PRODUCE FOR PERFORMANCE

The benefits of plant-based diets for athletes

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Owner, Active Eating Advice by Leslie

Brought to you by Potatoes USA
Sports Nutrition Concerns for Athletes

- Consistency
- Adequacy
- Quality
- Quantity
- Timing
- Eating for performance
- Eating for recovery
- Eating for weight management

Barnard et al, *Nutrients*, 2019
11(1): 130
What Do Plant-Based Meals Offer?

• Affordability
• Shelf stability
• Versatility
• Palatability
• Availability
Why a Plant-Based Diet?

Dietary Guidelines for Americans 2015-2020 recommend plant based diets as 1 of 3 healthy eating patterns:

- ↓ risk CVD mortality
- ↓ LDL-C
- ↓ TC
- ↓ BP
- ↓ risk Type II DM
- ↓ BMI
- ↓ cancer risk

Athletes Make Up

- Some have diabetes
- Constant stress on the body increases the risk of injury and inflammation
- Athletes may be at higher risk for heart disease
- Some athletes find it difficult to eat enough to maintain weight
- Some athletes are in “make weight” sports
What is in a Plant-Based Diet?

- Fruits
- Vegetables
- Starchy vegetables
- Beans
- Grains
- Nuts
- Seeds
What Do Plant-Based Meals Offer?

• Carbohydrates
• Fiber
• Antioxidants
• Vitamins
• Minerals
• Phytonutrients
# What’s Enticing: Macros & Fluid

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Quantity</th>
<th>Sources</th>
<th>Benefits</th>
<th>Strength of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protein</strong></td>
<td>0.13 g/lb ASAP post training 0.13 g/lb across 4-5 meals/day</td>
<td>High leucine sources: whey/milk High quality animal and plant protein sources</td>
<td>Muscle protein synthesis Muscle repair and remodeling</td>
<td>Good</td>
</tr>
<tr>
<td><strong>Carbohydrate</strong></td>
<td>1-2 g/kg within 1 hr post training 3-12 g/kg/d over the day</td>
<td>Produce, grains, potatoes and other starchy vegetables Dairy, sports drinks</td>
<td>Replenish liver and muscle glycogen Support immune function</td>
<td>Good</td>
</tr>
<tr>
<td>~3 PUFA</td>
<td>~3 g/d EPA/DHA</td>
<td>Fatty fish, krill, algaesupplement, canola, walnut, flaxseed, hemp oils, walnuts, flax, chia, hemp seeds</td>
<td>↓inflammation Support immune function Support muscle repair/remodeling if protein intake is inadequate</td>
<td>Fair</td>
</tr>
<tr>
<td><strong>Fluid</strong></td>
<td>1-1.5 L/kg body mass lost</td>
<td>Water, sports drink, milk, juice</td>
<td>Fluid balance and plasma volume restoration</td>
<td>Good</td>
</tr>
</tbody>
</table>
## What’s Enticing: Metabolites & Macros

<table>
<thead>
<tr>
<th>Metabolite/Micros</th>
<th>Quantity</th>
<th>Sources</th>
<th>Benefits</th>
<th>Strength of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antioxidants</td>
<td>Supplements not advised</td>
<td>Produce</td>
<td>↓ inflammation</td>
<td>Fair</td>
</tr>
<tr>
<td>Gelatin/collagen+ Vit C</td>
<td>15 g collagen hydrolysate with 50 mg Vit C 1 hr pre training</td>
<td>Gelatin, citrus fruits or juice, supplements</td>
<td>Promote collagen synthesis</td>
<td>Fair</td>
</tr>
<tr>
<td>Curcumin/ bromelain</td>
<td>0.4-5 g/d, 900-1000 mg/d</td>
<td>Turmeric, pineapple, supplements</td>
<td>↓ inflammation</td>
<td>Limited</td>
</tr>
</tbody>
</table>

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What’s Enticing?

• Super foods/supplements:
  • Beetroot and other dietary nitrates
  • Protein in any and every way
  • Performance enhancers: beta-alanine, creatine, caffeine
  • Foods that impact the microbiome

• Macros

• Phytos

• Microbes
MyPLATE in Microbes

Ellagic acid
Coffee fiber
Polyphenols

Polysaccharides
Oligosaccharides
Starch
SCFA

Inulin/Fructans
Soy Isoflavones
Glucosinolates
Xanthohumol
Polyphenols
Porphyrans
Lignans
SCFA
(Short chain fatty acids)

Milk Oligosaccharides
Fermentation Products
Probiotics

Phosphatidylcholine
Heterocyclic amines
Nitrosamines
Amino Acids

Fruits
Grains
Vegetables
Protein
Dairy

Concerns of Plant-Based Athletes

💧 immune function
  • Micronutrients
  • Carotenoids

↑ risk URI
↑ oxidative stress

Adequate caloric and macronutrient intake
  • Potatoes can help optimize caloric and nutrient density of an athlete’s diet

Adequate micronutrient intake

Plant-Based Diets & Athletes

- Attention must be paid to quantity and quality of protein consumed
- Need to optimize intake of BCAAs
- Soy protein can be beneficial
- Less research on muscle protein synthesis using plant-based supplements such as rice, pea, hemp
- Need to ensure adequate fat intake, especially DHA and EPA (through ALA- flax, walnuts, chia, algae)
# Nutritional Needs of Plant-Based Athletes

<table>
<thead>
<tr>
<th>DIET PATTERN</th>
<th>DIET CONCERNS</th>
<th>SPORT CONCERNS</th>
<th>SUGGESTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pesco-vegetarian</td>
<td>Adequate caloric intake, check vitamin D if sun exposure is minimal</td>
<td>Iron deficiency</td>
<td>Vitamin D and iron if levels are low</td>
</tr>
<tr>
<td>Lacto-ovo and lacto</td>
<td>Omega 3s, iron, zinc, B vitamins, iodine</td>
<td>Creatine and carnosine stored</td>
<td>Omega 3s, iron, zinc since plant bioavailability is low, iodine through food sources</td>
</tr>
<tr>
<td>Vegan</td>
<td>Protein, fat, omega 3s, B12, calcium, iodine deficiencies possible</td>
<td>Iron deficiency, low BMD, energy balance</td>
<td>Protein, fat, omega 3s, iron, zinc, B12, calcium, iodine</td>
</tr>
</tbody>
</table>
Micronutrient Concerns for Vegetarian Athletes

- Calcium: 1000 mg DRI
- Iron DRI 8 mg M, 18 mg F: vegan athletes: 14 mg M, 32 mg F
- Zinc: DRI 11 mg M, 8 mg F-vegan athletes: 16.5 mg M/12 mg F
- Iodine: DRI 150 μg
- Vitamin B12 6 μg
- Vitamin D: 400 IU- more if 25 (OH)D levels are < 30 nmol/L
- Potassium: 4700 mg
Food Sources of Nutrients of Concern

- Omega 3 - leafy greens, flax/chia, hemp, walnuts
- Iron - iron cookware, leafy greens, asparagus, tofu, lentils, sesame seeds, soybeans, pumpkin seeds, fortified oats, black beans
- Zinc - pumpkin & hemp seeds, chickpeas, almonds, cooked oatmeal, fortified cereals
- Iodine - iodized salt, kelp, seaweed, prunes, Lima beans, Raisin Bran
- Calcium – fortified soymilk, collard greens, Bok choy, kale, nuts, seeds
- Vitamin D - supplementation if necessary, fortified plant “milks”
- B12 - nutritional yeast, fortified plant-based “milks”, Shiitake mushrooms, fortified meat alternatives, some fortified cereals
- Riboflavin - fortified grains
- Potassium - potatoes, bananas, citrus, tomatoes, kiwi
Performance Benefits of Plant-Based Eating

• Higher CHO intake for optimized training and performance
• Higher antioxidant and phytonutrient intake
• Slight serum alkalinity
• Decreased oxidative stress
• Decreased blood viscosity
• Improved blood flow
• Improved arterial flexibility
• Improved endothelial function
• Decreased indicators of inflammation
Carbohydrate Confusion

What we know:
• The role of carbohydrate as a fuel source for moderate to high intensity endurance exercise and repeated bouts of moderate to high intensity exercise

Controversy:
• Training with low carbohydrate availability
• Impact on performance
• Impact on health; compromised immune function
Gluten Avoidance

• May decrease protein intake
• May decrease fiber intake
• May decrease micronutrient and phytonutrient intake
• May negatively impact the microbiome
• Athletes who go gluten-free may compromise carbohydrate intake
• Potatoes can be a great way to get the calories, carbohydrates, protein and fiber in those who insist on being gluten-free
Carbohydrate Guidelines

• Should be prescribed based upon exercise:
  • Training
  • Intensity
• Frequency
• Encourage athletes to be selective rather than neglectful with their carbohydrate intake
  • #dontsaynotothepotato
• Help athletes strategize, customize and prioritize attitudes and actions surrounding carbohydrate intake
• Carbs can be consumed within a price point
• Ease of cooking
• Can extend a meal
Power of Potatoes

• Nutrient-dense
• For a large potato ~ 10 ounces
  • Calories: 284
  • Carbohydrate: 64.11 gm
  • Fiber: 6.9 g
  • Protein: 7.86 g
  • Potassium: 1644 mg
• Easy to digest
• Can eat alone, paired with other foods
• Baked, boiled, mashed or more!
Needs-Based Nutrition Guidelines

- For those in energy balance:
  - 0.18 g/lb BM to stimulate MPS after rest or exhaustive exercise
  - Space protein throughout the day ~ 3-5 hrs
  - Consider pre-sleep protein ingestion to minimize MPS decline during overnight fasting
  - To maximize MPS with resistance training- protein recommendations are 0.7-1 g/lb/d in 3-4 meals/day
  - 3 meals with 0.24 g protein/lb or 4 meals with 0.18 g protein/lb

- For those restricting calories:
  - For those in “make-weight” sports, high quality proteins can help with satiety
  - Protein intakes of 1.04-1.4 g/lb/d may prevent loss of LBM
# Protein Content of Plant Foods

<table>
<thead>
<tr>
<th>FOOD</th>
<th>PROTEIN (grams)</th>
<th>CALORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quinoa, 1 cup cooked</td>
<td>8</td>
<td>222</td>
</tr>
<tr>
<td>Whole Bread, 1 slice</td>
<td>4</td>
<td>60-100</td>
</tr>
<tr>
<td>Broccoli Rabe, 1 cup cooked</td>
<td>5</td>
<td>60</td>
</tr>
<tr>
<td>Brown rice, 1 cup</td>
<td>4</td>
<td>216</td>
</tr>
<tr>
<td>Baked Potato</td>
<td>7.86</td>
<td>284</td>
</tr>
<tr>
<td>Beans, 1 cup cooked</td>
<td>13</td>
<td>210</td>
</tr>
<tr>
<td>Lentils, 1 cup cooked</td>
<td>18</td>
<td>230</td>
</tr>
<tr>
<td>Tofu, extra firm 1/2 block</td>
<td>22</td>
<td>207</td>
</tr>
<tr>
<td>Hummus, 1/3 cup</td>
<td>5</td>
<td>175</td>
</tr>
<tr>
<td>Edamame, 1 cup</td>
<td>22</td>
<td>254</td>
</tr>
<tr>
<td>Oats, 1/2 cup dry</td>
<td>5</td>
<td>150</td>
</tr>
<tr>
<td>Almonds, 1 cup</td>
<td>30</td>
<td>825</td>
</tr>
<tr>
<td>Peanuts, 1/3 cup</td>
<td>11.4</td>
<td>281</td>
</tr>
<tr>
<td>Peanut Butter, 1 tablespoon</td>
<td>7</td>
<td>90</td>
</tr>
<tr>
<td>Hemp Seeds, 1/4 cup</td>
<td>3</td>
<td>227</td>
</tr>
<tr>
<td>Sunflower Seeds, 1/3 cup</td>
<td>8.2</td>
<td>245</td>
</tr>
</tbody>
</table>
Veggies and Dietary Nitrates

• Dietary nitrates can help with:
  • Regulation of blood flow
  • Muscle contractility
  • Glucose and calcium homeostasis
  • Mitochondrial respiration and biogenesis

• Do this with food:
  • Shredded beets or beet noodles/arugula salad
  • Spinach/yogurt dip with celery for the dippers
Plant-Based Anti-Inflammatory Foods

- Tart cherries
- Berries
- Beet root juice
- Pomegranate
- Turmeric
- Ginger
- Saffron
- Polyphenols
- Flavonoids
Micronutrients of Interest

• Vitamin C: 60 mg/day for Collagen synthesis, wound healing, immune function
  • Citrus fruits/juices, strawberries, red peppers, watermelon, potatoes, tomatoes

• Vitamin A: 5000 IU/day for cell growth and immune function
  • Sweet potatoes, carrots, papaya, kale, pumpkin, collard greens, spinach, cabbage

• Zinc: 15 grams/day for wound healing, protein synthesis, immune function
  • almonds, sunflower seeds, pumpkin seeds
Anti-Inflammatory Diet

- ½ plate of fruits/vegetables (pomegranates, berries, beets, tart cherries, pineapple, dark green vegetables, deep orange fruits and vegetables, potatoes)

- Algae supplement for vegan diets

- Olive oil and avocados are preferred fats

- Add in anti-inflammatory spices such as ginger, saffron and turmeric
Low-Cost Produce

- Beans
- Canned tomatoes
- Frozen vegetables
- In-season fruits and vegetables
- Potatoes
- Salsa
- Spaghetti sauce
- Bean soup
Low-Cost Plant-Based Proteins

- Texturized vegetable protein
- Beans
- Lentils
- Potatoes
- Split peas
- Quinoa
- Tofu
- Nuts and seeds
Familiarity Rules

• Burgers - blended burgers, plant-based burgers
• Stir-fries with veggies, beans, over rice or noodles
• Smoothies with fruits and/or vegetables, nut butters
• Chili with more beans, less meat, or meat alternates, served in a bowl or over a potato
• Tacos made with meat alternatives, with added veggies, salsa, beans
Snacks are the New Meals

• Can be eaten on-the-go

• Can be smaller in size for better gut comfort for athletes

• Are not always balanced

• Great opportunity for more plants!

• Potatoes for snacks: on the go potatoes, mini potato pancakes with apple butter or applesauce
Building a Performance Plate

Adapted from the Athlete's Plates, a collaboration between the US Olympic Committee Sports Dietitians & the University of Colorado Sports Nutrition Graduate Program
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Athlete’s Plate

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Building a Performance Plate

Athlete’s Plate

Hard Training vs Race Day

Adapted from the Athlete’s Plates, a collaboration between the US Olympic Committee Sports Dietitians & the University of Colorado Sports Nutrition Graduate Program
Powered By Produce

• Put the “nutrition” in sports
• **Performance Enhancing Diets**
• Equip athletes with knowledge on why and how to fuel
• #Fuelsofengagement
• #producetoperform
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PBH Potatoes for Performance Webinar (02.20.19)

References Per Leslie Bonci


11. Stokes, T et al. Recent Perspectives Regarding the Role of Dietary Protein for the Promotion of Muscle Hypertrophy with Resistance Exercise Training. Nutrients 2018,10,180;doi.10.3390/nu10020180

