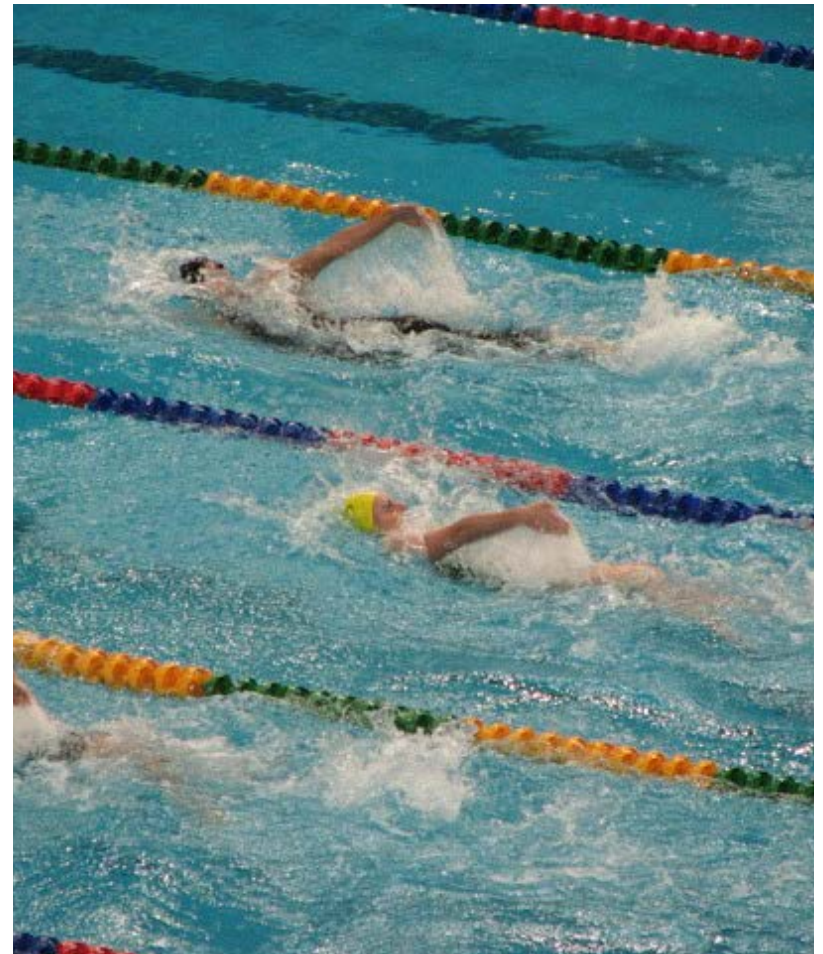


Meeting The Nutritional Carbohydrate and Protein Needs: Food or Supplement

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University of Colorado-Colorado Springs
Sports Dietitian: US Lacrosse and UCCS Athletics

Challenges to an Athlete's Diet

- Hectic schedules
- Little knowledge about:
 - Basic nutrition
 - Grocery shopping
 - Food preparation
 - What to choose when eating on the road
- Good nutrition isn't always a priority



Nutrition Knowledge

- Survey of age group swimmers
- Most nutritious carbohydrate
 - 63% chose an apple while 37% chose French fries
- Good source of protein
 - 63% chose chicken, while 37% chose oatmeal
- Food Groups
 - 95% identified the food groups, but only 45% could identify foods from the group

Nutrition Realities

- 30% of adolescent athletes skip breakfast
- 25% skip lunch
- 86% eat at fast food restaurants each week
- 82% of male track, basketball, and football teams could not identify the fuel sources in the muscles

Training Diet

- Swimmers need more calories and fluid when compared to general populations
- Additional calories should be in the form of CHO
- Timing of meals need to be determined on an individual basis with consideration for an athletes gastrointestinal characteristics and intensity of workout
 - Athletes in heavy training or multiple workouts may need to eat more than 3 meals per day

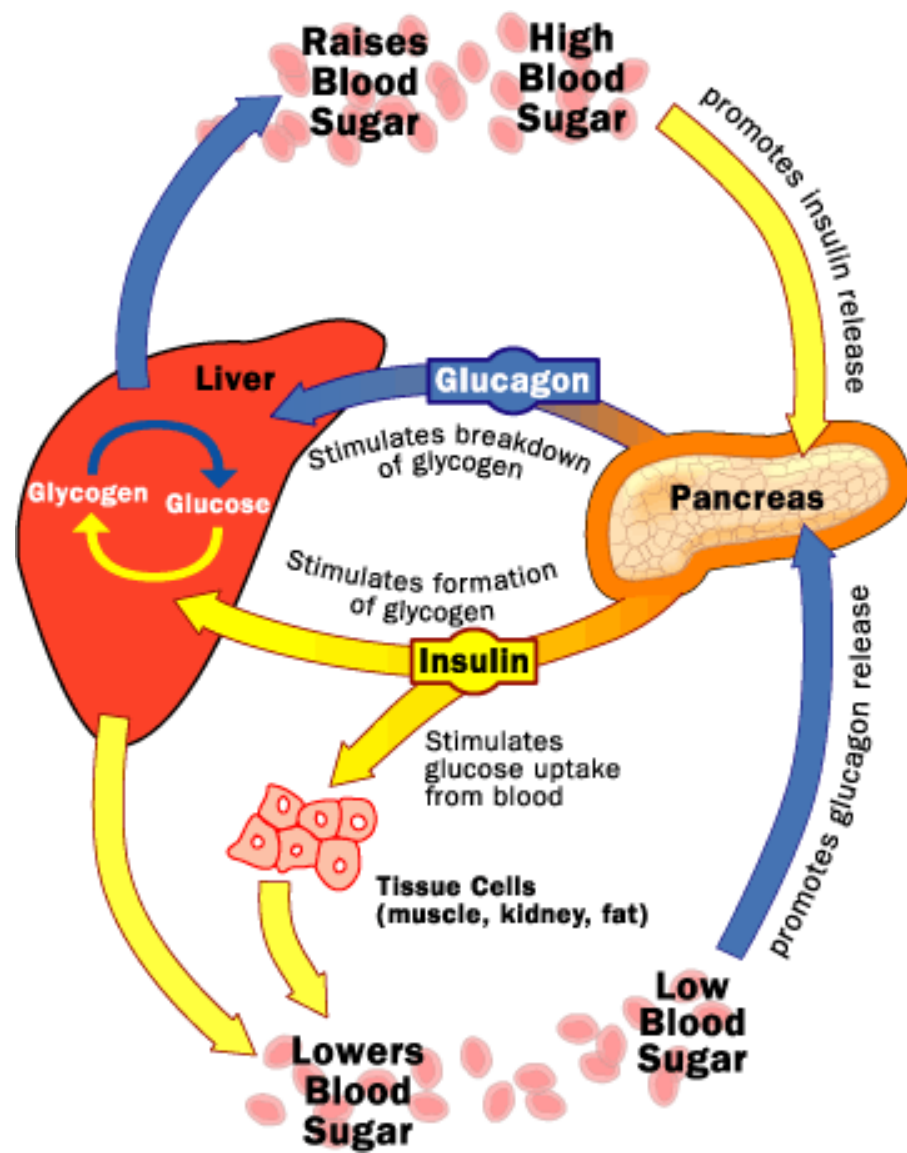
High School Swimmer

- Early morning swim practice
- Starts class at 7:30am skips breakfast
- Has an early lunch
- May eat a snack before afternoon workout
- Begins to get fatigued after about 30 minutes of swimming
- Started consuming a sports drink with 6% CHO or energy bar before workouts



Energy Sources In The Body

Energy Source	Storage Area	When Used	Activity
ATP	All Tissues	All the time	Sprinting (0-3 Sec)
Phosphocreatine	All tissues	Short bursts	Shot put, high jump, bench press
Carbohydrate (anaerobic)	Muscles	High intensity lasting 30 seconds to 2 minutes	200 meter sprint, 50 meter swim
Carbohydrate (aerobic)	Muscles and Liver	Exercise lasting 2 minutes to 3 hours or more	Jogging, soccer, basketball, swimming
Fat (aerobic)	Muscles and fat cells	Exercise lasting more than a few minutes; greater amounts are used at lower exercise intensities	Long-distance running, marathons, ultra marathons, day long hikes



Guidelines for Carbohydrate Intake During Exercise

During brief exercise	<45 min	No CHO needed
During sustained high intensity exercise	45-75 min	Small amounts including mouth rinse
During endurance ex. Including stop and start	1-2.5 hours	30-60 g/hr.
During ultra-endurance	>2.5-3 hours	Up to 90 g/hr.

Burke, Hawley, Wong and Jeukendrup, 2011

Low Carbohydrate Availability

“Train Low”

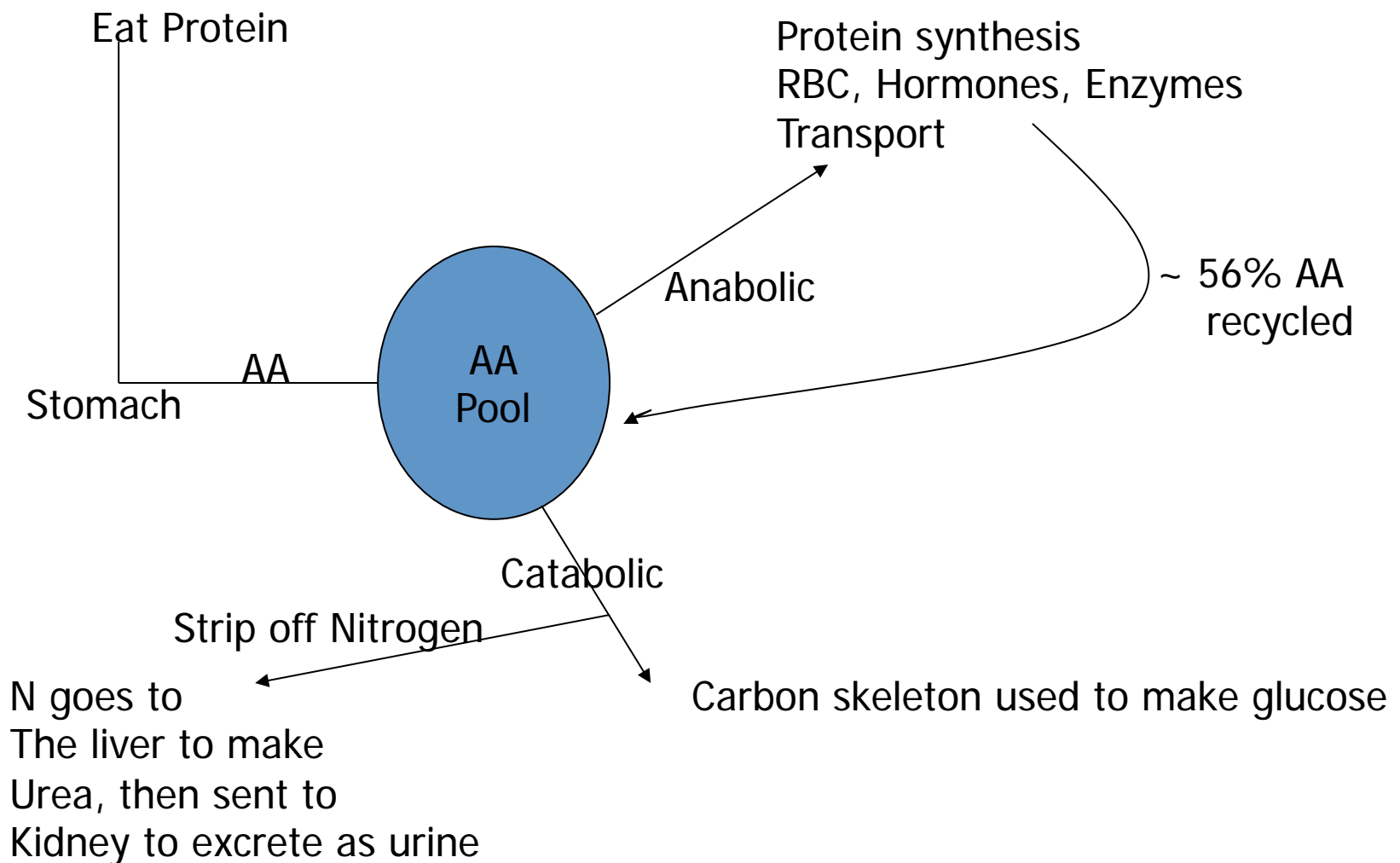
- Paradigm of training with low muscle glycogen to enhance rates of fat oxidation and drive further training adaptations
- Most studies show a compromise in power output when exercising with low glycogen stores
 - Found metabolic changes but no improvement in time-trial performance

Protein

- Primary role in the body is to “build and repair”
- Hormone and Enzyme
- Fluid Balance
- Maintains pH
- Transport
- Antibodies

Protein Metabolism

200 g of Pro is turned over daily



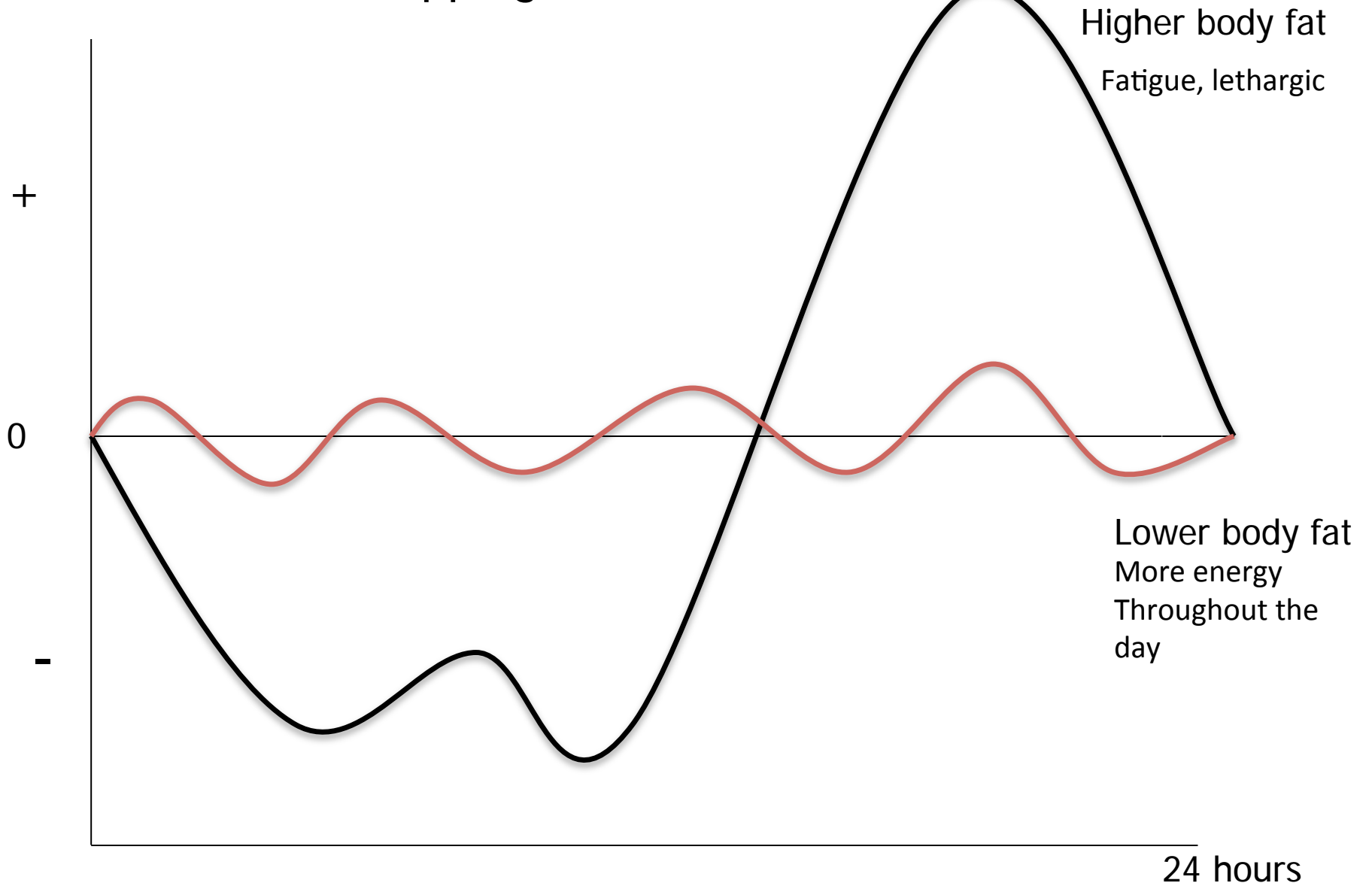
Protein Consumption

- Most athletes can easily meet their protein requirements through a well-planned diet
- Should include high quality of protein that is spread throughout the day rather than consumed in large amounts in one single meal.
- Protein Quality
 - Based on its digestibility but primarily on its essential amino acid profile

Protein Recommendations

- Based on body weight
- Growth need more protein
- Infants are highest
- Teens next
- Adults-0.8 grams of protein/kgbw
- **Athletes 1.2-1.7 grams of protein/kgbw**

Effects of skipping meals



Athletes who skip meals and only eat one meal per day have higher body fat

Deutz et al, 2000 Med Sci Sports Exerc 32(3) 659-68

Is It a Nutrient or Supplement?

- Definition of nutrient;
 - Substance that provides nourishment and is essential for growth and maintenance of life.
 - must provide a specific biological function.
 - Removing it from the diet causes a decline in biological function w
 - reintroducing it to the diet restores the body back to normal.
- Many Americans believe that they are not getting enough essential nutrients in their food or diet
- Rely on supplements to fill the gaps.
 - Supplements may contain essential nutrients they may also contain substances that have no biological function.

Dietary Supplement Health and Education Act of 1994
(**DSHEA**) Public Law 103:417, 103rd Congress

The term “dietary supplement”

- Means a product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients
 - A vitamin
 - A mineral
 - An herb or other botanical
 - A dietary substance for use by man to supplement the diet by increasing the total dietary intake; or
 - A concentrate, metabolite, constituent, extract or combination of any ingredient described above

Dietary Supplement Health and Education Act of 1994
(DSHEA) Public Law 103:417, 103rd Congress

- **DSHEA is the most important legislation on dietary supplements to date:**
- Assumes supplements are safe
- Consumers have the right of access to supplements
- Limited FDA authority over supplements
- No pre-market approval required
- Limited post-market reporting or surveillance
- Burden of proof of safety and efficacy falls on company

Supplement Use

- The allure of dietary supplements is to those who seek improved health, fitness or performance lacks no luster.
- Recent projections indicate that there will be a doubling in size of this \$30 billion-plus industry before the decade ends

Scope and Use

- 30,000 supplements on the market
 - 100 companies who supply formula to about 130 supplement makers
- 27-33 billion dollars spent on dietary supplements annually
- Sales occur in the natural/specialty retail stores, mass-market retail and direct-to-direct consumer sales
- Over 50% of Americans take supplements
- 40-60% of athletes take supplements
- Athletes reporting supplement use:
 - 3-5% of athletes in grades 6-8
 - 42% of adolescents
 - 42% of college freshman football players
 - 76% of college athletes

Why Do Athletes Use Supplements ?

Why athletes think they need supplements

- Reached a plateau in training
- Peer pressure
- Cultural norm
- Psychological effects
- No drug testing
- Competitors use supplements
- Best athlete on team using them

What they think supplements will do

- Have a positive physiological effects such as:
 - increasing performance and endurance
 - health maintenance
 - preventing injuries

Who Should take a supplement?

- Food First
- Those following a very low calorie diet
- Certain diseases, malabsorption
- Strict vegetarian
- Pregnant women
- Elderly
- Alcoholics
- Recovering from surgery, trauma

Which supplements should you take?

- Price is not an indication of quality
- Look for USP standards
- Look for expiration date
- **Should not** contain more than 100% of RDA for vitamins and minerals
- Watch for herbal content
- **CONSUMER BEWARE**



What is claimed about the product and active ingredient and is there supportive evidence?

- [ACSM's Sports Performance Center](#);
- [Academy for Nutrition and Dietetics - Supplements and Ergogenic Aids for Athletes](#);
- [U.S. FDA Consumer Updates on Dietary Supplements](#);
- Third party nonprofit organizations or businesses that test or evaluate supplements, e.g. [ConsumerLab.com](#), [NSF[®] International](#), [Consumer Reports](#) or [United States Pharmacopeial Convention \(USP\)](#).

Resources

- Is use of this ingredient permitted by the group that governs my sport?
 - High school: *see* [National Federation of State High School Associations;](#)
 - College: *see* NCAA policy information on [2014-17 Banned Drugs,](#) [Nutritional Supplements – What Now?,](#) and fact sheet on [Understanding Dietary Supplements;](#)
 - U.S. Anti-Doping Agency: *see* [USADA's Dietary Supplement Safety and Awareness Resource](#)

Food For Thought

- Nutrition goals and requirements are not static
- Nutrition plans need to be personalized to individual athletes
 - Express energy, CHO and PRO using guidelines per kg/bw
 - Timing of nutrient over the day
- Stay within your scope of practice
 - Use a sports dietitian (CSSD)

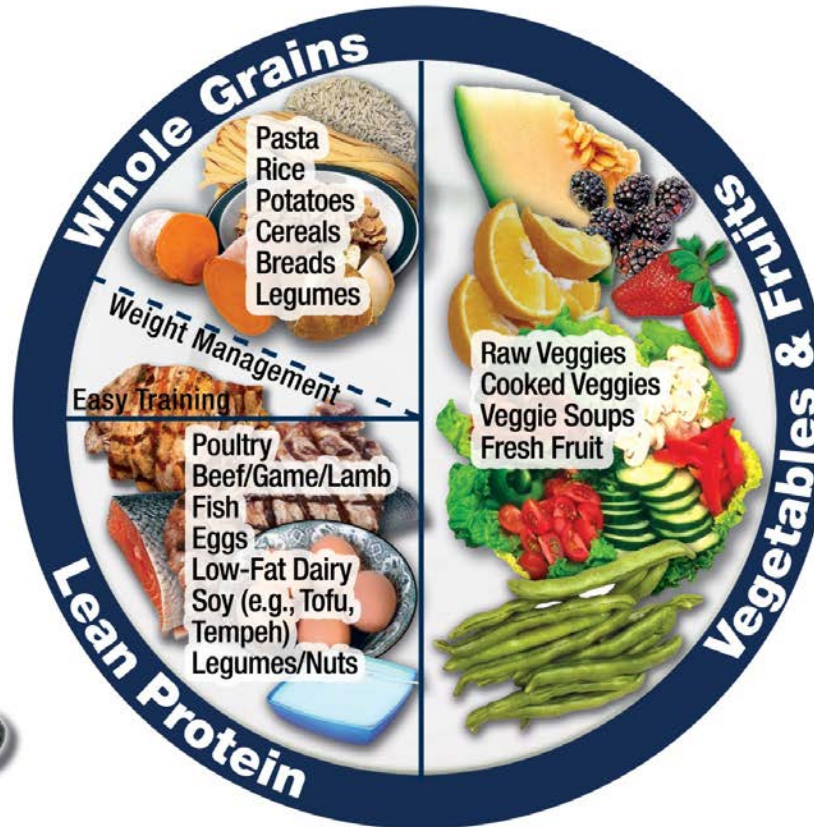
EASY TRAINING / WEIGHT MANAGEMENT:

FATS

1 Teaspoon



Avocado
Oils
Nuts
Seeds
Cheese
Butter



Water
Dairy/Nondairy
Beverages
Diluted Juice
Flavored
Beverages

Coffee
Tea

FLAVORS

Salt/Pepper
Herbs
Spices
Vinegar
Salsa
Mustard
Ketchup



MODERATE TRAINING:

FATS

1 Tablespoon

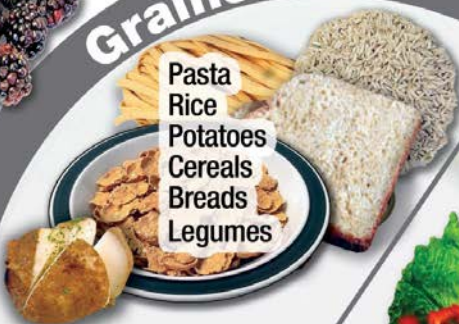


- Avocado
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- Nuts
- Seeds
- Cheese
- Butter

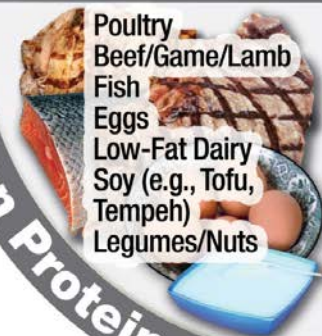


Grains

- Pasta
- Rice
- Potatoes
- Cereals
- Breads
- Legumes

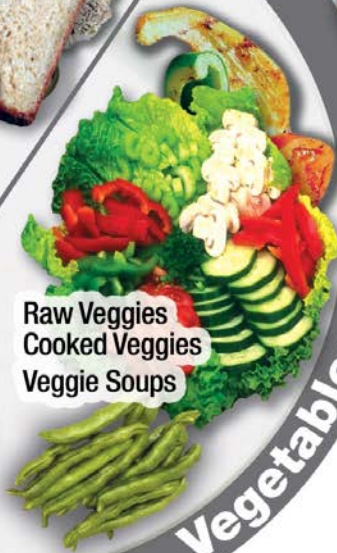


- Poultry
- Beef/Game/Lamb
- Fish
- Eggs
- Low-Fat Dairy
- Soy (e.g., Tofu, Tempeh)
- Legumes/Nuts



Lean Protein

- Raw Veggies
- Cooked Veggies
- Veggie Soups



Vegetables

- Fresh Fruit
- Stewed Fruit
- Dried Fruit



- Water
- Dairy/Nondairy Beverages
- Diluted Juice
- Flavored Beverages



Coffee
Tea

FLAVORS

- Salt/Pepper
- Herbs
- Spices
- Vinegar
- Salsa
- Mustard
- Ketchup



HARD TRAINING / RACE DAY:

FATS

2 Tablespoons



Avocado
Oils
Nuts
Seeds
Cheese
Butter



Grains

Pasta
Rice
Potatoes
Cereals
Breads



Fresh Fruit
Stewed Fruit
Dried Fruit

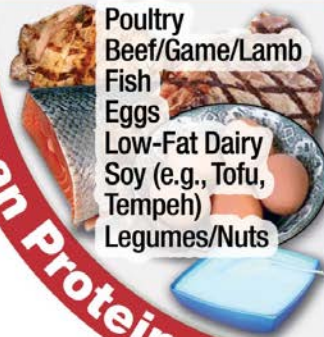


Water
Dairy/Nondairy
Beverages
Diluted Juice
Flavored
Beverages

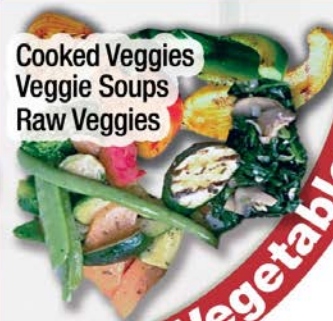


Coffee
Tea

Poultry
Beef/Game/Lamb
Fish
Eggs
Low-Fat Dairy
Soy (e.g., Tofu,
Tempeh)
Legumes/Nuts



Cooked Veggies
Veggie Soups
Raw Veggies



Lean Protein

Vegetables

FLAVORS

Salt/Pepper
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