

Protein Intake in Duchenne Muscular Dystrophy UMASS Memorial Medical

Protein is a nutrient found in many types of foods. The body needs a regular supply of protein to make and repair cells, including muscle tissue. Currently, we do not know the optimum amount of protein than individuals with Duchenne Muscular Dystrophy (DMD) require. However, there is some evidence to suggest that increased protein intake can help prevent muscle wasting in other populations.

Given the nature of Duchenne Muscular Dystrophy, we want to preserve muscle mass, and minimize muscle wasting by aiming for at least the minimum recommended dietary allowance (RDA) to assure adequacy, which is about 1 gram of protein per kilogram. Divide your child's weight (pounds) in half to determine how many grams of protein your child should aim for as a guideline; aim for 1 -1.5 grams of protein per kilogram. The dietitian can help identify sources and amounts of protein in your child's diet. Please see chart below to learn which dietary sources pack in the protein.

Both animal and plant foods contain protein. Some of these foods are better choices. Foods rich in protein may also be high in saturated fat and sodium. High intakes of saturated fat and sodium are not good for cardiac health. As a general rule, limit protein foods that are high in saturated fats and sodium, such as:

- **Meats and poultry:** bacon, chicken fried steak, Chorizo sausage, fried chicken, hot dogs, lunch meats, organ meats, processed meats, sausage and spare ribs
- **Fish and shellfish:** breaded and fried options
- **Whole-fat dairy:** whole milk and other whole fat dairy products

In contrast, numerous lean sources of protein are considered heart-healthy. Eating plans that include low-fat dairy products, skinless poultry, fish, beans, lentils and soy foods such as tofu and tempeh may help improve blood pressure and cholesterol levels. Here are some nutritious protein food options:

- **Meat, poultry and eggs:** lean cuts of beef, pork loin, skinless chicken and turkey
- **Fish and seafood:** salmon, tuna, cod, shrimp
- **Low-fat or fat-free dairy foods:** yogurt, milk, cheese, cottage cheese
- **Legumes:** beans, lentils, soy, peanut butter
- **Nuts and seeds:** walnuts, almonds, chia seeds, pumpkin seeds

Good sources of Protein

Food	Amount	Protein (grams)
Eggs	1	7
Eggs whites only	just the white of an egg	3.5
Egg substitute	¼ cup	7.5
Salmon	3 oz	19
White fish (haddock, cod, flounder)	1 oz	6.5
Low sodium canned tuna	2 oz (~ ½ can)	15
Shellfish (crab, shrimp)	1 oz	5.5
Tofu, firm	½ cup	20
Ground sirloin or beef	3 oz	24
Chicken breast (boneless, skinless)	3 oz	27
Lamb	1 oz	8
Pork Tenderloin	1 oz	9
Ham	1 oz	8
Turkey breast (skinless)	3 oz	18
No added salt, low-fat cottage cheese	½ cup	15
Greek yogurt, plain or low sugar, non-fat	1 cup	12
Regular yogurt, plain, non-fat	1 cup	10
Low fat cheese stick	1 stick (~20 g)	6
2% Land of Lakes cheese	1 slice	6
Low salt lunch meats	1 slice (1 oz)	3-4
Skim or 1% milk	1 cup	8
Carnation Breakfast Essentials Light Start	1 packet mixed with 8 oz of skim or 1% milk	13
Fairlife skim or 1% milk	1 cup	13
Simply Smart milk (Hood)	1 cup	10
Unsweetened Soy milk (most rice, coconut, almond milks will contain much less)	1 cup	7-11
Original Silk Protein (almond and cashew)	1 cup	10
Edamame (soy beans)	½ cup	11
Veggie or soy patty	1 patty	9-23
Dried beans and peas	½ cup	6-9
Low sodium, canned beans	½ cup	6-9
Lentils	½ cup	8
Hummus	¼ cup	5

Grains		
Quinoa	½ cup	4
Fats		
Unsalted almonds, peanuts, pistachios	1 oz	6
Teddie Unsalted Peanut Butter	2 Tbsp	8
Unsalted almond butter (no added sweeteners or palm oil)	2 Tbsp	8
Sunflower seeds	1 oz	5.5
Pumpkin seeds	1 oz	8.5
Chia seeds	1 oz (~2 Tbsp)	4
Protein Powders		
Non-fat dried milk	3 Tbsp	8
Whey protein powder	1 scoop (# Tbsp will vary per scoop/brand)	17
Dehydrated egg whites	1 Tbsp	4
Plant-based protein	1 scoop	10.5

**Sources: Eatright.org Nutrition Care Manual-Protein (High Protein Food List and Protein Content of Foods), USDA National Nutrient Database for Standard Reference, Google.*

Portion Tips: 3 oz of meat or poultry = deck of cards 1 oz cheese = 4 dice

Vegetarians

Strict, vegans who omit all animal products including eggs and dairy, will need to pay special attention to their diet to meet their protein needs. For these individuals, their sources will be the following:

- Tofu
- Tempeh
- Nuts/nuts butters
- Beans/legumes/pulses/lentils
- Seeds

*Please consult with your dietitian for ideas of how to incorporate these foods into your diet more.

Not all protein is created equal

It is actually the amino acids that make up protein that our bodies need. Meat, eggs and dairy foods are typically the most coveted protein sources because they contain all nine essential amino acids in the ratios that humans require. On the other hand, some plant-based proteins do not contain the essential amino acids in proportions that humans require. Include a variety of protein sources throughout the day to provide adequate amounts of all the essential amino acids, even if all of the protein sources come from plants.

Key is Protein Quality

The standard method of determining protein quality is the protein digestibility-corrected amino acid score (PDCAAS), which compares a protein's amino acid quality based on both the amino acid requirements of humans and their ability to digest it.

Egg protein has a high PDCAAS since it contains the perfect balance of the nine essential amino acids and is easily digestible, making it an excellent protein source for vegetarians. Other vegetarian foods that have a high PDCAAS include dairy products such as low-fat yogurt and milk, and soy, including tofu, edamame, soy milk and soy yogurt.

Tips for Increasing Your Protein Intake

Think Before You Drink

- ✓ Drinking milk is one of the easiest ways to not reach your calcium goals, but it will also fulfill a good percentage of your protein needs. Keep in mind that water is great for hydration but it lacks protein-whereas milk and water do both
- ✓ Consider trying ultra-filtered milk such as Fairlife or Simply Smart which will have a higher protein content
- ✓ Mix-ins such as non-fat dried milk or Carnation Breakfast Essentials Light Start are also options. To make Enriched protein milk, add 2 Tbsp of non-fat dried milk to 8 oz of 1% or skim milk to boost the protein content (13 grams)
- ✓ Aim to replace refined and processed carbohydrates with high quality protein. For example, swap unsalted nuts or seeds for white flour-based crackers or chips, replace an empty-calorie dessert with low sugar yogurt, or try grilled chicken salad vs pizza.

Sample Meal Plan

- Breakfast
 - Scrambled eggs with tomato slices (**2 eggs scrambled = 2 ounces of protein**)
 - Whole-grain toast (2 slices) with ½ teaspoon butter
- Lunch
 - Peanut butter and banana on whole-grain bread (**1 tablespoon peanut butter = 1 ounce of protein**)
 - Carrot sticks (½ cup)
 - Milk (1 cup)- low fat
- Dinner
 - Baked salmon (**3 ounce piece of salmon = 3 ounces of protein**)
 - Cheesy steamed spinach (2 cups fresh spinach)
 - Bulgur, ½ cooked with ½ teaspoon olive oil
- Snack
 - Cheese and celery sticks
 - Low-fat cheddar or Swiss cheese (**1 slice= 1 ounce = 1 ounce of protein**)
 - Celery sticks, ½ cup