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Nutrient Timing

- Is WHEN you eat as important as WHAT and HOW MUCH?
- Who benefits most?
 - Athletes
 - Weight Loss



The Basics

- Eat every 2 to 3 hours
- Increase vegetable & fruit intake
- Eat adequate protein
- Add healthy fats
- Decrease calorie-dense beverages
- Eat whole foods



“The Plate”



2011 Dietary Guidelines for Americans

Using "The Plate:" Recommended Servings Per Day*

Grains	5 – 8 oz. /day	Half should be whole grains.
Veggies	2 – 3 cups /day	Vary your veggies.
Fruits	1.5 - 2 cups /day	Focus on fruits.
Dairy	3 cups /day	Get your calcium rich foods.
Protein	5 – 6 oz. /day	Go with lean protein.

**This is appropriate for individuals who get less than 30 minutes per day of moderate physical activity. Those who are more physically active may be able to consume more.*

Macronutrient Profile

- American Dietetic Association (ADA) Recommendations



Carbs	45-65%	225-325g
Protein	10-35%	50-175g
Fats	20-35%	44-78g

Based on 2000 Calories/day diet

Common Meal Distribution

- Consume mixed meals that each maintain the desired distribution of macronutrients



From Simple to Complex



- Exercise increases demands for:
 - Carbohydrate
 - Energy to sustain intensity and duration
 - Stimulate insulin during recovery
 - Protein
 - Reduce muscle loss
 - Rebuild lean tissue

Fuel Demands by Exercise Type

- Low to moderate intensity endurance activities are driven predominantly by glucose and fat metabolism
- High intensity activities such as Resistance Exercise and Anaerobic Interval Training rely on glucose metabolism and ATP for fuel

Fuel for Exercise Intensity

- Higher the intensity, greater the catabolic response
- Greater demands for protein
- Intensity – time, %VO₂ Max, % 1 RM



The Solution

- Consume primarily carbohydrate (esp. simple sugars) and protein in close proximity to training
- Consume fat, protein, and low glycemic carbohydrates (i.e. vegetables) at additional meals



Begin with Total Calorie Intake

- Adequate total intake is most important factor related to performance
- Caloric requirements vary depending on:
 - Activity level, FFM, genetics, goals, dieting history, and body type
- Rule of Thumb:
 - 37 to 41 kcal/kg plus calories to cover exercise session

Exercise Increases Calorie Needs

- 70 kg runner (~154 lbs) who runs 10 miles per day at a 6 minute pace
 - 2590 to 3290 REE
 - 1000 kcal to cover exercise expenditure
 - 3590 to 4290 calories per day



Women and Calories

- Female athletes tend to restrict calories
- Intakes below 2000 calories may result in disruption of reproductive function and may contribute to the Female Athlete Triad of amenorrhea, disordered eating, and bone loss



"But...if I'm taking in calories during exercise, I'll gain weight"

Supportive Research

- Consuming a CHO replacement beverage during exercise (65% VO₂) did not result in greater total calorie intake for the day
- Drinking the beverage did not significantly affect fat utilization during or after exercise
- Drinking the beverage decreased fatigue
- 13 females, BMI 25 aged 18-30
- *Int J Sports Nutr Exerc Metab (2002)*

Pre-Exercise Nutrient Intake

- Meal containing
 - 30 to 60 grams of **Carbohydrate**
 - 7-10 grams of **Protein**
 - Low in fat and low in fiber for easy digestion and quick gastric emptying
 - Adequate fluids



Fueling for Resistance Training

- Emerging evidence supporting greater protein intake prior to resistance training
- 20 to 30 grams of high-quality protein just prior to resistance training results in greater positive nitrogen balance
- Limited number of studies

Sample Pre-Exercise Meals

- 1 cup low fiber cereal with ½ cup skim milk
- 1 medium banana with 6 oz lowfat yogurt
- 1 piece string cheese with 2 pieces toast
- 2 pieces bread with small amount meat
- 6 oz lowfat yogurt with ¼ cup dry cereal
- Homemade smoothie of 1 cup milk and 1 banana or other well-tolerated fruit

While You're Training

- Carbohydrates
- Protein
- Adequate Fluids
- Well-tolerated

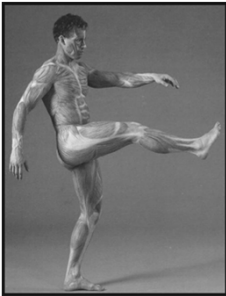


During the Workout



- 0.7 g Carbohydrate per kg body weight per hour (about 30 to 60 grams)
- Most effective when consumed every 15 to 20 minutes rather than in a large amounts
- Fluids aid gastric emptying as do larger amounts at a time (gulping vs sipping)

During the Workout



- Protein – controversial regarding protein's role just before and during exercise
- 2% or less concentration (about 5 grams per 8 oz) or 0.04 g/kg per hour IN ADDITION TO carbohydrates
- Typically whey protein or branched chain amino acids for improved absorption

Sample Exercise Meals

- 4 oz skim milk first 15 minute fluid break washed down with 4 oz water
- Repeat at second fluid break
- Remaining fluid breaks one handful pretzels or crackers with 6-8 oz water
- ***Experiment with what the person can tolerate: this is highly individualized***

Carbs and Protein during Exercise

- Who may Benefit?
 - Exercise session lasting longer than one hour
 - High intensity exercise of any type
 - Looking for an increase in performance
 - Exercise after a fast >4 hours
 - Suboptimal overall eating pattern: skipping meals and snacks, inadequate total energy intake, low carbohydrate diet



Exercise & Hydration

- Hydration is the ultimate performance enhancer
 - As little as 2% dehydration decreases performance (thirst is not an indicator)
 - Severe dehydration is life-threatening



Fluid Recommendations

- 16 ounces 2 hours prior to exercise
- 6 to 8 ounces every 15 minutes during exercise
- Replenish fluids at a rate of 16 ounces for every pound lost
 - It is important to drink all day, not play “catch-up” just before the workout

Taste Factor

- People voluntarily consume more fluid if it is a flavored beverage and if it is cool
- Kids prefer flavored beverages over water



Post-Workout/Recovery Meals

- Immediately after and up to two hours post-workout
- Goals are to:
 - STOP protein breakdown
 - START protein resynthesis
 - REPLENISH glycogen stores



Hormonal Response

- Anabolic hormones: insulin-like growth factor, insulin, testosterone, growth hormone work to reverse the effects of the catabolic hormones
- Consumption of carbohydrates and protein soon after exercise speeds up this process. Failure to consume adequate nutrition lowers this response

How Soon Should You Eat?

- Fast Acting Protein and Carbohydrate A.S.A.P.
- Optimal window for glycogen repletion is 15 to 60 minutes following your workout
 - Digestibility and glycemic index aren't as important post-workout



Macro-Nutrients in Recovery

- 1.5 gram CHO/kg BW over a 2 hour period
- 0.5 g/kg protein over a 2 hour period
- Optimal absorption and nitrogen balance occurs with <30 grams at a time
- Protein requirements may be less for endurance athletes -



Examples (Based on 170 lb)

- 15 min post-workout 12 oz chocolate milk
- 45 minutes post-workout Ham and Cheese Sandwich with an apple and 8 oz orange juice
- 15 minutes post-workout 3 chocolate chip cookies with 1 cup milk
- 1 hour post workout spaghetti (2 cups) with meat sauce (2 oz meat), grapes and 1 oz cheese for dessert

What's More Effective?

- Evidence supporting milk, chocolate milk, and cereal as effective post-workout nutrition
- Most research is done on formulated products due to funding
- Cost, Convenience, Taste, Tolerance



Distributing Remaining Nutrients

- Generally within 2 hours following the workout, begin tapering C + P
- Increase vegetable intake, add healthy fats and fiber



Sample

- 150# with calculated total calorie needs at 2000kcal/day
- C: 65% or 325g
- Pre-workout: 60g
- During Training: 47g
- Post-workout: 102g
- Total: 209g = 64% total C
- Rest of Day: 116g = 36%

Special Needs of Athletes

- Consume a minimum of 50% Carbohydrate
 - 3 to 5g/kg bodyweight
- Athletes may require additional Protein
 - 1.2 to 1.7 g/kg, okay to include non-meat sources
- Fat should comprise at least 20% of daily calories



What About Fat?

- Fat slows absorption of other nutrients.
- EFAs
- Athletes need fat
- Focus on the healthier fats – monounsaturated, then polyunsaturated.
- Limit trans fats and saturated fats
- Generally recommended athletes consume at least 20% calories from fat



Mixed-Meal Examples

- Baked potato with lowfat sour cream, Baked Chicken, Steamed Broccoli with Olive Oil dressing
- 1 cup pasta, ½ cup meat sauce, 2 cups green beans w/almonds
- 2 bean burritos with lettuce, tomato, shredded cheese, and salsa
- Tuna salad sandwich on whole grain with mixed tossed salad and olive oil dressing

Meal Replacements

- Generally lack fiber
- Lack phytochemicals and antioxidants found in food. May also be lacking in vitamins and minerals found in food
- Food variety helps insure good health



Planning Your Attack

- When will you exercise?
- What type of exercise will you be doing?
- How INTENSE will your training be?



Sample: Morning Workout: 7 AM

Meal #1	6:00 am	C + P
Meal #2	8:00 am	C + P
Meal #3	10:00 am	C + P + F
Meal #4	1:00 pm	P + C + F
Meal #5	4:00 pm	P + C + F
Meal #6	7:00 pm	P + C + F

**Sample:
Lunch Workout: 12 Noon**

Meal #1	6:00 am	P + C + F
Meal #2	9:00 am	P + C + F
Meal #3	11:00 am	C + P
Meal #4	1:00 pm	C + P
Meal #5	3:00 pm	C + P + F
Meal #6	6:00 pm	P + C + F

**Sample:
Evening Workout: 6 PM**

Meal #1	6:00 am	P + C + F
Meal #2	9:00 am	P + C + F
Meal #3	12:00 pm	P + C + F
Meal #4	3:00 pm	P + C + F
Meal #5	5:00 pm	C + P
Meal #6	7:00 pm	C + P
Meal #7	9:00 pm	C + P + F

“Never eat after 7pm”

1. No correlation between frequent snacking, including evening snacks and incidence of overweight
2. Some evidence a controlled quantity of bedtime snack may aid weight control
3. Perceived hunger and satiety are 2 major factors in dietary adherence

What Happens During Sleep?

- Growth hormone levels peak during sleep
- Testosterone levels drop with long-term sleep deprivation
- Cortisol and catecholamine levels rise with long-term sleep deprivation
- IOM recommends 6-8 hours of sleep
 - Inadequate sleep linked to hypertension, obesity, type II diabetes



Calorie Needs Present in Sleep

- During sleep, the body moves into a fasting state
- Glycogenolysis and gluconeogenesis occur to maintain blood glucose levels
- Eating a meal 2-3 hours and a snack 15 to 30 minutes prior to sleep decreases level of catabolism

Is a Midnight Snack Advisable?

- Weigh benefit of middle-of-the-night snack and improved anabolism vs. potential loss of sleep
- Good quality & quantity of sleep trumps benefit of a 3 am snack



Clients with High ADLs

- Activities of Daily Living increase NEAT (non-exercise activity thermogenesis), thus increasing need for carbohydrate in individuals with VERY active jobs and lifestyles.



Additional Weight Loss Strategy

- Nutrient Timing is effective for enhancing weight management goals
 - Lower glycemic carbs, lower overall caloric intake during rest of the day



Build Foundation First

- 80-90% of most performance and weight loss goals will be accomplished via basic nutrition principles



Principles of Healthy Eating

- Eating 5-6 meals per day
- Consuming adequate amounts of protein
- Eating breakfast
- Increasing vegetable intake
- Reducing refined sugars, etc



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