

# Arginine

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## Supplement Forms/Alternate Names

- Arginine Hydrochloride; L-Arginine

## Principal Proposed Uses

• [Angina](#); [Congestive Heart Failure](#); [Intermittent Claudication](#); [Sexual Dysfunction in Men \(Impotence\)](#); [Sexual Dysfunction in Women](#)

## Other Proposed Uses

• [Colds \(Prevention\)](#); Cystic Fibrosis; [Diabetes](#); [Female Infertility](#); [Heart Attack \(Aiding Recovery\)](#) ; [Hypertension](#); [Interstitial Cystitis](#); Maintaining Effectiveness of [Nitrate Drugs](#); [Male Infertility](#); [Osteoporosis](#); [Pre-eclampsia](#); [Raynaud's Phenomenon](#); [Sickle Cell Disease](#); [Surgery Support](#)

## Probably Not Effective Uses

- [Altitude Sickness](#); [Intermittent Claudication](#)

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Arginine is an amino acid found in many foods, including dairy products, meat, poultry, and fish. It plays a role in several important mechanisms in the body, including cell division, wound healing, removal of ammonia from the body, immunity to illness, and the secretion of important hormones.

The body also uses arginine to make nitric oxide (NO), a substance that relaxes blood vessels and also exerts numerous other effects in the body. Based on this, arginine has been proposed as a treatment for various cardiovascular diseases, including congestive heart failure and intermittent claudication, as well as impotence, female sexual dysfunction, interstitial cystitis, and many other conditions. Arginine's potential effects on immunity have also created an interest in using it as part of an "immune cocktail" given to severely ill hospitalized patients and also for preventing colds.

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## Requirements/Sources

Normally, the body either gets enough arginine from food, or manufactures all it needs from other widely available nutrients. Certain stresses, such as severe burns, infections, and injuries, can deplete your body's supply of arginine. For this reason, arginine (combined with other nutrients) is used in a hospital setting to help enhance recovery from severe injury or illness.

Arginine is found in dairy products, meat, poultry, fish, nuts, and chocolate.

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## Therapeutic Dosages

A typical supplemental dosage of arginine is 2 g to 8 g per day. For congestive heart failure, higher dosages up to 15 g have been used in trials.

**Warning:** Do not try to self-treat congestive heart failure. If you have this condition, be sure to consult your physician before taking any supplements.

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## Therapeutic Uses

Small double-blind, placebo-controlled studies suggest that arginine might be helpful for the treatment of several seemingly unrelated conditions that are, in fact, all linked by arginine's effects on nitric oxide: congestive heart failure, intermittent claudication, angina, impotence, and sexual dysfunction in women.<sup>1-6,8,9,40</sup>

**Note:** The first three conditions in this list are life-threatening. If you have angina, congestive heart failure, or intermittent claudication, do not attempt to treat yourself with arginine except under physician's supervision.

Arginine has been proposed for use after a heart attack to aid recovery. In one study, arginine did not cause harm and showed potential modest benefit.<sup>55</sup> However, in another study, arginine failed to prove helpful for treatment of people who had just suffered a heart attack, and possibly increased post-heart-attack death rate.<sup>56</sup>

One preliminary, double-blind study suggests that arginine supplementation might help prevent colds.<sup>10</sup>

A small, double-blind, placebo-controlled study suggests that use of arginine (700 mg 4 times daily) may support transdermal nitroglycerin therapy for angina.<sup>44</sup> Ordinarily, the drug nitroglycerin becomes less effective over time as the body develops a tolerance to it. However, arginine supplements appear to help prevent the development of tolerance.

The results of one controlled (but not blinded) study in women suggest that arginine might help standard fertility therapy for women (specifically, in vitro fertilization) work better.<sup>17</sup> However, studies have not found any benefit in male infertility.<sup>11-16</sup>

Weak evidence suggests that arginine might improve insulin action in people with type 2 (adult-onset) diabetes.<sup>18</sup> Nutritional mixtures containing arginine have shown promise for enhancing recovery from major surgery, injury, or illness, perhaps by enhancing immunity.<sup>57</sup> Highly preliminary evidence suggests that arginine might be worth investigating as a treatment for pulmonary hypertension in people with sickle cell disease.<sup>50</sup>

Arginine has also been studied as a possible treatment for hypertension.<sup>66</sup> In a small randomized trial, people with hypertension who took 4 grams of arginine 3 times daily had reduced blood pressure levels compared to those that took a smaller amount of arginine (2 grams, 3 times daily) or placebo.

Results are mixed, yet somewhat positive on the potential benefits of arginine for treatments of pre-eclampsia.<sup>51-52,58,68</sup> In one study, 672 pregnant women at high-risk for pre-eclampsia were randomized to receive one of three treatments: arginine plus antioxidants, antioxidants alone, or placebo.<sup>68</sup> The women were followed until they gave birth. Those taking arginine plus antioxidants were at a lower risk of developing pre-eclampsia compared to the other two groups.

Preliminary double-blind studies have failed to find arginine helpful for asthma,<sup>45</sup> cystic fibrosis,<sup>53</sup> interstitial cystitis,<sup>7</sup> kidney failure,<sup>19</sup> osteoporosis,<sup>59</sup> or Raynaud's phenomenon.<sup>42</sup> One study found that an arginine-rich food bar did not help relax arteries or thin the blood in people with high cholesterol.<sup>48</sup>

A study of 133 people with intermittent claudication (pain in the legs caused by atherosclerosis) failed to find arginine helpful; in fact, arginine was less effective than placebo, suggesting that it actually *increases* symptoms to some extent.<sup>63</sup> Two earlier studies had reported benefit, but they were small and poorly designed and reported.<sup>64,65</sup>

Arginine has been proposed for preventing altitude sickness, but the one reported study found harmful effects (increase in headache) rather than beneficial ones.<sup>60</sup>

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## What Is the Scientific Evidence for Arginine?

**Note:** The first three conditions in this section are life-threatening. If you have angina, congestive heart failure, or intermittent claudication, do not attempt to treat yourself with arginine except under physician's supervision.

### Congestive Heart Failure

Three small double-blind, placebo-controlled studies enrolling a total of about 70 individuals with congestive heart failure found that oral arginine at a dose of 5 g to 15 g daily could significantly improve symptoms as well as objective measurements of heart function.<sup>21,22,23</sup>

### Intermittent Claudication

People with advanced hardening of the arteries, or atherosclerosis, often have difficulty walking because of lack of blood flow to the legs, a condition known as intermittent claudication. Pain may develop after walking less than half a block.

In a double-blind study of 41 individuals, 2 weeks of treatment with a high dose of arginine improved walking distance by 66%; no benefits were seen in the placebo group or a low-dose arginine group.<sup>43</sup>

Good results were also seen in another study, although its convoluted design makes interpreting the results somewhat difficult.<sup>25</sup>

### Angina

A double-blind study of 25 individuals with angina pectoris found that treatment with arginine at a dose of 6 g per day improved exercise tolerance, but not objective measurements of heart function.<sup>26</sup>

A double-blind, placebo-controlled crossover trial of 36 individuals with heart disease found that use of arginine (along with antioxidant vitamins and minerals) at a daily dose of 6.6 g reduced symptoms of angina.<sup>40</sup>

### Impotence

The substance nitric oxide (NO) plays a role in the development of an erection. Drugs like Viagra increase the body's *sensitivity* to the natural rise in NO that occurs with sexual stimulation. A simpler approach might be to *raise* levels of this substance, and one way to accomplish this involves use of the amino acid L-arginine. Oral arginine supplements may increase NO levels in the penis and elsewhere. Based on this, L-arginine has been advertised as "natural Viagra." However, there is as yet little evidence that it works. Drugs based on raising NO levels in the penis have not worked out for pharmaceutical developers; the body seems simply to adjust to the higher levels and maintain the same level of response.

Nonetheless, some small studies have found possible evidence of benefit.

In a double-blind trial, 50 men with erectile dysfunction received either 5 g of arginine per day or placebo for 6 weeks.<sup>27</sup> More men in the treated group experienced improvement in sexual performance than in the placebo group.

A double-blind crossover study of 32 men found no benefit with 1,500 mg of arginine daily for 17 days.<sup>39</sup> However, the lower dose of arginine as well as the shorter course of treatment may explain the discrepancy between these two studies.

Arginine has also been evaluated in combination with the drug yohimbine (as opposed to the herb yohimbe).<sup>47</sup> A double-blind, placebo-controlled trial of 45 men found that one-time use of this combination therapy an hour or two prior to intercourse improved erectile function, especially in those with only moderate erectile dysfunction

scores. Arginine and yohimbine were both taken at a dose of 6 g. **Note:** Do not use the drug yohimbine (or the herb yohimbe) except under physician supervision, as it presents a number of safety risks.

One study supposedly found that arginine plus OPCs can improve male sexual function, but because the study lacked a placebo group it did not, in fact, find anything at all.<sup>54</sup> (For more information on why placebos are necessary, see Why Does This Database Depend on Double-Blind Studies?)

A small, unpublished, double-blind study listed on the manufacturer's website reported benefits with a proprietary combination of arginine and the herbs ginseng, ginkgo, and damiana, and vitamins and minerals.<sup>61</sup>

### **Sexual Dysfunction in Women**

Some postmenopausal women have difficulty experiencing sexual arousal. One small double-blind study of yohimbine combined with arginine found an increase in measured physical arousal among 23 women with this condition.<sup>28</sup> However, the women themselves did not report any noticeable subjective effects, suggesting that the effect was slight. In addition, only the combination of yohimbine and arginine produced results; neither substance was effective when taken on its own. Slight benefits were also seen in preliminary double-blind, placebo-controlled trials that evaluated a combination therapy containing arginine, along with the herbs ginseng, ginkgo, and damiana, and vitamins and minerals.<sup>49,62</sup>

### **Interstitial Cystitis**

Interstitial cystitis is a condition in which an individual feels like he or she has symptoms of a bladder infection, but no infection is present. Medical treatment for this condition is less than satisfactory.

A 3-month, double-blind trial of 53 individuals with interstitial cystitis found only weak indications that arginine might improve symptoms of interstitial cystitis.<sup>29</sup> Several participants dropped out of the study; when this was properly taken into account using a statistical method called ITT analysis, no benefit at all could be proven.

A very small double-blind trial also failed to find evidence of benefit.<sup>30</sup>

### **Colds**

A 2-month, double-blind study involving 40 children with a history of frequent colds concluded that arginine seemed to provide some protection against respiratory infections.<sup>31</sup> Of the children who were given arginine, 15 stayed well during the 60 days of the study. By contrast, only 5 of the children who took placebo stayed well, a significant difference.

### **Nutritional Support in Hospitalized Patients**

Several nutritional products that contain arginine as well as other substances have been tried in hospital settings to enhance recovery following major surgery, illness, or injury. These mixtures are delivered enterally, which means through a tube into the stomach. A review of 15 studies, about half of them double-blind and involving a total of 1,557 individuals, found that such products can reduce episodes of infection, time on ventilator machines, and length of stay in the hospital.<sup>32,33</sup>

However, because of the many nutrients contained in these so-called immunonutrient mixtures, it is not clear whether arginine deserves the credit.

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## **Safety Issues**

There is good evidence that arginine is safe and well tolerated at levels up to 20 g per day,<sup>65</sup> although minor gastrointestinal upset can occur. However, there are some potential safety issues regarding high-dose arginine. These cautions are based on findings from animal studies and hospital experiences of intravenous administration.

For example, arginine may stimulate the body's production of gastrin, a hormone that increases stomach acid.<sup>34</sup> For this reason, there are concerns that arginine could be harmful for people with ulcers or who take drugs that are hard on the stomach. In addition, a double-blind trial found that arginine (30 g/day) may increase the risk of esophageal reflux (heartburn) by relaxing the sphincter at the bottom of the esophagus.<sup>41</sup>

Arginine might also alter potassium levels in the body, especially in people with severe liver disease.<sup>35</sup> This is a potential concern for individuals who take drugs that also alter potassium balance (such as potassium-sparing diuretics and ACE inhibitors), as well as those with severe kidney disease. If you fall into any of these categories, do not use high-dose arginine except under physician supervision.

Evidence that arginine can improve insulin sensitivity<sup>36</sup> raises theoretical concerns that, if you have diabetes and take arginine, your blood sugar could fall too low. However, one study suggests that arginine is safe for use by people with stable type 2 (adult-onset) diabetes.<sup>37</sup>

The amino acid lysine has been advocated for use in oral or genital herpes. According to the theory behind this recommendation, it is important to simultaneously restrict arginine intake. If true, this would tend to suggest that arginine supplements would be harmful for people with a tendency to develop herpes. However, there is no meaningful evidence to support this hypothesis.

Maximum safe doses in pregnant or nursing women, young children, and those with severe liver or kidney disease have not been established.

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## Interactions You Should Know About

If you are taking:

- Lysine to treat herpes: Arginine might counteract the potential benefit.<sup>38</sup>
- Drugs that are hard on the stomach (such as nonsteroidal anti-inflammatory medications): Taking high doses of arginine might stress your stomach additionally.
- Medications that can alter the balance of potassium in your body (such as potassium-sparing diuretics or ACE inhibitors): High doses of arginine should be used only under physician supervision.
- Transdermal nitroglycerin: Arginine may help prevent the development of tolerance. ( **Note:** Your doctor's supervision is essential.)

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Last reviewed August 2011 by [EBSCO CAM Review Board](#)  
Last Updated: 8/1/2011