VEGETARIAN AND VEGAN DIETS FOR ATHLETES
OVERVIEW

• Vegetarian/Vegan Diets Defined

• Potential Benefits

• Nutrient Considerations for Athletes

• Practical Applications
VEGETARIAN & VEGAN DIETS DEFINED
### Types of Vegetarian Diets

<table>
<thead>
<tr>
<th>Diet Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>Vegan (strict vegetarian)</td>
<td>Excludes all animal products including dairy and eggs; may exclude honey</td>
</tr>
<tr>
<td>Vegetarian</td>
<td>Avoids all flesh foods; may or may not consume eggs or dairy products</td>
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<tr>
<td>Lacto-vegetarian</td>
<td>Includes milk or other dairy products but not eggs or other animal foods</td>
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<tr>
<td>Ovo-vegetarian</td>
<td>Includes eggs but not dairy products</td>
</tr>
<tr>
<td>Lacto-ovo-vegetarian</td>
<td>Includes eggs and dairy products</td>
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</tbody>
</table>
Athletes elect to follow a vegan/vegetarian diet for a variety of reasons, including:

• Health
• Environmental
• Ethical
• Philosophical
• Religious/Spiritual
• Nationwide polls in the U.S. suggest that ~3.3% of adults are vegetarian or vegan

• ~46% of all vegetarians in the U.S. are estimated to be vegan

• Among athletes, a survey from the 2010 Commonwealth games found that 8% of international athletes reported eating vegetarian diets, with 1% being vegan
POTENTIAL BENEFITS
Vegetarian/vegan diets associated with a ↓ risk of:

- Obesity
- Hypertension
- Cardiovascular disease
- Type 2 diabetes
- Cancer mortality

It has been hypothesized that vegetarian diets improve athletic performance due to higher consumption of:

- Carbohydrate
- Antioxidants/Phytonutrients

However, there is little research evidence to confirm these claims.

To help ensure optimal performance, vegetarian/vegan athletes must consume:

1. Adequate energy; and

2. Foods rich in essential nutrients that are less abundant in vegetarian foods (or are not as well absorbed from plant compared to animal sources).
NUTRIENT CONSIDERATIONS FOR ATHLETES
• Overall, the carbohydrate needs of vegetarian/vegan athletes do not differ from non-vegetarians.

• Recommended daily intake: 5-10 g/kg/day for most athletes performing moderate to high-intensity exercise of ~1-3 h/day.

Common Carb Sources for Vegetarian Athletes

- Grain products
- Fruits
- Juices
- Starchy vegetables
- Sports products (beverages, gels, bars)
• Protein requirements vary according to training level and activity type, ranging from 1.2-2.0 g/kg/day.

• Vegan athletes should consume a variety of plant-based protein sources to help ensure adequate intake of protein and essential amino acids*.

*Adequate intake may be easier for lacto-ovo vegetarians.
Plant-Based Protein Sources

- Soy products (e.g. tofu, tempeh, etc.)
- Beans
- Lentils
- Nuts and seeds
- Most grains (e.g. quinoa)
Lacto-Ovo Vegetarian Protein Sources

- Milk
- Yogurt
- Cheeses
- Cottage cheese
- Eggs
• Fat intake should be in accordance with public health guidelines.

• Vegetarian diets are typically rich in omega-6 fatty acids; therefore, athletes may benefit from omega-3 rich foods.
Plant-based Sources of Fat

• Nuts (almonds, walnuts, peanuts, etc.)
• Avocados
• Oils (olive, canola, sesame, etc.)
• Flax seed
• Chia seed
• Hemp seed
Athletes should pay attention to certain nutrients found less abundantly in plant-based foods, including:

- Iron
- Zinc
- Calcium
- Vitamin D
- Iodine
- Vitamin B-12
- Riboflavin

If necessary, consumption of fortified foods or supplementation should be considered.

Avoiding Low Energy Availability

- Some evidence suggests relative energy deficiency in sport (RED-S) may be more common in vegetarian athletes.
- This may be due to consumption of low energy-dense, high-fiber plant foods coupled with high training demands.
- Adequate energy intake should be emphasized for these athletes.
PRACTICAL APPLICATIONS
1. Athletes should be encouraged to eat a diet that contains a variety of plant foods, including whole and enriched grain products, fruits, vegetables, protein-rich plant foods, and (if desired) dairy products and eggs.

2. Properly educate vegetarian/vegan athletes on sources of both macro- and micronutrients that fit their personal preferences and values.

3. Ensure the athlete is not practicing a vegetarian/vegan diet in order to mask an eating disorder, as this is a serious mental illness that can impair health and athletic performance.
### Vegetarian Sources of Key Nutrients

<table>
<thead>
<tr>
<th>Protein</th>
<th>Functional and structural components of the body; in athletes serves as trigger and source for muscle protein synthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Fats</td>
<td>Energy source; aids in absorption of fat-soluble vitamins</td>
</tr>
<tr>
<td>Omega-3 Fatty Acids</td>
<td>Modulation of inflammatory process</td>
</tr>
<tr>
<td>Iron</td>
<td>Component of hemoglobin and myoglobin and as part of cytochromes and enzymes in energy-yielding pathways</td>
</tr>
<tr>
<td>Zinc</td>
<td>Component of many enzymes including those involved in energy metabolism, protein synthesis and immune function</td>
</tr>
</tbody>
</table>

- **Protein**: Milk, yogurt, cottage cheese, cheese, eggs, beans, peas, lentils, edamame, tempeh, tofu, soy products (veggie burgers, dogs, other meat analogues), nuts, seeds, nut butters (including peanut), soymilk and other plant-based “milks”. Other sources: starchy vegetables, grains including breads, rice, quinoa, oatmeal.
- **Healthy Fats**: Nuts, seeds, nut butters, avocado, olives, olive oil, flax seed, coconut, granola and muesli cereals, plant based oils including canola, grape seed, hazelnut, sesame seed, pumpkin seed and hemp oils.
- **Omega-3 Fatty Acids**: Walnuts, flax, chia, camelina and hemp seed, and canola, walnut, flax and hemp oils.
- **Iron**: Beans, peas, lentils, edamame, nuts, seeds, most vegetables, whole & fortified grains including breads, rice, quinoa, breakfast cereal. Absorption enhanced by consuming with source of vitamin C: citrus fruits, berries, melon, peppers, tomatoes, broccoli, kale, potatoe.
- **Zinc**: Beans, peas, lentils, edamame, nuts, seeds, most vegetables, whole & fortified grains including breads, rice, quinoa, breakfast cereal, hard cheeses.
# Vegetarian Sources of Key Nutrients

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Description</th>
<th>Examples</th>
</tr>
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</table>
| Calcium   | Growth, nerve conduction, maintenance and repair of bone tissue, regulation of muscle contraction and normal blood clotting  | Excellent bioavailability (> 50%): Chinese/Napa cabbage, bok choy, collards, kale, okra, turnip greens, texturized vegetable proteins, black strap molasses.  
Average bioavailability (~30%): Milk, yogurt, cheese, calcium-set tofu, fortified orange juice (with calcium citrate malate).  
Lower bioavailability: fortified soymilk, most nuts, seeds legumes, fortified orange juice (with tricalcium phosphate/calcium lactate).  |
| Vitamin D | Calcium absorption, bone health, skeletal muscle function, immune function, inflammatory modulation | Fatty fish, eggs from hens fed vitamin D or exposed to sunlight, vitamin D-fortified breakfast cereals, margarine, fruit juice and plant-based “milks.”  
Exposure of the arms, torso and legs, two to three a week, at close to solar noon for 25 to 50% of the time it would take to develop a mild sunburn.  |
| Iodine    | Functions as part of thyroid hormone, which is a key regulator of metabolism and heart rate | Iodized salt, fish, seafood, seaweed, dairy products and some commercial-breads. The iodine content of most foods is low and affected by soil content, irrigation and fertilizers. |
| Vitamin B12 | Important for energy production | Redstar™ nutritional yeast, soymilk & plant-based “milks,” breakfast cereals and B-12 fortified meat analogs (veggie burgers, veggie dogs, etc.). |
| Riboflavin | Coenzyme for numerous oxidation-reduction reactions in several metabolic pathways and in energy production | Milk and milk-based drinks, bread products and fortified cereals: small amounts found in most plant foods. |
Below is a list of options combining multiple plant protein sources to help improve delivery of essential amino acids.

- Whole Wheat Chips + Black Bean & Corn Salsa
- Brown Rice + Green Peas + Corn
- Black Beans + Spinach + Whole Wheat Pita Pocket
- Peanut Butter + Whole Wheat Toast or Bagel
- Whole Wheat Pasta + Tomato Sauce + Peas + Chopped Spinach
- Trail Mix: Dried Fruit + Nuts + Sunflower Seeds
- Raw Veggies + Hummus Dip + Whole Wheat Pita
- Oatmeal Crackers + Dried Fruit + Slivered Almonds
- Veggie Burger + Whole Wheat Bun
What is an example of a nutritious breakfast for a vegetarian athlete?
# Lacto-Ovo Vegetarian & Vegan Diet

## Breakfast
- 2 ounce Grains
- 2 ounce Proteins
- ½ cups Vegetables
- 1 cup Fruit
- ½ cup Diary/ Eq

<table>
<thead>
<tr>
<th>Lacto-Ovo Vegetarian</th>
<th>Vegan</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 slices Whole Wheat Toast Butter &amp; 1 Tbsp Fruit Preserves</td>
<td>2 Slice Whole Wheat Toast Margarine &amp; 1 Tbsp Fruit Preserves</td>
</tr>
<tr>
<td>2 Scrambled Eggs</td>
<td>½ cup Scrambled Tofu</td>
</tr>
<tr>
<td>½ cup Peppers &amp; Spinach</td>
<td>½ cup Peppers &amp; Spinach</td>
</tr>
<tr>
<td>1 cup Orange Juice</td>
<td>1 cup Calcium-Fortified Orange Juice</td>
</tr>
<tr>
<td>Latte made with ½ cup Milk</td>
<td>Latte made with ½ cup Soy milk</td>
</tr>
</tbody>
</table>

## Lunch
- 2 ounce Grains
- 2 ounce Proteins
- 1 cup Vegetables
- 1 cup Fruit
- ½ cup Diary/ Eq

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<thead>
<tr>
<th>Lacto-Ovo Vegetarian</th>
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<tbody>
<tr>
<td>2 slices Sourdough Bread</td>
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</tr>
<tr>
<td>2 cups Minestrone Soup (made with 1/4 cup garbanzo beans, ¼ cup kidney beans, 1 cup mixed vegetables &amp; olive oil) topped with ½ ounce Parmesan Cheese Large Apple</td>
<td>2 cups Minestrone Soup (made with 1/4 cup garbanzo beans, ¼ cup kidney beans ¼ cup mixed vegetables/ ¼ cup vale &amp; olive oil)</td>
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</tbody>
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## Snack
- 2 ounce Grains
- 1 ounce Proteins
- ½ cup Diary/ Eq

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<tr>
<td>½ Large (2 oz) Whole Grain Bagel</td>
<td>½ Large (2 oz) Whole Grain Bagel</td>
</tr>
<tr>
<td>1 Tablespoon Peanut Butter</td>
<td>1 Tablespoon Peanut Butter</td>
</tr>
<tr>
<td>1 cup Milk</td>
<td>1 cup Soy milk</td>
</tr>
</tbody>
</table>

## Dinner
- 4 ounce Grains
- 2 ounce Protein
- 2 ½ cups Vegetables

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<thead>
<tr>
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<th>Vegan</th>
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<tbody>
<tr>
<td>4 Lentil Tacos (made with lentils, tomato sauce, canned tomatoes, onion, celery and canola oil on soft corn tortillas served with lettuce, jicama, fresh tomato, avocado and salsa)</td>
<td>4 Lentil Tacos (made with lentils, tomato sauce, canned tomatoes, onion celery and canola oil on soft corn tortillas served with lettuce, jicama, fresh tomato, avocado and salsa)</td>
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## Snack
- 1 cup Diary/ Eq

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<thead>
<tr>
<th>Lacto-Ovo Vegetarian</th>
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<tbody>
<tr>
<td>1 cup Yogurt</td>
<td>1 cup Rice Yogurt</td>
</tr>
<tr>
<td>½ cup Berries or sliced Peaches</td>
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</tbody>
</table>

## Exercise Associated Snacks
- Fluid replacement beverage, sports gels, sports bars, etc.
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KEY TAKEAWAYS

✓ With proper planning, vegetarian and vegan athletes are able to meet their energy/nutrient needs on a diet that contains a variety of foods.

✓ Depending upon food preferences, eating patterns, and training load, the diet of some athletes may contain suboptimal amounts of certain nutrients (e.g. total energy, protein, omega-3 fatty acids, calcium, vitamin D, iron, zinc, riboflavin, and vitamin B-12).

✓ In such cases, athletes can generally improve nutrient status through careful selection of foods containing the nutrient(s) they lack and a supplemental source when appropriate.

✓ There is currently limited evidence that vegetarian/vegan diets are better than omnivorous diets for improving athletic performance.