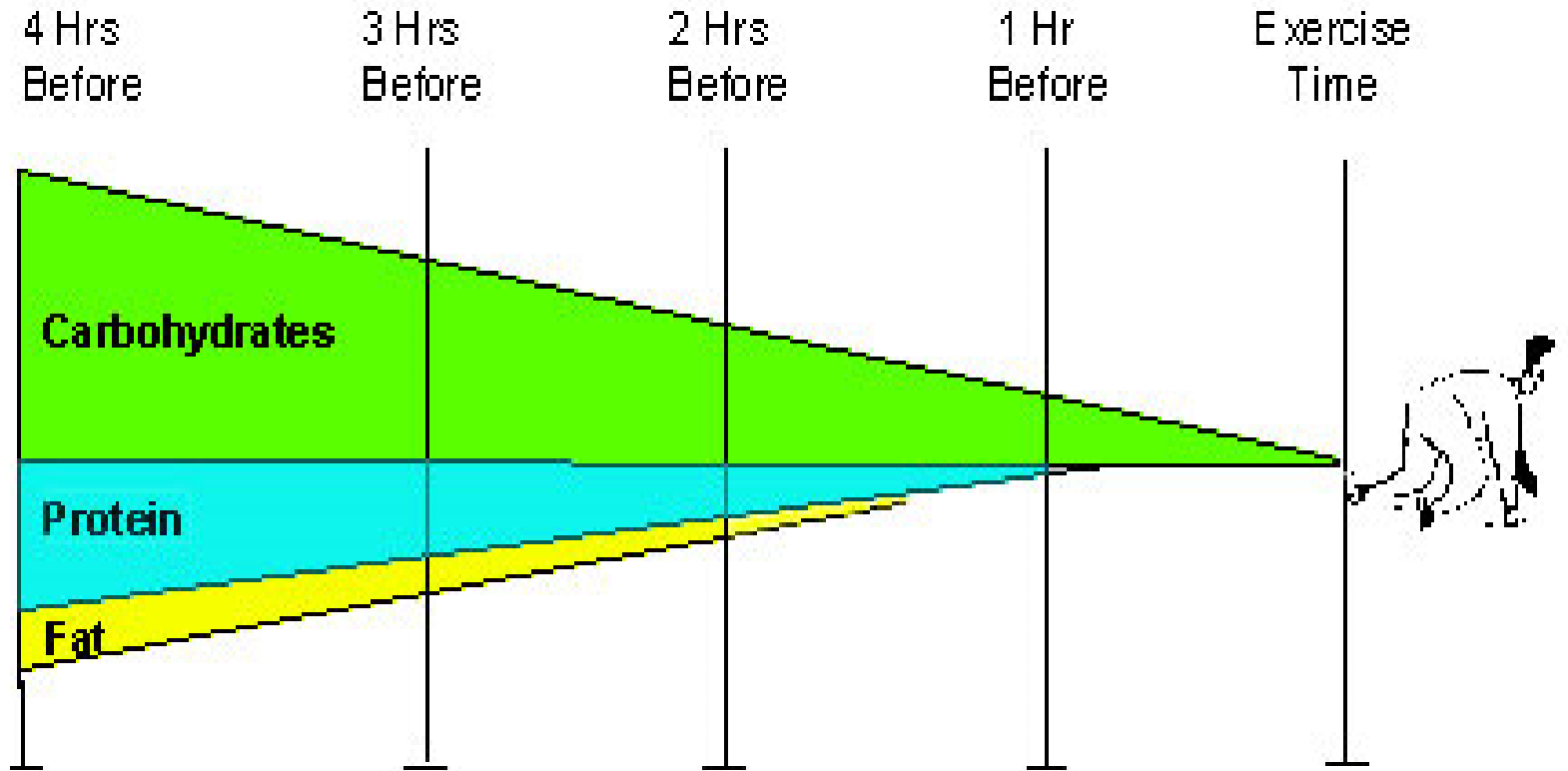
Rest	Light–Moderate Exercise	High–Intensity Sprint Type	High–Intensity Endurance
Protein 2–5%	Protein 2–5%	Protein 2%	Protein 5–8%
Glucose/Glycogen 35%	Glucose/Glycogen 40%	Glucose/Glycogen 95%	Glucose/Glycogen 70%
Fat 60%	Fat 55%	Fat 3%	Fat 15%

Carbohydrates

- Periodize your intake of energy and carbs
 - More during training days vs. rest days
 - More during building phase
- Have a snack with carbs before, during and after workouts

Tip: Have extra snacks available during high intensity training weeks i.e. smoothies, juices, dried fruit and nuts.

Eating Before Exercise

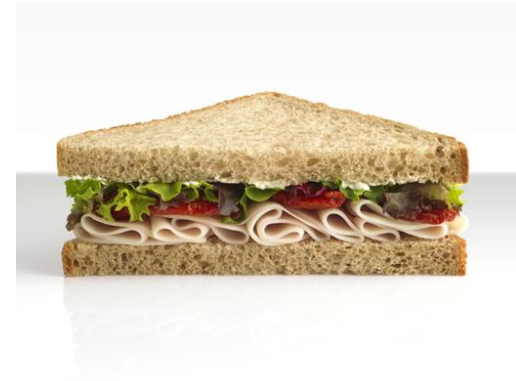


Your pre-meal 3-4 hours before exercise can include carbohydrate with some protein and fat. As you near the time of exercise the size of the meal/snack should decrease and the selection should be primarily carbohydrates with minimal fat and protein.

From "Nutrition for the Long Run" by Heidi Smith, RD

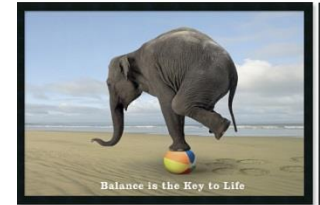
Eating Before Exercise

- Aim to eat a small meal or snack 2-3 hours before your workout
 - Goal: to provide a short-term energy boost
- Choose foods with carbohydrates and moderate fibre & protein
- Avoid high sugar, high fibre and high fat
- Stay hydrated



Balanced meals & snacks

- Including a source of protein or fibre with your carb filled snack can help keep you feeling full until your next meal or workout



Carbohydrate	Protein
Whole grain bread	Nut butter
Dried fruit	Nuts/seeds (almonds, soy nuts, pumpkin seeds)
Fruit	Cheese/cottage cheese
Cereal	Yogurt/milk
Veggies	Hummus/ bean dip
Crackers	Tuna/salmon

Eating During Exercise

- Less than 90 min
 - Water
- Longer than 90 min
 - 30-60 g of carbs/hour
- Examples:
 - Sports drink 500 ml, Homemade sports drink (500 ml of water, 5 tsp sugar 1/8 tsp of salt), Juice (with ~25-30 g carb/500 ml)
- Drink to thirst
 - ~400-1000 ml/hr



Examples

50-60 g of carbs:

- Sports drink (6% CHO)- 1L
- Sports gel x 2
- Energy bar (bought/homemade)
- Banana x 2
- Jelly beans/candy (60 g)
- Chocolate bar (80 g)
- Bread with honey or jam
- Pretzels- 35
- Dates- 10

Eating After Exercise

Snack Ideas

2 cups chocolate milk (or soymilk)
(55 g carb, 17 g protein)

2 cups chocolate recovery shake (water, $\frac{3}{4}$ c skim milk powder, 2 tbsp chocolate powder)
(50 g carb, 18 g protein)

1 cup milk (or soymilk), 1 $\frac{1}{4}$ cup cereal
(46 g carbs, 12 g protein)

Banana + yogurt (175 mL) (59 g, 8 g protein)

1 cup of Trail Mix (dried fruit, nuts, cereal)
(80 g carbs, 20 g protein)

Peanut butter and jam sandwich (63 g carbs, 17 g protein)

Protein (1.2-2.0 g/kg/day)

Food	Serving Size	Protein (g)
Meat, poultry, fish, or shellfish	75 g (2 ½ oz)	21
Protein powder, skim milk powder	1 scoop	9-30
Greek Yogurt, Cottage Cheese	125 g (1/2 cup)	15
Tofu, soybeans	150 g / 175 mL (¾ cup)	12
Eggs	2 large	12
Beans, peas or lentils, cooked	175 mL (¾ cup)	12
Cheese	50 g (1 ½ oz)	12
Milk (Cow or Soy)	250 mL (1 cup)	7-9
Yogurt	175 g (3/4 cup)	7
Nuts and seeds (varies by type)	60 mL (1/4 cup)	4-8
Nut butter	30 mL (2 tbsp)	4-8
Bread	1 slice (30 g)	4
Quinoa, Cereal, Oats	125 mL (1/2 cup)	4
Pasta, Rice	125 mL (1/2 cup)	3
Vegetables	125 ml (1/2 cup)	2
Fruit	125 ml (1/2 cup)	1

Fats

Monounsaturated

- Nuts
- Olive oil
- Canola oil
- Peanut oil
- Fish
- Avocado
- Non-hydrogenated margarine

Polyunsaturated

- OMEGA 3
- Flax
- Chia seeds
- Walnut
- Pecans
- Fish
- OMEGA 6
- Oils & Seeds (safflower, sunflower, sesame)
- Cottonseed/ corn/soybean oil
- Non-hydrogenated margarines

Saturated

- Butter
- Ice cream
- Whole Milk, Cream
- Lard
- Coconut oil (MCT)
- Cheese
- Pork, beef, chicken
- Palm oil
- Chocolate

Trans Fat

- Hydrogenated vegetable oils
- Partially Hydrogenated vegetable oils
- Shortening
- Cookies
- Pastries
- Frozen Desserts
- Crackers

Iron

	Females	Females (post menopause) or Males
Recommended Daily Allowance	18 mg/day	8 mg/day
Endurance athletes (1.3-1.7x more)	23-31 mg/day	10-14 mg/day
Vegetarian endurance athletes (+1.8x more)	41-56 mg/day	18-25 mg/day

Good Sources: Liver, meat, fish, seafood, tofu, eggs, legumes (dried beans, peas and lentils), cooked dark green leafy vegetables like spinach and kale, squash and pumpkin seeds, dried fruit, soy, and whole grain or fortified cereals, breads and pastas.

Calcium & Vitamin D

- Calcium 1000 mg/day
- Vitamin D 600 IU/day
- Important for bone health
- May need to find substitutes if lactose intolerant, vegan or avoiding dairy
- Good sources of Calcium: Milk, soy milk, cheese, yogurt, calcium fortified beverages, sardines, tofu, soybeans, navy beans, okra, bok choy, almonds
- Good sources of Vitamin D: Sunlight (at least during the summer months in Canada)
 - Salmon, trout, herring, sardines, tuna, milk, soymilk, vitamin D fortified beverages, egg yolk, pork, shiitake mushrooms.

Nutrition During Competition

Before Race Day:

- Carb load + Taper (at least for A races)
- Remember to **hydrate**
- May want to avoid high fat or high fibre meal the night before
- Add carbs and hydrate by adding smoothies, juice, or a sports drink

Carbohydrate Loading	Recommendations
If event is <90 min	7-12 g/kg/day for 24 hours prior to race
If event is > 90 min	10-12 g/kg/day for 36-48 hours prior to race

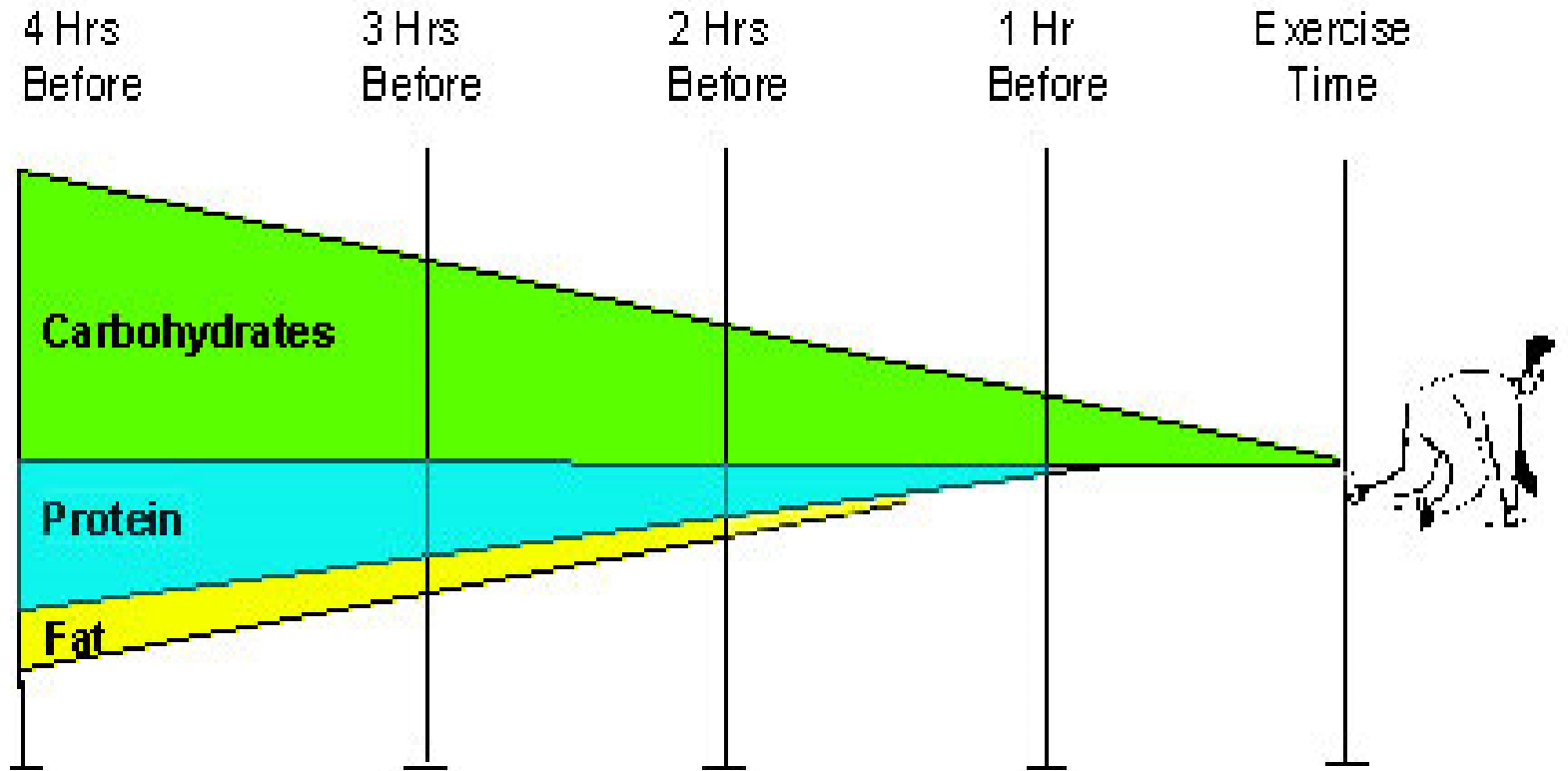
Nutrition During Competition

Race Day:

- Don't try anything new
- Pre-race meal: Fluids, carbs, some protein and fat if you have a few hours before the race
- Top up 30-60 min before race: banana, sports drink, gel etc.

Pre-race Meal (1-4 hours before)	Recommendations
Carbohydrate (if event is > 60 min)	1-4 g/kg
Fluid	Drink ad libitum about (5-7 ml/kg/hr)

Eating Before Exercise



Your pre-meal 3-4 hours before exercise can include carbohydrate with some protein and fat. As you near the time of exercise the size of the meal/snack should decrease and the selection should be primarily carbohydrates with minimal fat and protein.

From "Nutrition for the Long Run" by Heidi Smith, RD

Nutrition During Competition

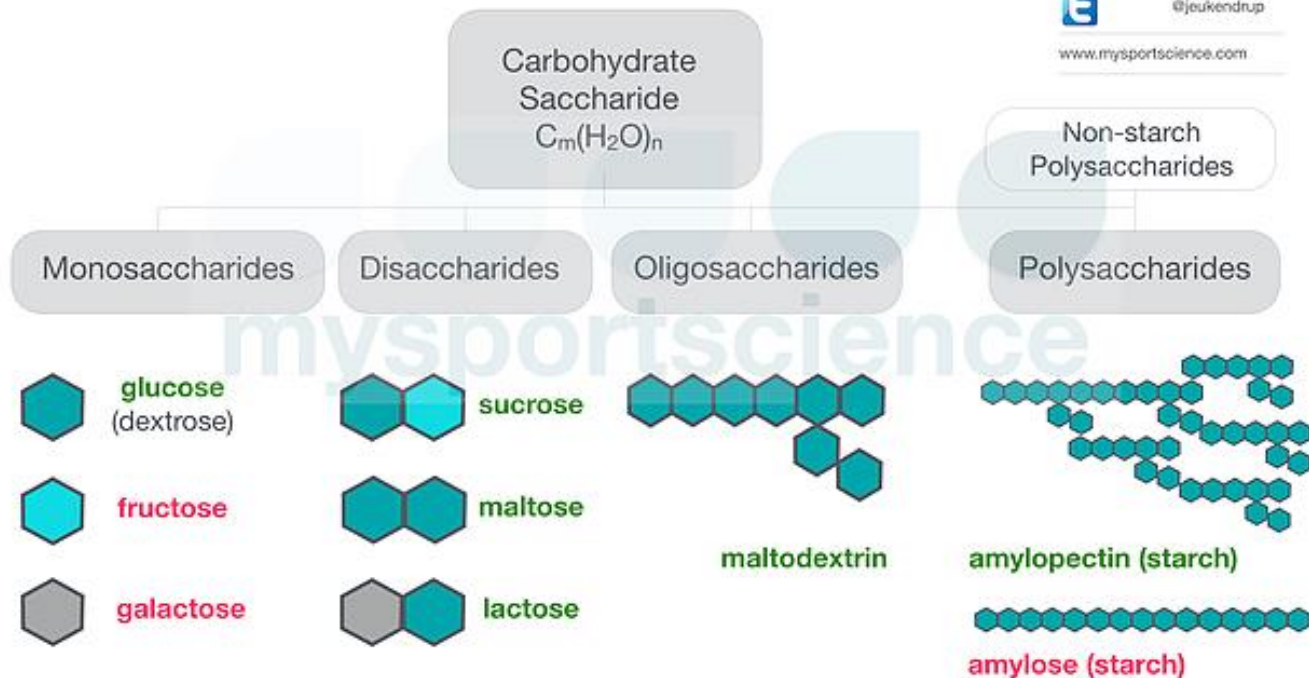
Carbohydrate during competition	Recommendation	Example
Sprint	mouth rinse/small amount of carb	Sport drink or gel rinse for 5-10 seconds
Olympic	30-60 g/hr	500ml sport drink (30 g) Gel (30 g)
Half Ironman Ironman	Up to 90 g/hr (More than one type of carb i.e. Maltodextrin/glucose and fructose)	500ml sport drink (30 g) 2x Gels (60 g) or 1 L sport drink (60 g) Gel (30 g)

Not all carbs are equal

May 10, 2015 | Asker Jeukendrup

Not all carbs are equal

When ingested during exercise some carbohydrates are used **fast (in green)** and some **slow (in red)**

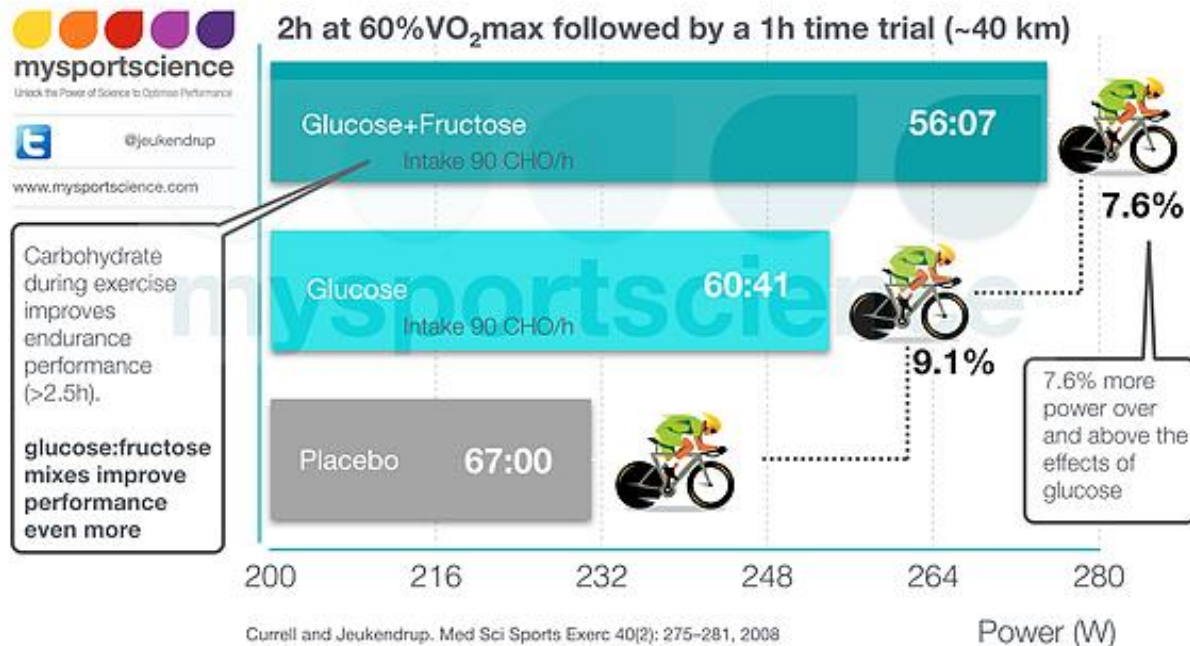


Jeukendrup A. A step towards personalized sports nutrition: carbohydrate intake during exercise. Sports Med. 2014 May;44 Suppl 1:S25-33.
Jeukendrup AE. Nutrition for endurance sports: marathon, triathlon, and road cycling. J Sports Sci. 2011;29 Suppl 1:S91-9

Carb mixes and benefits

May 14, 2015 | Asker Jeukendrup

Better performance with carb blends



In a previous blog [Not all carbs are equal](#) we saw that some carbohydrates are used more rapidly than others, but no carbohydrates are used at rates higher than 60 g/h. Why is this? Why can you not use more than 60 g/h? The answer lies in your capacity to absorb carbohydrate. How much ingested carbohydrate your muscles can use appears limited by how much your intestine can absorb.

<http://www.mysportscience.com/single-post/2015/05/14/Carb-mixes-and-benefits>



Nutrition During Competition

- **Tips During Races (Sprint/Olympic)**
 - Have sports drink and water available
 - Have your fluids earlier on the bike ride, as this is associated with faster run times
 - Carry a gel or gummies on your bike and run to save time at aid stations
 - Practice your race day nutrition plan in training

Nutrition During Competition

- Tips During Races (Half/Full Ironman)
 - 73% of energy is consumed during the bike
 - Having fluid and food earlier on the bike ride resulted in faster run times
 - Combine fluids and solids on bike
 - Stick with fluids and gels on the run
 - Practice your race day nutrition plan in training

(Kimber, 2002- Ironman)



Hydration

Many factors to consider:

- How many aid stations are there?
- How much will you take on the bike?
- Will you carry anything with you on the run?
- Products available on course?
- What will the range of temperatures be?
- Are you a salty sweater?



Hydration

- How much water to drink?
 - Determine your % weight loss during intense workouts by weighing yourself before and after
 - Aim for 2-3% weight loss
 - Keep track of how much you drank
 - Rehydrate with 1.25-1.5 L per kg lost
 - Ex. 60 kg athlete, loses 1.5 kg during 90 min run and drank 600 ml of fluids.
 - 2.5 % weight loss
 - Drank enough during workout & needs ~2.25 L of water after to rehydrate (1.5 L/1 kg body weight lost)

Hydration

- Start your training and race well hydrated
- Check the colour of your urine (it will normally be darker yellow first thing in the morning)
- Aim for 1-3 in the colour chart before a race or during the day

1	HYDRATED
2	HYDRATED
3	HYDRATED
4	DEHYDRATED
5	DEHYDRATED
6	DEHYDRATED
7	SEVERELY DEHYDRATED
8	SEVERELY DEHYDRATED

Make a race day nutrition plan

- Don't try anything new on race day
- Steps:
 - 1) Calculate your nutrition goals (Fluid and carbs)
 - 2) Choose the foods or products you like
 - 3) Pack your foods and fluids for the race





GI Issues

- Consider your meal the day before, was it high in fibre, fat or gas producing foods?
- Was your pre-race meal high in energy, fibre, carbs, or caffeine?
- Did you try something new?
- What carbs did you have during the race?
- What were the race day conditions like?
- Could you be swallowing water on the swim or air while you drink?



Meal Planning Tips

- How many dinners for the week?
- Use Flipp, Cookspiration and recipe books for meal ideas
- Make a grocery list
- Cook a big batch of dinner a few times a week, leftovers for lunch and freeze an extra meal or two
- Keep pantry/fridge well stocked

Grocery List Tips

Fruit & Vegetables

- Leafy green vegetables: bok choy, kale, swiss chard, collard greens, cabbage, spinach
- Orange vegetables: Carrots, Squash, Sweet potato
- Other vegetables: peppers, broccoli, cauliflower, zucchini
- Fruits: bananas, oranges, apples, pears
- Frozen: chopped spinach, peas, mixed vegetables, berries, mango, edamame

Meat and alternatives

- Tofu, eggs, nuts & seeds, legumes
- Unprocessed Chicken, Turkey, Lamb, Beef or Pork
- Fish & Seafood Fresh, frozen or canned
- Nut butters without added sugar, salt or oil

Grains

- Whole grain breads, pitas, muffins,
- Pasta, brown rice, barley, wheat berries, oatmeal, quinoa
- Cereals 4 g of fibre and least amount of sugar
-

Milk and alternatives

- Milk or Milk alternative
- Yogurt look for less sugar
- Cheese, cottage cheese, paneer
-

Fuel Packs

- More than your typical lunch...

This is your **ENERGY** for the day



- Pack balanced snacks along with your lunch (Carbs & protein)
- Pack at least 2 veggies & 2 fruits
- Prepare your fuel pack the night before
- Pre-wash and cut veggies so they are easy to grab
- Include an ice pack/frozen juice box to keep perishables cool or store in fridge

Summary

- During intense training aim to eat often (Balance: Carbs + protein), and drink lots to keep your fuel tank full
- Eat after exercise for recovery
- Choose high quality foods, and pack them ahead of time
- Make a race day nutrition plan and practice it ahead of time



Useful Resources

- Apps & Podcasts



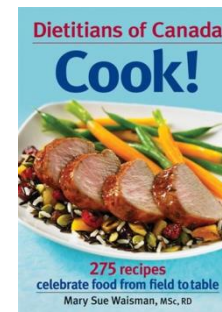
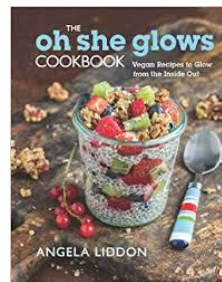
- Websites

<http://www.mysportscience.com/>

<https://www.sportsdietitians.com.au/>

<http://www.eatrightontario.ca/en/>

- Cookbooks





Contact Info

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Reference for Nutrition Guidelines:

This Academy of Nutrition and Dietetics, Dietitians of Canada (DC), and American College of Sports Medicine (ACSM) position statement on **Nutrition and Athletic Performance** *Medicine & Science in Sports & Exercise*. 48(3):543-568, March 2016.

https://journals.lww.com/acsmmsse/fulltext/2016/03000/Nutrition_and_Athletic_Performance.25.aspx