

# THE ROOT BRANDS

**Comprehensive All-Natural, Effective, Safe,  
Healthy Weight Management System**

# CRUSH



**Introduction by Claire Poulton**  
**Root Greatness**

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## CRUSH INGREDIENTS

### L-LEUCINE BCAA

The most investigated BCAA (**Branch Chain Amino Acid**) is **leucine**, due to its broad effects, including: Important roles in protein metabolism, glucose homeostasis, insulin action, and recovery from exercise.

For 35 years now, it has been known that leucine has anti-catabolic (**reduces the breakdown of proteins and muscle mass**) properties. The mechanism by which this occurs has not been clearly established; however, it has been hypothesized that the metabolite of leucine, a-ketoisocaproate (**KIC**) may contribute to these results. To elaborate, when ingested, leucine is transaminated into KIC, which appears to decrease muscle breakdown. <sup>1</sup>

### L-ISOLEUCINE BCAA

Plays a role in hemoglobin synthesis. Hemoglobin is the protein molecule in red blood cells that carries oxygen from the lungs to the body's tissues. **Isoleucine** is also key to the regulation of energy and blood sugar levels. The **isoleucine** amino acid is also believed to mediate glucose uptake into a cell and break it down into energy. This specific **isoleucine** function is why it may help to enhance athletic performance and also act as a hypoglycemic agent.

- Is an essential amino acid that the body cannot manufacture so it must be obtained through diet or supplements.
- Plays an Important role for maintaining immune function
- It's not hard to get this amino acid in your diet by consuming foods like meat, fish, dairy products, legumes and seeds.
- Based on research to date, benefits of this essential amino acid may include LOWERED GLUCOSE LEVELS, IMPROVED COGNITIVE AND PHYSICAL PERFORMANCE, and REDUCED POST-WORKOUT FATIGUE.
- It is most often taken as a supplement in combination with the other two branched-chain amino acids, L-Valine and L-Leucine. <sup>2</sup>

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## L-VALINE BCAA

Is an amino acid. It is one of the branch chain amino acids (BCAA) that we hear about all the time. It is safe to say that the talk around the gym may not be the best source of scientific information on something like L-Valine.

- Increased muscle protein synthesis
- Faster workout recovery
- Increased endurance
- Muscle maintenance
- Fights liver and gallbladder disease <sup>3</sup>

## L-LYSINE

**Lysine**, or **L-lysine**, is an essential amino acid, meaning it is necessary for human health, but the body cannot make it. You have to get **lysine** from food or supplements.

Amino acids like **lysine** are the building blocks of protein. **Lysine** is important for proper growth, and it plays an essential role in the production of CARNITINE, a nutrient responsible for converting fatty acids into energy and helping lower cholesterol. **Lysine** appears to help the body absorb calcium, and it plays an important role in the formation of collagen, a substance important for bones and connective tissues including skin, tendons, and cartilage.

Athletes sometimes use **lysine** as a protein supplement. Some studies suggest **lysine** helps muscle tissue recover after stress.<sup>4</sup>

## L-PHENYLALANINE

Is classified as an **essential amino acid**, which are chemical substances that your body assembles into proteins. Essential amino acids are those that your body requires to function properly but cannot produce or store on its own for lengthy periods of time. These important amino acids must be consumed regularly.

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i. Carnitine is a naturally occurring amino acid derivative that's often taken as a weight loss supplement.

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In order to meet your daily requirement of **phenylalanine**, you will either need to take a supplement or eat foods such as beef, eggs, liver, and chicken breast.

**Phenylalanine** is needed to produce chemical messengers (neurotransmitters) in the brain, including dopamine, epinephrine, and norepinephrine, as well as other amino acids. **Phenylalanine** is neither acidic nor basic; it is considered neutral.<sup>5</sup>

### Phenylalanine Comes In Three Different Forms.

- L-phenylalanine: Natural form of phenylalanine
  1. Naturally found in some foods, such as cow's milk and sweet potatoes.
  2. Serves as a building block for various proteins that are produced in the body.
  3. Transformed into tyrosine in the body, which is then utilized to make L-dopa. L-dopa is subsequently transformed into dopamine, epinephrine, and norepinephrine. These neurotransmitters have been linked to mood regulation.
- D-phenylalanine: Lab-created form of phenylalanine that closely resembles the structure of L-phenylalanine.
- DL-phenylalanine: Combines L-phenylalanine and D-phenylalanine.

### L-THREONINE

May benefit obesity by promoting fat metabolism, including preventing fat buildup in specific organs (especially the liver) and supporting overall metabolic health.

In one experiment of mice with high fat diet-induced obesity, the addition of supplemental **threonine** led to a significant decrease in body weight, fat pad weights, blood glucose levels, triglyceride levels, LDL and total cholesterol levels, and insulin resistance (as measured by HOMA-IR). From a mechanistic perspective, **threonine** achieved these effects by down-regulating the expression of genes involved in <sup>ii</sup>LIPOGENESIS and up-regulating the expression of genes involved in <sup>iii</sup>LIPOLYSIS <sup>6</sup>

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ii. Fat Creation

iii. Fat Burning

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### L-METHIONINE

**L-Methionine** is a unique amino acid. It contains sulfur and can produce other sulfur-containing molecules in the body. It is also involved in starting protein production in your cells.

**Methionine** can convert into several sulphur-containing molecules with important functions, such as GLUTATHIONE, TAURINE, SAM and CREATINE. These molecules are critical for the normal functions of the cells in your body.

Higher levels found in meat; lower amounts found in a plant-based diet.<sup>7</sup>

### L-TYROSINE

- Plays many important roles in the body, including these:
- Builds proteins, which are vital for life.
- Helps the body produce important enzymes.
- Boosts communication between nerve cells.
- Aids in the production of melanin, the skin pigment that helps to protect the body from sunburn.
- Plays a part in the production of thyroid hormones.<sup>8</sup>

### L-CYSTINE

**L-Cystine** a dietary supplement that has many health benefits. It is an amino acid that helps to STRENGTHEN THE IMMUNE SYSTEM, REDUCE INFLAMMATION, and IMPROVE SKIN HEALTH. It can also help to reduce the risk of certain types of cancer, improve digestion, and reduce the risk of heart disease. Additionally, it can help to improve cognitive function, reduce stress, and improve overall energy levels.

As a building block, **L-cysteine** contributes 2% of the total structural proteins in the body in the form of connective tissue, cell membranes, and the myelin sheaths around neurons, structures, which protect neurons from oxidative stress and harsh environmental conditions.

The stiffness of the connective tissue neutralizes heavy metals in the body. **L-Cysteine** is a hydrophilic amino acid, possesses a <sup>iv</sup>THIOL MOIETY which contributes toward its anti-oxidative properties.<sup>9</sup>

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iv. This chemistry is based on the facile reaction between carbon-carbon double bonds and sulfhydryl (a sulfur atom with two lone pairs, bonded to hydrogen).

## The Root Brands Healthy Weight Loss - **CRUSH** INGREDIENTS

### TETRASOD® (SOD – SUPER OXIDE DISMUTASE)

**TetraSOD**® is the most complete and comprehensive ingredient for the HEALTHY AGING NUTRACEUTICAL CATEGORY but also offers athletes and individuals with active lifestyles an increased physiological response against oxidative stress to aid performance and recovery.

**SOD** is considered to be an anti-aging enzyme. The FREE RADICAL THEORY OF AGING was proposed by *Derham Harman*. It postulated that oxygen free radicals generated in metabolic pathways result in age-related deterioration through oxidative damage to biomolecules, with mitochondria being the main target of attack.

Accumulation of oxidative damage is considered to be one of the key mechanisms of aging. <sup>v</sup>DROSOPHILA flies having 75% reduction in **SOD** activity, showed accelerated loss of olfactory behavior on aging. It has been suggested that novel **SOD** mimetics may be useful in attenuating aging-induced cognitive impairments and other aspects of physiological decline with aging.<sup>10</sup>

### HMB – $\beta$ -HYDROXY $\beta$ -METHYLBUTYRIC ACID

Several studies have found that **HMB** supplementation enhances LBM and indices of performance during resistance training, independent of training experience. Nissen et al. investigated **HMB** supplementation on strength and body composition in trained and untrained males undergoing intense resistance training.

Greater decreases in body fat and increases in <sup>vi</sup>LBM were found with **HMB** supplementation regardless of training status. Further, **there was an overall 55% greater increase in bench press** performance.<sup>11</sup>

**HMB** is a substance that the body produces naturally when it breaks down leucine, an essential amino acid. **HMB** is more likely to benefit older individuals experiencing muscle loss or malnutrition.

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v. *Drosophila* is a genus of flies, belonging to the family Drosophilidae, whose members are often called "small fruit flies" Drosophilidae have been in use for over a century to study genetics and behavior.

vi. LBM – Lean Body Mass

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## PHYTOPLANKTON

Marine **phytoplankton** is a rich source of protein, containing around 50% protein by dry weight. In fact, marine phytoplankton contains more protein per gram than beef or soybeans. The protein in marine phytoplankton is considered a complete protein, meaning it contains all the essential amino acids that the body needs to build and repair tissues.

Marine phytoplankton contains just under 10% carbohydrates, including simple sugars, complex polysaccharides, and dietary fiber. The complex carbohydrates in marine phytoplankton are believed to provide sustained energy, while the dietary fiber can help promote digestive health.<sup>12</sup>

## MILK THISTLE SEED

The active component of **milk thistle** is SILIBIN, also known as SILYBININ, which is usually derived from the seeds of the plant. Silymarin is a complex of biological compounds (flavolignans) that includes silibin; these compounds are known to be antioxidants, in addition to having several other biological properties. Silymarin is registered in the US Chemical Abstracts Service registry, and surveys have found **milk thistle** to be the most commonly used liver protectant or hepatoprotectant used by patients in gastrointestinal clinics in the USA.<sup>13</sup>

## GRAPE SEED EXTRACT 95%

There are some studies and evidences which show that cardio protective benefits are exhibited by certain fruits and vegetables, such as grapes and intake of food items that are rich in polyphenols to reduces the risk of **CARDIO VASCULAR DISEASE**.

There are many mechanisms by which **GSE** prevent atherosclerosis, including inhibition or limit the oxidation of **LOW-DENSITY LIPOPROTEIN (LDL)**, **LOWERING BLOOD PRESSURE**, **REDUCING INFLAMMATION**, **INHIBITION OF THE PLATELET AGGREGATION**, and **ACTIVATING SOME PROTEINS WHICH PREVENTS <sup>vii</sup>CELL SENESCENCE**.<sup>14 15</sup>

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vii. Cell Senescence: Researchers are exploring whether learning to harness a cellular state known as senescence — during which damaged cells resist removal by apoptosis, linger, and harm neighboring normal cells — might hold the key to revitalizing aging tissues and increasing healthy, active years of life.



# The Root Brands Healthy Weight Loss - **CRUSH** INGREDIENTS

## JUNIPER BERRY

People have used Juniper Berry as an anti-inflammatory and a diuretic. Studies indicate juniper has ANTIOXIDANT, ANTIMICROBIAL, ANTI-INFLAMMATORY, AND ANTICANCER, AS WELL AS BLOOD SUGAR, BLOOD FAT, and BLOOD PRESSURE LOWERING PROPERTIES. The therapeutic properties of **juniper** are believed to come from the various compounds it contains, including AROMATIC OILS, INVERTED SUGARS, RESINS, CATECHIN, ORGANIC ACID, TERPENIC ACIDS, LEUCOANTHOCYANIDIN, ALKALOIDS, FLAVONOIDS, TANNINS, GUMS, LIGNINS, and WAX.<sup>16</sup>

## L-GLUTATHIONE

**Glutathione** is a tripeptide., It is easily broken down into its component amino acids in the stomach and small intestine. Your body can produce **glutathione** if you consume sufficient quantities of its precursors, especially L-CYSTEINE, L-METHIONINE, GLUTAMATE, and GLYCINE. The hardest amino acid to maintain sufficient levels is L-CYSTEINE. To do so, consume foods high in the enzyme L-METHIONINE.<sup>17</sup>

Supplements that activate the natural glutathione production in the body. These supplements include:

- Milk thistle
- N-acetyl Cysteine <sup>viii</sup>(NAC)
- Superoxide dismutase

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viii. NAC may be less toxic and more soluble than l-cysteine itself, which is why NAC is often used in supplements instead of l-cysteine by itself unless l-cysteine has been added to assist in a small amount with effectiveness of the other

# Resources

1. L-Leucine BCAA: <https://pubmed.ncbi.nlm.nih.gov/10418071/>
2. L-Isoleucine BCAA: <https://pubmed.ncbi.nlm.nih.gov/30843485/>
3. L-Valine: <https://en.wikipedia.org/wiki/Valine>
4. L-Lysine: <https://www.mountsinai.org/health-library/supplement/lysine>
5. L-Phenylalanine:  
[https://www.medicinenet.com/phenylalanine\\_benefits\\_side\\_effects\\_food\\_source/article.htm](https://www.medicinenet.com/phenylalanine_benefits_side_effects_food_source/article.htm)
6. L-Theonine:  
[https://www.medicinenet.com/phenylalanine\\_benefits\\_side\\_effects\\_food\\_source/article.htm](https://www.medicinenet.com/phenylalanine_benefits_side_effects_food_source/article.htm)
7. L-Methionine: <https://www.healthline.com/nutrition/methionine-vs-glycine>
8. L-Tyrosine: <https://www.webmd.com/diet/foods-high-in-tyrosine>
9. L\_Cysteine:  
<https://www.sciencedirect.com/science/article/abs/pii/B9780128124918000072>
10. Tetra SOS®: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5969776/>
11. HMB: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2245953/>
12. Phytoplankton: <https://planktonforhealth.co.uk/worlds-finest-marine-phytoplankton-powder/whats-definition-phytoplankton/>
13. Milk Thistle: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4116427/>
14. Cellular Senescence: <https://www.nia.nih.gov/news/does-cellular-senescence-hold-secrets-healthier-aging>
15. Grape Seed Extract – 95%:  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7054588/>
16. Juniper Berry: <https://www.medicinenet.com/juniper/article.htm>
17. L-Glutathione: <https://www.medicalnewstoday.com/articles/323936#what-is-glutathione>