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Nutrition for Strength/Power Athletes

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NSCA Sports Nutrition Education Program



Introduction

- A proper diet has the potential to enhance any athlete's performance regardless of body size or type of activity.
- The main nutritional goals for a strength/power athlete are to provide the necessary nutrients needed to build, repair and maintain lean body mass, as well as enhance performance.

Energy Requirements of Strength/Power Athletes

- Meet energy needs
- Provide correct macronutrient amounts and in proper ratios to each other
 - Protein
 - Carbohydrates
 - Fats
- Provide sufficient micronutrients
 - Vitamins
 - Minerals
- Provide adequate fluids
- Incorporate proper timing of meals

Energy Requirements of Strength/Power Athletes

- It is critical that a strength/power athlete's diet meets their daily energy requirements
 - They perform excessive activity/training
 - They need to maintain or increase lean muscle mass and strength

Calculating Energy Requirements

Activity Level	Light	Moderate	Heavy
Males	17	19	23
Females	16	17	20

Light activities: walking (2.5 – 3.0 mph), such as to class, chores, golf.

Moderate activities: walking (3.5 – 4.0 mph), weight lifting, cycling, skiing, tennis, dancing.

Heavy activities: running, football, soccer, basketball.

Note: Most strength/power athletes will have an activity level that is considered heavy

Body Weight Goals

- For athletes who want to ***maintain body weight***, the estimated caloric intake calculated from their bodyweight x activity level is sufficient.
- For athletes who want to ***gain weight***, an excess of 300-500 calories should be added to their daily caloric intake.

Body Weight Goals

- For athletes who want to ***lose weight***, they should consume 500 calories less than their daily energy requirements.
- On average, if a person eats 500 fewer calories every day they will lose ~1 pound of body fat per week*.

** (1 pound of fat = 3500 calories)*

Daily diet plan

- Regardless of the athlete's daily energy requirements and body weight goals he/she should follow a nutrition program that encourages frequent food intake.
 - eat 4-6 small meals/day
 - snacks between meals as needed
 - eat before and after workouts/training

Macronutrient Needs

The three nutrients that provide energy to the body are:

Macronutrient	Recommended % of caloric intake
Protein	12-15%
Carbohydrate	55-60%
Fat	25-30%

Protein intake for Strength/Power Athletes

- One of the most frequently asked questions by strength/power athletes and their coaches is how much protein is required for increasing muscular size, strength and power.
- There are a large number of research studies indicating that intake of protein is advantageous for athletes when muscle hypertrophy is required.

Protein intake for Strength/Power Athletes

- Proteins are formed by amino acids, and they serve as the major structural component of tissues such as skeletal muscle as well as being used to produce substances such as hormones (i.e., growth hormone and insulin).
- Skeletal muscle consists predominantly of water and protein; therefore, in order to increase muscular size, adequate intakes of amino acids would appear to be important.

Protein choices for Strength/Power Athletes

- There are a number of different food sources available that can supply protein for the strength/power athlete.
- The nutritional value of the ingested protein is important, in addition to the composition of the amino acids and the timing of ingestion.

Enough is Enough

- The amount of protein required by strength/power athletes is a source of much debate by sports nutritionists.
- There has been a significant body of research recently to suggest that these athletes require greater amounts of protein to maintain positive protein balance.
 - 1.5 to 2.0 g/kg/day; or,
 - 0.7 to 0.9 g/pound/day

Enough is Enough

- This protein intake is equivalent to consuming 4 servings of chicken, beef or fish per day for a 150 pound athlete (6 servings for a 225 pound athlete).
- After the strength/power athlete's caloric needs are determined, the total daily protein intake should make up about 12%–15% of the total daily energy intake.

Enough is Enough

- In addition to the amount of protein consumed, perhaps even more critical is the timing of ingestion of the protein in relation to the exercise bout and the specific type of protein (i.e., quality).

Protein quality

- The quality of protein is mostly determined by its essential amino acid content.
- Amino acids are the building blocks of protein.
- Essential amino acids are not made in the body, therefore they must be consumed.

Protein quality

- **Complete proteins** contain all essential amino acids. These can be found in animal sources such as meat, dairy, eggs and fish.
- Lean meat products are recommended (skinless chicken and turkey) as well as low fat dairy products.

Protein quality

Incomplete proteins are missing one or more essential amino acids. They can be beneficial to the athlete when combined, making a complete protein. Incomplete proteins are found in plant sources, and some combinations include rice/beans and peanut butter/wheat bread.

Protein Supplements

- In order to meet your dietary protein needs, protein supplements (protein bars/shakes, etc.) can be used.
- High-quality protein supplements containing whey, casein, milk or egg products are recommended.

*Increasing your protein intake above the recommended amount for strength/power athletes will not continue to increase gains in strength and/or power.

Protein Supplements

- The best sources of high-quality protein found in supplements are reported to be milk (whey and casein) and egg proteins (egg whites).
- Whey proteins, especially whey protein isolates or hydrolyzed whey peptides, are widely promoted to strength/power athletes as being perhaps the best protein, based on its high bioavailability and its content of several critical amino acids.

Protein Supplements

- Dietary amino acid absorption is faster with whey protein than with casein.
- Casein is the major component of protein found in dairy products and is a complete protein.
- 20-30% of milk protein is whey which is often seen as the watery part of yogurt or sour cream.
- 70-80% of milk protein is casein which gives milk its white color.

Protein Timing

- Research indicates that for optimal muscle recovery and muscular growth protein should be taken both within 15 min before and within 15 min following training.
 - Athletes should take in 0.1 grams of protein per pound of body weight before training
 - Athletes should take in 0.2 grams of protein per pound of body weight after training
 - Fast digesting protein, such as whey protein powder, is the best source of protein at this time

Protein – In Summary

- Ensure that the strength/power athlete is consuming approximately 0.7 to 0.9 grams of protein per pound of body weight per day, with the total daily protein intake making up about 12%–15% of the total daily energy intake.
- Timing appears to play an important factor in muscle hypertrophy.
- Consuming a fast-digesting protein immediately before and after the athlete's workout is critical for gains in lean muscle mass.

Carbohydrate Intake for Strength-Power Athletes

- Carbohydrate stores in the body are essential for optimal athletic performance. These carbohydrate stores are reduced as a result of exercise; therefore, they must be replenished through your diet.
- Athletes should aim to consume 55-60% of their total calorie intake from carbohydrates, keeping in mind the kind of carbohydrates consumed and the timing of carbohydrate consumption.

Fueling Up

- Glycogen is the major substrate used for high-intensity exercise, including resistance training.
- Resistance training programs that use higher repetition loads (8–15 repetitions), such as those utilized by bodybuilders and during hypertrophy phases by athletes, could potentially have large effects on muscle glycogen stores.

How much carbohydrate?

- The daily maintenance of glycogen stores is directly related to the amount used during exercise and normal daily activity and the subsequent ingestion of carbohydrates used to replenish the stores.
- Strength/power athletes should consume approximately 55%–60% of total energy intake in the form of carbohydrate which equates to approximately 2–3 grams per pound per day for most athletes.

Carbohydrates and the Glycemic Index (GI)

The Glycemic Index (GI) ranks carbohydrate foods based on the body's blood sugar responses following consumption of these nutrients.

- **High GI:** These carbohydrates quickly raise blood sugar levels.
- **Low GI:** These carbohydrates take longer to absorb, and are slowly released into the blood stream.

Carbohydrate Choices

An athlete's carbohydrate intake should mainly come from complex sources that are predominately low GI sources.

These foods include:

- Fruits
- Vegetables
- Whole Grains

Carbohydrate Choices

- It is better for the athlete to choose nutrient rich-carbohydrate foods and to add other foods to recovery meals and snacks to provide a good source of protein and other nutrients.

Carbohydrate Choices

- The use of carbohydrate supplementation can potentially enhance muscular strength.
- No studies have systematically addressed the quantity, type and timing of carbohydrate intake and linked acute physiological responses to chronic adaptations in strength/power athletes.

Carbohydrate Intake & Exercise

- Resistance exercise (weight training) depletes energy stores and breaks down muscle in the body. These stores must be replenished for optimal recovery and growth.
- It is recommended that athletes consume carbohydrates with a moderate to high GI following exercise in order to quickly replenish these stores. These foods include white bread, potatoes, and sports drinks.

Carbohydrates – In Summary

- The strength/power athlete should eat approximately 2-3 grams per pound of body weight, with 55%–60% of their total daily energy intake from carbohydrates.
- The majority of these carbohydrates should be low to moderate on the glycemic index, while immediately post-exercise the sources should be moderate to high glycemic carbohydrates.

Fats

- Fat is an essential macronutrient. Athletes can tolerate slightly higher fat intakes than the normal population due to their energy intake needs.
- Some saturated fats are also necessary to maintain testosterone concentrations.
 - Testosterone is important to the athlete for building muscle mass and strength.

Fat Recommendations

- Approximately 30% of an athlete's calorie intake should come from fats. This can be further broken down into monounsaturated, polyunsaturated, and saturated fats.

<i>Type of Fat</i>	<i>Recommended %</i>
Monounsaturated	10-15%
Polyunsaturated	10-15%
Saturated	10% or less

Fat Recommendations

- The strength/power athlete should avoid trans fats.
 - Trans fats promote heart disease, diabetes, certain cancers and obesity.
 - Trans fats raise LDL (bad) cholesterol levels and lower HDL (good) cholesterol levels.
 - Trans fats may also encourage muscle breakdown.

Fat Choices

Type of Fat	Food Choices
Monounsaturated Fats	Olive, canola, peanut oils Nuts Avocados
Polyunsaturated Fats	Corn, safflower, sesame, canola, sunflower oils Nuts and seeds Cold water fish (mackerel, salmon, tuna)
Saturated Fats	Beef and poultry Dairy products
Trans Fats	Packaged cookies, crackers, pastries, etc. Chips, snack foods, candy Fried fast food Margarine and shortening

Vitamins and Minerals

- Vitamins are organic compounds the body uses in numerous functions
 - Fat Soluble Vitamins - A, D, E and K
 - Water Soluble Vitamins – B's and C
- Additional supplementation may be beneficial for individuals lacking in specific nutrient(s) or eating a calorie restricted diet.

Water Soluble Vitamins

- C and B vitamins are water soluble, therefore must be consumed on a daily basis.
- Multiple B-vitamins including thiamin, niacin and riboflavin.
 - They play a role in energy metabolism.
- Taking a supplement will not improve performance if you are not deficient.

Antioxidants

- Combat free radicals produced during exercise and protect cells.
- Vitamin sources include Beta-carotene, vitamins C and E.
- Mineral sources include copper, selenium, magnesium, and zinc.
- Found naturally in dark green, orange, red, and yellow fruits and vegetables.

Minerals

- Minerals are inorganic compounds including iron, zinc, magnesium, and calcium.
- Iron is needed to transport oxygen in the blood.
- Calcium absorption is enhanced by the presence of vitamin D, and together they promote bone growth and prevent osteoporosis.
- Calcium has also been linked to decreased body fat.
- Zinc and magnesium aid in muscle recovery following exercise.

Supplements

Individuals who are not deficient in certain nutrients will not benefit from taking a supplement; however, it is often recommended that athletes in training take a low dose one-a-day multi-vitamin/mineral supplement.

Hydration

- In energy metabolism, only 40% of fuel is turned into energy, while 60% is lost in heat, which is transferred to the skin by the blood.
- Studies have shown that as little as a 2% decrease in body weight due to fluid loss will decrease performance.
- For a 200lb athlete this would mean a 4lb decrease in body weight. It is normal for a football player to lose 6-8lb of fluid in a 2 hour practice.

Daily fluid recommendations

- Recommendations will vary based on the individual's fitness level, body size, intensity of exercise and levels of heat and humidity in your environment.
 - Women - 11 8oz cups/day (87oz or 2600mL)
 - Men - 16 8oz cups/day (125oz or 3800mL)
- All fluids count including coffee, tea and foods containing high water content.

Dehydration and Performance

Maintaining adequate hydration levels before and during training is essential for maintaining maximal performance.

% body weight lost in fluids	Effects on performance
2%	Decrease in muscular strength
4%	Increase in core temperature, heart rate and perceived effort
>4%	Risk of heat illness or death

Preventing Dehydration

Athletes should be weighed pre & post practice to monitor the fluid weight lost during a training session. Fluid consumption during exercise should be based on the amount of fluids lost.

Fluids lost during exercise	Amount of fluids that should be consumed (total)
4 lb	70-105 ounces
6-8lb	105-210 ounces as 5-7 ounces every 10-15 min
8-10lb	210-360 ounces as 7-10 ounces every 10-15 min

Recommendations

- Begin exercise hydrated
 - Drink 1L of fluids the day before you exercise
 - 2 - 20oz bottles
 - or 400-600mL 2 hours before exercising
 - a 20oz bottle
- Don't wait until you are thirsty to drink!
- Schedule water breaks into your practices.

Sports Drinks

- Water is sufficient for exercise lasting less than 90 minutes
- For exercise >90 minutes, a carbohydrate drink is recommended to replenish glycogen stores (Juice, Gatorade, Powerade, etc)
- Drinks with electrolytes will help maintain electrolyte balance

Hyponatremia

- Excess fluid intake which causes an electrolyte imbalance.
- Can lead to cardiac arrhythmias, improper muscle contraction and muscle cramps.
- A serious condition that can result in death.
- Preventable by ingesting electrolyte containing beverages vs. just water.

Nutritional Summary for Strength/Power Athletes

- Meet energy needs
- Incorporate proper timing of meals
- Provide correct macronutrient amounts and in proper ratios to each other
 - Protein
 - Carbohydrates
 - Fats
- Provide sufficient micronutrients
 - Vitamins
 - Minerals
- Provide adequate fluids

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