

# The Secrets of Using Protein to Get **BIGGER, STRONGER and FASTER!**

By Dr. David T. Ryan, D.C.

Are you an athlete who wants to play like a pro? Do you want to be bigger, stronger, faster, and have more endurance? If this is what you want and aspire to, then consuming more protein in your daily diet may be the ticket to accomplishing your goals.

I've heard from hundreds of professional, Olympic, college, and high school athletes who have expressed their desire to get bigger, stronger, faster and have more endurance. Often, when I propose that the solution may be just as simple as eating more protein, many get dismayed and feel that I'm giving them a blown-off response.

But the simple truth is that most athletes don't eat nearly enough protein to help them recover from their training, much less grow bigger and stronger.

## Why is protein so important for me as an athlete and bodybuilder?

Of the three *macronutrients* (proteins, carbohydrates, and fats) **protein** is the only one which contains nitrogen. Nitrogen is necessary to muscle growth. Consuming sufficient protein can help keep you in a "positive nitrogen balance" meaning that your body is retaining more nitrogen than it is excreting. Being in a positive nitrogen balance is indicative that you are in an *anabolic* (tissue building) state. That means you are in a position to build bigger, stronger muscles.

## How much protein do I need?

The debate over how much protein you need as an athlete has spawned a hot bed of controversy. First of all, let me say this. **No literature supports the idea that consuming too much protein is harmful or lethal!**

It is true that when you are consuming a high protein diet, you require lots of water to keep *ammonia* (a by-product of protein metabolism) flushed out of your body. Ammonia is toxic to the nervous system and therefore it must be detoxified into a form that can be readily removed from the body. Ammonia is converted to *urea*, which is water-soluble and is readily excreted via the kidneys in urine. As long as you are healthy and drink enough water, it is highly unlikely that you will ever have a problem with a high protein intake. **Shoot to consume about half of a gallon of water for every 100grams of protein in your diet.**



If you are a high school athlete who is trying to gain weight, then eat more protein. I have been coaching young adults for over 30 years now. “Eat more and eat more protein,” is the best advice you can get. The combination of sleep and food will make you bigger. **Now with all that said, let me simplify this:**

**An athlete’s protein needs = 1-2 grams of protein/day per pound of bodyweight.**

How can I say that? Because the American Dietetic Association , the American College of Sports Medicine, and even the Dieticians of Canada are in agreement on this.

**It is generally accepted that the average athlete will require only one gram of protein per pound of body-weight. Therefore a 100 pound athlete needs 100 grams of protein/day, spaced out evenly over multiple meals.**

However, heavy training athletes will require twice that amount. **A 200 pound strength athlete may need as much as 400 grams of protein per day! A hard training athlete can consume up to 60 grams of protein every 3-4 hours.** Going past that amount will result in wasted protein and excess calories.

These guidelines are based on male athlete requirements, but similar guidelines have been followed by females with success. Sufficient protein is even more important for aging athletes. Research shows that protein in the older adult provides considerable benefits and does not result in toxic effects. The exact amounts are still undetermined if you are over 50. Chances are that you will need less, since cellular reproduction slows down as you age.

The tables below are provided for your reference.

**Table: ADA (American Dietetic Association)**

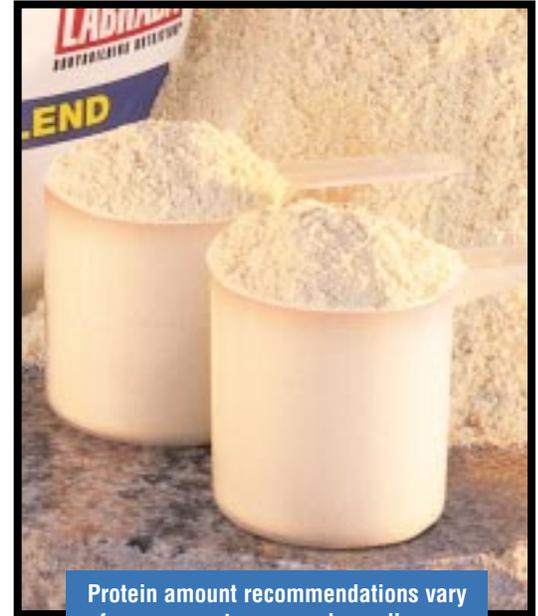
<b>Who?</b>	<b>How Much?</b> PRO g/kg BW/day
RDA for sedentary adult	0.8
Physically active adult	1.0
Endurance athlete	1.2 - 1.4
Strength athlete	1.4 - 1.8
Adolescent athlete	1.0 - 2.0
Maximum for adult athletes	up to 2.0

## The American College of Sports Medicine (ACSM), American Dietetic Association (ADA) and Dieticians of Canada (DC) recommend:

- Protein recommendations for endurance athletes are 1.2 to 1.4 g/kg body weight per day, whereas those for resistance and strength-trained athletes may be as high as 1.6 to 1.7 g/kg body weight per day.
- These recommended protein intakes can generally be met through diet alone, without the use of protein or amino acid supplements, if energy intake is adequate to maintain body weight.

### Some of the implications of the ACSM/ADA/DC Position Statement are that:

- Individual protein requirements may be influenced by the size of an athlete as well as the demands of his/her sport (i.e., whether the sport is mainly “endurance”- or “strength”-oriented). For example, a 60 kg (132 lb) cross-country runner might require 70-85 grams of protein per day, whereas a 100 kg (220 lb) football player might require up to 160-170 grams of protein daily.
- Athletes require ~10-15% of their daily energy intake from protein, provided that sound nutritional practices are followed and energy intake is sufficient to maintain body weight. If, for example, an athlete consumes 3,000 kcal and 10% of those calories are from protein, that’s enough to provide 75 grams of protein ( $3,000 \times 0.10 / 4$  kcal per gram of protein).



Protein amount recommendations vary from person to person depending on how much you weigh

### Side Effects of Eating Too Much Protein

1. Excess protein may result in excess calories becoming stored as fat. However, this is unlikely as protein must be broken down through many metabolic steps before it can be converted into a form which can then be stored as fat.
2. Intestinal irritation including constipation, diarrhea, gas, and bloating. Most of these symptoms can be controlled by using digestive enzymes and consuming sufficient fiber. Varying the protein source is also helpful.
3. Dehydration. Be sure to drink sufficient water – up to ? gallon per each 100 grams of protein consumed. When insufficient water is consumed it can result in symptoms ranging from simple fatigue to complicated neurological disorders.
4. Auto-immune reaction, resulting from using the same protein supplement repetitively for long periods. To prevent this, use different protein supplements periodically. You can build up an immune reaction to any protein drink if you overuse it for long periods of time. Vary both your natural protein sources (meat, fish, chicken, turkey, etc.) and protein supplements (whey, multi-blends, soy, etc.)
5. Elevation of liver enzymes.

## Side Effects of Not Eating Enough Protein

1. Bloating stomach.
2. Loss of coordination.
3. Loss of sleep.
4. Loss of hair.
5. Dry skin.
6. Vision problems.
7. Digestion problems.
8. Weakness.
9. Lack of weight gain and worse, weight loss due to loss of lean muscle tissue.
10. Chronic sinus trouble, allergies, anemia, pain, weak joints, bruising, difficulty breathing.

## How is protein digested?

Protein is made up of long chains of *amino acids*. If you think of proteins as a train, then amino acids are the boxcars which together make up the train. When you eat protein, proteolytic enzymes in your body break the proteins down into amino acids, which are then absorbed. Digestion of proteins is called *deamination*. The removal of the amino groups of all twenty amino acids begins with the conversion of amino groups to just one amino acid - *glutamic acid* (or glutamate ion.)

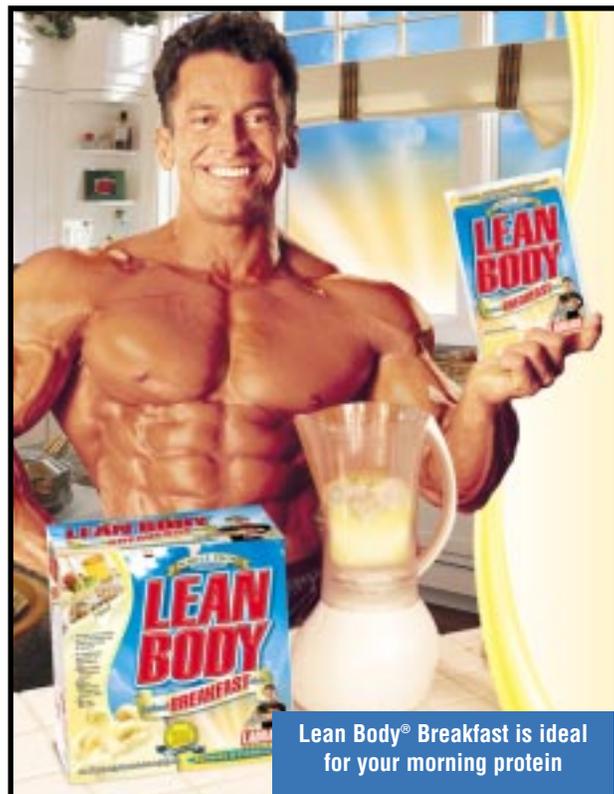
Once protein is taken in by the mouth, the digestive process begins. It is a very short trip, since most of the protein is digested within the first few feet of the digestive tract. The *stomach* leads to the *duodenum*, which leads to the *small intestine*. Almost 100% of protein is digested and absorbed in the duodenum.

## When should I consume protein?

The simple answer is, “at a time when you will not be engaging in strenuous physical activity.” When you work out, blood is transported to your muscles and away from your stomach and digestive anatomy. Training a large muscle group such as your legs can demand up to 65% of your blood supply! As your legs and stomach play “tug of war” over the blood supply, your digestion is stressed, causing nausea and reducing the absorption of protein.

### The best times to consume your proteins are:

**1. First thing in the morning upon awakening**, to stop the *catabolism* (tissue breakdown) that results after several hours of sleeping, and jump start your body into an *anabolic* (tissue building) stage. The best protein for this meal is a complete protein such as scrambled egg whites or a protein shake containing a multi-blend of proteins, such as **Lean Body® Breakfast, or Lean Body® Ready-to-Drink (RTD) Shakes**. Be sure to also consume some carbohydrates with your protein, such as oatmeal or whole grain cereal.



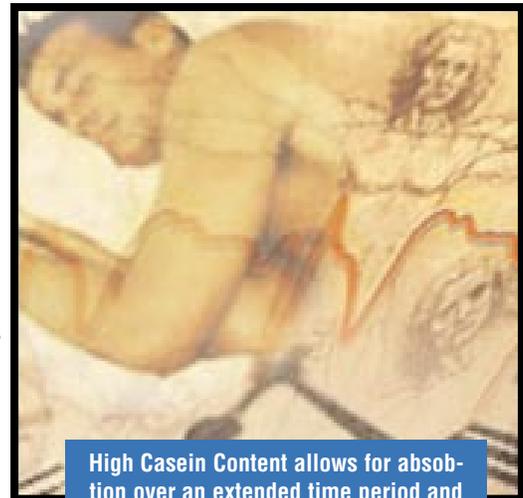
Lean Body® Breakfast is ideal for your morning protein

**2. Every 3-4 hours thereafter as part of a complete meal.** Giving your body protein every 3-4 hours promotes a positive nitrogen balance and will ensure that your muscles are supplied with the nutrients they need to grow. Remember to wait at least 1-1.5 hours after a meal to train. The best proteins to consume during your daily meals are lean chicken, fish, or turkey or a protein shake such as **Lean Body® Meal Replacement Shakes and Ready-to-Drink Shakes**. For higher protein intakes, **ProV60®** or **Lean Body® Mass 60** is recommended. These proteins are broken down and absorbed slowly over a period of hours, providing long lasting nourishment to your muscles.

**3. Pre-exercise meal.** Using proteins that are mostly isolates will digest the fastest. Take a high quality whey protein isolate such as **Iso Power 60™** about 30-60 minutes prior to exercise to allow for proper digestion. Take in 30-60 grams, along with a piece of fruit such as a banana.

**4. Directly after your training.** Within 30 minutes of training you should consume 75-100 grams of carbohydrates in the form of potatoes, whole grain bread with jam, bananas, rice, or whole grain cereal with skim milk. You need this to raise blood sugar levels in your body. This sugar will be deposited in the cells of your muscles and liver. The insulin released by your body in response to the carbohydrates will promote the uptake of amino acids into muscles as well. For this meal, you should consume 40-60 grams of a high quality whey protein isolate such as **Iso Power 60™**. Unlike protein blends which take hours to digest Whey Protein Isolate (WPI) is digested very quickly (within 30-45 minutes) so that your body can begin post workout muscle repair right away. Then, one hour later, have a complete whole food meal consisting of a protein such as chicken, turkey or fish, along with a complex carbohydrate such as sweet potatoes, rice and beans, or whole grain rice. (See sample diet pg 11)

**5. Right before bedtime.** Using a protein with a high casein content will allow for absorption over an extended time period and help stabilize your insulin through out the night. This should allow you to sleep better through the night. A light protein shake using **ProV60®** will provide time-release amino acids that your body can use to repair and build muscle all night long. Take in between 30-60 grams, depending on your duration of sleep and ability to digest protein.



High Casein Content allows for absorption over an extended time period and insulin stabilization overnight

## What are the advantages of using protein shakes?

### 1. You can tailor the type of protein you consume to meet your specific training needs.

For example, you can choose a multi-protein blend protein powder fortified with carbohydrates, vitamins and minerals for your meals (**Lean Body®**); a whey protein isolate to use right after training to enhance recovery (**Iso Power 60™**); and a low-calorie multi-protein blend at bedtime to promote nighttime muscle repair and growth (**ProV60®**.) Tailoring your protein intake in this fashion is more difficult to achieve with prepared food.

**2. Protein powders increase compliance with a high protein nutrition program.** Protein shakes are usually easier to make and consume than an equivalent amount of steak, turkey, chicken or fish. Eating a chicken breast every three hours is possible, but cumbersome for most people. Because of their ease of preparation and their delicious taste, protein drinks make it easier for you to comply with your program.

**3. Improved digestibility and absorption equals greater results.** The protein particles found in protein powder have already been ground down into a fine powder during manufacturing. This powder provides a large surface area with which the proteolytic enzymes in your digestive tract can make contact. The result is higher digestibility and absorption of the protein. Even if you were to chew a piece of steak, chicken, fish, or turkey for many minutes, you could never grind it down to a particle size as fine as that found in protein powder. When protein powder is suspended in fluid and ingested, it enters the stomach where it makes contact with proteolytic enzymes, which begin to break down the protein shake into its constituent amino acids, before it is quickly sent to the duodenum for absorption. That means more free amino acids are absorbed to keep you in a positive nitrogen balance, and that means building muscle faster.



**4. Value.** Ounce for ounce, high quality protein like that found in Labrada's protein powders, meal replacements and ready-to-drink shakes provide a better value than chicken, turkey, fish or steak. This is especially true when you consider the cost and time of preparation at home or the cost of restaurant-bought food, not to mention speed and convenience!

## Protein Supplements: What kinds of proteins are in my powder?

### Milk Protein

Dairy based protein is the most common form of protein used in protein powders. (Soy is the other major protein source.) There are two main proteins that make up the protein found in milk: *Whey and Casein*.

### WHEY

Whey Protein makes up about 20% of the protein found in milk. It is available in two major forms known as *whey protein concentrate (WPC)* and *whey protein isolate (WPI)*.

**Whey Protein Concentrate (WPC)** is exactly what the name implies; it is a concentrated form of whey protein. WPC contains an abundance of essential and non-essential amino acids and is an excellent source of all the essential amino acids. **Essential amino acids** are those that your body cannot produce on its own and therefore, must be obtained from the daily diet. Whey protein is also extremely rich in the **branched chain amino acids (BCAAs)**, leucine, isoleucine, and valine.

BCAAs are unique because they are metabolized in the muscles and not in the liver like other amino acids. Branched chain amino acids make up one-third of muscle protein and are important to bodybuilders because training increases the body's demand for them. An adequate supply of BCAAs in the blood is insurance against loss of muscle size and strength.

Whey protein is also rich in the amino acid, **taurine**, which supports muscle volume at the cellular level. In addition, whey is high in glutamine, which accounts for approximately 60% of all free amino acids in the body.

**Glutamine** is vitally important to muscle growth. Glutamine has a super-unique role: it can be utilized by the body as a fuel, used for a new body protein, and to make other important compounds and amino acids. There

are especially high concentrations of glutamine in muscle cells. If you do not eat enough glutamine-rich foods (like whey protein) your body tears down muscle tissue to supply the rest of the body with glutamine! The good news is that recent studies show that supplemental glutamine prevents muscle breakdown. **Using as little as a few scoops of whey per day may maintain muscle stores of glutamine and prevent muscle breakdown.**

In addition to glutamine, whey protein contains special types of antibodies called immunoglobulins. These *immunoglobulins* play a specific role in the body's immune system: they can attack foreign substances that enter the body. It appears that these substances help the immune system do its job more effectively. Whey protein is easily digested. In fact, the body absorbs whey protein better than any other protein, period. WPC is usually mixed with other proteins to offer a wider variety of benefits.

## Whey Protein Isolate

**Whey Protein Isolate (WPI)** is a less common form of whey protein which is about 90% pure protein. Isolate protein is considered a purer form of whey protein because it contains less fat and milk sugars (lactose) than whey protein concentrate (WPC.) **WPI is absorbed more quickly by the body than WPC.** Because it goes into your system very fast, this protein is best to drink right after training to jump start anabolism, and anytime an easily digested protein is needed.

### Advantages of Whey protein include:

- Enhances muscle recovery after workouts and helps prevent muscle breakdown.
- Helps boost immune system.
- Best source of amino acids next to cooked eggs.
- Absorbs very quickly in the body.

## CASEIN

**Casein protein** is the major protein component found in milk protein (about 80%) and it exists as micelles (globules.) Casein isn't as commonly used by itself since it is not as soluble in fluids compared to whey protein. However, casein has a strong advantage in that it is digested slowly. This makes it valuable as an overnight supplement. When you are sleeping 8-9 hours per night, your body isn't receiving meals every three hours. Casein, with its natural time-released properties, fills that gap and provides the slow digestion and release of muscle nourishing amino acids. Nighttime is a critical time for recovery, so you need to have protein available. Remember that you don't recover and grow muscle in the gym. You grow while you rest and sleep.

### Advantages of Casein protein include:

- Useful as a night-time meal to provide slow release of amino acids.
- Useful as a component of multi-blend proteins which you can use throughout the day to provide time release muscle nourishment.
- Mixes thicker than whey protein, so it adds a thicker consistency to shakes.

## MILK PROTEIN ISOLATE (MPI)

**Milk Protein Isolate** consists of all the milk protein fractions found in milk. It contains both whey protein (20%) and casein (80%), making it ideal for use in meal replacements and protein blends which you use throughout the day. MPI provides both quickly digested and more slowly digested proteins. MPI imparts a smooth creamy taste and is a high quality, versatile protein.



### Advantages of milk protein include:

- Good for use throughout the day at meals and in between meals
- Excellent taste and solubility

### SOY PROTEIN CONCENTRATE (SPC) AND ISOLATE (SPI)

This plant derived protein offers the most complete protein source of any vegetable. Just like with milk protein, it can be purchased in a “concentrate” and an “isolate” version. Soy protein offers anyone who has problems with milk intolerance an alternative source of supplemental protein. Soy protein is an *incomplete protein* in that it does not contain all of the essential amino acids, but this problem is easily overcome when manufacturers fortify it with extra essential amino acids or blend it with milk proteins to supply the missing amino acids. Soy protein is high in glutamine, BCAAs, and arginine.

### Advantages of Soy protein include:

- Mixes with most foods very well to increase protein content
- Boosts immune system
- Alternative for those who have problems with milk based proteins
- Lowers cholesterol, better for heart patients
- Rich in the “critical cluster” of amino acids: glutamine, branched chain amino acids, and arginine.

### EGG PROTEIN

Take your egg whites, cook them, dry them out and then grind them up, that is the basis of egg protein. The main advantage of egg protein is that it is a complete protein with more branched chain amino acids than the other proteins.

### Advantages of egg protein include:

- Highest amount of BCAA.
- Mixes well with foods to increase overall protein content.
- Egg protein is easily absorbed.
- Fat free.



Egg protein has more branched chain amino acids than any other protein

Some older athletic diets proposed eating just raw eggs. The problem with eating raw eggs (including the whites) is that they are poorly absorbed and contain a large amount of a glycoprotein called *avidin*. Avidin attached itself to **biotin**. Once that avidin-biotin forms a bond, the body can't break it apart, so you run the risk of developing a partial or full biotin deficiency. Egg protein has had the avidin neutralized through pasteurization, so it is safe to use. If you are going to use whole eggs or egg whites, cook them first to denature the avidin. This will allow you to absorb 98% of the proteins. Biotin helps the body utilize other B vitamins as well as aids it in the Krebs cycle (energy) in the synthesis of fats & proteins and cell reproduction (growth).

### A QUICK WORD ABOUT REAL FOOD!

With all this talk about supplements, you'd think eating real food is a bad idea. That isn't true! It is better to eat your protein along with “real food,” as it will slow down digestion and will provide beneficial nutrients and fiber that nourish your body and help with digestion and elimination.

Whole grains, vegetables and fruits contain fiber along with trace vitamins and minerals, and should be consumed at meals, regardless of whether your protein comes from an unprocessed animal source such as chicken, turkey fish or beef, or from a protein shake. The best coaches and trainers in the world will tell you that most

of your meals should consist of real food, and you should use supplements to improve your nutrition program, making it higher in protein and nutrients. As an athlete, you need both food and supplements to get bigger, stronger and faster!

One commonly overlooked fact is that in order to gain weight, you must consume sufficient calories. This is true, regardless of your protein and supplement intake. I'll say it again, in order to gain muscular weight, **you must consume more calories than you burn.** If your calories are too low, you simply won't gain weight, even if you are consuming lots of protein! To make up your needed calories, you need to consume lots of whole foods.

When eating a lot of food, it is helpful to take digestive enzymes along with your meals. Your body makes its own digestive enzymes, but adding digestive enzymes to your supplement program takes some of the load off of your body and can help you digest and absorb more protein and more food, more quickly. Digestive enzymes are inexpensive and can be obtained at any health food store. Use a digestive enzyme that contains protease, which digests protein. Take digestive enzymes with meals, or as directed on the bottle.

## Labrada Proteins



Lee Labrada and his staff have a top-notch company that provides you with the latest supplements that are the “cutting edge” of the fitness and nutrition industry. Lee and I have had many discussions on the topic of proteins and other issues of nutrition and training. He and his top staff people like Dave Ramirez, who heads the Research & Product Development team, work very hard to offer the best in nutritional supplementation and educate athletes in their online newsletter.

Lee takes a lot of interest and pride in his products and they are the best on the market today. Lee backs it all up with justifiable information that is both scientifically defensible and has years of “real world” testing to establish it. Beware of companies that offer you information that is misleading and not truly based on science.

After reading this article you should have a better understanding of the types of protein that you need to use and also the amount of protein that you need to have on a daily basis. You also know that you need to take in different types of protein at different times. Labrada Nutrition has a whole line of proteins to fit your needs.

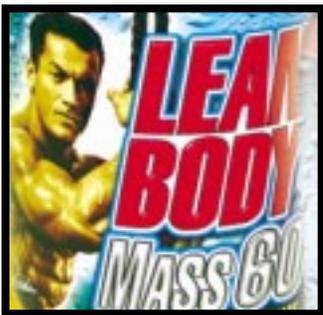
Labrada's three main proteins are in a family of supplements that are engineered to help you tailor your proteins to your needs and maximize the absorption. Lee believes so strongly in his products that he has offered a guarantee on them. Who else is doing that?

The three products in the “60” family are: **ProV60™**, **Lean Body Mass 60™**, and **IsoPower 60™**.

**All three of these powders contain a big 60 grams of protein per serving, to help athletes get bigger, stronger and faster!**



**ProV60™** is a multi-blend of five proteins, and since it is highest in casein protein, is the best for use at bedtime when you want slow extended digestion and absorption of protein. Because it is a blend of quickly absorbed and slowly absorbed proteins, you get the “time-release” effect that is so important to keeping your body in a positive nitrogen retention throughout the night. ProV60 is light and won’t weigh you down because it’s low in carbohydrates and fats. ProV60 can also be used as a drink with your meals to increase the total protein content of your meals. It’s delicious, mixes instantly and is easy to use. I like to mix it with skim milk. *Click here for complete product info: [www.labrada.com](http://www.labrada.com)*



**Lean Body Mass 60™** is the king of weight gainers. It is lower in sugar than the typical cheap weight gainer, so you don’t gain the fat, but contains lots of calories and there are six proteins that contain Casein and Whey concentrate and isolate proteins to allow for a complete spectrum of proteins. This is the protein you need if you are young or thin and are having trouble gaining weight. It contains 5 grams of CreaLean™ creatine to help you pack on more muscle volume and strength. Use of this product will make you gain weight and Lee guarantees it, right there on the package in black and white. You can use this protein right before bed or first thing in the morning to allow for sustained release of nutrition throughout the next six hours. *Click here for complete product info: [www.labrada.com](http://www.labrada.com)*



**IsoPower 60™** is the best protein for quick maximal absorption. It is 100% pure whey protein isolate, and is ideal for pre workout and post workout times to enhance your performance and recovery. This is the right product right before and after a hard weight training workout or athletic performance! It is very low in fat and sugars, and will be completely absorb in most cases in less than 1 hour. *Click here for complete product info: [www.labrada.com](http://www.labrada.com)*

Using all Labrada “60” proteins together will help you maximize your muscle gains, by providing the right protein at the right time. Below is an example of the kind of diet I would write for an athlete who is looking to put on lean muscle mass and gain strength.

## Average Diet for a Male who is looking to gain muscle mass:

### 7:00am Pre-workout/ Breakfast

Large Egg Beaters or egg white omelet made with low fat cheese and your favorite toppings/ or an IsoPower 60 (half-serving/30 grams) protein shake with skim milk; fruit, such as berries; and one cup of whole grain cereal or granola with skim milk, add a handful of nuts such as almonds if you wish

### 8:30am-10:00 Workout

### 10:00am Post-Workout

Drink an **Iso Power 60™** (full serving /60 grams) protein shake mixed with skim milk; 1 cup of Oatmeal with cinnamon, raisins; plus a sliced banana

### 12:30pm Lunch

6-8 oz chicken breast or turkey burger on whole grain bread; baked potato or whole wheat pasta; salad; favorite fruit or granola bar; glass of non-fat chocolate milk

### 3:00 pm Mid-afternoon snack

**Lean Body Mass 60™** (full serving/ 60 grams) shake, natural peanut butter on whole grain bread, banana

### 5:30 pm Dinner

6-8 oz of lean protein (fish, chicken, turkey, or lean red meat), one medium sweet potato or bowl of brown rice and black beans, steamed vegetables, apple or granola bar for dessert

### 8:30pm After-Dinner Snack

Shake made with **ProV60™** (one full serving/ 60grams) and skim milk plus frozen strawberries; small yogurt and granola.

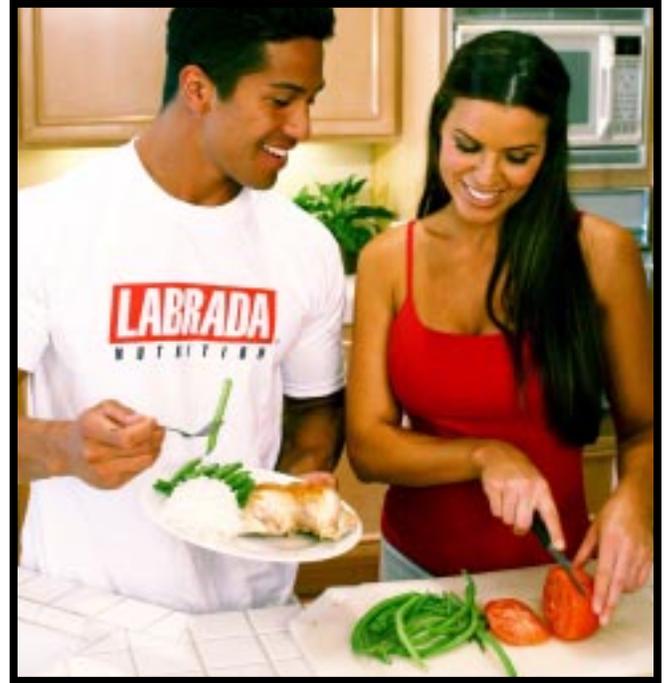
If your workout time is in the afternoon, not to worry; just rearrange the post-workout meal time. Space the other meals and snacks so that you are eating every 3 hours.

**Throughout the day, you should also consume enough water ... about 3-4 quarts is right.**

## Start today!

Eating right, supplementing right, training hard, and getting enough sleep are the things you must do to get bigger, stronger and faster. At Labrada, we are dedicated to helping you achieve your goals. If you want to become a better athlete and make greater gains, let us help you. Make Labrada's "60" family of proteins part of your weight gain nutrition program starting today.

For more information, please visit Labrada on the web at [www.labrada.com](http://www.labrada.com) , or contact us at 1-800-832-9948.



# PROTEIN GLOSSARY

**AMINO ACIDS:** These are the nutrients that make up proteins. They are typically classified as either **ESSENTIAL** or **NON-ESSENTIAL** amino acids.

**ESSENTIAL AMINO ACIDS:** are not manufactured by the body, these are produced by bacteria or yeast then passed to a plant or another animal that we eat.

**NON-ESSENTIAL AMINO ACIDS:** are actually developed from the other essential amino acids and therefore are not considered as important to have in the diet. These are usually produced in our bodies, but the processes that produce them can be disrupted due to stress or illness.

**PROTEINS:** are usually twenty or more amino acids linked together.

**BRANCHED CHAIN AMINO ACIDS:** these are special amino acid chains that help produce other amino acids like Glutamine. You want a protein supplement that is high in BCAA's. Using this type of protein may reduce your need for additional supplementation of Arginine and Glutamine.

**HYPERTROPHY-**In muscle terms, this is where your muscle cells actually get bigger.

**HYPERPLASIA-**In muscle terms, this is where your muscle cells actually replicate.

\*Science has long since debated which actually occurs in the muscle, hypertrophy or hyperplasia. According to most experts, both occur, depending on what muscle and your genetic make-up.

**POSTIVE NITROGEN BALANCE-**This is a state where you are taking in more protein than your body is using.

**NEGATIVE NITROGEN BALANCE-**This is a state where you are taking in less protein than you are using.

**ANABOLISM-**tissue building

**CATABOLISM-**tissue destruction

**DEAMINATION-**process of removing the amino (nitrogen) from the amino acid, thus producing urea

## Essential Amino Acids

### TRYPTOPHAN

A natural relaxant  
Reduces anxiety & depression  
Helps with the treatment of migraine headaches  
Boost the immune system  
Reduces the risk of heart or artery spasms  
Works with Lysine to reduce cholesterol levels

### LYSINE

Very strong at reducing herpes outbreaks and other viral conditions  
Helps form collagen, to make bone, cartilage and connective tissues  
Aids in the production of antibodies, hormones and enzymes

### METHIONINE

Helps stop the formation of ammonia  
Helps with normal hair growth by working on the root  
Makes the liver produce Lecithin, which lowers cholesterol levels  
Main supplier of sulfur to prevent skin, nail and hair disorders  
Natural chelating agent for heavy metal toxins  
Reduces the liver fat and protects the kidneys

### PHENYLALANINE

Reduces hunger pains  
Used by the brain to produce norepinephrine, a neurotransmitter

Keeps you awake and alert  
Antidepressant  
Improves memory

### THREONINE

A major product of collagen, elastin (in your skin) and enamel protein  
Stops the fat build up in the liver  
Aids in digestion  
Helps with the absorption of several nutrients

### VALINE

Promotes mental vigor  
muscle coordination

### LEUCINE

Provides ingredients for the manufacturing of vital biochemical processes of the body involved in energy and specifically those that keep you alert.  
Stimulates protein synthesis in muscles.

### ISOLEUCINE

Provides ingredients for the manufacturing of vital biochemical processes of the body involved in energy.

Non-Essential Amino Acids

## ARGININE

Helps the immune responses to bacteria and viruses  
Promotes wound healing  
Helps regeneration of the liver  
Causes the release of growth hormones  
Optimizes muscle growth and tissue repair  
Arginine is a major factor in the making of NO, which gets you pumped

## TYROSINE

Transmits nerve impulses to the brain  
Natural anti depressant  
Increases mental alertness  
Promotes healthy function of the thyroid, adrenal and pituitary glands

## GLUTAMINE

Has been shown to cure ulcers.  
This AA is crucial in nitrogen metabolism.  
Ammonia (formed by nitrogen fixation) is assimilated into organic compounds by converting glutamic acid to glutamine.  
Glutamine can be used as a nitrogen donor in the biosynthesis of many compounds, including other amino acids, purines, and pyrimidines

## GLYCINE

Help to facilitate the carrying of oxygen to the energy requiring cell-making process  
Important in the manufacturing of hormones  
Helps spare glucose for energy by improving glycogen storage

## SERINE

Important for creatine metabolism and synthesis  
Strengthens the immune system by providing antibodies  
Synthesizes fatty acid sheath around nerve fibers

## GLUTAMIC ACID

Major improver of mental capacities  
Helps with the healing of ulcers  
Gives a lift from fatigue  
Helps control hunger, alcohol cravings, and schizophrenia

## ASPARTIC ACID

Major component of removing harmful ammonia from the blood stream.  
Studies have shown that aspartic acid increases your resistance to fatigue and also increases endurance

## TAURINE

Sounds simple, but taurine is very important for the stability of membranes. Without that control, there is no nerve activity and no absorption. Without this control you will have abnormal heart beats and seizures  
Along with Sulfur, is a major control of the aging process  
Removes free radicals from the body

## CYSTINE

Works as an antioxidant  
Protects the body against radiation and pollution  
Slows the aging process  
Deactivates free radicals  
Neutralizes toxins  
Kicks the DNA in your cells on to make proteins  
Forms the skin proteins, helps with recovery from burns and surgical operations  
Hair and skin are made up of 10-14% cysteine

## HISTIDINE

Found in hemoglobin  
Used pharmacologically in the treatment of rheumatoid arthritis, allergic diseases, ulcers, and anemia  
Deficiencies result in poor hearing  
Used by the body for tissue formation or repair

## PROLINE

Is very important for the proper function of joints and tendons  
Helps maintain and strengthen heart muscles  
Helpful in tissue repair after injury or for any type of wound healing

## ALANINE

Is a very important source of energy for muscle tissue, several biological weapons destroy this protein and cause complete rigor  
Major producer of antibodies  
Necessary for the metabolism of sugars and organic acids

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