

# L-Citrulline Powder

Kyowa Quality®

Doctor's  
**BEST**

Science-Based Nutrition™

in the body, L-Citrulline supplementation was shown to be an excellent L-arginine precursor.\*8,9



## Doctor's Best L-Citrulline helps support muscle protein synthesis and relieve muscle fatigue\*

Arginine is an essential amino acid precursor for the synthesis of muscle proteins and other molecules with important biological activities like nitric oxide, ornithine and urea. However, arginine coming from food is mostly withdrawn from the hepatic portal blood flow making it less available to build muscle. The liver is unable to uptake L-Citrulline, hence making L-Citrulline more available to the whole body. Many studies have showed that L-Citrulline supplementation was able to raise plasma L-arginine allowing higher protein synthesis and higher protein content in muscle during exercise.\*10

## Doctor's Best L-Citrulline helps support vascular health\*

Supplemental administration of L-Citrulline, which is converted to L-arginine in the kidney, vascular endothelium and other cells, is an effective means of elevating plasma and tissue levels of L-arginine. When given orally as supplement, L-Citrulline is more effective than L-arginine in raising circulating L-arginine levels because it bypasses metabolism in the gastrointestinal tract and liver. Therefore, use of L-Citrulline supplements is a promising alternative to support vascular health.\*11,12

## INGREDIENTS

L-Citrulline, named after watermelon *Citrullus vulgaris* from which it was first isolated. It is an  $\alpha$ -amino acid well studied that is an effective and natural precursor of L-arginine and is one of the three dietary amino acids in the urea cycle.<sup>1</sup> L-Citrulline is also found in some foods like watermelons, cucumbers, squashes and pumpkins. Its basic function is to detoxify ammonia via conversion to urea from the body.<sup>2</sup> Doctor's Best L-Citrulline plays an important role in nitric oxide metabolism and regulation. It is converted to and supports L-arginine and nitric oxide (NO) levels. Increased production of nitric oxide promotes vascular dilation which improves oxygen and blood circulation throughout the body. L-Citrulline may also relieve muscle fatigue through ammonia elimination.\*3

In clinical trials, L-Citrulline has been used safely and was well tolerated in children and adults.<sup>4,5</sup> L-Citrulline is considered safe according to existing data and has been granted self-affirmed GRAS status.

## BENEFITS

- Doctor's Best L-Citrulline helps support nitric oxide metabolism\*
- Doctor's Best L-Citrulline helps support muscle protein synthesis and relieve muscle fatigue\*
- Doctor's Best L-Citrulline helps support vascular health\*
- Non-GMO, Soy Free, Gluten Free, Vegan

## EXTENDED BENEFITS

### Doctor's Best L-Citrulline helps support nitric oxide metabolism\*

Nitric oxide (NO) is a key molecule involved in a variety of biological functions throughout the entire body. NO regulates vascular tone and blood flow. In particular, it plays an essential role in penile erection as it acts both as a vasodilator of smooth muscle cells of the penile arteries and as a neurotransmitter in the penile nerve fibers.<sup>6</sup> Also, in the brain, NO regulates processes involved in behavior and cognitive functions.<sup>7</sup> Endogenous enzymatic nitric oxide formation is catalyzed by nitric oxide synthase (NOS) through a series of redox reactions involving oxidative degradation, L-arginine and L-Citrulline. To maintain nitric oxide level

## PHARMACOLOGICAL & CLINICAL STUDIES

In a double-blind, randomized, placebo-controlled cross-over study, 20 healthy volunteers received different dosing regimens of placebo, citrulline (0.75g - 3g twice daily), and arginine. Results showed that oral L-Citrulline supplementation raises plasma L-arginine concentration more effectively than L-arginine supplementation and NO-dependent signaling

## Supplement Facts

Serving Size 1 scoop (3 grams)  
Servings per container 66 servings

	Amount per serving	% Daily Value
L-Citrulline (Kyowa Quality)	3 g	†

† Daily Value not established.

**Other Ingredients:** None

**Suggested Adult Use:** Take 1 scoop daily with 8 oz. of water or beverage of your choice, before workouts, or as recommended by a nutritionally-informed physician.

**Warning:** Do not use in conjunction with vasodilating medications.

**Non-GMO / Gluten Free / Soy Free / Vegan**

Store in a cool dry place.

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in a dose-dependent manner.\*<sup>13</sup>

A randomized, double-blind, 2-period crossover study was conducted in 41 male participants to determine the effects of an oral single dose of citrulline malate (8g of Citrulline malate) just 1 hour before an anaerobic exercise. The results showed that citrulline supplementation might be useful in increasing athletic performance and in relieving post-exercise muscle soreness.\*<sup>14</sup>

In a single-blind study, male participants were to receive placebo for a month then L-Citrulline 1.5g/day, for another month. Oral L-Citrulline supplementation for 1 month was able to improve erection hardness enough in 12 of 24 patients. L-Citrulline supplementation proved to be safe and was psychologically well accepted by participants.\*<sup>15</sup>

A four-week oral L-Citrulline supplementation conducted in young normotensive men showed that L-Citrulline (6 g/day) has positive effect on vascular health.\*<sup>16</sup>

In a small clinical study, participants who received 3.2 g/day of L-Citrulline showed improvement in myocardial blood supply thus enhancing cardiovascular health in healthy volunteers.\*<sup>17</sup>

In a clinical study, 35 participants were randomly assigned to receive either placebo or L-Citrulline (3 g/day) for 4 months. The results showed that L-Citrulline supplementation can improve cardiovascular health.\*<sup>18</sup>

The short-term effects of L-Citrulline supplementation on vascular tone was conducted in a double-blind, randomized, placebo-controlled trial among 15 volunteers. Participants who received 5.6 g/day of L-Citrulline for 7 days saw improvement in vascular tone.\*<sup>19</sup>

## SCIENTIFIC REFERENCES

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