Sports Nutrition: Practical Application of Evidence-Based Guidelines

EATA Annual Symposium
Saturday, January 7, 2012

Presented By:
Jennifer M. Doane, MS, RD, CSSD, LDN, ATC
Advantage Nutrition & Wellness, LLC
Looking For An “RD”

Registered Dietitian

- Legally protected title that can only be used by practitioners who are authorized by the Commission of Dietetic Registration of the American Academy of Nutrition and Dietetics (formerly American Dietetic Association)

- All RD’s hold at least a bachelor’s degree, completed required hours of supervised practiced, as well as having passed the national registration exam
Looking For A “Nutritionist”

“Nutritionist”

- Some dietitians call themselves nutritionists, however not all nutritionists are registered dietitians
- Some states have licensure laws that protect the term however in other states virtually anyone can call themselves “nutritionist”
Board Certifications

- **Board Certified Specialist in Sports Dietetics (CSSD)**
  - Just as many other medical professions have specialty areas, RD’s are now being held to their practice standards through national board certifications.
  - An RD which completes a minimum of practice hours in the realm of sports nutrition and successfully completes a board certification exam (5 year certification)
What Services Do RD’s Provide

- Clinical Nutrition – Acute Care/inpatient
- Clinical Nutrition – Ambulatory Care
- Clinical Nutrition – Long-term care
- Community Nutrition
- Food and Nutrition Management
- Consultation and Business
- Education and Research
ATC’s Also Nutrition Care Providers

- Nutrition falls within the domains of practice for ATC’s
- First line of support for all athletes within the sports medicine team
- Just as you refer to your physician after assessing the appropriate signs/symptoms of an injury....When assessing an athlete nutritionally an ATC needs to be able to recognize when to consult with a CSSD for optimal outcomes
Rationale For Nutrition Consult Order

Nutritional guidance to enhance the following:

- Exercise / Sport training capacity
- Athletic performance
- Recovery from illness and/or injury
- Overall health of athletes and physically active adults
Goals for Athletes

- Meet the demands for energy, fluid, and nutrients imposed by physical activity
- Achieve and maintain levels of body mass, muscle mass, and body fat appropriate for athletic performance as good health
- Fuel and hydrate adequately to delay fatigue during training and competition
- Promote recovery after training and competition with adequate food, fuel, and fluid
- Maintain and promote health and wellness
- Prevent illness and injury
- Maintain and achieve normal menstrual function
- Prevent eating disorders
- Support rehabilitation from injury
Criteria To Assign Risk

- There are certain “red flags” to watch out for that determine nutrition risk
- Understanding these signs and/or symptoms of greater nutrition risk will be the cornerstone to a positive referral and adequate nutrition intervention
Consultation With An RD...
Provides Medical Nutrition Therapy (MNT)

- Iron depletion
- Iron deficiency anemia
- Poorly controlled diabetes
- Hypoglycemia
- Cardiovascular conditions
- Food Allergies
- Food intolerances
- Bone mineral disturbances
- Hemochromatosis
- Eating Disorders
- Female Athlete Triad
- Vitamin/mineral deficiencies
- Gastrointestinal Disorders
- Hydration Issues / Hyponatremia
Nutrition Prescription
Synonyms or Acronym

- CHO = Carbohydrates
- PRO = Protein
- BW = Body Weight
- FM = Fat Mass
- FFM = Fat-free Mass
- Kcal = kilocalories
- g = gram
- kg = kilogram
- L = liter
- d = day
- hr = hour
- PWO = post workout
Nutrition Care Process

- Nutrition Assessment
- Nutrition Diagnosis
- Nutrition Intervention
- Nutrition Monitoring & Evaluation
Nutrition Care Process

- Nutrition Assessment
  - Information and data are collected such as nutrition-related history, biochemical data, medical tests, anthropometric data, nutrition-focused physical findings and personal history
  - This can be the RD or ATC in the care team
Nutrition Care Process

- Diagnosis
  - Data in the nutrition assessment guides in the selection of the appropriate nutrition diagnosis (i.e. – naming the specific problem)
nutrition intervention that will be directed to the root cause (etiology) of the nutrition problem and aimed at alleviating the signs and symptoms of the diagnosis
Nutrition Care Process

- Monitoring / Evaluation
  - The final step, which the RD uses to determine if the athlete has achieved or is making progress towards the planned goals

Nutrition Care Process SNAPshots
Role of Nutrition for Athletes

- “Paycheck”
- Improve performance
  - Strength
  - Power
  - Endurance
- Each sport has its own unique nutrient and energy demands
- As a practitioner – Knowing the different aspects of each sports is a MUST to be effective
Nutrition Comes From Six Essential Nutrients

- Carbohydrates → Quick Energy
- Proteins → Structure (Reserve Energy)
- Fats → Back-Up Energy
- Vitamins → Functional
- Minerals → Functional
- Water → All Body Processes and Structures
Overview of Energy

- Movement requires energy to fuel muscle contraction
- Varies greatly among sports
- ATP, our ultimate source of energy
- Chemical energy stored in the phosphate bond of ATP is converted to mechanical work in skeletal muscle by hydrolysis of ATP
- ATP is stored in limited quantities
- However, can be rapidly synthesized by input of energy to join inorganic phosphate with ADP

\[ \text{ATP} \rightarrow \text{ADP + Pi + Energy} \rightarrow \text{ATP} \]
Where Does ATP Come From

- Three energy systems replenish ATP to meet energy needs for all body functions:
  - **Creatine Phosphate** (CrP) provides immediate anaerobic energy
  - **Anaerobic Glycolysis** provides short-term energy anaerobically
  - **Oxidative Phosphorylation** provides longer term energy via aerobic glycolysis and aerobic lipolysis
Energy System Integration

- All 3 energy systems contribute to ATP production for muscle contraction
- They contribute variable amounts influenced primarily by intensity and duration of exercise
- A single energy system can predominate at a given time for a specific movement, more than one energy system typically contributes to energy production for most movements
- Exercise intensity is the most influential factor that determines which energy system is used
Creatine Phosphate (CrP)

- Anaerobic energy production with high power output
- Extremely rapid reaction
- Yields enough energy for 5-10 seconds of all-out exercise
- Muscle fatigue is associated with low levels of CrP
- Creatine is a nitrogen-containing compound that is obtained from the diet by eating meat products, primarily beef and fish
**Anaerobic Glycolysis**
*(Lactate System)*

- Involves the incomplete breakdown of glucose or muscle glycogen to produce lactate.
- Energy is released to re-phosphorylate ADP and reform ATP.
- Higher power output than oxidative phosphorylation but lower power output than Creatine Phosphate.
- Operates at the onset of all exercise but predominates in anaerobic exercise lasting 10 sec to 2 min.
- "Buys time" when O2 supply is low.

\[
\text{Glucose} \rightarrow 2 \text{ ATP} + 2 \text{ Pyruvate} \rightarrow 2 \text{ Lactate} + 2 \text{ H}
\]
Oxidative Phosphorylation

- Substrates are metabolized to provide energy for re-phosphorylation of ATP
- Carbohydrates, Fatty Acids, Amino Acids
- As long as oxygen and substrates are available then oxidative phosphorylation can proceed nearly indefinitely
- Metabolism of these substrates yields molecules which enter the Kreb’s Cycle or TCA cycle
- Electrons removed from the substrate breakdown enter the Electron Transport Chain
Characteristics of Oxidative Phosphorylation

- Aerobic re-synthesis of ATP
- **Complete breakdown** of glucose, glycogen, fatty acids, amino acids, to yield CO2 and H2O
- Slow process which requires adequate oxygen to working muscles
- Lowest power output of the three energy systems
- Predominates in exercise lasting longer than 2 minutes
- Fatigue is associated with depletion of fuel stores particularly muscle glycogen
- Efficiency of ETC = 40% with 60% of energy being dissipated as heat
- VO2 Max = upper limit of one’s ability to consume and utilize oxygen
Energy Use Summary

- Carbohydrates and Fatty acids are the main fuel for energy production during exercise.
- Amino acids from protein breakdown are used as fuel sources to a limited degree:
  - In endurance activity when glycogen stores are low about 90 minutes into an activity.
  - When carbohydrate stores are limited with insufficient calorie intakes.
Nutrition Related Fatigue

- Characterized by an inability to continue exercise at a desired pace or intensity
- Nutritional Factors
  - Iron deficiency anemia
  - Depleting muscle glycogen stores
  - Hypoglycemia
  - Dehydration
Delay Fatigue By…

- Maintain adequate carbohydrate availability
- Maintain adequate fluid intakes
- Adhering to appropriate aerobic exercise training
- Wearing appropriate clothing for environmental conditions
Complications To The Athlete With An Energy Deficit

- Loss of muscular strength
- Loss of endurance
- Decreased oxygen utilization
- Decreased aerobic power
- Decreased speed
- Loss of coordination
- Impaired judgment
- Amenorrhea
- Reduced blood volume
- Decreased blood flow to kidneys
- Loss of all muscle glycogen
- Inability to regulate body temperature
- Dehydration
- Electrolyte imbalance (cardiac complications)
Energy Balance

- An essential consideration for athletes
- The energy allocated for each macronutrient must be considered holistically within the goal of reaching energy balance and adequate intakes for all three macronutrients
- Food/History/Recall/Frequency
- Calculations for Nutrition Assessment
Calculating Energy Needs

- How many calories will I need?
  - Age
  - Gender
  - Height
  - Weight
  - Body Composition
  - Exercise Time
  - ADL
Estimated Energy Requirement

- EER is a prediction to maintain energy balance in a healthy adult of a defined age, gender, weight, height, and physical activity level consistent with good health.

- Weight in pounds = kg / 2.2

- Height in inches = meters = inches x 0.0254

- Age = years
## Energy Formulas

### Estimated Energy Requirement Formulas

<table>
<thead>
<tr>
<th>PAL Category</th>
<th>Men, Age &gt;19y</th>
<th>Women, Age &gt;19y</th>
<th>Boys, Age 8-19y</th>
<th>Girls, Age 8-19y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Low Active</td>
<td>1.11</td>
<td>1.12</td>
<td>1.13</td>
<td>1.16</td>
</tr>
<tr>
<td>Active</td>
<td>1.25</td>
<td>1.27</td>
<td>1.26</td>
<td>1.31</td>
</tr>
<tr>
<td>Very active</td>
<td>1.48</td>
<td>1.45</td>
<td>1.42</td>
<td>1.56</td>
</tr>
</tbody>
</table>

### Physical Activity Coefficient (PA)

- **Boys, age 9-18y**: $88.5 - 6.19 \times \text{Age} + [\text{PA} \times (26.7 \times \text{Wt}) + (903 \times \text{Ht})] + 25$
- **Girls, age 9-18y**: $135.3 - 30.8 \times \text{Age} + [\text{PA} \times 10.0 \times \text{Wt}) + (934 \times \text{Ht})] + 25$
- **Men, age >19y**: $662 - 9.53 \times \text{Age} + [\text{PA} \times 15.91 \times \text{Wt}) + (539.6 \times \text{Ht})]$
- **Women, >19y**: $354 - 6.91 \times \text{Age} + [\text{PA} \times (9.361 \times \text{Wt}) + (726 \times \text{Ht})]$
Activity Calories

Nutrition For Sport & Exercise

- Jacqueline Berning & Suzanne Nelson Steen
- Appendix A: Caloric Expenditure for Various Physical Activities
Quick Version

- Weight kg x 30 = maintenance
- Weight kg x 25 = weight loss
- Weight kg x 20 = basal metabolic requirement

Use your activity calories to estimate caloric activity levels
Periodization

- Energy intakes need to be adjusted!!
- Off-season
  - Heavier conditioning phases
- Two-A-Days
- Multiple sports participation
- Extended breaks
Weight Balance

- Ideal Body Weight (IBW) =
  - 100# for 5ft and 5# per in (women)
  - 106# for 5ft and 6# per in (men)

- Percentage IBW = ideal = 90-110% range

- <85% IBW = at risk for malnutrition, identifiable protein/calorie malnutrition and possibly eating disorder

- Body Mass Index (BMI) = $Wt \# / (ht in)^2 \times 703$
  - This is not an “athletic” range; most helpful for evaluating malnutrition
### Weight Balance

<table>
<thead>
<tr>
<th><strong>Body Fat %:</strong></th>
<th>17-24% women</th>
<th>9-15% men</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-13% essential</td>
<td>3-5% essential</td>
<td></td>
</tr>
<tr>
<td>20-33% average</td>
<td>11-23% average</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>BMI:</strong></th>
<th>20-24.9</th>
<th>Ideal</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18.7</td>
<td>Underweight</td>
<td></td>
</tr>
<tr>
<td>25.0 – 29.9</td>
<td>Overweight</td>
<td></td>
</tr>
<tr>
<td>30.0-34.9</td>
<td>Mild Obesity</td>
<td></td>
</tr>
<tr>
<td>35.0 – 39.9</td>
<td>Moderate Obesity</td>
<td></td>
</tr>
<tr>
<td>40.0 – 44.9</td>
<td>Severe Obesity</td>
<td></td>
</tr>
<tr>
<td>&gt; 45.0</td>
<td>Morbid Obesity</td>
<td></td>
</tr>
</tbody>
</table>
Carbohydrates

- Types of Carbohydrates (Food):
  - Simple Carbohydrates
  - Complex Carbohydrates

- Storage Forms of Carbohydrates (Body):
  - Glycogen (muscle and liver)
  - Blood glucose

- Food Sources
  - Grains and Starchy Vegetables
  - Dairy Products
  - Fruits
How Much?

- 3 – 9 g/kg/day average
  - For every 100# = 135 - 400g carbohydrates
    - Light training: 3.0 – 5.0 g/kg/day
    - Moderate or Heavy Training: 5.0 – 8.0 g/kg/day
    - Pre-event Loading: 8.0 – 9.0 g/kg (24 - 48 hrs prior)
    - Recovery Fuel: 1.5g/kg (immed & 2 hr post)

Grams verses Percentage of Calories

- Ideal = 55 – 60% total calories

Very variable depending upon:
- Sport
- Competition vs. Training
- Actual Minutes of Activity
## Recommended CHO Intake Prior To Exercise

<table>
<thead>
<tr>
<th>Carbohydrate (g/kg)</th>
<th>Time Prior To Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1 Hour</td>
</tr>
<tr>
<td>approx. 40-50g / 100#</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>2 Hours</td>
</tr>
<tr>
<td>approx. 90-95g / 100#</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>3 Hours</td>
</tr>
<tr>
<td>approx. 135-140g / 100#</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>4 Hours</td>
</tr>
<tr>
<td>approx. 180 – 185g / 100#</td>
<td></td>
</tr>
</tbody>
</table>
Carbs Too Low?

■ Muscles:
  - Inadequate carbohydrate intake is the largest factor for the onset of fatigue
  - Most injuries occur late game/practice when fatigue increases

■ Mind:
  - Concentration
  - Skill level and performance
Best Type of Carbohydrate For Muscle Energy

- **Glucose:**
  - complex carbohydrates and starches

- **Sucrose:**
  - table sugar

- Glucose and sucrose are twice as effective as fructose in restoring muscle glycogen after exercise
  - Fructose = liver glycogen
  - Glucose/Sucrose = muscle glycogen
Fats

- Types of Fats (Food):
  - Saturated Fats
    - Trans Fats
  - Unsaturated Fats
    - Poly-
    - Mono-

- Food Sources
  - Meat/Proteins
  - Added Fats
  - Whole Grains
  - Dairy Products

FATS Burn Within A Carbohydrate Flame!!
How Much?

- Low-fat = 20-30% of calories coming from dietary fat
  - About .8 - 1.0g/kg or 40 - 45g every 100#

- Consuming less than 20% of your calories from fat (< 22g / 1000 kcal)
  - Develop EFA deficiency
    - Cell Structure, Nerve Integrity
    - Immune Function
    - Sufficient energy for endurance performance
Benefits of Fats

- All cellular structure
- Absorption and storage of fat soluble vitamins
- Hormone Balance
  - Estrogen imbalance = poor bone health & increased risk of stress fractures
  - Poor testosterone levels
- Blood pressure
- Blood flow regulation
- Blood clotting
- Inflammation
- Bronchiole air flow
Fuel Comparison

For every 100#...
1,200 kcal stored carbohydrates
40,000 to 70,000 kcal stored fat

- All muscles require CHO as their main fuel supply
- Carbohydrates determine how long you can exercise!!
Substrate Utilization At Different Exercise Intensities

Protein

- **Primary Function**
  - Structure
  - Not an efficient energy source

- **9 Essential Amino Acids**
  - Complete proteins
  - Animal vs. plant proteins

- **Food Sources:**
  - Dairy
  - Meat, Poultry, Fish, and Eggs
  - Beans
  - Grains
  - Nuts/Seeds
Muscle Building

- Adequate protein intake with inadequate caloric intake *prohibits* protein balance

- You need to pay the builder to make the materials turn into a house!
  - Carbohydrates = energy
  - Protein = structure
How Much Protein?

- Current ADA Guidelines
  - Beginner
  - Adult Endurance Athlete
  - Growing teenage athlete
  - Adult building muscle
  - Estimated Upper Limits

- Average PRO Male Athletes
- Average PRO Female Athletes

- 0.85 g/kg (39g / 100#)
- 1.1 – 1.5 g/kg
- 1.2 – 1.4 g/kg
- 1.7 – 2.0 g/kg
- 1.6 – 1.7 g/kg
- 2.0 g/kg (90g / 100#)
- 1.1 – 2.0 g/kg
- 0.95 – 1.5 g/kg
Many athletes consume protein far in excess of any additional dietary requirements due to their exercise.

Extra calories = Extra energy storage = ↑ Body fat.

Strength trained athletes only require 1.12 times more protein than sedentary counterparts.
- Need for increased protein is greatest during the first phases of training (3-6 months) when muscle hypertrophy gains are the greatest.

Greater than 2.5g/kg shown to increase risks for dehydration, calcium losses, and weight gain.
- Equals decreased performance.
Fluid Replacement Guidelines

- Adequate fluid intake ensures optimal performance
- Adults – We know that even a 1-2% loss of body weight can decrease performance by 2-5%
- Adolescents require greater diligence with hydration practices because:
  - Surface area to mass ratio is much greater in children than adults thus they absorb heat more easily
  - Children lack adequately functioning sweat glands until well into puberty
  - Children/adolescents experience greater heat accumulation and heat stress
- Sports drinks beneficial if activity > 60-90 minutes
  - New low-calorie sports drinks
Fluid Replacement Guidelines

- Depletion of body water beyond 2% can cause significant impairment of endurance
- Sweat loses of 1.5L/hr common in endurance with 2.5L possible in hot/humid conditions with accelerated sweat rates
Hydration Guidelines

- **Before exercise:**
  - 16 - 24oz water 2-3 hours before exercise
  - 8oz water 10-20 minutes before exercise

- **During Exercise:**
  - 6 – 8oz every 20 minutes
  - Can be very individualized

- **After exercise:**
  - Drink 16-20 oz for every # lost during exercise
Sweat Rate Calculation

- Ensure your athlete is well hydrated prior to exercise
- Instruct athlete to warm up for 5-10 minutes until they break a sweat
- Instruct athlete to urinate if needed
- Then....
Sweat Rate Calculation

A. Record nude body weigh before exercise (kg)
B. Record nude body weight after exercise (kg)
C. Record change in body weight
D. Record drink volume consumed during exercise (oz x 30 = ml)
E. Record urine volume excreted before post-exercise weighing (oz x 30 = ml)
F. Determine sweat loss C+D-E, oz x 30 = ml
G. Record exercise time, minutes or hours
H. Calculate sweat rate = F/G in ml/min or ml/hr
Electrolyte Losses

Concentrations in mmol/L of the major electrolytes present in sweat

- Sodium     40-80 mmol/L
- Potassium  4-8 mmol/L
- Calcium    3-4 mmol/L
- Magnesium  1-4 mmol/L
- Chloride   30-70 mmol/L

Most sports drinks contain 10-30 mmol/L sodium
Hyponatremia

- Electrolyte imbalance when water is consumed and the athlete becomes water-intoxicated
- Typically occurs when athlete gains weight during an event/practice
- When water intake exceeds water loses and causes an abnormally low plasma Na+ concentration
- S/S = diarrhea, exhaustion, mental confusion, syncope and even convulsions
Working Performance Nutrition Around Their Sport

How They Eat Is Just As Important As What They Eat...
Nutrition Before Exercise

- Used to increase fuel stores
- Provide adequate hydration
- Prevent both hunger and GI distress during activity
- Consumption of 1.0-5.0g/kg of CHO 1-4 hours before exercise has potential to improve endurance performance as much as 14%
  - 50 – 230 calories of carbohydrates for every 100#
  - Focus on complex CHO (high fiber, low sugar, increased protein) and shift towards higher sugar more refined carbohydrates when closer to exercise
- High fiber, higher protein CHO foods (starchy vegetables, whole grains) may prolong endurance by maintaining higher blood glucose levels longer than sugars
- 8oz every hour within 2-3 hours before exercise
- 6 – 8oz during the 15 min before exercise
Nutrition During Exercise

- CHO ingestion between 30 and 60g/hour have been shown to benefit prolonged, moderate-intensity exercise (more than 2 hours) as well as stop & go exercise of shorter duration
  - Moderate to High “sugar” foods
  - Most athletes cannot metabolize more than 60g/hour
  - Eating foods containing higher levels of protein or fat during activity = cramping and/or GI distress

- Both fluid and CHO are shown to have a cumulative effect on performance
  - About 14g CHO in every 8oz sports drink
  - Recommend 8oz every 20 min during exercise
Nutrition After Exercise

- Consume a mixed meal of CHO, PRO, and FATS within 30-60 minutes after strenuous exercise

- CHO intake of 1.5 g/kg immediately after as well as additional 1.5g/kg 2 hours later
  - Recovery Fuel; About 68g CHO for every 100#

- Use moderate to high index CHO and small amounts of PRO (approx. 1g protein : 4g carbs)
  - Chocolate Milk?? (Note on NCAA Compliance for Collegiate Setting)

- Fats consumed after recovery are important to replace lipid stores after periods of high volume endurance training

- Consume 16-24 fl oz./# lost during exercise

- Need to include adequate electrolytes
  - Salting foods/plate is recommended for athletes
Always Be Prepared...With Snacks

- Newtons
- Cereal bars
- Pretzels
- Mini Bagels w/ PB
- Cold pizza
- Trail mix
- Nuts, seeds
- Cheese sticks
- PB, banana sandwich
- Animal crackers
- Wheat thins
- PB crackers
- Sports bars
- Dry cereal
- Yogurt
- Raisin bread
Taking A Look At...
Case Study Examples
Case Study #1

- How many calories should I consume? (WSoC)
- Age 22 years, Weight = 182.0#, Height = 5 ft 8 in
- Carbs: 8g/kg body weight x 4 g/kcal
  - \((182 / 2.2) \times 8g \times 4 = 2647 \text{ kcal CHO}\)
- PRO: 1.2 g/kg body weight x 4 g/kcal
  - \((182 / 2.2) \times 1.2g \times 4 = 397 \text{ kcal PRO}\)
- FAT: 1g/kg body weight x 9 g/kcal
  - \((182 / 2.2) \times 1g \times 9 = 745 \text{ kcal day}\)
  - \(= 3789 \text{ kcal/day}\)
Case Study #1

- Age 22 years, Weight = 182.0#, Height = 5 ft 8 in
- EER =

\[354 - 6.91 \times \text{Age} + [\text{PA} \times (9.361 \times \text{wt}) + (726 \times \text{ht})]\]

\[354 - 6.91 \times 22 + [1.45 \times (9.361 \times 82.6) + (726 \times 1.73)]\]

\[202 + [1.45 \times 773 + 1256]\]

2579 kcal/day
Case Study #2

**Am I drinking enough fluids? (Football)**

- Nude weight before px. = 215#' / 2.2 = 97.7 kg
- Nude weight after px. = 208#' / 2.2 = 94.55 kg
- Greater than 1-2% dehydration loses = concern
- Represents 3.2% weight change at practice or 3.15 kg
- Football player drank 32oz @ px x 30 = 960 ml
- Urine output before post-px weight = 9oz x 30 = 270 ml
- Equals = 693.15 ml per practice
- Practice was 2 hours = 346.6ml/hour or 11.6 oz/hour or additional 2.9oz per water break
- If the athlete was drinking 8 ounces every 15 minutes he will now require 11 oz every 15 minutes
- **NATA Guidelines:** 16-24 oz per # lost (7#) = 112 – 168 fl oz within 2 hours recovery hydration
Case Study #3

- I want to lose 5# for running XC, Can/Should I do this?
- 18 yo female, Height 5 ft 6 in, Weight 115#
- IBW = 130#, %IBW = 88.5% IBW
- BMI = 18.56

- Goal Setting: 90% IBW and BMI 18.9 = 117#
  95% IBW and BMI 19.9 = 123.5#

- Recommend weight gain for health and performance; Need to assess menstrual cycle regularity; Focus on calorie balance
Healthy Weight Control

- Focus on positive changes of food choices and portions FIRST
- Tread carefully on caloric restriction
  - Growth and development considerations (about 25kcal/day)
  - Can have athlete gradually decrease calories 200 up to 400/day
  - Increased cardio training esp. if moving into off-season
- Have athlete be more responsible for po intakes
  - Food records
  - Collect food label for ALL foods
Weight Control Practices

- “Athletes”, especially youth athletes, are most at risk for developing eating disorders and/or disordered eating behaviors.
- Appearance sports such as gymnastics, figure skating, ballet as well as sports where low fat mass is beneficial such as wrestling, rowing, and distance running are at highest risk.
- Periods of life transition are “weak points”
  - Start of puberty
  - Start of college
Case Study #4

- What should I eat before and after my practice? (M bball)
- 19 yo male, Weight 185#, Height 5ft 10 in

Before Practice:
- Last meal of mixed content (preference to CHOabs) @ 4 hours
- Slide towards preference of simple starches versus complex
- Finally, move towards all simple starches pre-event
Case Study #4

- **Examples:**
  - @ 3-4 hours = Brown rice/fruit/dairy
  - @ 2 hours = yogurt, fruit, cereal
  - @ 1 hour = Gatorade, cinnamon/sugar graham crackers or fruit newtons

- **CHO focus:**
  - 4 hours = 336g CHO
  - 3 hours = 252g CHO
  - 2 hours = 168g CHO
  - 1 hour = 84g CHO
Case Study #4

- **After Practice:**
- Use a 4:1 CHO:PRO ratio for recovery fuel
- Base from carbs
  - $185#/2.2 = 84.09\text{kg} \times 1.5 = 126\text{g}$ Post-WO
  - **CHO:**
    - Bagel 45g, Banana 30g, Yogurt 25g, Gatorade 16oz 28g = 128g CHO
  - **PRO:**
    - Bagel 9g, Yogurt 8g, Turkey 2oz (14g PRO) = 31g PRO
How Do We Fix This?

Fat Phobia

- **Breakfast**
  - Frosted toaster pastry or “bar”

- **Snack**
  - 6oz Hot Chocolate

- **Lunch**
  - Egg white sandwich on English muffin
  - 4 graham crackers
  - 2c sweetened dry cereal

- **Dinner**
  - 1c cream of wheat w/ skim milk
  - 1 apple

- **Snack**
  - 1 piece white cake
  - 8 pieces licorice
Recommendations

- Incorporate “healthy” fats in appropriate portions
- Add at least 3 dairy products
  - 8oz milk, 8oz yogurt, 1oz cheese or 1/2c cottage cheese
- Add 5-6 ounces of high quality protein sources
  - Lean lunchmeat at lunch
  - Poultry, lean meat, pork tenderloin, or fish
How Do I Fix This?

**Eating After An Injury**

- 6’2”, 170# athlete is post-ACL surgery and wants to know if vitamins will help healing move faster
- Food diary has shown 2,500 calories, 228g CHO, 117g PRO, and 105g FAT
- Diet changed to 3,500 calories, 558g CHO, 112g PRO, and 95g FAT
How Do I Fix This?

Eating After An Injury

- $170\text{#/}2.2 \times 30 = 2318 \text{ kcal/day maintenance}$
- $2318 \times 1.5 \text{ very active} = 3477 \text{ kcal/day}$
- Vitamin C aids collagen formation
- Vitamin A is needed for cell growth and development, bone development, and to help immune function
- Zinc is involved in wound healing
How Do I Fix This?

Vitamin C

Recommended Dietary Allowance (RDA) is 90 milligrams per day for men and 75 milligrams per day for women. Do not take more than 2,000 milligrams per day.

- Oranges and orange juice
- Broccoli
- Red bell peppers
- Strawberries
- Grapefruit and grapefruit juice
- Papaya
- Cantaloupe
- Baked potatoes
- Cabbage
- Tomatoes
How Do I Fix This?

**Vitamin A**

- Liver
- Sweet potatoes
- Carrots
- Mango
- Turnip greens
- Spinach
- Papaya
- Red bell peppers

- The RDA for vitamin A is 900 retinol activity equivalents (RAE) per day for men and 700 RAE per day for women.
- Do not take more than 3,000 RAE (10,000 IU) per day.
How Do I Fix This?

Zinc

- Meat
- Seafood
- Sunflower seeds
- Almonds

- The RDA for zinc is 11 milligrams per day for men and 8 milligrams per day for women
- Do not take more than 40 milligrams per day
Eating For Rehab

- **Breakfast**
  - Banana, 4oz 2% milk, 8oz OJ, 1c instant oatmeal

- **Snack**
  - 12oz sports drink, 1c fruit salad, 4 graham crackers, 1T PB

- **Lunch**
  - Roast beef sandwich w/ mustard, small French fries, 1/2c cole slaw, water

- **Snack**
  - 16oz cran-apple juice, 1oz cheese stick

- **Dinner**
  - 3c cooked spaghetti, 2c marinara sauce, 2oz lean ground beef, tossed green salad, veggies for salad, 1T Italian dressing, 2 T sunflower seeds, 2 slices Italian bread, water

- **Snack**
  - 1c vanilla frozen yogurt, topped with 1/2c fresh strawberries
How Do I Fix This?

**Bulking Up**

- Adding muscle mass means adding calories through carbs, not just proteins, to your diet.
- Usually rakes at least adding 500 – 1000 calories/day to create increases.
- Need to be concerned with not surpassing “extra” calories which will just be turned to FAT!!
3,800 Calories For Weight Gain

- **Breakfast**
  - 1 cinnamon raisin bagel, 4oz 100% juice, 2t butter, 1t all-fruit, 1/2c bran cereal, 8oz 1% milk

- **Snack #1**
  - 2 pieces fresh fruit, 1/2c pudding

- **Snack #2**
  - 1 sports drink, 1/4c raisins, 2.25oz pretzels

- **Lunch**
  - 1c cooked pasta, 1c pasta sauce with meat, 8 black olives, 2 bread sticks, 1t butter, 1c 1% milk, 1 pear

- **Snack #3**
  - 1 High-Carb Drink (70g CHO), rice crispy treat

- **Workout/Practice** with 40oz sports drink

- **After Workout/Practice** “Shake” with 8oz milk, 1 packet CIB, 1 banana, 1T peanut butter

- **Dinner**
  - 1/2c brown rice, 2c tossed salad, 5-7oz fish/poultry, 2T salad dressing, 1 High Carb replacer
How Do I Fix This?

Weight Loss

- All weight does not equal FAT
- Weight loss should not occur at the expense of muscle mass/lean mass, health or performance
- When is the best time to lose weight?
- Create a deficit, not a depression
- Focus on how much, how often
- Start with making better choices and “smaller” portions
Very Balanced 2,500 Calories

- **Breakfast**
  - 3c whole grain cereal, 8oz skim milk, 2c OJ

- **Lunch**
  - 2sl whole grain bread, 2oz turkey, 1oz cheese, 2t mayo, 4oz chicken/rice soup

- **Snack**
  - 2c seedless grapes

- **Dinner**
  - 2c prepared macaroni and cheese, 3oz grilled chicken, tossed salad w/ 1T dressing

- **Snack**
  - 1/2c frozen yogurt, 1t chopped nuts
Very Balanced 2,200 Calories

- **Breakfast**
  - 2sl. Toast, 2t margarine, 2 scrambled eggs, 8oz milk, 1c fresh fruit

- **Snack**
  - 8oz yogurt with 1/4c granola

- **Lunch**
  - 12” wrap, 2oz turkey, 1oz cheese; L/T, 1t mayo; fresh fruit and salad with 1T dressing

- **Snack**
  - 2-3 sour dough pretzels

- **Dinner**
  - 1c rice with vegetables – stir fry, 3oz chicken, 1c frozen yogurt with 1T cookie crumbles, 8oz milk

- **Snack**
  - 2c butter lite popcorn
  - 8oz yogurt with 2 graham cracker squares
Taking Responsibility

- Responsible for follow-through with coach...we are no different!
- Everyone is different – all nutrition plans will be different
- Good nutrition for athletes will often involve schedules and diligence rather than “feeling”
- Should also be responsible for their own fueling plan
  - Nutrition On The Go
  - Meal Substitutes
  - Trying new foods
  - Packing appropriate snacks
  - Remembering water bottle / fluids
Thank You!!

Jennifer M. Doane, MS, RD, CSSD, ATC
SCAN / NATA Alliance, Chair

Advantage Nutrition & Wellness, LLC
2005 City Line Road, Suite 104
Bethlehem, PA 18017
610-443-1885

www.AdvantageNutritionAndWellness.com
Jdoane@AdvantageNutritionAndWellness.com
References