

# Immune-D™

## Ingredients – General Description & Benefits

### 1. Amino Acids

#### 1.1 What is an Amino Acid?

Amino acids are organic compounds that combine to form proteins.

#### 1.2 Detailed Description

The key elements of an amino acid are carbon (C), hydrogen (H), oxygen (O), and nitrogen (N), although other elements are found in the side chains of certain amino acids. About 500 naturally occurring amino acids are known (though only 20 appear in the genetic code) and can be classified in many ways.[3] They can be classified according to the core structural functional groups' locations as alpha- ( $\alpha$ -), beta- ( $\beta$ -), gamma- ( $\gamma$ -) or delta- ( $\delta$ -) amino acids; other categories relate to polarity, pH level, and side chain group type (aliphatic, acyclic, aromatic, containing hydroxyl or sulfur, etc.). In the form of proteins, amino acid residues form the second-largest component (water is the largest) of human muscles and other tissues.

#### 1.3 Functions

The human body uses amino acids to make proteins to help the body break down food, grow, repair body tissue, and perform many other body functions. Amino acids can also be used as a source of energy by the body.

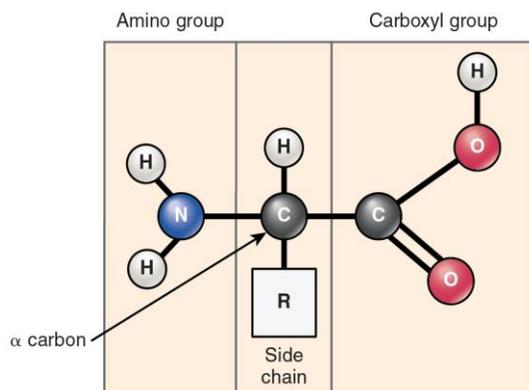
#### 1.4 Top Amino Acids & Nutritional Benefits

1. Cysteine - Enhances white blood cell count to boost immune function.
2. Histidine - Helps regulate trace elements and is required for forming metal-bearing compounds.
3. Isoleucine - Helps to elevate endurance and heal damaged muscle tissues.
4. Leucine - Involved in the growth and healing of bone tissues and muscles.
5. Lysine - Is needed to produce antibodies, enzymes, and hormones.
6. Methionine – Critical component in liver detoxification and single-carbon metabolism.
7. Phenylalanine - Phenylalanine helps to support cognitive function and mental wellness.
8. Threonine - Threonine plays an important role in metabolism and digestion.
9. Tryptophan – Includes serotonin, niacin, and auxin. Used widely to treat depression, insomnia, and anxiety.
10. Tyrosine - Helps regulate concentrations of neurotransmitters such as noradrenalin and dopamine. It can help to reduce stress, and improve mental alertness.
11. Valine - Helps to supply the muscles with glucose for energy production.

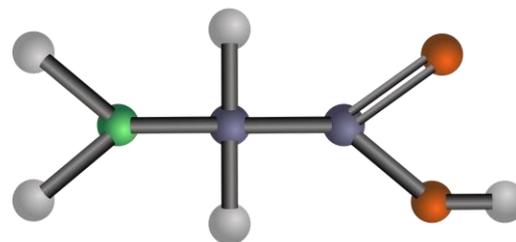
## 1.5 Applications

Amino acids are used for a variety of applications in industry, but their main use is as additives to animal feed. This is necessary, since many of the bulk components of these feeds, such as soybeans, either have low levels or lack some of the essential amino acids: lysine, methionine, threonine, and tryptophan are most important in the production of these feeds. In this industry, amino acids are also used to chelate metal cations in order to improve the absorption of minerals from supplements, which may be required to improve the health or production of these animals.

## 1.6 Illustrations



Structure of Amino Acid



Structure of Amino Acid (Glycine)

## 1.7 References

*[Links for reference and source identification ONLY; may not be included on the website]*

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## 2. Beta Glucan

### 2.1 What is Beta Glucan?

Beta-glucans are sugars that are found in the cell walls of bacteria, fungi, yeasts, algae, lichens, and plants, such as oats and barley. They are sometimes used as medicine.

### 2.2 Detailed Description

The  $\beta$ -Glucans (beta-glucans) comprise a group of  $\beta$ -D-glucose polysaccharides naturally occurring in the cell walls of cereals, bacteria, and fungi, with significantly differing physicochemical properties dependent on source. Typically,  $\beta$ -glucans form a linear backbone with 1–3  $\beta$ -glycosidic bonds but vary with respect to molecular mass, solubility, viscosity, branching structure, and gelation properties, causing diverse physiological effects in animals. At dietary intake levels of at least 3 g per day, oat fiber  $\beta$ -glucan decreases blood levels of LDL cholesterol and so may reduce the risk of cardiovascular diseases.  $\beta$ -glucans are used as texturing agents in various nutraceutical and cosmetic products, and as soluble fiber supplements, but can be problematic in the process of brewing.

Beta Glucan is a natural polysaccharide that is classified as an Immuno-Modulator; meaning, it “modulates” (changes) your Immune System to make it as efficient as possible. This fiber-like molecule works by activating every Immune System Cell in the body: Macrophages, Neutrophils, Basophils, and Natural Killer Cells.

Macrophages, specifically, trigger a host of immune functions that allow the body to produce the most complete, effective and appropriate immune response achievable. The activity of the body's immunocytes (Immune Cells) determines how well your Immune System traps and consumes invaders that do not belong in the body. When the body is confronted with foreign pathogens it sees as non-self (e.g., Viruses, Bacteria, Fungi, Cancer, Parasites, etc.), Beta glucan puts the immune cells on “high alert” to confront the attackers. Simply put, Beta Glucan is the catalyst that makes our immune systems smarter, increasing the strength of our wellness forces.

### 2.3 Functions

Healthcare providers sometimes give beta-glucans by IV (intravenously) or by injection into the muscle to treat cancer and to boost the immune system in people with HIV/AIDS and AIDS-related conditions. Beta-glucans are also given by IV to prevent infection in people after surgery. Healthcare providers give beta-glucans by a shot under the skin (subcutaneously) for treating and reducing the size of skin tumors resulting from cancer that has spread. In manufacturing, beta-glucans are used as a food additive in products such as salad dressings, frozen desserts, sour cream, and cheese spreads. There are several beta-glucan supplement products that claim beta-glucans taken by mouth can only be absorbed if the product is prepared by a special patented process that “micronizes” beta-glucan particles to a size of 1 micron or less.

### 2.4 Top Beta Glucans & Nutritional Benefits

1. Barley fiber - May benefit your digestion and reduce your risk of chronic disease.
2. Oats – Benefits in weight loss, lower blood sugar levels and a reduced risk of heart disease.
3. Whole grains - Associated with various benefits, including a lower risk of diabetes, heart disease, and high blood pressure
4. Reishi - Variety of potential health benefits, including boosting the immune system and fighting cancer.
5. Maitake - Type of that assists the body in fighting against any type of mental or physical difficulty. Prevents and treats cancers, cholesterol, and type-2 diabetes.

6. Shiitake mushrooms - Compounds in shiitake may help fight cancer, boost immunity, and support heart health.
7. Seaweed – Contains various healthy vitamins and minerals. Eating it regularly may help heart health, blood sugar levels, weight loss, and boost immune system.
8. Algae - High in omega-3 fatty acid, an essential nutrient with numerous proven health benefits, including reducing cholesterol and improving heart health.

## 2.5 Applications

The FDA approved of a claim that intake of at least 3.0 g of  $\beta$ -glucan from oats per day decreased absorption of dietary cholesterol and reduced the risk of coronary heart disease. The approved health claim was later amended to include these sources of  $\beta$ -glucan: rolled oats (oatmeal), oat bran, whole oat flour, oatrim (the soluble fraction of alpha-amylase hydrolyzed oat bran or whole oat flour), whole grain barley and barley beta-fiber. An example of an allowed label claim: Soluble fiber from foods such as oatmeal, as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease. A serving of oatmeal supplies 0.75 grams of the 3.0 g of  $\beta$ -glucan soluble fiber necessary per day to have this effect.

## 2.6 References

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### 3. Micronutrients

#### 3.1 What are Micronutrients?

Micronutrients are essential elements required by organisms in small quantities throughout life to orchestrate a range of physiological functions to maintain health.

#### 3.2 Detailed Description

Micronutrient requirements differ between organisms; for example, humans and other animals require numerous vitamins and dietary minerals, whereas plants require specific minerals. For human nutrition, micronutrient requirements are in amounts generally less than 100 milligrams per day, whereas macronutrients are required in gram quantities daily. The minerals for humans and other animals include 13 elements that originate from Earth's soil and are not synthesized by living organisms, such as calcium and iron. Micronutrient requirements for animals also include vitamins, which are organic compounds required in microgram or milligram amounts. Since plants are the primary origin of nutrients for humans and animals, some micronutrients may be in low levels and deficiencies can occur when dietary intake is insufficient, as occurs in malnutrition, implying the need for initiatives to deter inadequate micronutrient supply in plant foods.

#### 3.3 Functions

Micronutrients are dietary components, often referred to as vitamins and minerals, which although only required by the body in small amounts, are vital to development, disease prevention, and wellbeing. Micronutrients are not produced in the body and must be derived from the diet

#### 3.4 Top Micronutrients & Nutritional Benefits

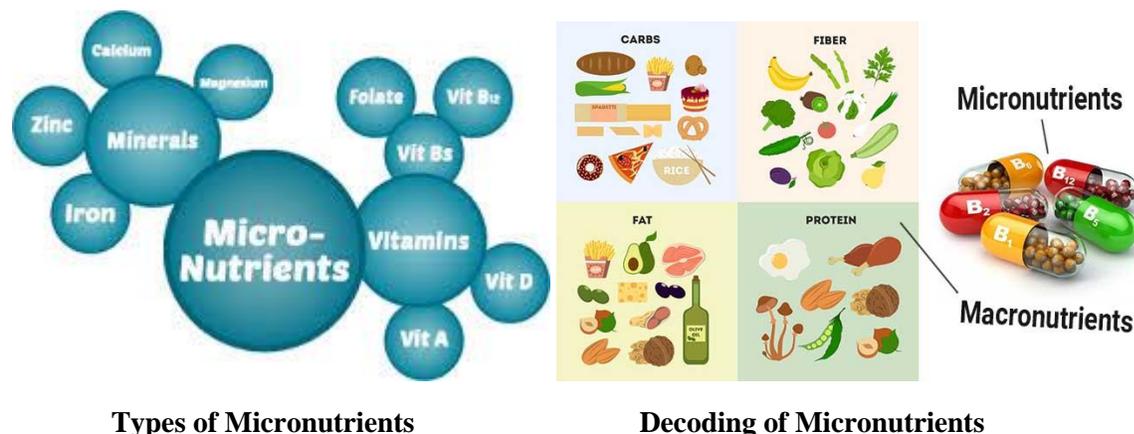
1. Iron - Essential mineral critical for motor and cognitive development.
2. Iodine - Most important minerals required by a fetus for brain and cognitive development,
3. Vitamin A - Necessary to support healthy eyesight and immune system functions.
4. Zinc - Promotes immunity, resistance to infection, and development of the nervous system.
5. Folate - Essential in the earliest days of fetal growth for healthy development of the brain, spinal cord, and skull.
6. Boron - Via its effect on steroid hormones and interaction with mineral metabolism, boron may be involved in a number of clinical conditions such as arthritis.
7. Chromium - Is an essential nutrient required for sugar and fat metabolism.
8. Manganese - Is associated with impaired growth, reproductive function and glucose tolerance as well as changes in carbohydrate and lipid metabolism.
9. Selenium - An essential trace element for humans and animals, and selenium deficiency is associated with several disease conditions such as immune impairment.
10. Copper - An essential trace element for animals needed for body, bone and wool growth, pigmentation, healthy nerve fibers and white blood cell function.

#### 3.5 Applications

Micronutrients are used various applications in nutrition and agriculture. In regards to nutritional absorption, micronutrients are compounds that are only required in minimal amounts which aid in the growth, development, and maintenance of the body. The most common micronutrients are vitamins and minerals (e.g., iron, zinc, vitamins A, D, E, and K). Micronutrient absorption occurs in the small intestine. In this industry, micronutrients supplements are used to counteract particular vitamin deficiencies. Deficiencies in micronutrients such as iron, iodine, vitamin A, folate and zinc can have

devastating consequences. At least half of children worldwide ages 6 months to 5 years suffer from one or more micronutrient deficiency, and globally more than 2 billion people are affected.

### 3.6 Illustrations



### 3.7 References

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## 4. Minerals

### 4.1 What are minerals?

Minerals are substances that are formed naturally in the Earth. Minerals are usually solid, inorganic, have a crystal structure, and form naturally by geological processes. The study of minerals is called mineralogy. A mineral can be made of single chemical element or more usually a compound.

### 4.2 Detailed Description

In the context of nutrition, a mineral is a chemical element required as an essential nutrient by organisms to perform functions necessary for life. However, the four major structural elements in the human body by weight (oxygen, hydrogen, carbon, and nitrogen), are usually not included in lists of major nutrient minerals (nitrogen is considered a "mineral" for plants, as it often is included in fertilizers). These four elements compose about 96% of the weight of the human body, and major minerals (macrominerals) and minor minerals (also called trace elements) compose the remainder. Minerals, being elements, cannot be synthesized biochemically by living organisms.

### 4.3 Functions

Minerals help your body grow, develop, and stay healthy. The body uses minerals to perform many different functions — from building strong bones to transmitting nerve impulses. Some minerals are even used to make hormones or maintain a normal heartbeat.

### 4.4 Top Minerals & Nutritional Benefits

1. Calcium - Essential for healthy bones and teeth, and the proper functioning of the heart.
2. Phosphorus - Aids in the formation of bones and teeth. It plays an important role in how the body uses carbohydrates and fats. It is also needed for the body to make protein for the growth, maintenance, and repair of cells and tissues.
3. Potassium - Helps regulate fluid balance, muscle contractions and nerve signals.
4. Sodium - Essential electrolyte that helps maintain the balance of water in and around your cells.
5. Magnesium - Helps to maintain normal nerve and muscle function, supports a healthy immune system, keeps the heartbeat steady, and helps bones remain strong.
6. Sulfur - Has antibacterial effects against the bacteria that causes seborrheic dermatitis or acne.
7. Iron - Iron is a mineral vital to the proper function of hemoglobin, a protein needed to transport oxygen in the blood.
8. Chlorine - Plays an essential role in the electrical neutrality and pressure of extracellular fluids and in the acid-base balance of the body.
9. Cobalt - Used in the body to help absorb and process vitamin B12.
10. Zinc - plays a role in cell division, cell growth, wound healing, and the breakdown of carbohydrates.

### 4.5 Applications

The two kinds of minerals in regards to nutrition and health are: macrominerals and trace minerals. Macro means "large" in Greek (and your body needs larger amounts of macrominerals than trace minerals). The macromineral group is made up of calcium, phosphorus, magnesium, sodium, potassium, chloride, and sulfur. A trace of something means that there is only a little of it. So even though your body needs trace minerals, it needs just a tiny bit of each one. Trace minerals includes iron, manganese, copper, iodine, zinc, cobalt, fluoride, and selenium.

## 4.6 Illustrations



### Minerals Food Chart Benefits

## 4.7 References

*[Links for reference and source identification ONLY; may not be included on the website]*

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## 5. Vitamins

### 5.1 What is a Vitamin?

Any of several organic substances that are necessary in small quantities for normal health and growth in higher forms of animal life.

### 5.2 Detailed Description

A vitamin is an organic molecule (or related set of molecules) that is an essential micronutrient that an organism needs in small quantities for the proper functioning of its metabolism. Essential nutrients cannot be synthesized in the organism, either at all or not in sufficient quantities, and therefore must be obtained through the diet. Most vitamins are not single molecules, but groups of related molecules called vitamers. For example, vitamin E consists of four tocopherols and four tocotrienols. The thirteen vitamins required by human metabolism are: vitamin A (as all-trans-retinol, all-trans-retinyl-esters, as well as all-trans-beta-carotene and other provitamin A carotenoids), vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B5 (pantothenic acid), vitamin B6 (pyridoxine), vitamin B7 (biotin), vitamin B9 (folic acid or folate), vitamin B12 (cobalamins), vitamin C (ascorbic acid), vitamin D (calciferols), vitamin E (tocopherols and tocotrienols), and vitamin K (quinones).

### 5.3 Functions

Vitamins and are considered essential nutrients—because acting in concert, they perform hundreds of roles in the body. They help shore up bones, heal wounds, and bolster your immune system. They also convert food into energy, and repair cellular damage.

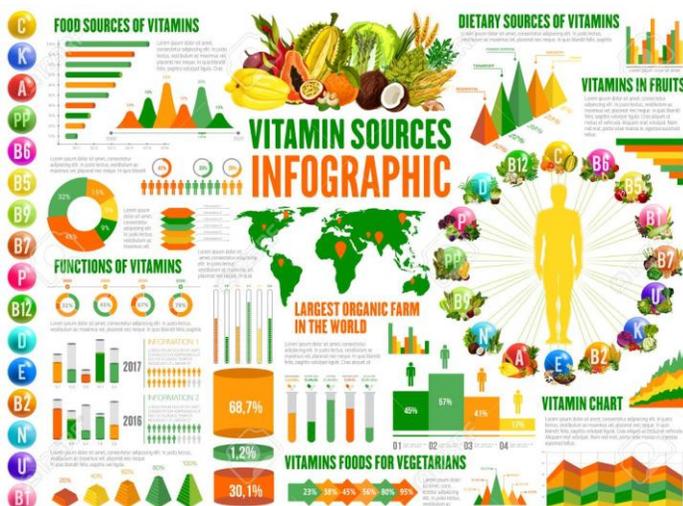
### 5.4 Top Vitamin & Nutritional Benefits

1. Cysteine - Enhances white blood cell count to boost immune function.
2. Magnesium - This mineral plays an important role in muscle contractions.
3. Calcium - Is very essential for bone and teeth health.
4. Vitamin C - Water-soluble vitamin plays important roles in immune system function.
5. Vitamin B-12 - Important in the conversion of food to be burned as energy.
6. Omega-3 - Is the beneficial fatty acid found in fishes and fish oil.
7. Vitamin D - Important for bone and colon health.
8. Iron - This metal is responsible for the red color of your blood.
9. Potassium - Plays a role in keeping your body well-hydrated. Supporter of blood pressure.
10. Vitamin A - It is known to be good for your eyes and assist in fighting chronic diseases.
11. Co-Q10 - Helps to increase blood oxygenation and is also potent anti-oxidant.

### 5.5 Applications

Fat-soluble vitamins are stored in the body's fatty tissue. The four fat-soluble vitamins are vitamins A, D, E, and K. These vitamins are absorbed more easily by the body in the presence of dietary fat. There are nine water-soluble vitamins. They are not stored in the body. Any leftover water-soluble vitamins leave the body through the urine. Although, the body keeps a small reserve of these vitamins, they have to be taken on a regular basis to prevent shortage in the body. Vitamin B12 is the only water-soluble vitamin that can be stored in the liver for many years.

## 5.6 Illustrations



Vitamin Infographic



Vitamin Food Vector

## 5.7 References

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