**Nutrition Recommendations for Young Athletes**

- Susan Kundrat, MS, RD, CSSD, LDN
- Clinical Associate Professor
  University of Wisconsin-Milwaukee
  Department of Kinesiology
- kundrat@uwm.edu

**Presentation Outline**

- Background on youth sports
- Key nutrition recommendations
- Case studies
- Questions

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**Youth Sport Participation**

- Just over 45 million kids participate in sports in the U.S. based on tracking of 17 sports (down from 50 million in 2009)
- Sports gaining in popularity include gymnastics, ice hockey, lacrosse, rugby, and beach volleyball

*Physical Activity Council; Sports and Fitness Industry Association

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**The Race We Don’t Want to Win**

**Prevalence of Overweight/Obese Children & Youth Countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE USA</td>
<td>25.2%</td>
</tr>
<tr>
<td>FRANCE</td>
<td>32.9%</td>
</tr>
<tr>
<td>ITALY</td>
<td>40.3%</td>
</tr>
<tr>
<td>SWEDEN</td>
<td>29.2%</td>
</tr>
<tr>
<td>FINLAND</td>
<td>29.2%</td>
</tr>
<tr>
<td>GERMANY</td>
<td>25.2%</td>
</tr>
<tr>
<td>SPAIN</td>
<td>37.4%</td>
</tr>
<tr>
<td>SWITZERLAND</td>
<td>37.4%</td>
</tr>
<tr>
<td>SWITZERLAND</td>
<td>37.4%</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>19.2%</td>
</tr>
<tr>
<td>CANADA</td>
<td>27.2%</td>
</tr>
</tbody>
</table>

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**KIDS ARE LEAVING SPORTS**

**Significant Decline in Participation Among 6-12 Year Olds**

<table>
<thead>
<tr>
<th>Sport</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASKETBALL</td>
<td>5.7 M</td>
<td>4.8 M</td>
</tr>
<tr>
<td>SOCCER</td>
<td>5.6 M</td>
<td>4.7 M</td>
</tr>
<tr>
<td>TRACK &amp; FIELD</td>
<td>5.1 M</td>
<td>4.2 M</td>
</tr>
<tr>
<td>BASEBALL</td>
<td>5.3 M</td>
<td>4.5 M</td>
</tr>
<tr>
<td>FOOTBALL</td>
<td>1.8 M</td>
<td>1.3 M</td>
</tr>
<tr>
<td>SOFTBALL</td>
<td>1.5 M</td>
<td>1.0 M</td>
</tr>
</tbody>
</table>

*2.8M fewer kids playing major sports alone & past 5 years

*The Aspen Institute: www.aspeninstitute.org

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**Active Kids Do Better in Life**

**What the Research Shows on the Compounding Benefits**

- Active parents associated with active kids
- Kids of active moms are 2x more likely to be active
- Early childhood, adolescence, adulthood

The Aspen Institute
Assets Gained Through Physical Activity Participation Among Girls

- Physically active lifestyle
- Interpersonal competencies, teamwork, and cooperation
- Positive body image and physical identity
- Mental health, positive affect, and stress relief
- Social capital and social ties
- Learning and empowerment
- Healthy gender identity


Why do youth players quit a team sport?

*Espn.com

Why Sports Nutrition???

- “Sports nutrition enhances athletic performance by decreasing fatigue and the risk of disease or injury.”
- “Sports nutrition enables athletes to optimize training and recover faster.”

Purcell, Paediatr Child Health, 2013

Find Your Opportunity Areas!


Tip #1 – Make Performance Nutrition part of your game plan on a daily basis

Physical Conditioning
Desire
Coaching
Mental Toughness
Performance Nutrition
A high-performance nutrition program can be the difference between being a “good” and a “great” athlete.

• Your diet can either hold you back from reaching your goals or propel you on to success!

TIP #2: Cook Like a Champion!

Start with Easy Options

• Sandwiches
• Burgers
• Pasta and sauce
• Scrambled eggs
• Smoothies
• Skillet meals

Learn how to cook your family favorites!

When you can put together simple, easy meals, you are on your way to boosting your sports performance and maximizing your health

POUNCE Recovery Shake

• 1 cup calcium-fortified OJ
• 1 cup frozen berries or peaches
• 6 oz. vanilla GREEK yogurt
• Ice

• Blend and drink within 30 minutes of hard workouts and competitions
• 289 calories / 60g CHO / 14g PRO / 1g FAT + 600mg calcium / 110 mg sodium

No matter how successful athletes are, they can always learn new tips in the kitchen! Check out momsteam.com.

• http://momsteam.com/nutrition/sports-nutrition-basics

Tip #3 Eat Enough Energy

• Low energy (Calorie) intake can lead to fatigue, irritability, poor attention span, decreased performance in a sport, and even the desire to stop playing a sport.
• Energy deficits can cause short stature, delayed puberty, menstrual dysfunction, loss of muscle mass, and loss of muscle mass.
Some studies find youth and collegiate athletes consistently under-eat. One study of 345 collegiate athletes found that both genders eat well under their recommended needs, with only 15% consuming enough CHO and 26% eating enough PRO. In the study, the majority of female athletes (62%) wanted to lose at least 5 pounds.

Energy Intake – High School Athletes

Youth athletes may expend more calories during exercise than adults. They are generally less efficient in movement, requiring more calories.

Estimated Energy Requirements

Estimated Energy Requirements (EER) for children and adolescents are based on:
- Energy expenditure
- Requirements for growth
- Level of physical activity

Estimated Daily Energy (Calorie) Needs for Energy Balance

<table>
<thead>
<tr>
<th>Training/workouts</th>
<th>Calories/pound BW</th>
<th>120-lbs.</th>
<th>160-lbs.</th>
<th>200-lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (sedentary)</td>
<td>13 to 15</td>
<td>1,560</td>
<td>1,800</td>
<td>2,080</td>
</tr>
<tr>
<td>Active (30 to 60min/d)</td>
<td>16 to 18</td>
<td>1,900</td>
<td>2,160</td>
<td>2,560</td>
</tr>
<tr>
<td>Moderate (1 to 1 ½ hr/d)</td>
<td>19 to 21</td>
<td>2,280</td>
<td>2,520</td>
<td>3,040</td>
</tr>
<tr>
<td>High (1 ½ to 2 hr/d)</td>
<td>22 to 24</td>
<td>2,640</td>
<td>2,880</td>
<td>3,520</td>
</tr>
<tr>
<td>Very High (2 to 3 hours/d)</td>
<td>25 to 30 or more</td>
<td>3,000</td>
<td>3,600</td>
<td>4,000</td>
</tr>
</tbody>
</table>

*Based on the DRI’s
**Needs for a 130# Baseball Player**

**Calories** = At least 2,500 per day

**Protein** = 158 - 175 grams per day (0.9 to 1.0 gram/pound for enhancing strength and leaning out especially in a growing athlete)

*Breakfast = 500 calories and 20-30 grams protein
*Lunch = 500 calories and 35 grams protein
*Dinner = 500 calories and 35 g protein
*Snacks = 500 calories and 35 g protein
*Pre- & Post-Workout = 500 calories and 35 g protein

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**Macronutrient Keys**

- **CARBOHYDRATES** are KEY for MAXIMAL energy, speed, stamina, concentration, recovery and better fluid balance
- **BOTH carbohydrate and protein** are important for muscle strength and mass
- **FAT** needs to be part of the plan for stamina – with emphasis on omega-3 and mono-unsaturated fats
- **FLUIDS** should be maximized before, during, and after workouts and games

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**Protein Intake is Higher in Males and Declines with Age**

![Bar chart showing protein intake by age and gender](image)

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**Sample High-Nutrient Intake**

- **Breakfast**: 1 egg + 2 whites, scrambled with 1 slice cheese in 1 whole wheat tortilla + 8 ounces calcium-fortified OJ + water (520 calories + 32 grams protein)
- **Lunch**: 1 ham/cheese sub + 1 apple + 1 cookie + water (550 calories + 35 grams protein)
- **Snack**: 1 banana + 2 T. peanut butter + water (300 calories + 10 grams protein)
- **Post-workout Smoothie**: 1 cup GREEK yogurt + ½ cup OJ + ½ cup frozen berries + ice (250 calories + 15 grams protein)
- **Dinner**: 4 oz. grilled chicken breast + 1 cup whole wheat pasta/sauce + 1 big salad/lite dressing + 1 cup skim milk (600 calories + 50 grams protein)
- **Snack**: ¼ cup nuts + 1 apple (250 calories + 10 grams protein)
- **TOTAL**: 2,470 calories + 152 grams protein

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**Tip #4 Maximize Protein for Growth and Repair**

- Beef, pork, veal, lamb, venison
- Poultry
- Fish, shellfish
- Milk, cheese, yogurt, cottage cheese, ricotta
- Eggs
- Nuts, nut butters, seeds, seed butters
- Beans/peas
- Soy foods
- Vegetables
- Grains (cereal, bread, rice, crackers)

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**American Average Protein Intake is Above the RDA**

![Graph showing protein intake by age and gender](image)
The Top 5 Food Sources that Contribute ~50% of Children’s and Adult’s Total Protein Intake

Children
- Milk 12.2%
- Poultry 12.8%
- Beef 11.5%
- Cheese 9.7%
- Yeast bread/rolls 6.4%

Adults
- Poultry 14.4%
- Beef 14.0%
- Cheese 8.5%
- Milk 6.9%
- Yeast bread/rolls 6.4%

Protein Recommendations

- **Endurance Athletes**
  - 1.2 to 1.4 g/kg/day
  - 65-76 grams protein per day for 120# youth athlete
  - 82-95 grams protein per day for 150# youth athlete

- **Strength Athletes**
  - 1.2 to 1.7 g/kg/day
  - 65-93 grams protein per day for 120# youth athlete
  - 82-116 grams protein per day for 150# youth athlete

Meeting Robin

- 15 year old cross country runner
- Trains 5 days/week for 60-90 minutes + a long run on the weekends
- Current weight: 130#
- History of low Calorie intake and injuries
- Energy needs = ~3,000 Calories per day (23 Calories/pound)
- Protein needs = ???

Protein Recommendations

- **Recommended Dietary Allowance:**
  - 0.85 to 0.95 grams per kg body weight (youth)
  - 50 grams of protein per day for 120# youth

- **Institute of Medicine Dietary Reference Intake (AMDR):**
  - 10-30% of total daily calories
  - 2,500 calorie diet: 62-187 grams of protein/day

Protein Distribution is Key

- Even out the intake throughout the day
- Example: 120 grams of protein per day =
  - Breakfast: 30 g
  - Lunch: 30 g
  - Dinner: 30 g
  - Snack: 30 g

Meet Robin

- 15 year old cross country runner
- Trains 5 days/week for 60-90 minutes + a long run on the weekends
- Current weight: 130#
- Protein needs = 1.2 to 1.4 g/kg = 1.2-1.4 (50 kg) = 60-70 grams protein/day minimum. For healing, up to 1.7 g/kg or ~100 grams/day

http://training-conditioning.com/content/fueling-misfires
Meet Landon

- 16 year old basketball player
- Practices 4 days/week for 2 hours
- Lifts 3 mornings/week for 1 hour
- Current weight: 180#
- Goal weight: 190#
- Energy needs = 4,320-4,500 per day (24-25 Calories/pound) + 500/d for gain = ~5,000 Calories/day
- Protein needs = ???

Meet Landon

- 16 year old basketball player
- Practices 4 days/week for 2 hours
- Lifts 3 mornings/week for 1 hour
- Current weight: 180#
- Goal weight: 190#
- Energy needs = 4,320-4,500 per day (24-25 Calories/pound) + 500/d for gain = ~5,000 Calories/day
- Protein needs = 180 grams/day (max at 1 gram per pound for strength gains)

Tip #5: Optimize Carbs for workouts and competitions

*When muscle glycogen is used up, athletes have less energy!

Less energy leads to:
- Decreased focus
- Decreased quality of performance
- Increased rating of perceived exertion

25% of all injuries occur in the last 15-20 minutes of a game, often due in part to decreased energy

Carbohydrates Fuel Muscles

*A muscle is like a sponge
*Keep your muscles full of fuel
*Carbohydrate should make up ~50-65% of the diet for youth athletes

Train longer ➔ Eat more carbohydrates

*The longer you train, the more carbohydrate you need to fuel muscles. Add in 100 calories (25 grams) of carbs for every 15-20 minutes you train (during the day or for recovery)

EXAMPLE for 90 minute practice in the afternoon:
*Breakfast: Add 2 cups 100% OJ (50g CHO)
*Lunch: Add 1 fruit yogurt (50g CHO)
*Afternoon snack: Add 2 cups cereal (50g CHO)

Eat Carbs at Each Meal and Snack!

- Breads, cereals, bagels, tortillas, crackers
- Fresh fruit, canned fruit, dried fruit, frozen fruit, fruit juice
- Pasta, potatoes, rice, corn, peas
- Granola bars, cereal bars, trail mix
- Milk, chocolate milk, yogurt, cheese
- Veggies
- Sweets, desserts
Tip #6: Optimize Fats for Recovery and to Decrease Inflammation

*Fats are good for athletes!
*Just choose the right KINDS of fats
*Taking in moderate fat in your diet (20-30% of your intake) may help you train harder, recover better, and lower inflammation in your body.

**How to Optimize Fats**

- Optimal fat: 20-30% of calories
- Moderate fat diet aids overall health, minimizes GI upset, and allows for adequate CHO and PRO intake
- Monounsaturated fats: nuts, sunflower seeds, nut butter, soybeans, avocados, unsaturated oils (olive, canola)
- Omega-3 fats: salmon, tuna, ground flaxseeds, walnuts
- Choose low-fat vs. nonfat products for needed energy and fat
- Avoid fried or greasy foods

Energy Bites

**Ingredients:**
- 2 scoops of vanilla protein powder
- 1 cup of almond meal
- ½ cup of nut butter
- ¼ cup of maple syrup
- ¼ cup of mini chocolate chips

Tip #7: HYDRATE on a SCHEDULE

*Hydrate before, during, and after training and competition.
*Be Smart: When you sweat a lot, you lose fluid AND sodium. Replace both with sports drinks and salty foods in addition to water and other fluids
*Stick to a drinking schedule
*Know your sweat rate and develop your personal hydration plan
*Take advantage of fluid breaks during training

Youth Athletes and Hydration

- Children who have not reached puberty are at a higher risk of overheating compared to those who have reached puberty
- Children have a lower capacity to sweat to dissipate heat than adults
- Children take longer to adjust to warmer temperatures than adults

“**There is no cheaper, simpler, or more effective way to help performance and protect health than staying hydrated during exercise.”**

—Heather Mangieri, RDN, CSSD, MS

Youth Athletes and Hydration

College of Health Sciences
Department of Kinesiology

Energy Bites

College of Health Sciences
Department of Kinesiology

Tip #6: Optimize Fats for Recovery and to Decrease Inflammation

College of Health Sciences
Department of Kinesiology

Tip #7: HYDRATE on a SCHEDULE

College of Health Sciences
Department of Kinesiology

Youth Athletes and Hydration

College of Health Sciences
Department of Kinesiology
**Hydrate, hydrate, hydrate!**

*When you are hydrated, your body performs at its best.*

*Optimal hydration = fewer injuries, a healthier body, and better performance.*

*Drink water, 100% juice, and milk all day long to optimize fluids.*

*EAT foods with water, too – like fruits, veggies, yogurt, and soups.*

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**Electrolyte Losses in Sweat**

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Mg in a Liter of sweat</th>
<th>AI Values, mg/day</th>
<th>Possible AI Lost in Sweat, %/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>460-1,840</td>
<td>1,500</td>
<td>35-140</td>
</tr>
<tr>
<td>Chloride</td>
<td>710-2,840</td>
<td>1,500</td>
<td>35-140</td>
</tr>
<tr>
<td>Potassium</td>
<td>160-390</td>
<td>4,700</td>
<td>3-8</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0-36</td>
<td>240-420</td>
<td>0-15</td>
</tr>
<tr>
<td>Calcium</td>
<td>0-120</td>
<td>1,000-1,300</td>
<td>0-12</td>
</tr>
</tbody>
</table>

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**Youth Athletes and Sports Drinks**

- Youth athletes are susceptible to voluntary dehydration.
- Studies indicate youth will drink more of a flavored beverage than water.
- Because young athletes can dehydrate faster than adults, optimal consumption of fluids is imperative.

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**FLUIDS - HOW MUCH?**

- 1 20 oz. water bottle in AM, 1 in afternoon, and 1 at night *minimum*
- At least 2 cups 1 hour pre-workout
- At least 4-6 ounces every 20 minutes of hard exercise
- 24 ounces (3 cups) for every pound lost within 2 hours AFTER exercise
- Add CHO + sodium if >1 hour

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**Youth Athletes and Sports Drinks**

- In one study of boys 11-14 who were exercising in the heat:
  - They drank 45% more when grape flavoring was added to the beverage.
  - They drank an ADDITIONAL 46% more when grape flavoring and sodium chloride was added to the beverage (i.e. a sports drink).

Oded Bar-Or, 2000

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**How much fluid during exercise?**

<table>
<thead>
<tr>
<th>Body Weight (Kg)</th>
<th>Fluid Replacement During Exercise (mL/Hour)</th>
<th>Fluid Replacement After Exercise (mL/Hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 kg (66#)</td>
<td>390</td>
<td>120</td>
</tr>
<tr>
<td>45 kg (99#)</td>
<td>585</td>
<td>180</td>
</tr>
<tr>
<td>60 kg (132#)</td>
<td>780</td>
<td>240</td>
</tr>
</tbody>
</table>

*Based on the recommended fluid intake of 13 mL/kg during exercise and 4 mL/kg after exercise.

*Purcell, 2013*
How do you know if you are hydrated?

• Check your urine!!!
  – Light in color
  – Lots of it
  – Go every 2 hours

Meet Calvin: 17 year-old, 160# football quarterback

• Consuming 3,600 Calories per day (goal of 4,500 to 5,000 to gain muscle)
• Eating 250 grams of protein a day with only 425 grams of CHO per day
• Parents provided a healthy, lowfat, low salt diet at home

Calvin’s Game Plan

• Pre-hydrate with a sports drink
• Drink at least 2, 20-ounce sports drinks per practice with a packet of salt added to each drink.
• Salt your food!
• Boost calories to 5,000 per day, mainly by increasing carbohydrate options
• Taper protein down to 160 grams/day

http://training-conditioning.com/content/fueling-misfires

Tip #8 Focus on Key Nutrients for Young Athletes

• Iron
• Calcium
• Vitamin D

Iron

• Reduced dietary iron and increased iron requirements have been identified as underlying causes of the increased prevalence of iron depletion in athletes.
  – Iron demands may be elevated because of increased losses via sweat and urine, gastro-intestinal bleeding, exercise-induced hemolysis, or exercise-induced inflammatory responses.
• There is an increased need for iron during adolescents for both sexes
  – Girls and boys: to support increased in lean body mass
  – Girls: to support menstruation
Iron

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  - Iron demands may be elevated because of increased losses via sweat and urine, gastrointestinal bleeding, exercise-induced hemolysis, or exercise-induced inflammatory responses.
- There is an increased need for iron during adolescence for both sexes
  - Girls and boys: to support increased in lean body mass
  - Girls: to support menstruation

RDA for Iron

<table>
<thead>
<tr>
<th>Age</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-8 YO</td>
<td>10 mg</td>
<td>10 mg</td>
</tr>
<tr>
<td>9-13 YO</td>
<td>8 mg</td>
<td>8 mg</td>
</tr>
<tr>
<td>14-18 YO</td>
<td>15 mg</td>
<td>11 mg</td>
</tr>
</tbody>
</table>

Calcium and Vitamin D

- Calcium and Vitamin D are especially important for youth athletes because of the rapid growth rate of bones in the teen years.
- Athletes need a strong, developed skeleton to maximize training and performance.
- Emerging research on the many roles of Vitamin D make it a key nutrient of interest for athletes.

Calcium and Vitamin D RDA

<table>
<thead>
<tr>
<th></th>
<th>Calcium</th>
<th>Vitamin D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>4-8 YO</td>
<td>1,000 mg</td>
<td>1,000 mg</td>
</tr>
<tr>
<td>9-13 YO</td>
<td>1,300 mg</td>
<td>1,300 mg</td>
</tr>
<tr>
<td>14-18 YO</td>
<td>1,300 mg</td>
<td>1,300 mg</td>
</tr>
<tr>
<td>4-18 YO</td>
<td>600 IU</td>
<td>600 IU</td>
</tr>
</tbody>
</table>

Calcium, Vitamin D, and Dairy Intakes

- Over 6,700 girls were followed in the Growing Up Today Study
- Dairy, calcium, and Vitamin D intakes were assessed every 12 to 24 months between 1996-2001.
- During the 7 years of follow-up, 3.9% of the girls developed a stress fracture.
- Vitamin D intake was inversely related to stress fracture risk. Girls in the highest quintile had a 52% lower risk than those in the lowest quintile.
- 90% of the stress fractures occurred in girls who were participating in at least 1 hour/day of high-impact activity.


Tip #9 Optimize Pre- and Post-workout Fuel
Pre-exercise Fuel

- Provide energy to working muscles
- Maximize blood sugar and glycogen stores
- Provide a psychological edge
- Minimize hunger during play
- Consist of foods an athlete is used to and relies on in training
- Be individualized based on an athlete's needs
- Maximize hydration

Pre-exercise Fuel

- Meals should be 2/3 normal size
- Meals: 3-4 hours before competition
- Snacks: 1-2 hours before competition
- The closer to competition, rely more on liquids and small snacks

Focus on Breakfast!

- Fuel early in the day
- Hydration boost
- Muscle glycogen promotion
- Better concentration
- Muscle building
- Pre-workout fuel
- Team bonding

Breakfast Keys

High-quality carbohydrates for muscle and brain energy
High-quality protein to maintain and build lean muscle and provide satiety
Fiber (primarily from whole grains and fruit) boost satiety while providing overall health benefits
Fluids to enhance hydration and digestion


Eat Quickly After Practices and Games (30-45 minutes is ideal)

- Recovery FUEL should be part of your training regimen each day.
- The goal of recovery nutrition is to train your muscles to maximize energy storage every day.
- Optimal recovery decreases muscle soreness, increases muscle mass, and increases muscle energy.

*FLUIDS + CARBS + PROTEIN

5 30-gram protein breakfasts

Breakfast #1: 2 slices of whole wheat toast with 2 tablespoons of peanut butter + 1 banana + 2 cups lowfat chocolate milk or soy milk
Breakfast #2: 2-egg omelet with 2 oz chopped ham wrapped in 1 medium whole grain tortilla + 1 cup of 100% grapefruit juice
Breakfast #3: Smoothie with ½ cup lowfat vanilla Greek yogurt + ½ cup grape juice + ½ cup frozen berries + 1 scoop vanilla protein powder + ice
Breakfast #4: 1 turkey and cheese sandwich (3 oz. turkey) on whole wheat bread + 1 cup OJ
Breakfast #5: 1 veggie sausage, egg, and cheese bagel + 1 lowfat milk (McDonald's)
Recovery Nutrition Options

– Chocolate milk (16 oz.)
– Instant breakfast drinks
– Yogurt and fruit
– Cereal and milk
– Smoothie with milk, soy milk, or yogurt and fruit
– Sports bars and water
– Chicken noodle soup, crackers, and 100% juice
– Peanut butter and jelly on whole wheat + 100% juice
– Pasta/sauce + 100% juice
– Pizza and 100% juice
– EAT A REGULAR MEAL!

Tip #10 Treat Nutrition Like a Tool

We have a unique opportunity to help athletes feel more energized, compete at a higher level, suffer fewer injuries, and enjoy their sport to a much higher degree with solid nutrition practices!

Selected Resources and References

1. Mangieri, Fueling Young Athletes, 2017
2. Training and Conditioning Website: www.training-conditioning.com
4. Sports, Cardiovascular, and Wellness Nutritionists: www.scandpg.org