



# The Carb Controversy: How to best fuel our running

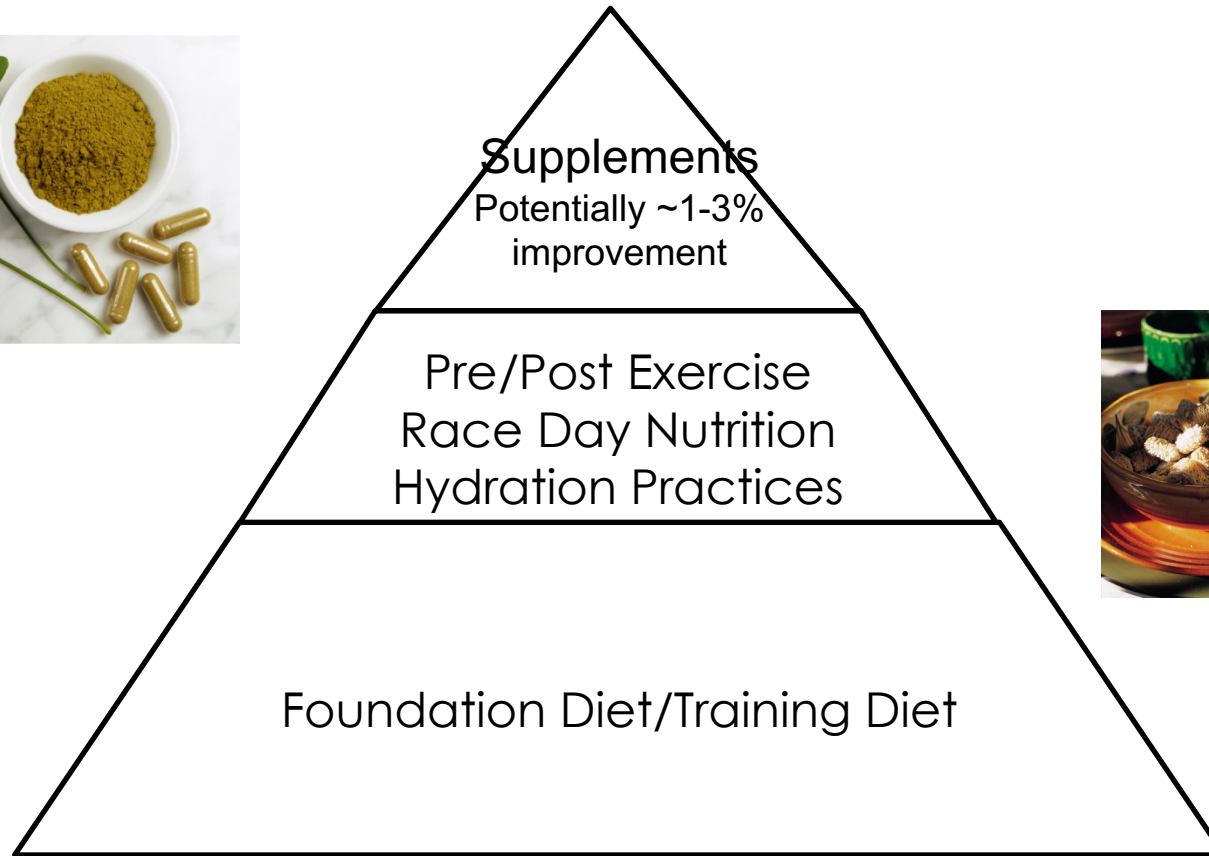
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# Outline

- Intro to nutrition for running
- Role of Carbs, Protein, Fats
- Current guidelines for carb intake and practical application
  - Types of carbs: fibre, added sugars
  - Guidelines for runners
- Strategies to manipulate carb intake to enhance training effect
  - Low carb/high fat & ketogenic diets for athletes
- Intro to Carb loading and Race Day Nutrition
- Summary & Conclusion

# Building Blocks to Optimize Nutrition for Sport



# Factors Affecting Diet & Food Choices



- Competition/Race schedule
- Training schedule
- Body composition goals
- General healthy eating
- Habits
- Appetite
- Metabolism
- Digestive health/symptoms



# Function & Role of Carbohydrates

- Provide fuel for brain, CNS and energy for muscles through oxidative and anaerobic pathways
- Better energy efficiency with adequate CHO – yields greater ATP per volume of oxygen
- Exercise/performance is enhanced when carbohydrate availability matches exercise
- When carbohydrate depletion occurs → fatigue, decreased performance, concentration, increased perception of effort
- Glycogen plays important role in muscle adaptation during training
- Aids in recovery of muscle, and improved immune function/stress markers after exercise

# Role of Carbohydrate Taken During Exercise

- Only required in exercise lasting longer than 60-90 minutes or higher intensity exercise lasting 45-75 minutes
- Glycogen sparing effect
- Used as a muscle fuel substrate
- Prevents hypoglycemia
- Activates the reward center in the CNS → perception of effort, fatigue



# Protein & Fats

- Protein:
  - Muscle adaptation
  - Recovery and rebuilding after exercise
  - Small amount used as fuel substrate
  - Protein needs are higher in athletes than in general population
  - Athletes often get enough protein in the diet, but protein timing/distribution is often inadequate
  
- Fat:
  - Aids in the absorption of fat soluble vitamins
  - Plays a structural role in cell membranes
  - Used as fuel substrate
  - Healthy fats should be included with most meals/snacks

# Carbohydrate Guidelines

	<b>Exercise Amount/Intensity</b>	<b>Recommended CHO Intake</b>
Light Exercise	Low intensity/skill-based	3-5 g/kg body weight
Moderate Exercise	Moderate intensity (~1 hr/day)	5-7 g/kg body weight
High Exercise	~1-3 hours per day of moderate to high intensity	6-10 g/kg body weight
Very high	>4-5 hrs per day of moderate to high intensity	8-12 g/kg body weight

# Carbohydrate Intake - Example

- **60 kg runner**, training on average ~1 hour per day requires 5-7 grams carb/kg body weight = **300-420 grams carbs per day**

## Carb Amounts in Food:

- 1 cup cooked pasta – 30 grams carbs
- 1 slice bread – 15-20 grams carbs
- 1 bagel – 45-60 grams carbs
- 1 cup rice – 45 grams carbs
- 1 medium apple – 20 grams carbs
- 1 large banana – 30 grams carbs
- $\frac{3}{4}$  cup flavoured yogurt – 15 grams carbs
- 1 cup white milk – 15 grams carbs
- $\frac{1}{2}$  medium-sized potato – 15 grams carbs



# Sample Day Containing ~300 grams Carbohydrate



Meal/Snack	Food	Carb Amount
Breakfast	Overnight oats: 1/3 cup rolled oats, 2 Tbsp chia seeds, 1 cup milk, 1 banana, 1 Tbsp maple syrup, 1/4 cup nuts/seeds	70 g
AM Snack	1 med apple + 1/4 cup almonds + 1/4 cup dried fruit	50 g
Lunch	Salad w/ 1 small roasted sweet potato, veg, olive oil & vinegar, 1/2 cup berries, 3/4 cup chickpeas	60 g
PM Snack (pre run) – 1-2 hrs prior	3/4 cup plain greek yogurt with 1 cup berries and 1 Tbsp maple syrup	30 g
Post-Run	1 Lara bar + 1/4 cup nuts	25 g
Dinner	4 ounces baked chicken, 1.5 medium potatoes, 2 cup vegetables	60 g

**Total Daily Carbohydrate Intake: 295 grams**



# Balancing Carbs with Protein & Fats

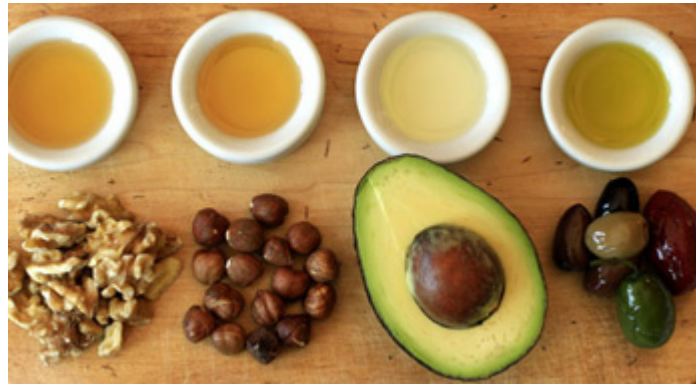
- **Note: Most meals should contain ~20-40 grams of protein, and snacks should contain ~10 grams protein \*\*dependent on body size, type of training, training goals**
- ½ cup cottage cheese – 15 grams protein
- ¾ cup plain greek yogurt – 18 grams protein
- ¼ cup almonds – 8 grams protein
- 1 Tbsp peanut butter – 4 grams protein
- 1 cup milk – 8 grams protein
- Small chicken breast (size of deck of cards) – 21 grams protein
- 1 egg – 6 grams protein



# Example – Protein Needs

- **Breakfast** (24 grams):
  - 2 eggs (12 grams) + 2 slices toast + ½ cup greek yogurt (12 grams) + berries
- **Lunch** (29 grams):
  - Whole grain wrap with 3 ounces chicken (21 grams)/veggies + 1 cup skim milk (8 grams) + fruit
- **Dinner** (28 grams):
  - 4 ounces chicken (28 grams) + 1 baked sweet potato + steamed veggies + salad + 2 cups water
- **Snacks** (~10 grams):
  - ¼ cup almonds (8 grams) + piece of fruit
  - Smoothie with 1.5 cups milk (12 grams) + frozen berries
  - 1 hard boiled egg (6 grams) + 1 Babybel cheese (4 grams) + piece of fruit

# Include Healthy Fats at Each Meal



# Ways to Include Healthy Fats at Meals

- Have fatty fish (eg salmon, rainbow trout, mackerel) 2-3x (or more) per week
- Try drizzling olive oil on cooked vegetables, potatoes, or salad
- Try sliced avocado on a sandwich, or mash up ripe avocado for a dip with veggies
- Try a pesto sauce for your pasta
- Have a small handful of nuts or seeds as a snack
- Add wheat germ, chia seed, flaxseed or hemp hearts to your oatmeal



# Types of Carbohydrate - Fibre

- Most people should aim for 25-35 grams per day (no upper limit)
- Everyday diet choices should be higher in fibre
- High quality carbs are often higher in fibre (whole grains, vegs, fruits, legumes)
- Avoid too much fibre before running/exercise – may cause digestive discomfort, feeling of heaviness

Food	Fibre Content
1 slice whole wheat bread	2 grams
1 medium apple	3.5 grams
$\frac{3}{4}$ cup cooked lentils	6 grams
$\frac{3}{4}$ cup cooked beans	9-13 grams
$\frac{1}{2}$ cup broccoli	2 grams
8 baby carrots	2.5 grams
$\frac{1}{2}$ cup cooked quinoa	3 grams
$\frac{1}{4}$ cup almonds	4 grams

# Tips for Ensuring Adequate Dietary Fibre Intake

- Aim for 3 servings of fruit per day and 4-5 servings of vegetables (equal to about 2-4 cups)
- Aim to get ¼ cup nuts + 2 Tbsp seeds daily
- Aim to have legumes (beans, lentils, dried peas) 3-4x per week (great protein source in addition to fibre)
- Choose whole grains most of the time (eg oats, quinoa, barley, bulgur, whole grain pasta, brown or wild rice)
- Make sure to increase fibre intake slowly and drink lots of water
- Adjust fibre intake for exercise
- High fibre considered >4 grams per serving



# What about sugar?

- For general population: **eat less than 24 to 36 grams of added sugar each day** (6 to 9 teaspoons)
  - 1 tsp. of sugar = 4 g
  - 1 tbsp sugar= 12 g sugar
  - Low sugar considered <5-8 grams per serving
- Read labels and look at sugar content on processed foods such as:
  - Pop, energy drinks, juice, juice cocktails, added sugar in coffee/teas, sweetened hot beverages, sweets, sauces, baked goods



# Added Sugars

- Look for these words on ingredient lists - they all mean sugar!

- Corn syrup
- Cane sugar
- Dextrose, Dextrin
- Fructose
- Glucose
- High-fructose corn syrup
- Maltose, Maltodextrin, Malt syrup
- Sucrose



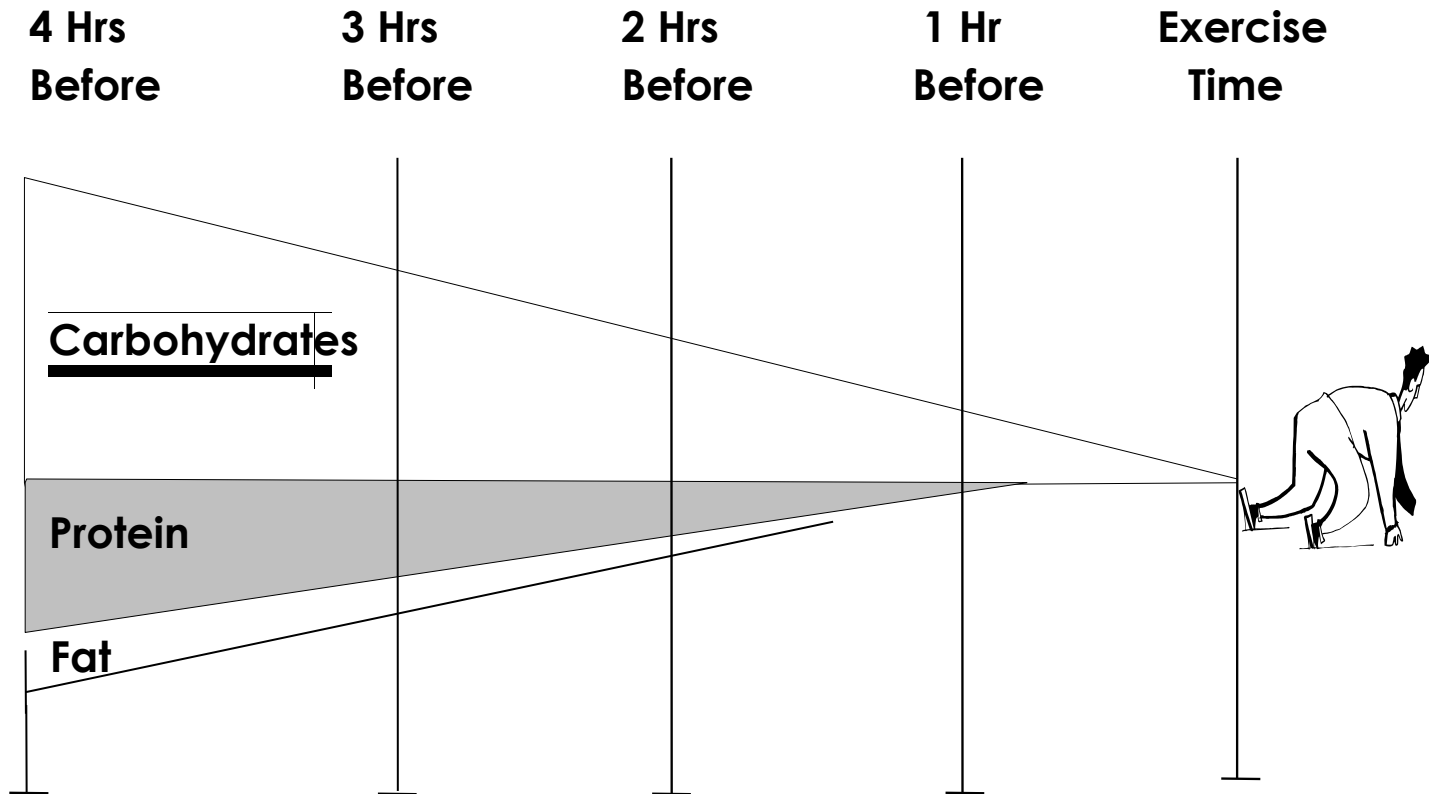
- And remember, too many “natural” sugars, like honey, maple syrup and molasses can have impacts on health too!
- \*\*Again, level of exercise and goals must be taken into account when considering how much/what type of sugars are appropriate

# How much sugar??

<b>Food</b>	<b>Amount</b>	<b>(g) of sugar</b>
Quaker instant flavoured oatmeal	1 packet	12g
Tim Horton's whole grain carrot muffin	1	29g
Coca Cola	1 can	39g
Vanilla Greek yogurt	175 grams (1 small container)	19g
Clif Bar	1	20g

# What to eat before a workout or race?

## Low fibre, low fat, high carb, avoid sugar



# Eating Before Race/Workout

## ■ Higher Carbohydrate

- Fruits, vegetables, crackers, low-sugar cereals, granola bars, bread, bagels, yogurt
- Need carbohydrate for main energy/fuel source during workouts and races

## ■ Low Fat

- Fat is slower to digest – will delay carbs from getting into muscles for energy
- Might cause stomachaches, feeling unwell, sluggish

## ■ Low Fibre

- High fibre foods should be avoided in the pre-run/workout meal or snack because it takes longer to digest – may cause digestive discomfort

## ■ Watch added sugars

- Can cause sugar “spike” and “crash” – shorter acting energy source (eg chocolate bars, candy, pop, high sugar cereals/bars/cookies etc)

# Fueling for Exercise:

Lower fibre, low fat, high carb avoid sugar

- Recommended: Snack 1-3 hours before (**1-4 grams carb/kg in the 4 hours before exercise**)

## **Carb Source (60 g carbs)**

1 cup pasta (30 g)  
1 cup rice (45 g)  
1/2 bagel (30 g) + 1 banana (15-20 g)  
2 slices bread (40 g) + piece of fruit (15 grams)

## **Protein Source**

1/2 cup meat sauce  
3-4 oz. chicken  
1-2 eggs  
2 Tbsp. PB

- Recommended: Snack 30-60 minutes before

## **Carb Source (10-20 g carbs)**

1/2 - 1 slice bread (10- 20g)  
1 banana (15-20 g)  
4-6 saltine crackers (15-20g)  
1 granola bar (20 g)

## **Protein Source**

Easy to digest proteins only: small amt peanut butter, yogurt, milk etc.



# Bars for Pre Workouts

## Examples of bars good for before exercise:

- Larabar (watch the fat content - the higher the fat content, may be more difficult to digest before exercise, also watch protein content- some flavours may have higher protein than others)
- Kind Bar (an additional piece of fruit will provide some extra carbs)
- Taste of Nature bar (may need an addition of fruit for extra carbs)
- PROBAR (Watch for fat content)
- Homemade energy bars or bites (like the ones we are sampling tonight! )

\*Note: always double check the nutrition label, as nutrients vary with different flavours and ingredients/recipes change

Higher carbohydrate (>25 g)

Lower fibre (<4g)

Lower fat (<4g)

Lower protein (<4g)

# Bars for Post Workout

## Examples of bars good for after exercise:

- Larabar ALT
- The Simply Bar (would need an additional piece of fruit for extra carbs )
- GORP bars
- Elevate Me bar
- SoLo bar
- Clif Bar
- Quest Bars
- Kirkland Signature Protein Bars

\*Note: always double check the nutrition label, as nutrients vary with different flavours and ingredients/recipes change

Higher carbohydrate (>25 g)

Can be higher in fibre (>4g)

Can be lower fat (<4g)

Higher protein (10-25g)

# Pre-Race/Run Nutrition

Situation	Description	Recommended Carb
General “fueling up”	Events lasting <90 minutes	7-12 g/kg body weight in the 24 hrs prior
Carb Loading	Prep for events lasting >90 minutes	Start 36-48 hours prior: 10-12 g/kg body weight per 24 hours
Speedy Refueling	<8 hours recovery between 2 fuel demanding sessions	1.0-1.2 g/kg body weight/kg/h for the first 4 hours, then regular feeding/eating schedule

# Race Day Nutrition

Situation	Description	Recommended Carb
Pre-event Fueling	Events >60 minutes	1-4 g/kg body weight consumed in the 1-4 hours before event
During brief exercise	<45 minutes	No carb required
During sustained high intensity	45-75 minutes	Small amount, including carbohydrate mouth rinse
During endurance events	1.5-2 hours	30-60 grams/hour
Endurance events	>2.5-3 hours	Up to 90 grams/hour

# Fueling During Running

- Marathon Event: 30-60 grams carbohydrate per hour

Example: 4 hour marathon (30-60 grams/hour for every hour after first hour = 90 grams-180 grams total)

\*If taking in gel or sport drink every 30 minutes – 7x throughout the race: 13-26 grams CHO every 30 minutes

1 GU Gel = 23 grams

250 mls Nuun Performance = 8 grams

250 mls Eload = 13 grams

Untapped Gel = 26 grams

Example: ½ gel + 125-250 mls Eload every 30 minutes = 18-25 grams CHO

18-25 grams x 7 = 125-175 grams CHO total

# Manipulating carbohydrate for training

- Glycogen plays important role in muscle adaptation during training:
  - “Train low” - start exercise session with low muscle glycogen by doing 2 workouts in 1 day without adequate carbohydrate repletion after first session
  - Fasted workouts
  - Not taking in any carbohydrate during prolonged exercise sessions
- Enhances training effect by:
  - Increasing mitochondrial activity and content
  - Increased rates of lipid oxidation – increased free fatty acid oxidation
  - Increased molecules that have glycogen binding domain

**\*\*Must assess purpose of training session/plan – High quality training sessions vs enhancing training adaptation\*\***



# Food as Fuel

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



# Low Carb, High Fat & Ketogenic Diet?

- Low Carb High Fat: can be fat adapted in 3-5 days (ie increased rates of fat oxidation)
- Ketogenic: usually requires >3 weeks to be in full ketosis
- Requires individual to consume <20-50 grams carbohydrate per day
- Much of the focus on keto-diet is for weight loss, and reported health benefits (diabetes, dyslipidemia etc) – little long term research to support long term benefits
- Weight loss often occurs in ketosis due to water loss, loss of carbohydrate (glycogen) stores, adipose tissue being used as fuel, some lean tissue loss – sustainability of the diet is key factor

# Why would fat adaptation be desirable for endurance athletes?

## Energy storage (aka Body fat)

- 1 lb body fat = 3500 kcal stored energy
- 150 lb person with 25% body fat = 37.5 lb body fat = 131,250 stored calories!

## Compare to....

- Liver glycogen – 80 g = 320 calories
- Muscle glycogen – 350 g = 1400 calories

Most people require 2500-3500 calories to run a marathon.....

# Does it work?

- Results in athletes show that fat adaptation (or glycogen-sparing) may actually be caused by down regulation of carbohydrate metabolism, resulting in decreased performance
- **May** be useful for as a weight reduction strategy in recreational athletes if needed (weigh pros and cons and work with Dietitian)
- **May** be useful in ultra-endurance sports (eg ultra marathons)
- Not recommended for most athletes



# Benefits of seeing an RD for Sport Nutrition Plan



- Develop nutrition plan to support training goals and optimize training
- Develop pre-run/race strategy
- Develop Carb-loading plan for week prior to race, if needed
- Develop race day Nutrition & Hydration Plan
- Optimize recovery in training and racing/competition season
- Ensure balance of micronutrients for optimal health, to reduce inflammation, optimize performance and recovery and ensure deficiencies are corrected appropriately
- Strategies for digestive issues (related to running or other)
- Review use of supplements and ergogenic aids

- Websites for tips and tools:
  - [www.dietitians.ca](http://www.dietitians.ca)
  - [www.coach.ca](http://www.coach.ca)
  - [www.scandpg.org](http://www.scandpg.org)
  - [www.ausport.gov.au/ais/nutrition](http://www.ausport.gov.au/ais/nutrition)
  - [www.gssi.com](http://www.gssi.com)
  
- For recipe inspiration:
  - [www.cookspiration.com](http://www.cookspiration.com)
  - [www.eatrightontario.ca](http://www.eatrightontario.ca)
  - [www.cookinglight.com](http://www.cookinglight.com)
  - [www.lentils.ca](http://www.lentils.ca)
  - [www.pulsecanada.com](http://www.pulsecanada.com)
  - [www.ohsheglows.com](http://www.ohsheglows.com)
  - [www.halfyourplate.ca](http://www.halfyourplate.ca)
  - [www.cleaneatingmag.com](http://www.cleaneatingmag.com)
  - [www.runfasteatslow.com](http://www.runfasteatslow.com)

**THANK  
YOU!**

For additional questions, information, or to book a consultation, please contact me at [carakasdorf.rd@gmail.com](mailto:carakasdorf.rd@gmail.com)

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