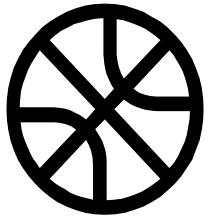
SPORTS NUTRITION FOR TEAM SPORT ATHLETES

The Team Sport Athletes

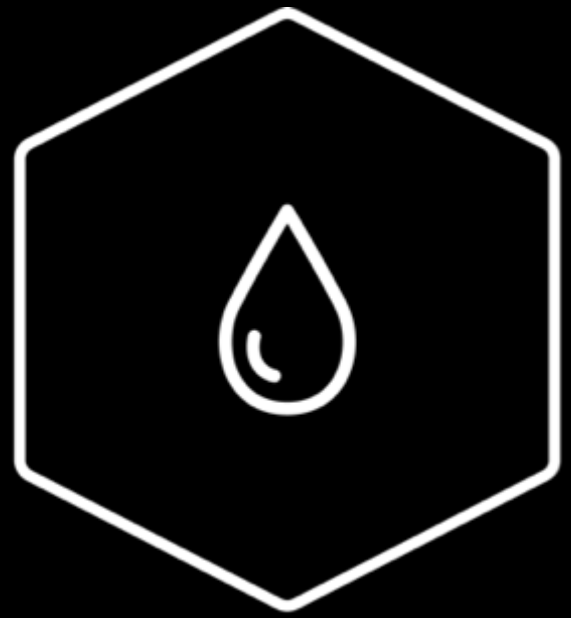


All Athletes

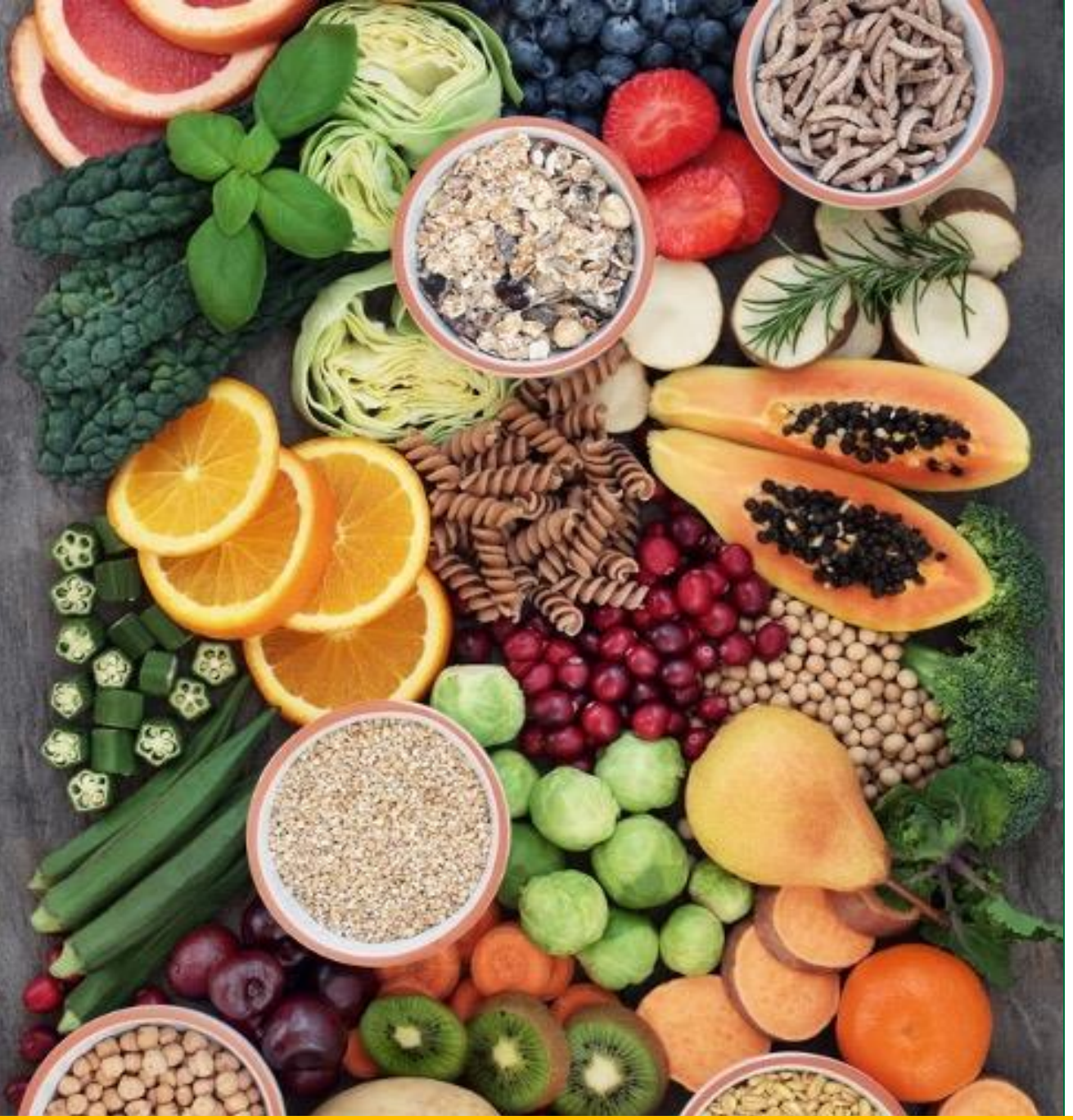
- Athletes use and need fuel for energy to train/compete
- Athletes sweat and need hydration
- Athletes use muscles and need to be strong

Team Sport Athlete Specific

- Mixture of high and low intense activity over specific duration
- Changes in pace/direction (“stop & go”, fast, slow, jumping, forward, backward, lateral)
- May have certain skill involvement (throwing, swinging, kicking, dribbling, catching)
- Can involve physical contests (guarding, pushing, pulling, tackling)
- May involve a ball/puck or other pieces of equipment



ENERGY ***HYDRATION*** ***STRUCTURE***



Carbohydrates and Performance

Carbohydrates= Muscle Fuel

During Endurance Exercise

- Maintain high rates of carb oxidation
- Reduce ratings of perceived exertion
- Increase endurance capacity
- Delay the onset of fatigue
- Prevent hypoglycemia

Carbohydrate and Team Sports

Field Sports
STRENGTH + POWER

Short distances covered, many short bursts

Field Sports
ENDURANCE

Large distances covered, high speeds

Batting Sports

Lower overall energy demands, long duration

Court Sports

Smaller area, shorter duration, tournaments, substitutions

CARBOHYDRATES ARE ESSENTIAL

- Maintain short energy bursts
- To maintain glycogen stores
- To maintain blood glucose for attention & decision making
- To maintain glycogen over time

Daily Carbohydrate Intake for Team Sports

Recommendations based on body weight

Team Sport Athletes (3-5 or 5-7g/kg)

A wide range of carbohydrate is recommended since each team sport athlete's needs are different

-position and/or intensity

Choose a starting point and then alter within the range

-tolerability and energy level

Type of Activity	Daily Carbohydrate Targets
Low intensity or skill-based activities	3-5 g/kg
Moderate exercise (~1h per day)	5-7 g/kg
Endurance program (~1-3 h/d mod-high intensity exercise)	6-10 g/kg
Extreme commitment (>4-5 h/d mod-high intensity exercise)	8-12 g/kg

Carbohydrate Recommendations for Team Sport Performance

1-4 Hours Before

1-4 g/kg

1 Hour Before

~25-30g

During

30-60 g/h

≥ 60 min duration
Performance goal

After

1.0-1.2 g/kg

< ~8 h until next training or competition

Types of Carbohydrate Before Activity

1-4 Hour Prior to Exercise ("Pre-Game Meal")

- Higher glycemic carbohydrate-rich food foods
  - Cereals, breads, potatoes, rice, pasta, etc
- Minimal fiber, fat, and protein
- What works for the athlete (trial and error best while training vs games)

<1 Hour Prior to Exercise

- Same rules as above but may come in form of gels, gummies, and/or sports drinks

Types of Carbohydrate During Activity

Choose mostly Fast vs Slow Carbs

- Fast = carbohydrate that is easily digested, rapidly absorbed and oxidized
- Slow= carbohydrate that is slowly digested and not as rapidly absorbed and oxidized

A high rate of carbon oxidation = better performance

Fructose is appropriate in small amounts when combined with Fast Carbs

The form in which carbohydrate is consumed (gel, drink, gummy) does not influence oxidation rates and athletes should choose the form that works best for them

Fast

Glucose (dextrose)
Maltose
Sucrose
Maltodextrins
Amylopectin

Rapid Digestion

1.0 g/min (60 g/h)

Slow

Fructose
Galactose
Trehalose
Isomalatulose
Amylose

Slow Digestion

.06 g/min (35 g/h)

GI Issues with Carb Intake

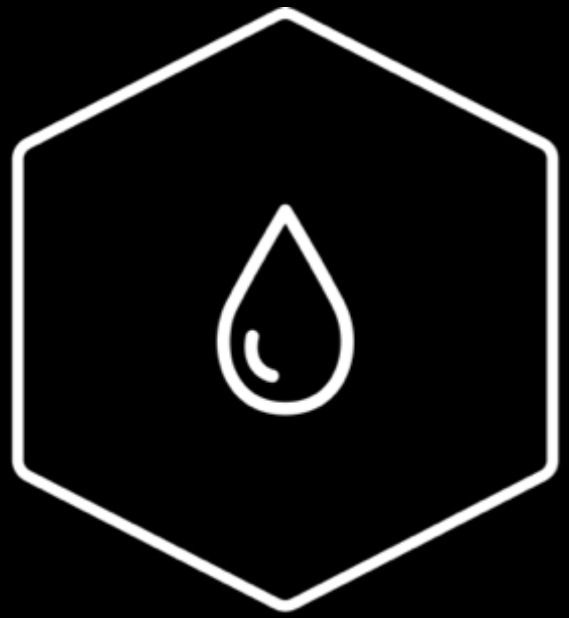
- The stomach is an organ that can be trained
- It is important that an athlete gradually increase the amount of fuel intake during exercise to meet the recommendations
- Consuming more carbs than an athlete is used to can result in a "sloshy" stomach and other more intense gastrointestinal (GI) discomfort

Types of Carbohydrate After Activity

- Types may vary, depending on next exercise bout
- Higher glycemic vs lower glycemic carb foods (within 24 hours/same day)
- Adding protein while equating calories result in a similar rate of glycogen resynthesis

Summary: Carbohydrate Energy

- Team sports, although very diverse, have commonalities including:
  - a mixture of high and low intense activity
  - changes in pace/direction
  - rely on skill
  - can involve physical contests
- Carbs are well known to improve aspects of team sports performance
- Daily requirement depends on the activity and body size
- Carbs before and during can top off fuel supply and improve performance
- Types of carbs in addition to amount and timing are also important (fast and slow)
- It is imperative that the athlete personalize their carb intake based on recommendations and tolerance with trial and error in a practice/training setting



ENERGY

HYDRATION

STRUCTURE

Hydration and Performance

- Water ~ 60% of body weight
- Roles in numerous physiological processes
- Evaporation of sweat cools the body
- Performance suffers with fluid/sweat losses >2% body weight

Consequences of Dehydration

- Impairs the ability to remove heat
- Increased cardiovascular strain
- Altered metabolic & CNS function
- Increased glycogen use
- Decreased fluid absorption
- Risk of heat illness

Dehydration and Performance

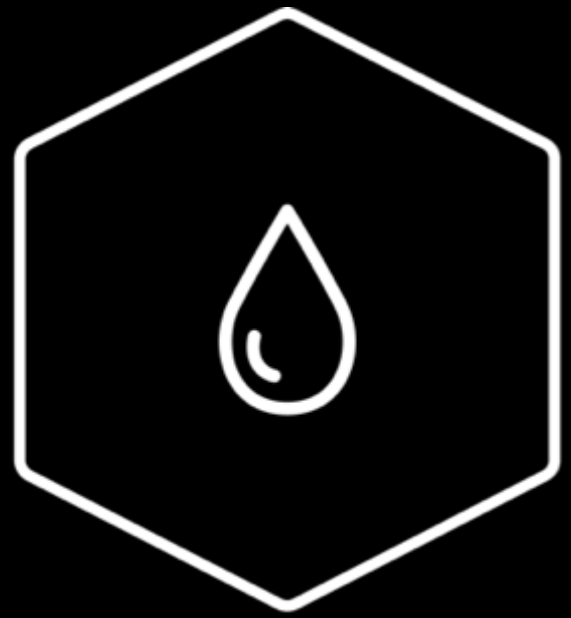
- 2% dehydration = decreases in endurance performance

- Performance decrements also seen in:
  - Anaerobic/high intensity performance
  - Muscle strength
  - Muscle power
  - Cognition

Occasion Around Training/Competition	Hydration Assessment	Definition	Recommendations
Before	Morning Body Weight Urine Color	• Determine "normal" (euhydrated) baseline body weight by taking daily measurements over a period of ≥ 3 days. • In a euhydrated individual who is in "energy balance", morning body weight is stable and not expected to deviate by >1%. • Light yellow (like lemonade) is indicative of euhydration. • Dark yellow or brown (like appl juice) is indicative of dehydration. • Clear urine is indicative of overhydration.	• If morning body weight has dropped by >1% from "normal" then drink fluid to reestablish baseline body weight. • Slowly drink beverages at least 4 hours before exercise. If no urine is produced, slowly drink more fluid about 2 hours before the event, • Consuming beverages with sodium (110-270 mg/8 oz) and/or small amounts of salted snacks will help retain consumed fluids.
During	Change in Body Mass	• Measure pre- and post- workout body weight to determine expected sweat loss during training and games of various intensities, durations, and environmental conditions.	• Avoid significant body weight deficit (≥ 2%). Also, avoid any body weight gain. • Drink 16 oz of fluid for each lb lost during the course of a workout. • Consuming a beverage with sodium (110-160 mg/8 oz) helps replace sweat sodium losses and stimulates thirst.
After	Change in Body Mass	• Compare post-workout body weight to pre-workout body weight.	• Drink ~16-20 oz of fluid for each 1 lb of body weight lost. • Consuming beverages with sodium (110-270 mg/8 oz) and/or small amounts of salted snacks helps replace sweat sodium losses, stimulate thirst, and retain the ingested fluids.

Summary: Hydration

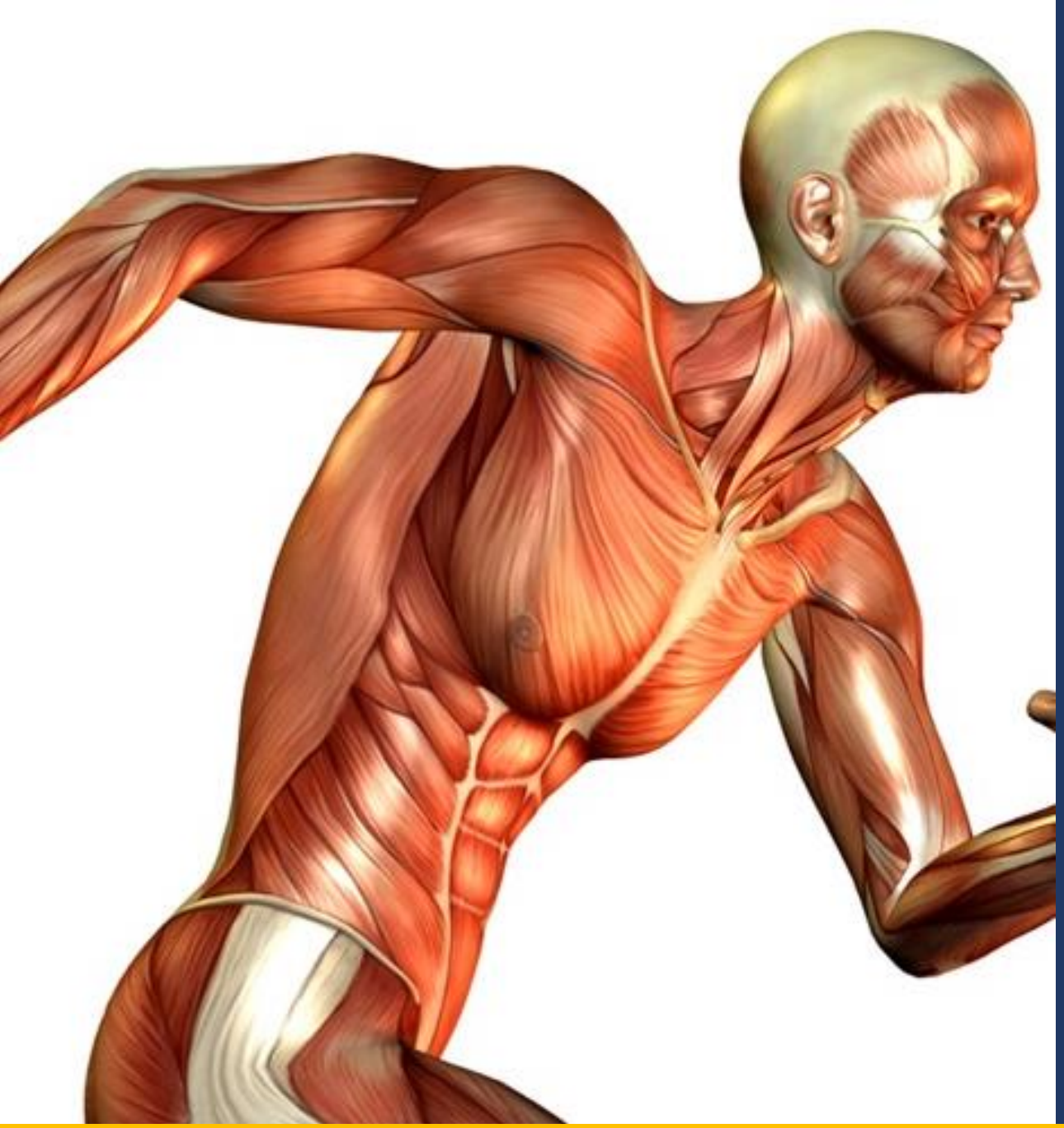
- Dehydration can decrease performance within the team sport setting
- Efforts to hydrate should be made to avoid fluid losses of ≥ 2% of body mass
- Fluid imbalances vary among sports because of differences in fluid availability or opportunity for hydration breaks
- Sweat rates and sodium losses vary between sports
- Drink 16-20 fl oz for every pound lost after activity
- Include sodium with fluids to improve palatability, stimulate drinking, and retain fluid



ENERGY

HYDRATION

STRUCTURE



Protein and the Body

- Protein ~ 45% of body
- Numerous roles in the body
- Important component of recovery nutrition and muscle repair
- Important component of injury rehabilitation
- Team sport athletes sustain eccentric loads + plyometrics + physical contact = increased muscle damage

Incorporating Protein into a Strategic Recovery Plan

Consider the following when it comes to protein intake:

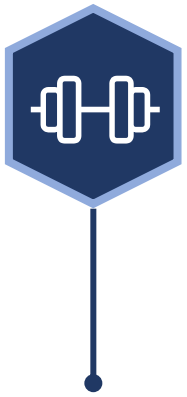
- Amount:
  - How much protein to be effective?
- Timing:
  - What is the best time after exercise to eat protein?
- Type:
  - Which source of protein is most beneficial for recovery?

Protein Amount- Daily

Recommended dietary allowance: *0.8 g/kg/day*

TEAM SPORTS

1.2-1.7
g/kg/day



STRENGTH

1.6-1.7
g/kg/day

POWER

1.5-1.7
g/kg/day

ENDURANCE

1.2-2.1
g/kg/day

Protein Amount - Recovery

260 LBS
X 0.25 (g/kg)
30G PROTEIN

~0.25-0.30
g/kg

185 LBS
X 0.25 (g/kg)
21G PROTEIN

Protein Timing- Amount and Timing

What about if we combine dosage and timing?

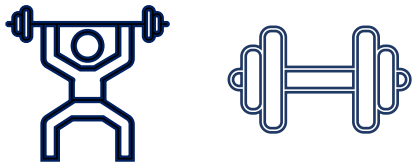
Team sport athletes should:

- Consume 0.25 g/kg body mass protein
- Immediately after training
- Spread evenly every 3-4 hours = more positive protein balance!

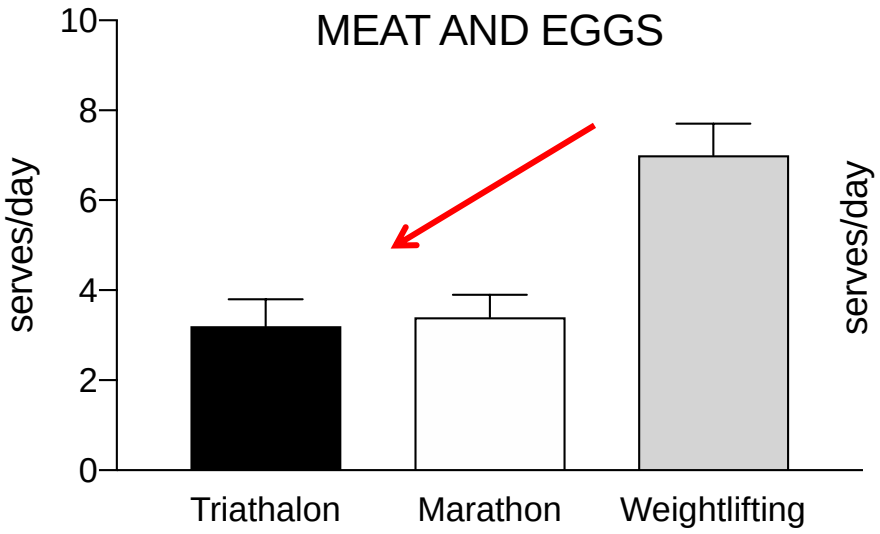
Protein and Sleep

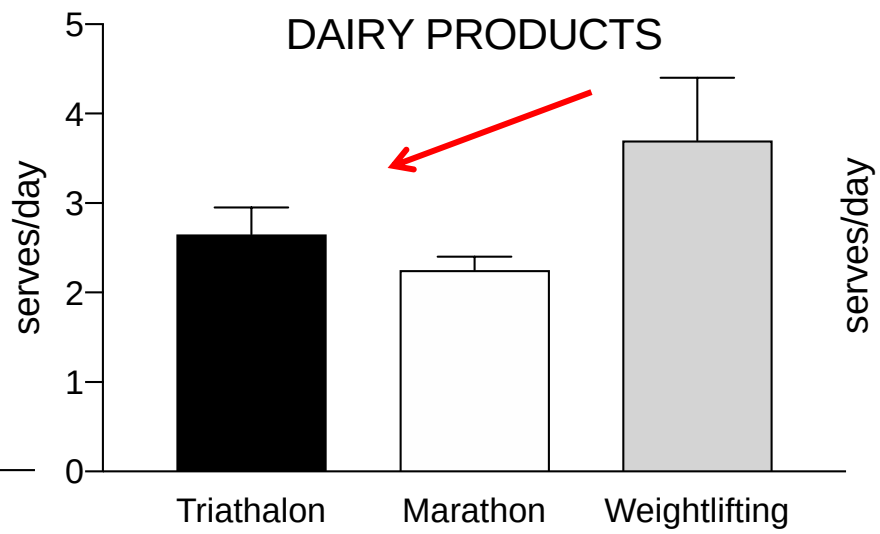
- Protein intake right before bed can boost muscle repair
- Casein (slow disgesting protein)
  - Higher amount (30-40g; 0.5 g/kg)
- Could be beneficial especially as an in-season protocol
  - Frequent games (baseball, basketball)
  - High muscle damage (football, rugby, hockey)

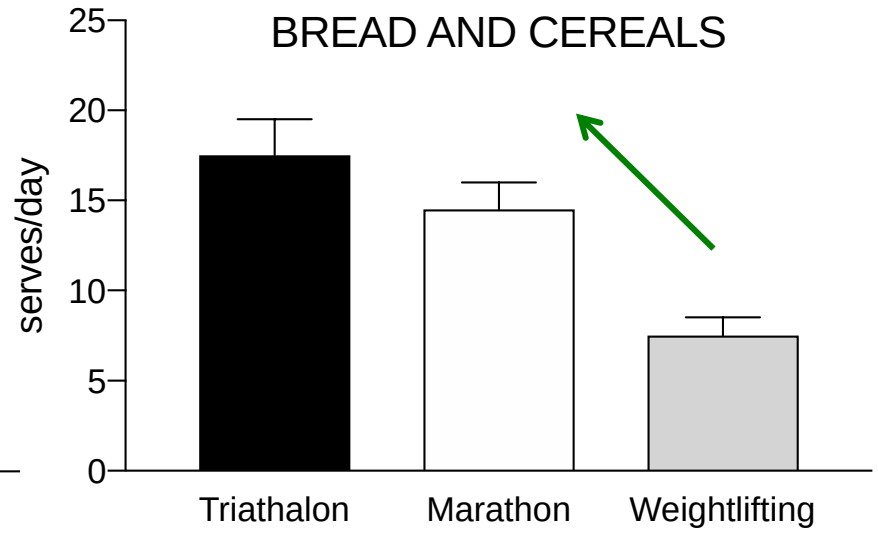
Protein Type- Behaviors



Resistance trained athletes compared to endurance athletes get more of their total protein from dairy, meat, and eggs (animal-based protein sources)







Protein Type- How does this translate to food?

Leucine-Rich Foods	
Egg, white, raw, fresh	4.23
Whey, protein dried	4.00
Seaweed, spirulina, raw	3.92
Chicken, broilers or fryers, breast, meat only, cooked, rotisserie	3.84
Fish, tuna, light, canned in water, drained solids	3.57
Turkey, fryer-roasters, light meat, meat only, raw	3.57
Fish, cod, Pacific, cooked, dry heat	3.55
Greek yogurt	3.50
Pork, fesh, loin, boneless	3.38
Chicken breast, oven roasted	3.04
Beef, round, top round, lean only	3.00
Cheese, cottage, nonfat, uncreamed, dry, large or small curd	2.88
Cheese, low fat, cheddar or colby	2.48
Tofu, silken, extra firm	2.32
Milk, reduced fat (2%)	1.33

The best protein for recovery will have these three critical components to drive muscle protein synthesis:

1. A complete protein
2. Rapidly digested & absorbed
3. Rich in leucine

While egg and whey have the highest leucine values, from a practical standpoint all foods on this list are appropriate.

For vegetarian and vegan athletes, blend foods for complete amino acids. Vary the sources!

Protein Type- How does this translate to food?

High quality protein sources = animal products

- Exceptions are quinoa and soy

Low quality protein sources = plant products

- Can be paired together to obtain all essential amino acids

Body Mass in lbs. (kg)	Range of protein requirement lbs. (kg) 0.73 – 0.77 g/lb. BM (1.6 – 1.7 g/kg BM)	Approximate amount of foods to eat throughout the day to meet protein requirement
180 (81.8)	131 – 139	2 eggs (8 g) 4 tacos with 2 ounces meat each and 1/2 cup pinto beans (63 g) 2 ounces shredded cheese (16 g) 1 cup Greek yogurt (20 g) 4 ounces chicken (28 g)
200 (90.1)	146 – 154	Greek yogurt smoothie (20 g) Tuna fish sandwich (24 g) 8 ounces lean pork (56 g) 2 cups rice (10 g) 2 ounces mixed nuts (10 g) 1 cup Gatorade shake (20 g) 4 ounces hummus (5 g)
220 (100)	161 – 169	1 cup low-fat cottage cheese (25 g) Lean ham sandwich with 8 ounces ham (66 g) 1 cup Gatorade shake (20 g) 2 boiled eggs (14 g) 6 ounces grilled chicken (42 g)
250 (113.6)	183 – 193	Egg white bagel breakfast sandwich (20 g) 1 cup Greek yogurt (20 g) 1/2 cup granola (10 g) 6 ounces turkey sandwich (52 g) 2 ounces almonds (12 g) 6 ounces salmon (42 g) 1 cup pasta (15 g) 1 cup Gatorade shake (20 g)

Summary: Protein

- Protein is a critical nutrient for muscle repair and recovery especially for team sport athletes who sustain high amounts of muscle damage
- Daily amounts vary between athletes but 0.25-0.3g/kg body weight has been found to be an optimal per meal dose.
- Timing is crucial as well but more so as it relates to spreading protein intake every 3-4 hours throughout the day and before sleep
- Types of protein should include foods that contain complete protein sources that are quickly digested and absorbed and rich in leucine (whey and animal products
- If the team sport athlete consistently eats the right amounts, timing, and types of protein, the athlete may be able to achieve optimal recovery especially during the season where physiological demands are high

Sample Menu: 140 lb Athlete

- **Breakfast**: 2 cups Life Cereal, 10 oz Skim Milk, Banana, 10 oz Orange Juice
- **Snack**: Apple, 2 TBS Peanut Butter, 1 oz Pretzels
- **Lunch**: Turkey Sandwich (Wheat Bread), 10 Baby Carrots, Chocolate Pudding Cup
- **Snack** (Pre-Practice): 20 oz Gatorade, Granola Bar
- **Dinner**: 1.5 cups Spaghetti with Marinara Sauce, Tossed Salad with Dressing, 3 pieces Garlic Toast, 8 oz Skim Milk

2557 kcal (Carbohydrate: 6.5 g/kg, Protein: 1.4 g/kg)

Sample Menu: 180 lb Athlete

- **Breakfast**: 2 cups Life Cereal, 12 oz Skim Milk, Banana, 12 oz Orange Juice
- **Snack**: Apple, 2 TBS Peanut Butter, 2 oz Pretzels
- **Lunch**: 2 Turkey Sandwiches (Wheat Bread), 10 Baby Carrots, Chocolate Pudding Cup
- **Snack** (Pre-Practice): 20 oz Gatorade, Granola Bar
- **Dinner**: 3 cups Spaghetti with Marinara Sauce, Tossed Salad with Dressing, 3 pieces Garlic Toast, 12 oz Skim Milk
- **Evening Snack**: 12 oz Blueberry Banana Smoothie

3262 kcal (Carbohydrate: 6.5 g/kg, Protein: 1.6 g/kg)

Putting it all Together

- Daily carbohydrate intake = 5-7g/kg
- Daily protein intake = 1.2-1.7g/kg
- Carbohydrates from fruits, vegetables, and whole grains for fuel.
- Protein from high quality source animal products for recovery.
- Meals/snacks spread throughout the day and evening for optimal energy and recovery

Pre-Game Meal Example

An outside linebacker who weighs 220 lbs (100kg) is getting ready for a 1pm game. He wakes up at 8:30am, noticing his urine is fairly dark. Like every gameday, he decides to eat 3 hours prior (10am).

He consumes a large, low-fat, moderate protein, higher carb meal (300g or 3g/kg) consisting of:

- Few pieces of French toast (90g)
- Small stack of pancakes (90g)
- Maple syrup (60g)
- Piece of fruit (30g)
- Couple scoops of scrambled eggs
- Low-fat milk (12 oz)
- 100% fruit juice (30g)

He ends up consuming about 312g of carbohydrate and leaves for the stadium at about 10:30am.

Before Warmups and Game

- The athlete arrives to the locker room, weighs himself wearing compression shorts (219lbs) then gets taped and dressed. He goes to the bathroom and notices his urine is still a bit dark, so he continues to drink fluids steadily.

- At 12pm the whole team heads out for warmups and he decides to eat a banana before going out. When he arrives back to the locker room from warm-ups he takes a 20 oz sports drink.

- Overall, the athlete ingested ~60 g carbohydrates from the banana and sports drink within 1-hr leading up to kickoff. He's ready to go!

During Game and Half-time

- Because there are many breaks in play, the athlete has ample opportunity to consume fluids and carbohydrates in amounts and products that he tolerates.
- He takes advantage of the times he is on the bench between each series to drink a combination of sports drinks and water.
- When he arrives back in the locker room during halftime, he has a sports drink and also eats some gummies to refuel.
- For the second half of the game, he continues to drink a combination of sports drinks and water during his breaks on the bench.

Post-Game Nutrition and Meal

- After the game, the athlete arrives back in the locker room at about 4pm where he consumes a carbohydrate and protein shake (25g). He decides to drink this right away while he weighs out at 217 lbs (~1% wt loss).

- After the coach's speech, seeing the athletic trainer, taking a shower, and getting dressed, he leaves the locker room at around 5pm.

- On the way out, he finds a post-game pre-packaged meal consisting of a deli sandwich, baked chips, and a fruit salad (120 g carbs, 30 g protein or 0.3g/kg) to eat a little later when his stomach can tolerate food a bit more.

Summary

- Team sport activities involve high and low intensity activity over specific duration combined with skill performance

- Carbohydrate energy, hydration, and protein needs will be quite different compared to those seen with endurance type sports.

    - Carbohydrates are the primary fuel during high intensity training and competition and should therefore be emphasized at many points during the day and around activity for glycogen replenishment and to meet energy demands

    - Hydration should be tailored to individual needs based on sweat losses and be encouraged outside of activity with team sport athletes, since many may show up to training or competition already dehydrated.

    - Protein also plays a key role in many functions of the body and should be strategically incorporated with respect to time, amount, and type to help enhance recovery from highly damaging team sports