

Sports Nutrition: A Game Changer in Athletics

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Sports Nutrition: A Game Changer in Athletics

- Hydration
- Weight Management
- Nutrient Timing
- Nonanabolic Supplementation

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Hydration

A high school football linebacker had poor performance in his first game despite his dedication to lifting and conditioning all summer. As a coach, you notice reduced speed, explosiveness and chronic mental mistakes with drills. He reports high anxiety and breaks down in tears over confusion with his constant mistakes in practice. His parents fear that he is suffering from an anxiety disorder or depression.

What could be wrong nutritionally?

Hydration

Goals of Performance Hydration:

- Begin exercise well-hydrated
- Minimize fluid loss and electrolyte imbalances from sweating
- Delay fatigue and maintain mental acuity
- Optimize ability to regulate body heat, especially in hot environments
- Establish a personalized rehydration plan
- Improve ability to recover quickly from training and competition

Hydration

Benefits of Adequate Hydration:

- Lower heart rate
- Higher stroke volume
- Higher cardiac output
- Higher skin blood flow
- Lower core temperature
- Lower perceived exertion
- Better performance

Hydration

Performance detriments from Dehydration:

- Decreased muscle strength
- Decreased speed
- Decreased stamina
- Decreased energy
- Decreased cognitive function
- Increased risk of injury
- Mental & physical fatigue
- Cardiovascular strain
- Heat intolerance
- Slow recovery

Hydration

Electrolyte Losses in Sweat:

Mineral	mg per Liter sweat	mg per day	% per Liter
Chloride	710 - 2840	1300	35-140
Sodium	460-1840	1300	35-140
Potassium	160-390	4700	3-8
Magnesium	0-36	240-420	0-15
Calcium	0-120	1000-1300	0-12

Hydration

Meal examples incorporating essential electrolytes:

1. spinach salad with salmon, tomatoes, cheese, avocado, almonds and raspberry vinaigrette
2. baked potato with chili beans, cheese, broccoli and baked chicken
3. baked quesadilla with beef, black beans, cheese, spinach, avocado, mushrooms

Hydration

Snack examples incorporating essential electrolytes:

1. homemade trail mix with dried apricots, mixed nuts, pretzels and dark chocolate candy
2. low-fat yogurt parfait with bananas, granola and mixed nuts
3. whole-grain crackers with low-fat cheese, tuna and avocado

Hydration

Sports Fluids & Foods:

	Sports Drink (15 g carbs/8 oz + electrolytes)	Sports Bars (40-60 g carbs + 6-20 g protein)	Sports Gels, Gummies & Beans (20-25 g carbs/ serving + electrolytes)
Pre-Exercise	15-20 oz 1-2 hrs before	High-Carb, Mod-Pro, Low-Fat Bar 1-2 hrs before	1-2 servings per hr to supplement diet
During Exercise	6-12 oz every 15-20 min	High-Carb, Low-Pro, Low Fat Bar	1-2 servings per hr combined with 4-8 oz water
Post-Exercise	24 oz per lb body weight lost	High-Carb, High-Pro, Mod-Fat Bar within 15-30 min	1-2 gels to supplement High-Pro recovery foods

Hydration

Can you drink too much
water?

YES!

Hydration

HYPONATREMIA

- Too much water can deplete sodium and other electrolyte levels.
- Potential causes:
 - excessive sweating, excessive sodium loss, excessive water intake, absence of sports drinks after 60 min exercise, intentional urine dilution
- Symptoms:
 - Headache, nausea, confusion, swollen hands/feet, difficulty breathing

Proactive Hydration Practices

Fluid Recommendations

- Men: 3.7 L per day
- Women: 2.7 L per day

Proactive Hydration Practices

What does that look like?

- Men: 3.7 L per day



Proactive Hydration Practices

What does that look like?

- Women: 2.7 L per day



Proactive Hydration Practices

Fluid Recommendations

Sweat Loss Goal: Limit weight loss due to sweat to 2% of total weight.

NOTE: This is based on specific daily weights, not the average weight of an athlete.

Proactive Hydration Practices

What does that look like?

Example:

2% of a 200-lb football player's weight = 4 lbs

Goal: Lose no more than 4 lbs fluid per workout.

Proactive Hydration Practices

Does fluid timing really matter?

Proactive Hydration Practices

- BEFORE:
 - 16-20 oz two hours before
 - 7-10 oz 10-20 min before
- DURING:
 - 6-8 oz every 15-20 min
 - After 60 min, incorporate 6-8% CHO Sports Drink + Sodium
- AFTER:
 - 24 oz for every lb lost during exercise

Proactive Hydration Practices

What does that look like?

- BEFORE:

- 16-20 oz two hours before



- 7-10 oz 10-20 min before



Proactive Hydration Practices

What does that look like?

- DURING:

- 6-8 oz every 15-20 min
 - practice with athletes so they can define “gulps”
- After 60 min, incorporate 6-8% CHO Sports Drink + sodium (either in drink or snack)



Proactive Hydration Practices

What does that look like?

- AFTER:
 - 24 oz for every lb lost during exercise



Hydration Game Plan

- Educate athletes on the risks of dehydration related to safety and on performance, as well as the benefits of adequate hydration.
- Develop individualized athlete hydration plans.
- Be proactive in promoting consistent hydration. Prevention is much more effective than correction!

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Weight Management

A high school wrestler needs to cut weight prior to weigh-ins. He has a good of eating as healthy as possible the week prior, so he focuses on whole grains, peanut butter, fresh fruits and vegetables and water with a safe calorie-reduction. Despite his efforts, he fails to make his weigh-in.

What could be wrong nutritionally?

Weight Management

Long-Term Weight Management Strategies:

- Stay within 3-4% of competition weight within the off-season
- Lose excess weight in the off-season
 - 300-500 calorie reduction for males, 200-300 calorie reduction for females

Weight Management

Short-Term Weight Management Strategies:

- Be aware of timeline for weight change
 - The NCAA limits weight loss to no more than 1.5% of body weight per week
- Avoid fasting, excessive sweat loss ($> 2\%$ BW), laxatives, purging, diet pills
- Choose low-fiber and low-sodium foods like white bread, cornflakes and sports fluids/foods to reduce water retention

Weight Management

Enhancing Recovery between Weigh-In & Competition:

- Restore at least 75% of the weight lost during weight cutting
- Consume carb-electrolyte beverages for rehydration and refueling
 - Eat high-glycemic, salty foods such as pretzels and crackers

Weight Management

Warning Signs that Energy Availability is Imbalanced:

- Chronic fatigue
- Anemia
- Recurring illness
- Depression
- Disordered behaviors
- Muscle loss
- Irregular menstruation
- Stress fractures
- Decreased muscle strength
- Irritability
- Chronic injuries
- Absence of performance gains
- Gastrointestinal issues
- Weight loss

Sports Nutrition: A Game Changer in Athletics

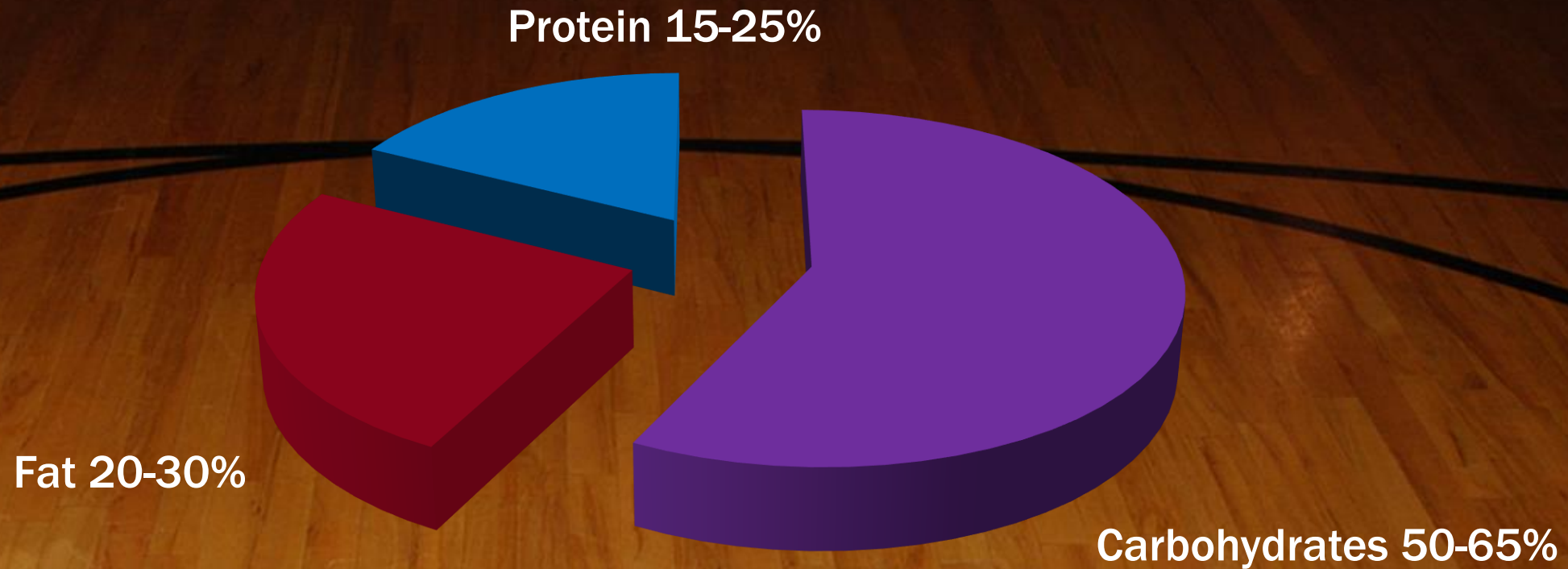
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Nutrient Timing

A college volleyball player chooses Greek yogurt and a protein bar prior to practice in an effort to have adequate carbohydrates and protein available for energy, while choosing low-fat foods to reduce upsetting her stomach. During practice, she experiences cramping and can't seem to quench her thirst.

What could be wrong nutritionally?

Macronutrients



Estimation of Fuel Needs

Training Level	Estimated kcal per lb BW
Low (sedentary)	13 to 15 kcal per lb BW
Active (30 to 60 min/day)	16 to 18 kcal per lb BW
Moderate (60 to 90 min/day)	19 to 21 kcal per lb BW
High (90 min to 2 hrs/day)	22 to 24 kcal per lb BW
Very High (2 to 3 hrs/day)	25 to 30 kcal per lb BW

Carbohydrates

- Stored Carbohydrate
 - Muscle glycogen = 300-400 g
 - Liver glycogen = 75-100g
 - Blood glucose = 25 g

*Training and carbohydrate loading can affect muscle glycogen stores greatly.

Carbohydrates

Recommended Daily Intake

- General Athlete (1 hour exercise daily)
 - 5 to 7g CHO per kg body weight
- Endurance Athletes (1-3 hrs exercise daily)
 - 7 to 10 g CHO per kg body weight
- Ultra-Endurance Athletes (3-5 hrs exercise daily)
 - 10 to 12 g CHO per kg body weight

*Athletes must maintain adequate nutritional balance to maximize muscle & liver glycogen stores.

Carbohydrates

So what does that look like?

Example:

- 150 lb (68 kg) female
- training 1-3 hrs per day for a half-marathon
- 7-10 g CHO per day recommended

68 kg (7) to 68 kg (10) = 476 to 680 g CHO per day

1904 to 2720 kcal from CHO per day

Carbohydrates

BEFORE

If exercising for one hour or longer...

- 30 to 60g CHO consumed one hour before
- 120 to 240 kcal from CHO

EXAMPLES:

- 3-4 hrs before exercise:
 - Yogurt parfait (fruit, yogurt, granola)
 - Tuna & cheese sandwich + fruit + yogurt
- 1 hr before exercise:
 - Peach
 - Jelly sandwich

Carbohydrates

DURING

If exercising for one hour or longer...

- Supplement with 1g CHO per kg body weight per hour
 - EXAMPLES:
 - PowerBar Gel (27g CHO) every 30 to 45m
 - Banana
 - Bites of low-fat granola bar
 - Optimal sports drinks contain 4-8% CHO
- *Make sure to practice using CHO supplements!

Carbohydrates

AFTER

If exercising for one hour or longer...

- 1.5 g CHO per kg body weight within 30 min
- EXAMPLE:
 - pretzels + peanut butter + yogurt
 - Whole wheat pita with turkey & veggies + yogurt

WHY within 30 min?

Increased blood flow, increased insulin sensitivity and increased transporters.

- Additional 1.5 g CHO per kg body weight 2 hrs later

Why do athletes crash?

- Depletion of carbohydrates
 - No glucose for the brain
 - Fat needs carbs to be utilized
- Lactic acid build-up
- Central fatigue
- Muscle contraction disturbance
- pH changes within the body

Protein

Recommended Daily Intake

- **Current Daily Reference Intake**
 - 0.8 to 1.0 g protein per kg body weight
- **Endurance Athletes**
 - 1.2 to 1.4 g protein per kg body weight
- **Resistance Athletes**
 - 1.6 to 1.7 g protein per kg body weight

Protein

- Endurance Athletes
 - Only 2-6% of energy comes from protein
- Resistance Athletes
 - Repair of micro-damage to muscle fibers
 - Small amounts of protein used as energy
 - Increased protein needed for lean gains

Protein

BEFORE: 5-15g pre-workout

Example: peanut butter granola bar

DURING: Limited to no protein.

AFTER: 10-30g post-workout within 30 min

Example: Greek yogurt & almonds

Why not more than 30g?

Protein

What does excessive protein do?

- Liver damage
- Kidney damage
- Vitamin inadequacies
- Potential bone concerns
- Dehydration

Protein

WHEY:

-increased strength, increased lean muscle, decreased body fat

CASEIN:

-increased strength, increased lean muscle, increased body fat

Whey protein is the ideal choice.

Fat

Recommended Daily Intake

- Moderate intake: 20 to 30% of total calories
 - Minimizes GI upset
 - Promote balanced nutritional intake
 - Promotes overall wellness
 - EXAMPLES: nuts, seeds, veggie oils, tuna, salmon, low-fat foods

Fat

Detriments of Inadequate Fat

- Compromised performance
- Energy reduction
- Malabsorption of fat-soluble vitamins (A, D, E, K)
- Abnormal hormone levels
- Menstrual dysfunction
- Reduced repair of injuries

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Nonanabolic Supplementation

A female sprinter is concerned about getting sick due to frequent meets taking place in rainy, cold weather. She starts taking over-the-counter Zinc and Vit C supplements in an effort to promote increased immunity and reduced cold symptoms. Within a week, this athlete starts experiencing nausea, vomiting and stomach aches.

What could be wrong nutritionally?

Nonanabolic Supplementation

Zinc

- athletes call it “the well-being mineral”
- involved in function of over 100 enzymes
- 50% increased secretion during strenuous exercise
- deficiency leads to decreased immunity & healing
- daily supplementation of 25-30g daily interferes with absorption of iron and copper, causes nausea/vomiting
- food sources: red meat, grains, beans, potatoes, cereal

Nonanabolic Supplementation

B-Complex Vitamins

- associated with energy production in the body
- studies of 10-50x increase show little to no benefit
- vitamins B3 and B6 are toxic at excessive doses
- multi-vitamin/mineral will meet needs of most athletes
- applicable to athletes in weight-control sports, strict vegans, and high consumption of processed foods

Nonanabolic Supplementation

Vitamin C

- associated with improved immunity, increased fat utilization, enhanced iron absorption & reduced respiratory infections in endurance exercise
- deficiency leads to fatigue, decreased immunity, weakness and depression
- excess intake leads to “stomach flu” symptoms, copper deficiencies and the risk for renal issues
- most athletes can achieve needs with multi-vitamin/mineral supplementation
- food sources: most fruits and vegetables

Nonanabolic Supplementation

Vitamin E

- athletes used secondary to belief it will reduce delayed onset muscle soreness
- only clinically-proven benefit is improved immunity during exercise to exhaustion at high altitudes
- food sources: vegetable oil, whole grains, wheat germ, fortified cereals, nuts/seeds
- most athletes achieve needs via food and use of a multi-vitamin/mineral supplement

Nonanabolic Supplementation

Chromium

- currently one of top two supplements marketed
- referred to as “anabolic hormone” to increase lean muscle mass
- deficiency results in fatigue, carb cravings, weight gain and Type 2 Diabetes risk
- excessive intake interferes with iron metabolism and zinc absorption
- NOTE: supplemental forms often contain ephedrine
- food sources: grains, meat, beans, fresh fruits/vegetables

Supplementation

Caffeine

- most widely-consumed drug in the world
- caffeine use is controversial despite 100+ yrs research
- potential benefits: increased mental awareness, increased metabolic rate, reduced perception of effort
- potential risks: increased performance anxiety, performance variability, effects on hydration, increased heart rate, trembling
- urine levels are regulated by most major sports leagues

Nonanabolic Supplementation

HMB (hydroxy-methylbutyrate)

- component of leucine, a BCAA
- food sources: catfish, citrus fruits and breast milk
- used most often for muscle appearance changes
- limited to no research support for performance improvements
- athletes with adequate meat intake and multi-vitamin/mineral supplementation likely already meet their needs

Supplementation

(BCAA) Branched Chain Amino Acids

- consist of leucine, isoleucine and valine
- athletes use with belief of improved mental endurance and reduced central fatigue
- limited research to support potential benefits
- potential risks: inhibit absorption of other amino acids, gastric water retention, GI upset
- potential benefits for high-trained athletes involved in prolonged endurance events

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Additional Questions?
Interested in Handouts?

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