

Nutritional Considerations for Sport Performance

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***“Your body is the greatest
instrument you will ever own.
Take care of it!”***

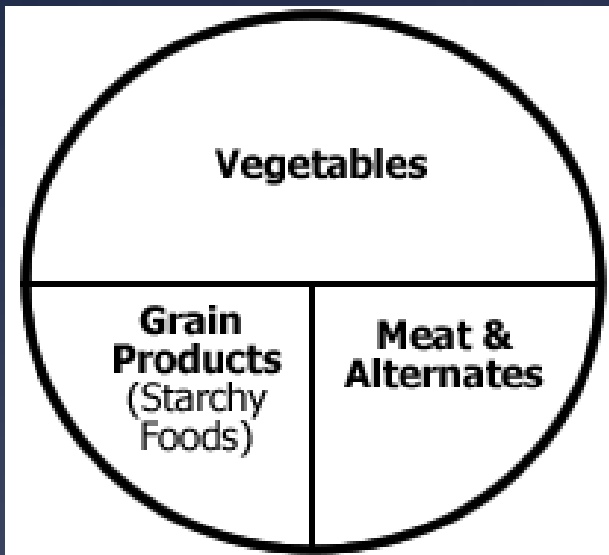
~Marcy Schmich

Sports Nutrition 101

- * A method to provide the body with the best tools for growth and development as well as aid in recovery (exercise, injury, illness)
- * Improves--physical activity, athletic performance and recovery from exercise
- * Consuming adequate *food and fluid* during, before, and after exercise
- * Maintains blood glucose, maximizes performance, and improves recovery time
- * Eat to:
 - * Increase glycogen synthesis
 - * Increase/restore electrolytes
 - * Tissue repair
 - * Maintain hydration



Balanced Meals!!



A balanced meal consists of at least 3 food groups!

The Healthy Plan

- Eat **balanced meals** containing carbohydrate, protein, and fat, every 3 to 4 hours
 - Never skip breakfast!
 - Eat within 30 minutes of waking
 - Consume protein + carbohydrate before and immediately after a workout
 - Avoid/limit alcohol, sweets, fried foods
 - Moderation/Variety
- ...to help to meet energy and nutrient goals!



Carbohydrate

Fat

Protein

4 kcal/g

9 kcal/g

4 kcal/g

Alcohol

7 kcal/g

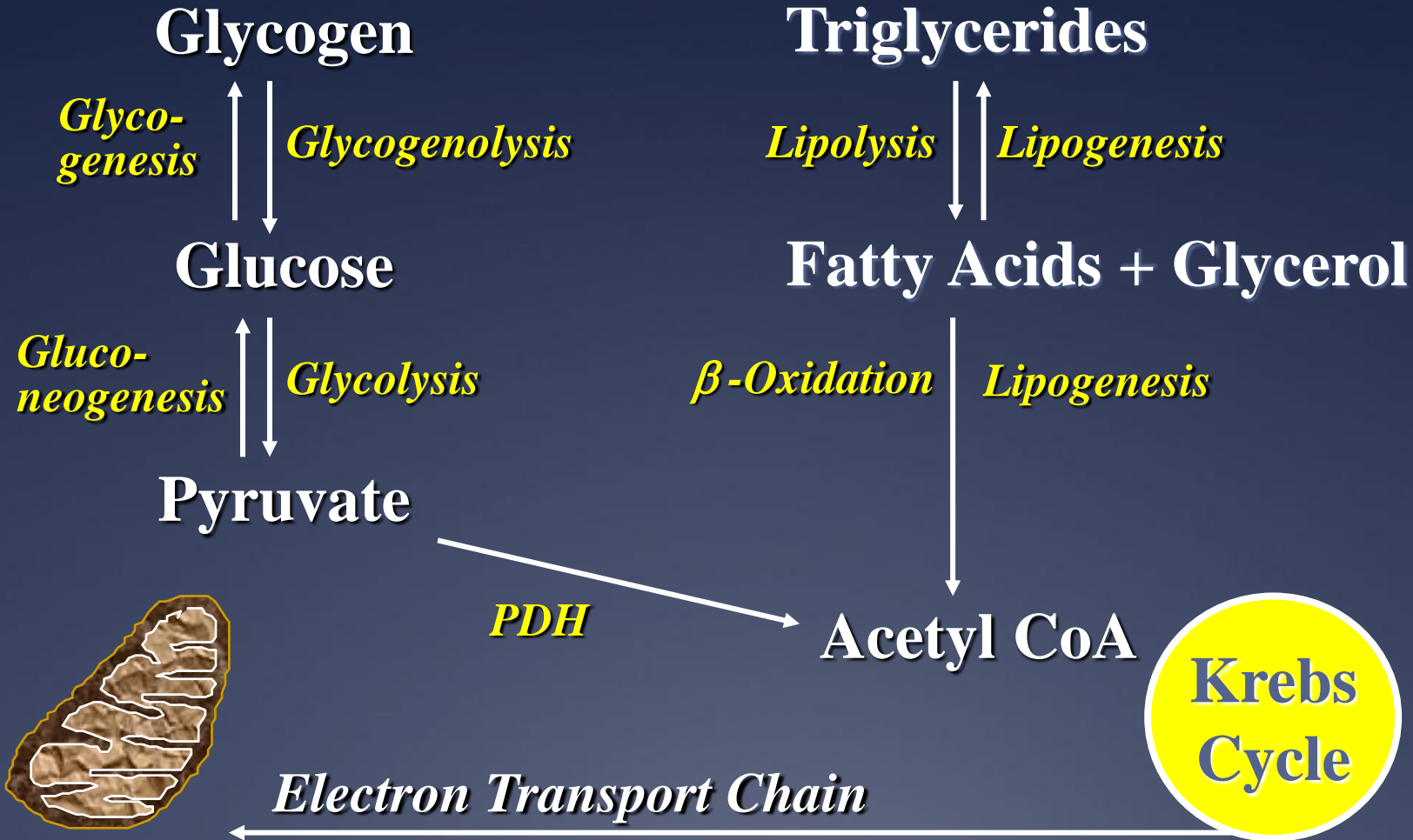
ATP

Stored chemical energy links the energy-requiring and energy-releasing functions within all cells.

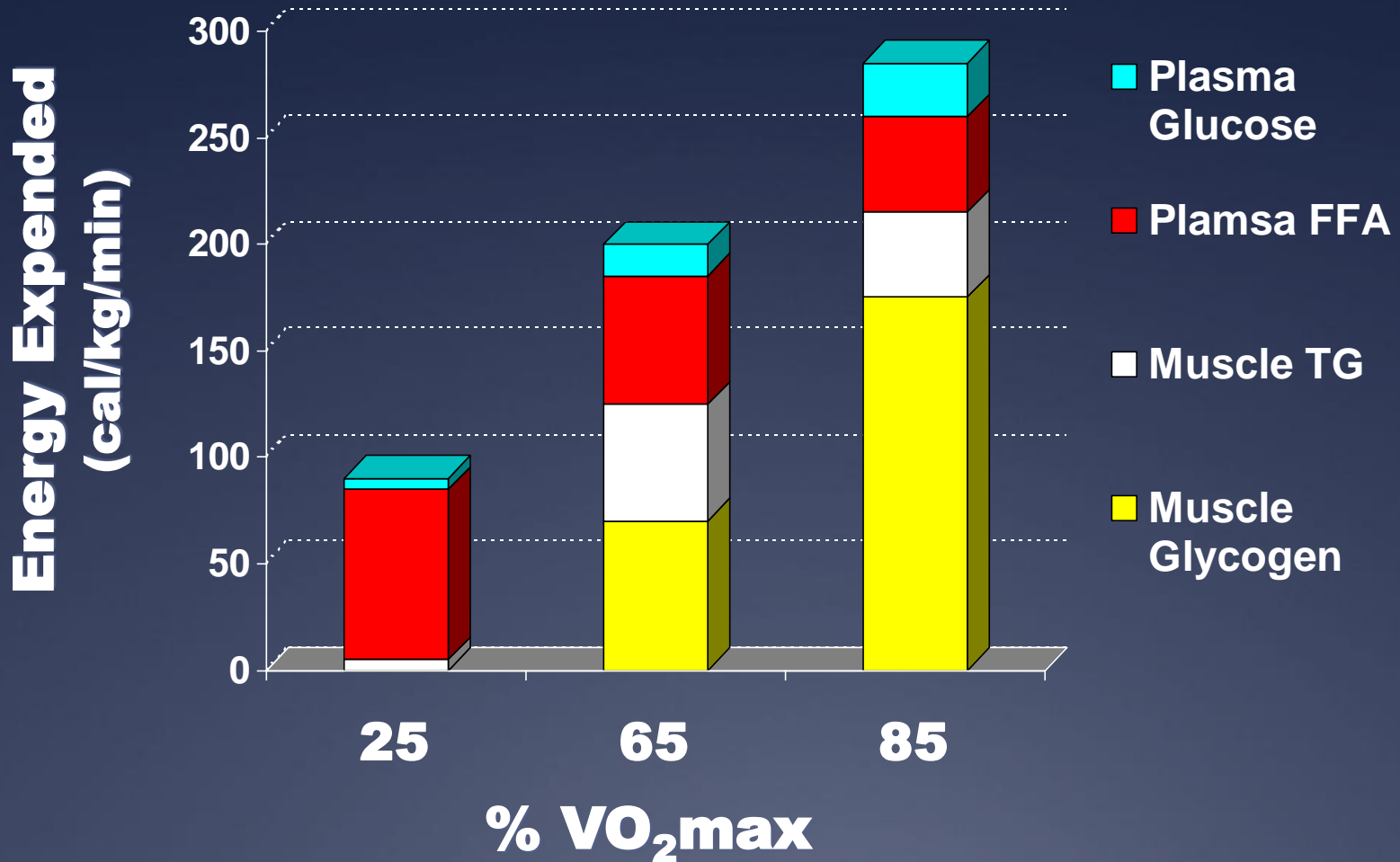
Muscle:
Converts chemical energy to mechanical energy

CARBOHYDRATES

LIPIDS



Contribution of Substrates to Energy Expenditure



“hitting the wall”



Energy Demands of Athletes



Nutrition is Individual

- * Needs based on...
 - * Sport (Soccer)
 - * Event (Endurance)
 - * Current nutritional status
 - * Deficiencies?
 - * Weight goals (lose, gain, maintain)
 - * Improve body composition
 - * Energy needs
 - * During and between exercise bouts
 - * Speed recovery from training/competition

Sports Nutrition

- * Energy demands (based on previous considerations)
 - * Carbohydrates: more as intensity of exercise increases
 - * Fat: long duration, low-intensity
 - * Interplay of carbohydrate and fat utilization always

Achieved by...

- * proper food selection
- * portion control
- * nutrient timing
- * and hydration



Calorie Needs

Calorie needs are

- * specific to each person
- * depend on activity and genetics
- * should be enough to maintain weight and exercise intensity

Remember your goals:

- * **Weight maintenance**

- * Calorie intake = REE

- * **Weight gain**

- * Calorie intake > REE

- * **Weight loss**

- * Calorie intake < REE

***If an athlete loses weight, consider increasing calories, taking more rest, and assessing stress levels.**

How much?

Calorie needs for athletes between the ages of 2-20 years old can be found by accessing this website...

<http://www.bcm.edu/cnrc/healthyeatingcalculator/eatingCal.html>

You will find a pie chart with information on:

-Food group servings, body mass index, calorie needs, and activity information

Daily Energy Needs

Carbohydrate	Protein	Fat	Water
55-65%	15-20%	25-30%	--

calories IN = calories OUT

*Increased demand for athletes



Increased Energy Demands



Carbohydrates

- * Major energy source
 - * short-duration or intense exercise
 - * 55-65% of calories
 - * 4 kcal/g
- * Provides dietary fiber, vitamins, minerals, and antioxidants (i.e. fruits)
 - * Opt for 100% whole wheat/grain, fruits, vegetables
 - * Fiber: 25-30 g/day
- * Classifications
 - * Simple and complex carbohydrates
 - * Glycemic Index (fast vs. slow)
- * Digestion, breakdown, and conversion
 - * Absorption rate, glycemic index



Include balance in every meal!

* Breakfast

Skim milk, whole grain English muffin, 2 Tbsp peanut butter, apple

* Lunch

Turkey sandwich on whole wheat bread, banana, carrots & yogurt

* Dinner

Wheat pasta, tomato sauce, turkey meatballs, green salad, oil & vinegar

***Add healthy snacks through out the day also!

This is NOT balanced...

- * Breakfast: Fruity Pebbles and milk
- * Lunch: Hot dog and Doritos
- * Snack: donut
- * 2nd snack: rice crispy treat
- * Dinner: Kraft Macaroni & Cheese
- * Dessert: Carmel apple with sprinkles

And it is not healthy!

If this is how we fuel our bodies, our performance will suffer!

Carbohydrate Summary

- * Needed to make muscle glycogen (storage)
- * Will reduce training stress (cortisol)
- * Help prevent tissue breakdown
- * Avoid sugary drinks other than during/after prolonged workout
- * Combine with protein to maximize recovery

Protein

- Essential dietary macronutrient
- Contains 4 kcal/g
- Functions:
 - *Structural: Collagen of bone and skin*
 - *Regulatory: Hormones (insulin)*
 - *Contractile: Actin and myosin*
 - *Transport: Hemoglobin*
 - *Catalytic: Enzymes*
 - Repair, recovery, increase muscle mass, decrease body fat, decrease fatigue & protein breakdown



Protein Requirements

RDA - .8 g/kg/day

Athlete = 0.9-2.1 g/kg/day
Endurance vs. Strength

- **Endurance Athletes:**

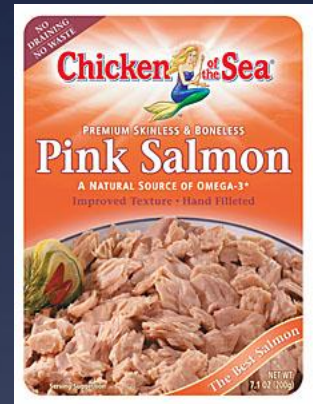
- *1.2 - 1.4 g/kg/day (98 g/day for 75 kg person)*
- *Extra protein used as an auxiliary energy source*

- **Strength Athletes:**

- *1.7 - 1.8 g/kg/day (131 g/day for 75 kg person)*
- *Extra protein required for incorporation into skeletal muscle*

Recommended Protein Foods

- Eggs (scramble, poach, boiled)
- Lean Beef (steaks, ground, strips)
- Skinless Poultry
- Fish (canned or fresh, not breaded)
- Seafood (not imitation)
- Dairy (low-fat yogurt, cheese, cottage cheese)
- Beans (kidney, black),
- Nuts (almonds, walnuts)
- Tofu



Fats

- **Essential** dietary macronutrient
- Contains 9 kcal/g (excellent energy source)
- Major form is triglyceride (3 fatty acids + glycerol)
- Functions
 - Efficient energy source
 - Thermal insulator
 - Nerve transmission
 - Lipid transport in blood
 - Membrane components



Do Not Fear Fat

- * Training increases body's ability to use fat as a fuel source (large amounts in storage)
 - * IMTG (intra-muscular triglyceride) store
 - * Triglycerides have excellent energy value
 - * Heart uses fatty acids as energy
 - * Need fat to absorb Vitamin A, D, E, K
 - * Look for mono and poly-unsaturated fat
 - * vegetable sources, like avocados and nuts,
 - * Fish is great– Omega 3 and 6 fatty acids

Olive oil, canola oil, nuts,
peanut butter, seeds,
avocado, fatty fish



Healthy vs. Unhealthy Fats

- * **Healthy fats (mono & poly-unsaturated)**

- Nuts, seeds, peanut butter, olive oil, olives, canola oil, avocados, fatty fish

- * **Unhealthy fats (saturated)**

- Butter, shortening, cream cheese, cheese, high fat meats, chicken skin, mayonnaise, fried foods, donuts, chocolate candy

Hydration

- * GOAL= prevent dehydration
- * Water is fine for exercise < 1 hour
- * For training >60-90 min, you will need small amount of CHO (sports drink) for mind and muscle and SODIUM to enhance water absorption and retention, and WATER to replace sweat loss
- * Drink every 15-20 minutes during training and on race day
- * Drink on a schedule, 4-8 ounces every 15-20 minutes

Electrolytes

- * Must replete post-exercise (easy to do through foods)
 - * lost in sweat
- * Common recovery foods (Sodium + Potassium)
- * Potatoes Bananas
- * Yogurt Orange Juice
- * Soup Cereals
- * Cheese Breads
- * Excessive sweat—sport drink



Replacing Sweat Losses

Electrolyte	Avg amt./ 2 lb (1L) sweat	Food comparison
Sodium	800 mg	1 qt. Homemade sports drink = 440 mg
Potassium	200 mg	1 med. Banana = 450 mg
Calcium	20 mg	8 oz. yogurt = 300 mg
Magnesium	10 mg	2 tbsp peanut butter = 50 mg

Homemade Sports Drink

- * $\frac{1}{4}$ cup sugar
- * $\frac{1}{4}$ tsp salt
- * $\frac{1}{4}$ cup hot water
- * $\frac{1}{4}$ cup orange juice
- * 2 tbsp lemon juice
- * $3\frac{1}{2}$ cups cold water

Makes 4 cups:

Per 8 ounces: 50 calories, 12 g carbohydrate;
110mg sodium, 30 mg potassium

Eating for Performance

General Guidelines

- * Strategic Eating and Meal Timing for:
 - * PRE EXERCISE
 - * DURING EXERCISE
 - * POST EXERCISE
 - * GAME DAY

When Should I Consume Carbs?

- * Very beneficial before, during, and after your practice/games
- * Include a portion with each meal to keep glycogen stores full (fruits, vegetables, rice, oats, beans)
 - * Graze throughout the day
- * Only consume simple carbs (sugars, sports beverages) around your practice/games!!



Pre-exercise Carbohydrate Suggestions

* Carbohydrate-rich, low-fat foods—whole-grain, high-fiber foods, consumed >1 hour prior to exercise (**about 30-60 grams is needed**)

* Breads Oatmeal

* Cereals Bean

* Muffins Crackers

* Yogurt Pasta



Ex. About 2 slices of bread with peanut butter

Pre-Exercise Protein

- * Avoid high-fat protein sources (fried meats, cheese, burgers, French fries, etc)
 - * longer to empty from the digestive tract
 - * may contribute to a sluggish or nauseated feeling

- * Yogurt

- * Peanut Butter sandwich



Pre-Exercise Protein and Carb

- * A banana with 1 tablespoon of peanut butter
- * Low-fat yogurt and a piece of fruit
- * Oatmeal made with skim milk and fruit
- * Trail mix with nuts and fruit
- * Granola with low-fat milk and fruit
- * A smoothie made with low-fat yogurt, fresh fruit, and wheat germ or flax meal

During Exercise/Competition Carbohydrate

- * Needed for endurance events
- * 30-60 grams or 100-250 calories of carbohydrates/hour during endurance exercise, after the first hour. (avoid crashes caused by low blood sugar)
- * Both fluids and foods provide the same energy to the body, (if carbohydrate-rich sources)
- * *Tip: Try a combination of beverage and food to find what works best for you.*

During Exercise/Competition Carbohydrate Suggestions

- * 16 fluid ounces (fl oz) of a sports drink (30 g CHO)

-try drinking 4 ounces every 15-20 minutes

- * An energy bar (carbohydrate content varies among bars
 - * look for one that contains around 30 grams carbohydrate
- * Other options
 - * Energy bars/gels
 - * Hard candies
 - * Medium banana (30 grams CHO)

Post-Exercise/Competition Carbohydrate

- * Timing (replenish glycogen quickly)
 - * *within the first 2 hours (preferably within 15- 30 minutes)*
 - * glycogen synthetase upregulated
 - * ↑ permeability of muscle cells to glucose
- * **1-2 g CHO/kg body weight/hour for 2 hours
(About 50-100 grams of CHO)**
 - * *example. if weight = 100 lb (45kg)*
 - 45-90g CHO/hour*
 - 1 liter Gatorade (60g CHO)*
 - + 1 banana (≈30g CHO)*
 - total ~ 90g CHO*

Post-Exercise Protein

- * Ingestion of 18g protein after exercise stimulates protein synthesis
- * Post-exercise ingestion of CHO and protein promotes more anabolic environment (muscle building/repair)
- * Ingestion of protein and CHO following exercise should promote greater recovery and training adaptations
- * Little impact on glycogen repletion
- * Impacts hormonal responses
- * Enhances satiety



Post-Exercise

- * 12-16 fl oz of juice or a sports drink and a yogurt
- * Cereal with milk and a banana
- * Chocolate Milk
- * Can be similar to pre-exercise

Summary Specific

* **Pre-exercise:**

1 hr before you need FLUID + FUEL

20 ounces FLUID + 30-60 grams CHO

15 grams PROTEIN if weight training

* **During exercise:**

FLUID every 15-20 min

30-60 grams of CHO per hour + electrolytes
(food or sports beverage)

* **After exercise:**

within 15-30 min FOOD + FLUID

fluid to replace losses

50-100 grams of CHO

15-18 grams of PROTEIN to expedite recovery

Summary Slide

Timing	Optimal Nutrients	Food or Drink
Pre-exercise fuel 1 hour prior	Carbohydrates	<ul style="list-style-type: none"> • Sports bars • Tolerated fruit • Half of a sandwich • Sports drinks
During intense exercise lasting longer than 1 hour	Carbohydrates, electrolytes, and fluids	<p>Depends on duration, intensity, and environment</p> <p>In addition to water possibly:</p> <ul style="list-style-type: none"> • Sports drink • Sports bar • Gel • Recommendation is to have 30-60 grams of carbohydrates/hour
Post-exercise fuel Within 10-15 minutes and then a meal 60-90 minutes later	Carbohydrate/protein	<p>Immediately post-exercise:</p> <ul style="list-style-type: none"> • Shakes • Bars • Sports drinks • Fruits/yogurt • Sandwich • Yogurt with fruit • Low-fat chocolate milk • Meal suggestions: <ul style="list-style-type: none"> ○ Pasta/rice with lean protein ○ Vegetables

GAME DAY

- * Wake up and start to hydrate with water
- * **Pre-Game meal (2-3 hours before):** Balanced with carb, protein, and veggies or fruits
- * **Pre-Game snacks (30 minutes before):** banana, pretzels, granola bars, etc. & Hydrate

- * **GAME:**

First & Second Halves: Consume 5-10 oz. water or sports drink every 15-20 minutes

Half-Time Snack Options: granola bars, banana, goldfish, pretzels, crackers

- * **Post-Game Snack (within 30 minutes):** Low-fat chocolate milk or plain, energy bar, yogurt & granola, banana and peanut butter

Increase Calories/ Rethink Your Food Choices When...

You see signs of overtraining/under-nutrition:

- Mood Changes (depression, anger)
- Appetite (increase or decrease)
- Decreased willingness to train/poor performance
- Fatigue
- Poor sleep Quality

Decrease training and evaluate the quality and quantity of your food choices.

Nutrition Facts

Serving Size 5 Crackers (16g)

Servings Per Container About 28

Amount Per Serving

Calories 80 Calories from Fat 40

% Daily Value*

Total Fat 4.5g 7%

Saturated Fat 1g 5%

Trans Fat 0g

Polyunsaturated Fat 1.5g

Monounsaturated Fat 2g

Cholesterol 0mg 0%

Sodium 140mg 6%

Total Carbohydrate 9g 3%

Dietary Fiber less than 1g 1%

Sugars 1g

Protein 1g

Vitamin A 0% • Vitamin C 0%

Calcium 0% • Iron 2%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories 2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Think of calories as energy!

80 total calories

Fat = 9 calories per gram

$$4.5g \times 9 \text{ kcals/g} = 40.5$$

Carbohydrate = 4 calories per gram

$$9g \times 4 \text{ kcals/g} = 36$$

Protein = 4 calories per gram

$$1g \times 4 \text{ kcals/g} = 4$$

$$40.5 + 36 + 4 = 80.5$$

**the energy needed to increase the temperature of 1 kg of water by 1°C*

Label reading for CHO



Nutrition Facts
Serving Size 8 fl oz (240ml)
Servings Per Container 4

Amount Per Serving	
Calories 50	
	% Daily Value*
Total Fat 0g	0%
Sodium 110mg	5%
Potassium 30mg	1%
Total Carbohydrate 14g	5%
Sugars 14g	
Protein 0g	

Not a significant source of Calories From Fat, Saturated Fat, Cholesterol, Dietary Fiber, Vitamin A, Vitamin C, Calcium, Iron.

* Percent Daily Values are based on a 2,000 calorie diet.

NO FRUIT JUICE
INGREDIENTS: WATER, SUCROSE SYRUP, GLUCOSE-FRUCTOSE SYRUP, CITRIC ACID, NATURAL GRAPE FLAVOR WITH OTHER NATURAL FLAVORS, SALT, SODIUM CITRATE, MONOPOTASSIUM PHOSPHATE, RED 40, BLUE 1.

SHAKE WELL. REFRIGERATE AFTER OPENING.

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0 52000 32673 4

Label reading for CHO



Nutrition Facts

Serving Size: 1 bar (68g)

Amount Per Serving

Calories 250 **Calories from Fat** 45

% Daily Value*

Total Fat 5 g **8%**

Saturated Fat 2 g **10%**

Trans Fat 0 g

Cholesterol 0 mg **0%**

Sodium 150 mg **6%**

Potassium 250 mg **7%**

Total Carbohydrate 45 g **15%**

Dietary Fiber 5 g **20%**

Sugars 21 g

Sugar Alcohols

Protein 10 g

Vitamin A 1500 IU 30%

Vitamin C 60 mg 100%

Calcium 250 mg 25%

Iron 4.5 mg 25%

Label reading for CHO and Protein



Nutrition Facts	Amount Per Serving	%Daily Value*	Amount Per Serving	%Daily Value*
	Serving Size: 6oz (170g) Servings Per Container 1	Total Fat 0g	0%	Total Carbohydrate 20g
Calories 140 Calories from Fat 0	Saturated Fat 0g	0%	Dietary Fiber less than 1g	4%
	<i>Trans</i> Fat 0g		Sugars 19g	
*Percent Daily Values (DV) are based on a 2,000 calorie diet.	Cholesterol 0mg	0%	Protein 14g	28%
	Sodium 65mg	3%	Vitamin A 0% • Vitamin C 2% • Calcium 20% • Iron 0%	

INGREDIENTS: CULTURED PASTEURIZED NONFAT MILK, STRAWBERRIES, EVAPORATED CANE JUICE, NATURAL FLAVOR, LOCUST BEAN GUM, PECTIN, BEET JUICE CONCENTRATE (FOR COLOR). CONTAINS FIVE LIVE ACTIVE CULTURES INCLUDING S. THERMOPHILUS, L. BULGARICUS, L. ACIDOPHILUS, BIFIDUS, AND L. CASEI. **Contains milk.**

- Twice the Protein
- No Fat. No Cholesterol
- All Natural: No Artificial Flavors or Preservatives
- No Synthetic Growth Hormones
- Includes Live & Active Cultures
- 3 Types of Probiotics
- Kosher Certified
- Gluten Free
- Safe for People with Corn, Nut and Soy Allergies
- Vegetarian Friendly: Made without Gelatin
- Nothing But Good

Peanutty Energy Bars

- * ½ cup salted-dry roasted peanuts
- * ½ cup roasted sunflower seed kernels
- * ½ cup raisins (or other dried fruit)
- * 2 cups uncooked oatmeal, old-fashioned or instant
- * 2 cups toasted rice cereal, such as Rice Krispies
- * ½ cup peanut butter
- * ½ cup packed brown sugar
- * ½ cup light corn syrup
- * 1 tsp vanilla
- * (optional) ¼ cup wheat germ

Makes 16 squares or bars

Per serving: 225 calories, 30 g carbohydrate, 6 g protein, 9 g fat

Our Goal

- * *Provide our athletes with healthy food choices to enable them to succeed.*
- * *Make a family lifestyle change and practice being a good role model for your kids.*
- * *Remember...healthy eating habits helps kids at school, at home, and on the field.*

Questions??



Crystal Lake Triathlon, Aug 2009.