CURRENT TRENDS IN SPORTS NUTRITION

IMPORTANT CONSIDERATIONS FOR PEAK PERFORMANCE

Alicia Kendig, MS, RD, CSSD
USOC Sports Dietitian

Functions of Food

• Locomotion
• Cellular growth, maintenance, and repair
• Growth
• Thermoregulation
• Oxidative stress regulation
• Reproduction

What is needed for optimal performance?

• Energy Availability
• Immune system integrity
• Muscle strength and contractility
• Hydration
• Oxygen availability
• Bone Density

WHAT IS NEEDED FOR OPTIMAL PERFORMANCE?

• Energy Availability
• Immune system integrity
• Muscle strength and contractility
• Hydration
• Oxygen availability
• Bone Density
ENERGY VS FUNCTIONAL ENERGY

What is needed for optimal performance?
- Energy Availability
- Immune system integrity
- Muscle strength and contractility
- Hydration
- Oxygen availability
- Bone Density

Nutrient Density
- Maintain the Nutrient Density of your food choices
  - (ND = Amt of Nutrients/Serving of Calories)
  - Vibrant fruits and vegetables
  - Packed full of vitamins and minerals
    - Dark Color Veggies
    - Nuts/Seeds
    - Avocados
    - Fish
    - Granola

Red Contain nutrients such as folate, folic acid, dihydroxy, and lycopene, to name a few. These nutrients reduce the risk of prostate, colorectal, and breast cancer, and lower tumor growth, and LDL cholesterol levels, increase heart circulation, and support osteoporosis in arthritic cases.
Orange and Orange and Green contain beta-carotene, zeaxanthin, lutein, lycopene, lutein, and vitamin C. These nutrients reduce age-related macular degeneration and the risk of prostate cancer, lower LDL cholesterol and blood pressure, improve collagen formation and healthy joints, fight harmful free radicals, scavenge harmful free radicals, and work with magnesium and calcium to build healthy bones.
Green Contain chlorophyll, beta-carotene, zeaxanthin, lutein, lutein, and vitamin C. These nutrients reduce cancer risks, lower blood pressure and LDL cholesterol levels, normalize digestion time, support retinal health and vision, fight harmful free radicals, and boost immune system activity.
Blue and purple Contain nutrients which include lutein, zeaxanthin, vitamin A, vitamin C, vitamin D, magnesium, folate, dihydroxy, and lutein. Similar to the previous nutrients, these nutrients support retinal health, lower LDL cholesterol levels, improve immune system activity, support healthy digestion, improve calcium and other mineral absorption, fight inflammation, reduce tumor growth, act as antioxidants, and reduce the risk of breast cancer.
White Contain nutrients such as beta-glucans, EGCG, SDG, and lignans. These nutrients boost the immune system, provide powerful immune-boosting activity, reduce the risk of colon, breast, and prostate cancers, and balance hormonal levels reducing the risk of hormone-related cancers.
Function: Recovery Nutrition

• Recovery Nutrition is equally as important as pre- and during meet nutrition
  – Carbohydrate and Protein
  – Chocolate Milk
  – Protein Sports Drinks during practice...
    • Endurance vs. Strength/Power
    • Prevent muscle breakdown
    • Heavier training phases

Recovery Nutrition Ideas

<table>
<thead>
<tr>
<th>Natural Foods</th>
<th>Sports Nutrition Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-fat Chocolate Milk</td>
<td>Clif Bar</td>
</tr>
<tr>
<td>Half of a bagel with fruit preserves</td>
<td>Powerbar Performance Bar</td>
</tr>
<tr>
<td>Low-Fat Yogurt with cereal/fruit</td>
<td>Endurox</td>
</tr>
<tr>
<td>Cereal with low-fat milk</td>
<td>PowerBar Recovery Drink</td>
</tr>
<tr>
<td>Peanut Butter and Jelly Sandwich</td>
<td>First Endurance Bar</td>
</tr>
<tr>
<td>Fruit Smoothie (yogurt, fruit, protein)</td>
<td>Liquid Meal Supplement (Boost, Ensure)</td>
</tr>
<tr>
<td>Turkey Sandwich</td>
<td></td>
</tr>
</tbody>
</table>

Recovery from Post-Training Immune Suppression

• Training at high intensities and volumes compromises immune system
  – Stress promotes training adaptation
• Carbohydrate depletion and energy depletion increases stress and suppresses immune function
• Choose nutrition-rich foods during training and the recovery time frame
• Fruit and other energy dense foods are optimal for recovery

Protein...how much?

• Knowing the facts
  – What makes one better than another?
Chicken Breast vs. Steak vs. Salmon

<table>
<thead>
<tr>
<th>4 oz serving</th>
<th>Chicken Breast</th>
<th>Salmon</th>
<th>Steak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>157</td>
<td>130</td>
<td>240</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>38 mg</td>
<td>30 mg</td>
<td>70 mg</td>
</tr>
<tr>
<td>Unsaturated Fat</td>
<td>0 g</td>
<td>3 g</td>
<td>0 g</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>-5 g</td>
<td>-5 g</td>
<td>7 g</td>
</tr>
<tr>
<td>Protein</td>
<td>27 g</td>
<td>23 g</td>
<td>19 g</td>
</tr>
</tbody>
</table>

How much protein do you really need?

<table>
<thead>
<tr>
<th>Weight in Kilograms (FYI, lbs/2.2 = kgs)</th>
<th>(A)______ kgs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Protein needs based on current level of training:</td>
<td>(B)_______ g/kg</td>
</tr>
<tr>
<td>Sedentary - 0.8 g PRO/kg body mass</td>
<td>(C)_______ g/kg</td>
</tr>
<tr>
<td>Endurance – 1.2-1.4 g PRO/kg body mass</td>
<td></td>
</tr>
<tr>
<td>Strength, Power, Anaerobic/aerobic – 1.4-1.6 g PRO/kg body mass</td>
<td></td>
</tr>
<tr>
<td>Weightlifting, Increase muscle mass – 1.6-1.8 g PRO/kg body mass</td>
<td></td>
</tr>
<tr>
<td>Multiply your weight (A) in kgs by the lower range (B)</td>
<td>g Pro/Day</td>
</tr>
<tr>
<td>Multiply your weight (A) in kgs by the upper range (C)</td>
<td>g Pro/Day</td>
</tr>
</tbody>
</table>

Protein Content in Common Foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Serving</th>
<th>Protein (g)</th>
<th>Food</th>
<th>Serving</th>
<th>Protein (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken Breast</td>
<td>4 oz</td>
<td>27</td>
<td>Tofu, soft</td>
<td>1 cup</td>
<td>10</td>
</tr>
<tr>
<td>Fish</td>
<td>4 oz</td>
<td>23</td>
<td>Tofu, soft</td>
<td>1 cup</td>
<td>10</td>
</tr>
<tr>
<td>Beef</td>
<td>4 oz</td>
<td>19</td>
<td>Tofu, firm</td>
<td>1 cup</td>
<td>20</td>
</tr>
<tr>
<td>Egg (whole)</td>
<td>1 large</td>
<td>7</td>
<td>Yogurt, Greek non-fat</td>
<td>1 cup</td>
<td>15</td>
</tr>
<tr>
<td>Legumes, most beans/peas (cooked)</td>
<td>⅔ cup</td>
<td>7</td>
<td>Yogurt, Light</td>
<td>1 cup</td>
<td>8</td>
</tr>
<tr>
<td>Soybeans, cooked</td>
<td>⅔ cup</td>
<td>11</td>
<td>Yogurt, Soy</td>
<td>1 cup</td>
<td>8</td>
</tr>
<tr>
<td>Soy milk</td>
<td>1 cup</td>
<td>7</td>
<td>1% fat Cottage Cheese</td>
<td>¾ cup</td>
<td>14</td>
</tr>
<tr>
<td>GREENS (cooked)</td>
<td>1 cup</td>
<td>8</td>
<td>Vegetarian Burger</td>
<td>1 patty</td>
<td>6-16</td>
</tr>
<tr>
<td>Quinoa (cooked)</td>
<td>1 cup</td>
<td>11</td>
<td>Sunflower seeds</td>
<td>3 Tbsp</td>
<td>5</td>
</tr>
<tr>
<td>Brown Rice (cooked)</td>
<td>1 cup</td>
<td>5</td>
<td>Almond/Peanut Butter</td>
<td>2 Tbsp</td>
<td>6</td>
</tr>
<tr>
<td>Oatmeal, regular (cooked)</td>
<td>1 cup</td>
<td>6</td>
<td>Fresh Vegetables (cooked), most</td>
<td>¼ cup</td>
<td>2-3</td>
</tr>
<tr>
<td>Nuts, mixed</td>
<td>2 Tbsp</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**WHAT IS NEEDED FOR OPTIMAL PERFORMANCE?**

- Energy Availability
- Muscle strength and contractility
- Hydration
- Oxygen availability
- Immune system integrity
- Bone Density

---

**Role of fluid in the body**

- **Physiological**
  - Transport: Glucose and O2
  - Muscle Contraction: Dependent on H2O
  - Excretion of toxins: Urine Production
  - Regulation of core body temperature: Via Sweat
- **Psychological**
  - Motivation: Decreased Perceived Exertion
  - Concentration: Ability to focus on race
  - Drive to compete: Both physical and psychologically!

---

**Average Recommendations**

- USDA: 3.0L a day for men
  - 2.5L a day for women
  
  *THIS DOES NOT TAKE INTO ACCOUNT SWEAT LOSSES*
- As little as 2% of weight lost in the form of sweat can affect performance
- Even in cool environments, aerobic power decreases by 5%, with 3% of body weight lost
  
  — Even greater in warm environments: aerobic capacity affected more in warm temperatures
- Losses in excess of 5% can decrease performance by 30%

---

**Urine Color Chart**

- If your urine color matches #1, 2, or 3, you are well hydrated
- If your urine color matches #4, 5, or 6, you are dehydrated
Effects of Dehydration on Performance

Study completed on basketball players with as little as 2% dehydration:
- Performance on all timed and shooting drills declined progressively as % Dehydration increased
- Subjects who were dehydrated by at least two percent consistently performed basketball movement exercises at slower rates.
- Dehydrated subjects failed to make as many shots as hydrated players.

Baker, et al. 2007, Medicine & Science in Sport & Exercise

WHAT IS NEEDED FOR OPTIMAL PERFORMANCE?

- Energy Availability
- Muscle strength and contractility
- Hydration
- Oxygen availability
- Bone Density

Generalization for Elite Endurance Athlete (Swimming?)

- Low energy availability
  - Low in carbohydrate intake
- Low in Oxygen Transporting Nutrients
  - Iron, folate, vitamin B12
- Low in bone building nutrients
  - Calcium, Vitamin D and magnesium
Oxygen Transporting Nutrients
• Iron, Folate, Vitamin B12
• Involved in the formation and integrity of Red Blood Cells

Iron Insufficiency
Causes
• Diet low in dietary iron
• Blood Loss
• Nutrient interaction and inefficient absorption
• High altitude training and increased training volume
Symptoms
• Fatigue and weakness
• Shortness of breath
• Increased heart rate

Iron Status
• Periodic CBC screening
  – Hemoglobin (Hgb)
  – Hematocrit (Hct)
  – RBC
• Serum Ferritin
  – Usually have to request

Generalization for Elite Endurance Athlete (Swimming?)
• Low energy availability
  – Low in carbohydrate intake
• Low in Oxygen Transporting Nutrients
  – Iron, folate, vitamin B12
• Low in bone building nutrients
  – Calcium, Vitamin D and magnesium
“Female Athlete Triad”

<table>
<thead>
<tr>
<th>Old School Thoughts (Females Only)</th>
<th>New Thoughts (ACSM Position Paper 2007)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anorexia, Disordered Eating</td>
<td>Low Energy Availability</td>
</tr>
<tr>
<td>Amenorrhea (No menstrual cycle)</td>
<td>Abnormal Menstrual Cycle</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>Low Bone Density, Low Vitamin D Status</td>
</tr>
</tbody>
</table>

DXA SCANs: Bone Density

DXA SCANs: Spine Scan

DXA SCANs: Femoral Scan
**Fighting Low BMD and Helping Bone Formation**

- Childhood to adulthood (30 yoa) bones forming
- Calories and Protein
- Vitamin D w/ Calcium (post blood testing)
- Weight bearing Exercise
- Avoid high intake of caffeine, protein, alcohol

**Dietary Supplements/Functional Foods**

- Ingredient sourcing is the same for supplements and functional foods
  - This opens both of them up for the same contamination issues
  - China has a bad track record of contaminated ingredients
- The FDA regulates food labeling, but currently not any “functional” foods
  - Bars, RTD’s, Protein Powders and Gels
- Intentional labeling of supplements as food to keep below banned substance certification radar is a growing trend.

**Consider Risks versus Benefits**

- Muscle Builders
- Single AAs
- Weight loss suppl.
- High doses of

**A typical list...**

- Creatine
- Caffeine
- Bicarbonate
- Dietary Antioxidants
- Carbohydrate
- Protein
- Fluids & Electrolytes
- Calcium, Iron, Vitamin D

---

*UNITED STATES OLYMPIC COMMITTEE*
Yeah, but... my supplement is “safe”

- FDA does not regulate “functional” products (Bars, RTD’s, Protein Powders and Gels) or dietary supplements.
- Intentional labeling of supplements as food to keep below banned substance certification radar a growing trend.

“WADA Certified”

Before taking any supplement ask your coach or sports dietitian!

Take Home Message on Supplements

- What can you do
  - GO NATURAL...Eat Food, Train Hard!
  - Be aware of GMP labels
  - Choose products that are 3rd Party Tested

• NSF, HFL/Informed Choice
Most Important Rule...

- A nutrition plan should be treated as part of a training plan
  - Level of commitment
  - Preparation
  - Structure
  - Recovery Days

PRO-active vs RE-active

- Introduce the idea of food as fuel early
- Educate and adopt nutrition periodization along with training periodization
- Revisit the new nutrition topics frequently
  - Shorter talks/presentation more often instead of one long one
  - Encourage hands-on activities (recipes, cooking, healthy eating)
- Focus less on the scale and more on healthy eating
- Mark changes in performance, energy levels, prevention of injury and normal menstrual function
In Summary...
Endurance athletes (Swimmers) should adjust eating patterns to high training and competition loads
• Sports nutrition education
• Accountability
• Commitment

In Summary...
Refer to multidisciplinary team (Coach, Sports RD, Sports Med)
• Sports Dietitian Search Engine, by Zip Code
  [www.scandpg.org](http://www.scandpg.org)
• USA Swimming Sports Medicine Network
  – Assess Performance, fatigue, injury
  – Monitor Blood Testing (Iron Profile, Vitamin D, Estrogen/Testosterone)

...Communicate Early!
Thank You!

USA SWIMMING

UNITED STATES OLYMPIC COMMITTEE