

# BENEFITS OF COLLAGEN

## Amino Acid Function Broken Down by Category

### ATHLETIC PERFORMANCE/TENDON/MUSCLE

**Alanine:** Alanine is an important source of energy for muscle tissue. Helps to convert sugar into glucose for energy.

**Asparagine:** Asparagine may increase endurance and decrease fatigue.

**Aspartic Acid:** Helps to increase stamina.

**Arginine:** Can aid in bodybuilding.

**Cystine:** Promotes muscle building.

**Glutamine:** Involved in muscle strength and endurance.

**Glutamic Acid:** May increase energy.

**Glycine:** Helps to prevent the breakdown of muscle. Essential for structural integrity of muscles and tissues.

**Histidine:** Ensures a sufficient energy supply in the cells.

**Isoleucine:** Involved in muscle strength, endurance and muscle stamina. Increases endurance and helps to heal muscle tissue (it is recommended to professional athletes and body builders). Your muscles use isoleucine as an energy source. Without isoleucine your body cannot make the structural and functional proteins your body depends on – including the protein that makes up muscle.

**Leucine:** Leucine is used by the liver, body fat and muscle to increase energy and endurance. Leucine reduces muscle wasting in ill patients.

**Lysine:** Builds muscle and stimulates the production of creatinine, which helps to convert fatty acids into usable forms of energy.

**Proline:** Responsible for the proper functioning of tendons and ligaments.

**Serine:** Is involved in muscle formation. Required for growth and maintenance of muscle.

**Threonine:** It helps keep muscle strong and elastic. Threonine is needed for other amino acids that are necessary to produce muscle tissue. Threonine helps to speed recovery from injury.

**Tyrosine:** May help to increase energy.

**Valine:** Valine helps to prevent muscle breakdown by supplying the muscles with extra glucose for energy during intense exercise. Involved in muscle strength, endurance and muscle stamina.



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## Amino Acid Function Broken Down by Category

### BONE HEALTH/CONNECTIVE TISSUE/JOINT HEALTH

**Alanine:** Alanine is a major part of connective tissue.

**Glycine:** Glycine may protect against arthritis.

**Histidine:** Used to treat rheumatoid arthritis.

**Leucine:** Promotes the growth and recovery of bone tissues and aids in bone healing.

**Lysine:** Helps is the production of collagen which aids in the growth and maintenance of bone and connective tissue.

**Phenylalanine:** A major part of collagen. Useful in reducing arthritic pain.

**Proline:** Responsible for proper function of joints. It is an important component of cartilage and the health of joints.

**Threonine:** Threonine supports the production of connective tissue. Threonine helps keep connective tissue elastic and strong. Helps build strong bones and tooth enamel. Required for the formation of collagen.

### BRAIN/CENTRAL NERVOUS SYSTEM

**Alanine:** Helps to form neurotransmitters.

**Asparagine:** Is an essential component for nerve development, signaling and transmission across nerve endings.

**Aspartic Acid:** Is important for stamina, brain and neural health.

**Glutamine:** Aids in normal brain functioning.

**Glutamic Acid:** Is a major excitatory neurotransmitter in the brain and spinal cord. Supports brain function (it is one of the few nutrients that it is able to pass through the blood-brain barrier).

**Glycine:** Plays a role as an inhibitory neurotransmitter mainly in the spinal cord, brainstem and in the retina. Essential for the functioning of the central nervous system.

**Histidine:** The body uses histidine to form the myelin sheath, which surrounds all nerve cells and protects them from damage. It is important in preventing certain degenerative conditions such as Alzheimer's and Parkinson's.

**Serine:** Is essential for the proper functioning of the brain and central nervous system.

**Tyrosine:** Is important for brain health and aids in pain relief.

**Valine:** Valine helps to stimulate the central nervous system and is needed for proper mental functioning.



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## Amino Acid Function Broken Down by Category

### CARDIOVASCULAR

**Arginine:** Is a precursor of nitric oxide which causes blood vessel relaxation. Is helpful and can aid with high blood pressure and congestive heart failure.

**Glycine:** Post heart attack, glycine in the blood may help decrease the death of heart muscle cells.

**Lysine:** Aids in reducing LDL and triglyceride levels in the blood.

**Methionine:** Helps reduce blood cholesterol levels. Plays a role in the prevention of heart disease by decreasing the amount of plaque formation

**Proline:** Helps strengthen and maintain the heart muscle. Helps to prevent arteriosclerosis. Proline helps arteries to stretch out and go back to their normal size and shape, which is important to maintain proper blood pressure and transportation of blood throughout the body.

**Threonine:** Supports cardiovascular health. It helps keep the heart muscle strong and elastic.

### DIABETES/BLOOD SUGAR

**Alanine:** Helps to convert sugar into glucose for energy.

**Arginine:** Arginine is the most potent amino acid in releasing insulin. Arginine increases the release of glucagon.

**Glutamine:** Helps to maintain normal glucose levels.

**Glutamic Acid:** Is important for metabolism of carbohydrates. Helps stop sugar cravings.

**Glycine:** May help to reduce glycated hemoglobin (A1C). Glycine helps to stimulate the release of glucagon which helps insulin remove glucose from the blood.

**Isoleucine:** Helps to regulate blood sugar and energy levels.

**Leucine:** Helps to regulate blood sugar levels by stimulating the release of insulin.

**Serine:** Critical in maintaining blood glucose levels.

**Valine:** Helps to regulate blood sugar levels and produce energy.



# BENEFITS OF COLLAGEN

## Amino Acid Function Broken Down by Category

### GASTROINTESTINAL HEALTH

**Glutamine:** Aids in digestion. Protects the lining of the gastrointestinal tract.

**Glycine:** Responsible for a healthy digestive system. Regulates the synthesis of bile used to digest fat. Inhibits stomach acid secretion and may protect against stomach ulcers.

**Lysine:** Promotes absorption of calcium from the intestines.

**Serine:** Aids in the digestive process.

**Threonine:** The gastrointestinal tract needs threonine for normal functioning.

**Valine:** During periods of valine deficiency, all other amino acids are absorbed less by the GI tract.

### IMMUNE SYSTEM

**Alanine:** Helps boost the immune system by producing antibodies.

**Arginine:** Can help to boost your immune system.

**Aspartic Acid:** Aids in strengthening the immune system through the production of immunoglobulin and antibody synthesis.

**Cysteine:** Is responsible for helping to build up white blood cells.

**Glutamine:** Aids in immune function.

**Histidine:** Is associated with the allergic response and has been used to treat allergies.

**Isoleucine:** Without isoleucine your body cannot make the structural and functional proteins your body depends on - including the protein that makes up the antibodies used by your immune system and hormones.

**Lysine:** Facilitates the production of enzymes, hormones and antibodies.

**Serine:** Boosts the immune system by assisting in the production of antibodies and immunoglobulins.

**Threonine:** Helps to produce antibodies.



# BENEFITS OF COLLAGEN

## Amino Acid Function Broken Down by Category

### LIVER/DETOXIFICATION

**Alanine:** Helps to regenerate the liver. Helps to eliminate excess toxins from the liver.

**Asparagine:** Aids in the removal of ammonia. Asparagine detoxifies harmful chemicals.

**Aspartic Acid:** Aspartic acid helps to remove excess toxins from cells that damage the liver, brain and nervous system.

**Arginine:** Assists with regeneration of the liver.

**Glutamic Acid:** Helps to detoxify muscle cells.

**Glutamine:** Aids in helping to remove excess ammonia.

**Histidine:** Detoxifies the body of heavy metals.

**Methionine:** Is a powerful antioxidant. The sulfur it contains helps to neutralize free radicals (if free radicals are not neutralized they interact with DNA and proteins in healthy cells and damage tissues and organs). It is a neutralizing chelating agent for heavy metals, such as lead and mercury. Assists in the removal of toxic waste from the liver.

**Threonine:** May support liver health by minimizing the accumulation of fats around the liver. Acts as a detoxifier.



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## Amino Acid Function Broken Down by Category

### MENTAL WELL BEING

**Asparagine:** Can help with fatigue. Symptoms of asparagine deficiency are depression, confusion and headaches.

**Aspartic Acid:** Helps produce the chemicals necessary for proper mental functioning

**Arginine:** Arginine is a precursor to GABA (an important inhibitory neurotransmitter)

**Glutamine:** A precursor to the neurotransmitter GABA (this neurotransmitter that helps to produce serenity and relaxation)

**Glutamic Acid:** Can enhance clarity in thinking, mental alertness and mood

**Glycine:** Glycine may improve the quality of sleep by helping to fall asleep quicker. Low levels of glycine in the blood is associated with depression.

**Lysine:** Helps to minimize anxiety.

**Phenylalanine:** Has an energizing and cognitive-enhancing effect by helping to increase dopamine and other catecholamine levels. It can also help with depression and may help with ADHD symptoms. Phenylalanine enhances mood, clarity of thought and concentration and memory.

**Serine:** Is important for overall physical and mental good health. Low levels of serine can lead to depression, insomnia and anxiety. Low levels of serine have been shown to be responsible for chronic fatigue syndrome and fibromyalgia.

**Threonine:** Threonine is helpful in treating depression (often threonine levels are low in people who suffer from depression).

**Tyrosine:** Helps form neurotransmitters especially dopamine and noradrenalin which in turn helps mental functioning and mood. Improves mental clarity and concentration. Aids in the production of the hormone thyroxine which helps to regulate mental health. Can help to alleviate stress, anxiety and alertness.



# BENEFITS OF COLLAGEN

## Amino Acid Function Broken Down by Category

### SKIN, HAIR AND NAILS

**Cystine:** Aids in reducing the effects of aging. Essential for growth maintenance and repair of healthy skin, hair and nails. Key ingredient in hair.

**Glycine:** Helps to improve water loss and skin moisture as well as it may improve skin elasticity. It may help to prevent UV skin damage.

**Leucine:** Promotes skin healing.

**Methionine:** Helps prevent disorders of the hair, skin and nails due to sulfur and antioxidant activity.

**Proline:** Works with vitamin C to keep skin healthy.

**Tyrosine:** Aids in the production of the hormone thyroxine which aids in healthier skin and hair pigment.

### WEIGHT LOSS/APPETITE SUPPRESSANT

**Alanine:** Aids in the metabolism of sugars.

**Aspartic Acid:** Aids in metabolism.

**Cystine:** Cystine burns fat.

**Glycine:** Inhibits sugar cravings. Involved in glucagon production which assists in glycogen metabolism (glucagon causes the liver to convert fat into sugar which can trigger weight loss). Increases adiponectin which may help with weight loss.

**Glutamic Acid:** Helps to control alcohol and sugar cravings.

**Leucine:** Leucine breaks fat down to increase energy and endurance.

**Methionine:** May help block the storage of fat. May assist in the breakdown of fats.

**Phenylalanine:** Suppresses appetite.

**Tyrosine:** Aids in the production of the hormone thyroxine which helps to regulate metabolism.



# BENEFITS OF COLLAGEN

## Amino Acid Function Broken Down by Category

### WOUND HEALING/PRESSURE INJURY

**Arginine:** Aids in wound healing through collagen synthesis, release of hormones and removal of ammonia.

**Cysteine:** Helps during recovery from surgery. Aids with healing severe burns.

**Glutamic Acid:** May accelerate wound and ulcer healing.

**Histidine:** Supports wound healing.

**Leucine:** Aids in skin/tissue repair and healing.

**Proline:** Deficiency in this amino acid can slow tissue repair and healing and lead to tears in the soft tissue.

**Threonine:** May help to speed wound healing.

**Valine:** Helps with tissue repair.

