The Protein Prescription

How to choose the healthiest sources

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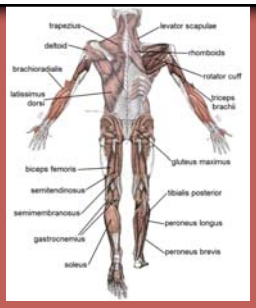
What is Protein?



- An essential nutrient
- No life without protein
- Contained in every part of body: skin, muscles, hair, blood, organs, eyes, fingernails and bone
- Next to water, protein is most plentiful substance in your body

Structure of Protein

- Composed of small units called amino acids
- The building blocks of protein
- 20 different amino acids
- Each different type of protein is composed of various amino acids put together in varying order
- Most proteins contain several hundred amino acids

Amino Acids

- The body requires 20 different amino acids of which 8 are referred to as *essential amino acids* which cannot be synthesized by the human body
- There are 12 amino acids which can be made by the body and are called the *non-essential amino acids*

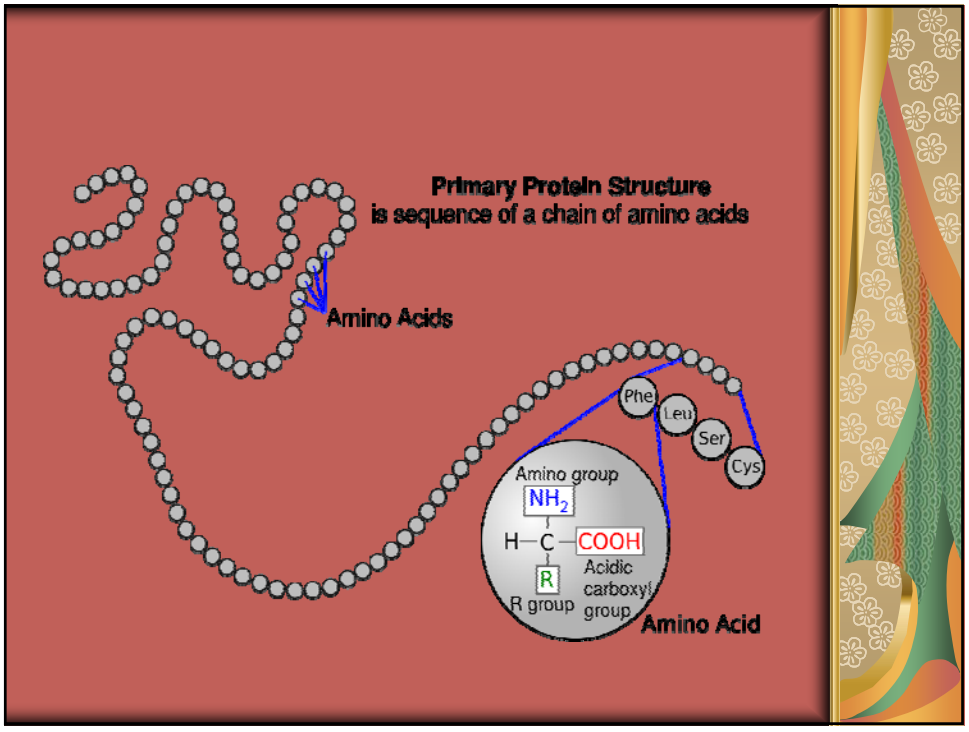
Amino Acids

- Body has the ability to make some of the amino acids
- 9 are called ESSENTIAL amino acids – body must obtain from food
- Most animal proteins contain all 9 essential amino acids
- Some plant sources contain all 9 (soybeans), but most are higher in some amino acids and lacking in others

Amino Acids

- **Essential** – must be consumed in the diet
- **Nonessential** – can be synthesized in the body
- **Conditionally essential** – cannot be synthesized due to illness or lack of necessary precursors
  - Premature infants lack sufficient enzymes needed to create arginine

Essential	Conditionally Non-Essential	Non-Essential
Histidine	Arginine	Alanine
Isoleucine	Asparagine	Asparatate
Leucine	Glutamine	Cysteine
Methionine	Glycine	Glutamate
Phenylalanine	Proline	
Threonine	Serine	
Tryptophan	Tyrosine	
Valine		
Lysine		



Structure of Proteins

- Not all proteins are alike.
- Differing combinations of any number of 20 amino acids may constitute a protein.
- In much the same way that the 26 letters of our alphabet serve to form millions of different words, the 20 amino acids serve to form different proteins.

Protein

- Protein is necessary for proper growth and development, muscle contractions, production of red blood cells and normal metabolism.
- It aids in **immune function; maintain fluid and electrolyte balance; provides structure to nails, hair and teeth; and repairs tissues.**
- Protein makes up approximately 17% of the body and is present primarily in **bone, muscle, hemoglobin, myoglobin, hormones, enzymes and antibodies.**

Function of protein

- Used primarily in body to *build, maintain and repair body tissue*
- Excess is used for energy or stored as fat
- Protein energy will be used only after other energy sources (carbs and fat) are exhausted or unavailable

Protein Needs

- The amount of protein you need depends on your:
- age
- gender
- weight
- activity level

Protein Needs

- The recommendation from the current **Dietary Guidelines for Americans is that we get 10% to 35% of daily calories from protein.**
- Our calorie needs are based on our age, weight, sex, and activity level

How much protein do you need?

- Number of servings depends on the number of calories consumed, activity level, and age
  - approx. 10-35% of calories

- Ex: 1200 cal: 30-105 grams protein
  1500 cal: 38-131 grams protein
  2000 cal: 50-175 grams protein

- To more **specifically** determine your daily protein needs, you must first know your weight in kg.
- To convert your body weight into kg, simply divide your weight in pounds by 2.2.
- The Centers for Disease Control and Prevention recommends minimum of 0.8 g of protein per kilogram of body weight for healthy individuals.
- If you are pregnant, under stress or moderately to vigorously active, use a number between 1.1 and 1.8 per day.
- To calculate your protein needs, multiply your weight in kg by the number of g of protein/kg you require each day.

For example, if you are a healthy individual and weigh 154 pounds:
154 divide by 2.2 = 70 kg
70 kg x 0.8 g protein = 56 g of protein per day, **minimum.**

If you are **moderately active**
70 g x 1.1 to 1.8 = 77 to 126 g of protein per day

Animal sources of protein

Meat
Chicken
Fish
Pork
Dairy: Eggs, Milk
Cheese, Yogurt

Plant sources of protein

- Nuts
- Beans/Legumes/Soybeans
- Whole Grains
- Seeds (Flax, pumpkin)
- Peas

How Much Protein Do You Need?

- Two new research studies published in *Cell Metabolism* suggest that low protein intake may be a key factor, **at least until old age**
- First study analyzed information on 6,831 middle-aged and older adults participating in NHANES III, a nationally representative dietary survey in the United States
- Researchers found that people **aged 50 years old** who reported eating a high **animal protein** diet, with more than 20% of their calories coming from protein, were *4 times more likely to die of cancer or diabetes and had a 74% increased risk of death from <u>any</u> cause in the following 18 years*

What does 20% look like?

- 1500 calories per day
- 1500 x .20 = 300 calories from protein
- 300 calories divided by 4 (calories per gram) = 75 grams
- 4 oz chicken breast = 35 grams
- 2 eggs = 12 grams
- 4 oz tuna = 30 grams

Too much protein

- In that same research, a moderate-protein diet was associated with a *3-fold increase in* ***cancer mortality***
- These effects were either abolished or reduced in people eating a high-protein diet that was *mainly plant-based*

- However, for people **over age 65**, the effects on mortality were **reversed:** those who consumed high amounts of protein had a **28% reduced risk of dying from any cause and a 60% reduced risk of dying from cancer**
- Similar beneficial effects were observed for the moderate-protein intake group
- Our ability to absorb protein appears to **diminish with age**, requiring perhaps greater concentrations

Protein for Older Adults

- The researchers found that the effects of protein on an individual's risk of dying may be caused in part by the activation of **growth hormone and the growth factor IGF-1**
- "Notably, the activity of these factors, but also body weight, declines naturally with aging, which may explain why older people not only did not benefit but appeared to do worse if they ate a low-protein diet," one of the researchers explained.
- Additional experiments in mice suggested that aging reduces the body's ability to absorb or process proteins.

Protein

- Older people **need more protein** than their younger counterparts.
- Though greater protein needs for older individuals aren't yet reflected in the Recommended Dietary Allowances (RDAs), it's clear that not only do older people progressively lose muscle as they age but also their bodies **resists building new muscle.**
- The muscle loss, known as sarcopenia, ranges anywhere from 0.5% to 2% of total muscle mass each year, starting around age 50.

Protein

- The good news is that after age 50, **getting enough high-quality protein in the diet, coupled with physical activity, can help overcome that resistance**
- Research shows that for people who are inactive, muscle loss can begin much earlier in middle age
- **Pair inactivity with low protein intake, and continued muscle loss with age is inevitable**.

- The RDA states that 0.8 g of protein/kg of body weight per day is adequate for all adults.
- But research indicates that protein requirements increase with age.
- Recommendations for how much protein is enough for older people vary, but **current studies suggest that most people over age 65 should take in about 1 g to 1.2 g of protein/kg of body weight per day to both gain and maintain muscle mass and function.**
- There are no separate recommendations for people between ages 50 and 65, but it stands to reason that getting enough protein during that time would make good nutrition sense.

Protein Needs

- 150 pounds divided by 2.2 = 68 kg
- 68 kg x 1 to 1.2 = 68 to 82 grams of protein per day
- Best spread out

  over the day

What does a serving of protein look like?

- Approximately 4 oz. of meat, fish, poultry or soy burger (deck of cards)
- 1 cup of beans (black, kidney, etc.)= 14 g
- 3 oz of reduced fat cheese or tofu = 20 g
- 2 large eggs = 12 g
- 2 Tbsp peanut butter or ¼ cup of nuts = 8 g
- ½ cup low-fat cottage cheese (low sodium) = 14 g
- 1 serving of protein powder for smoothie - variable
- 8 oz. of non-fat/low-fat milk = 8 g

Protein

- Extra protein does NOT offer added benefits
  - Does NOT build more muscle
- Excess protein isn't stored in body for future use as protein
- Stored as FAT

Protein

- If you do not eat enough protein, body will **break down protein in muscles**
- **Lowers metabolism**
- **Muscle wasting** (heart is muscle)
- For patients with pulmonary hypertension, strength of diaphragm and of respiratory muscles can be diminished
- Decreases ability to breathe well

Animal Proteins

- Tend to be high in **saturated fat and cholesterol**
- Saturated fat **increases LDL** cholesterol
- The American College of Cardiology and the American Heart Association recommend that people limit their intake of **saturated fat** to no more than 7% of their total daily calories.

Animal Proteins

- Choose lowest fat possible:
- Skim/1% milk vs. low-fat or whole
- Low-fat/non-fat cheese
- Lean cuts of meat – remove visible fat

Keep Animal Fats Low - REPLACE:

- Sour cream with non-fat or low-fat sour cream or yogurt
- Eggs with omega 3-rich eggs or eggbeaters
- Full fat ice cream with low-fat ice cream or sorbet
- Butter with olive oil or plant sterol margarine or nut butters

REPLACE:

- Cheddar cheese with part-skim mozzarella or low-fat cheese
- Animal hamburgers with meatless version
- Full fat animal foods with lower fat version (milk, cheese, meat, etc.)

Nuts

- Epidemiological studies have consistently reported that frequent nut consumption is associated with a **30-60% reduction in the risk of coronary heart disease.**
- A number of clinical trials: almonds, pecans, peanuts, hazelnuts, pistachios, macadamia nuts, and walnuts significantly lower LDL cholesterol levels by 7-16% without much change in HDL cholesterol and triglyceride levels.

Nuts

- Review of 4 large epidemiological studies:
  - Nurses' Health Study
  - Adventist Health Study
  - Iowa Women's Health Study
  - Physicians' Health Study
  - **37% reduced risk of coronary heart disease in those consuming nuts at least 4 x/week**

Nuts – Serving Size

- Palm size

Beans/Legumes/Soybeans

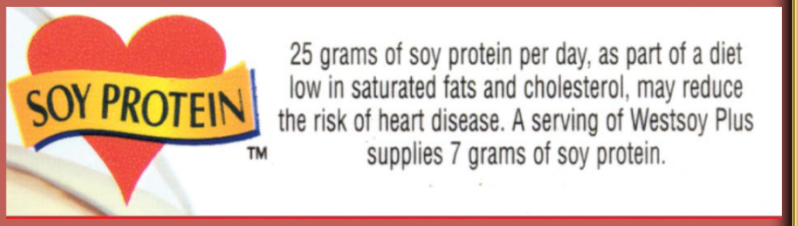
- Soluble fiber in legumes (lentils, pinto, kidney, garbanzo, navy, soy and black beans) can lower total and LDL cholesterol
- 1 cup per day can lower cholesterol by 10-20 %
- ½ cup per day can lower cholesterol by 12%

Soy Protein

- **All 9 essential amino acids**
- Complex carbohydrates
- Omega-3 fatty acids
- Vitamins and minerals such as calcium, folate and iron

Soybeans

- FDA approved health claim for soy
- 25-50 grams per day may reduce risk of heart disease (lowers LDL cholesterol)



Soy

- Over 30 years of research – soy protein can lower LDL cholesterol 3-5%
- 1% increase in LDL associated with a 2-5% increase in heart disease risk
- www.SoyNutrition.com info on soy research

Ways to Add Soy to Your Diet

- **Baking**
- Add soy nuts to cookie or brownie recipes.
- For cheesecake, replace half of the cream cheese with pureed tofu.
- Use calcium-fortified soymilk in place of milk for pudding.
- **Main Dishes**
- Add tofu, tempeh, texturized vegetable protein or textured soy protein to meatless chili, soups and stews.
- Cook extra-firm tofu or tempeh on the grill.

Ways to Add Soy to Your Diet

- In meatloaf, use veggie crumbles and half ground turkey or lean ground beef.
- Make a taco using pre-browned, flavored tofu.
- Marinate tofu chunks in teriyaki sauce or your favorite dressing and keep on hand for an easy snack.
- Puree silken tofu and flavor with ranch dressing mix, onion soup mix or taco seasoning. Serve with low-fat tortilla chips, potato chips or fresh vegetables.

Ways to Add Soy to Your Diet

- Replace all or part of the ricotta cheese in lasagna or stuffed pasta shells with tofu. Blend soft tofu with salt, pepper, garlic, basil and chopped fresh parsley until smooth.
- Skewer extra-firm tofu chunks for shish kabobs.
- **Salads**
- Top salads with roasted soynuts.
- **Sandwiches**
- Add a thin slice of baked tofu to a sandwich.
- Use soynut butter in place of peanut butter.

Ways to Add Soy to Your Diet

- **Side Dishes:** Use pureed tofu in twice-baked potatoes. Scoop out the baked potato pulp and combine with tofu. Add sauteed garlic and minced onions. Season to taste. Refill the potato shell with tofu mixture. Top with low-fat shredded cheese and bake until cheese is melted.
- **Soymilk:** Make smoothies by blending soy milk, silken tofu, frozen bananas and other frozen fruit in a blender.
- **Pour soymilk over cereal or fruit,** use in sauces, soups, puddings, muffins, pancakes or in any recipe that calls for milk.

What about GAS?

- Digestive Enzymes, Beano, Digest Gold
- Increase fiber/beans SLOWLY!
- Chew well!
- Use canned and rinse well

Seeds

- Chia
- Hemp
- Flax
- Pumpkin
- Sesame
- Sunflower
- 1 oz = approx. 5 grams protein
- Good source of protein and good fats

Whole Grains

Whole Grains and Protein

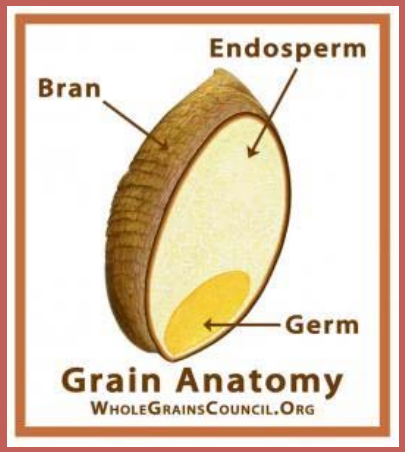
- While many of us have heard that one of the things that makes quinoa the superfood extraordinaire is that it's high in protein, it certainly isn't the only protein-filled grain.
- Virtually all foods contain a mix of three macronutrients: fat, protein, and carbohydrates.
- Though we think of grains as carbohydrates in fact they also contain small amounts of healthy fat, along with a dose of protein.

Protein in Whole Grains

- Just one cup of cooked quinoa contains 8 grams of protein, as well as 5 grams of fiber.
- 1 cup cooked Amaranth = 8 g
- 1 cup cooked Oat bran = 7 g
- 1 cup cooked Wild Rice = 7 g
- 1 cup cooked Barley = 5 g

Whole Grains

- Whole grains contain all three parts of the kernel: Bran, Germ, Endosperm
- Refining normally removes the bran and the germ, leaving only the endosperm.
- **Without the bran and germ, about 25% of a grain's protein is lost, along with at least 17 key nutrients**.



Whole Grain Research

- Heart: Harvard researchers followed 21,376 physicians for 20 years – eating 2-6 servings of whole grain products a week reduced risk of heart failure 22%
- Those eating whole grains daily reduced risk by 28%

Complete Proteins

- To make a complete protein, combine *beans* with any one of the following:
- Brown rice
- Seeds
- Corn
- Wheat
- Nuts

Complete Proteins

- Combine *brown rice* with any one of the following:
- Beans
- Seeds
- Nuts
- Wheat

Protein Powders

- Unlike protein bars which need to contain a good amount of carbohydrates to give them a reasonable texture, feel and taste, **protein powders and drinks** do not
- It is possible to find powders and drinks with **half the fat and carbs of most bars, with twice the protein**
- Protein shake -easy to do before/after a workout
- A review of 22 studies found that protein supplementation also **increases muscle mass** and strength gains during resistance exercise in both young and older adults

Protein Powders

- A review of **22 studies** showed that after training 2-5 times a week over 6-24 week period, people getting **supplemental protein** gained an additional 1.5 pounds of muscle and could leg press an additional 30 pounds compared to people not getting the extra protein

Protein Powders

- Quality is critical
- FDA does NOT routinely test protein powders and drinks for quality
- ConsumerLab (consumerlab.com) did a review in which 31% of the selected protein powder failed quality testing including 2 for lead contamination

Protein Powders

- Many people are using protein powders in protein shakes for a quick meal
- Products vary based on source of the protein: whey, soy, casein, rice, pea, hemp
- Amounts of protein can vary – a good rule of thumb is 25 grams of protein in a meal

Whey Protein

- Milk derived
- A “complete” protein – contains all essential amino acids
- Contains highest amount of the branched chain amino acids – BCAAs
- The BCAAs: valine, leucine, and iso-leucine tend to **become depleted following exercise and are needed for the maintenance of muscle tissue**

Whey Protein

- **Whey concentrates** – water is removed from whey to create a whey concentrate
- Most of the concentrate is protein but it will also contain lactose, fat and cholesterol naturally found in whey
- Amount of **protein can vary from 25-80%** of the weight of the concentrate
- If concentrated **without heat (using "cold" press)** the concentrate may still contain the potentially beneficial immunostimulant constituents (immunoglobulins) of whey

Whey Isolate

- Whey **isolates** – typically lower in lactose, fat and cholesterol than concentrate
- Cold press may still contain immunoglobulilns of whey

Whey hydrolysates

- Predigested protein that is assimilated into the body more quickly than non-hydrolyzed types
- Good for use after exercise

Soy Protein

- Very heart healthy - **lowers LDL cholesterol** and can reduce risk of heart disease
- Vegetarian source of **complete protein**, equivalent to animal protein
- Soy isolates may also provide higher amounts of soy isoflavones such as genistein, and daidzein than a soy protein concentrate –
- Can help reduce menopause symptoms for some women
- Those with thyroid issues should limit intake of soy-based protein (avoid within 2-4 hours of meds)

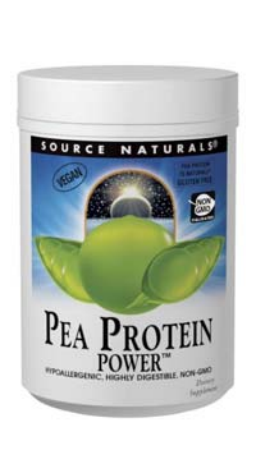
Soy Protein

Rice Protein

- Most of the rice seed is carbohydrate, but it also contains protein
- **Rice protein isolate** from whole grain brown rice contains all essential amino acids
- Low allergenic

Pea Protein Powder

- Like whey, it is a **complete protein** and rich in essential branched amino acids
- A placebo-controlled study found that it built muscle equally well as whey
- Vegan protein
- Low allergic potential



Hemp Protein

- High quality source of protein due to its high rate of digestibility.
- The better a protein is digested, the more efficiently it can be used by the body.
- One of the best **vegan protein powders** with 20 amino acids, including the nine essential amino acids that your body is unable to produce on its own and must obtain from dietary sources.
- Hemp protein powders are **rich in fiber** and can lower your risk for heart disease, type-2 diabetes, constipation and diverticular disease

Combination Protein Powders

- Sometimes protein sources are bundled together like pea and rice protein
- Both protein sources are vegan and both incomplete protein sources.
- But by adding them together you have a complete vegan protein source
- Amino acid profile of a rice and pea combination is very similar to that of whey protein
- In general plant proteins better for heart health than animal proteins

Carnitine

- Carnitine is sometimes added to protein powders although it has not been shown to be of added benefit for athletes
- Recent research suggests that it **may potentially contribute to cardiovascular disease in certain people**
- People who eat red meat have bacteria in their GI tracts which digest carnitine to a compound called TMAO which appears to increase risk of atherosclerosis by reducing the normal clearing of cholesterol

Daily Value

- Some protein shakes contain 10-100% of the Daily Value for one or more vitamins and minerals
- If you take a multi-vitamin/mineral or eat fortified products like breakfast cereals with 100% of the Daily Value, be careful not to exceed tolerable upper limits of vitamins/minerals

Conclusions

- High quality protein is essential for human health
- Individual amino acids make up protein
- Over age 65 protein needs go up: 1 to 1.2 grams of protein per kg body weight
- Keep animal proteins low in fat
- Protein powders can fill the nutritional gaps for some people
- Don’t buy protein powders with added carnitine