

Arginine & Hypertension

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Hypertension is a major healthcare problem afflicting nearly 50 million individuals in the United States. Despite its strong causal association with cardiovascular disease complications including myocardial infarction, heart failure, and stroke, the majority of patients with hypertension do not achieve optimal blood pressure control. The prevalence of hypertension is expected to increase with the aging population, growing obesity epidemic, and rising incidence of metabolic syndrome.

Endothelial dysfunction and reduced nitric oxide (NO) bioactivity represent prominent pathophysiological abnormalities associated with hypertensive cardiovascular disease. Individuals with hypertension exhibit blunted epicardial and resistance vascular dilation to endothelium-derived nitric oxide (EDNO) agonists in the peripheral and coronary circulation that likely contributes to mechanisms of altered vascular tone in hypertension. The amino acid arginine serves as the principal substrate for vascular NO production. Numerous studies, though not uniformly, demonstrate a beneficial effect of acute and chronic arginine supplementation on EDNO production and endothelial function, and arginine has been shown to reduce systemic blood pressure in some forms of experimental hypertension.

Arginine dilates blood vessels, reduces blood pressure, mimics the activity of nitroglycerine, and produces nitric oxide (NO). Arginine contributes to normal blood vessel function. Congestive heart failure often reveals blood vessels that fail to dilate in response to certain drugs, a sign that the inner blood vessel wall, or endothelium, is compromised. Arginine produced a fourfold increase in blood vessel dilation (Hambrecht et al. 2000). Doses of 5.6-12.6 grams of arginine increased blood flow to the extremities by 29% (Rector et al. 1996). The effectiveness of arginine relates to its ability to directly create NO, a vasodilator produced in endothelial cells by the enzyme nitric oxide synthase (Brunini et al. 2002). Nitric oxide counteracts the vasoconstrictive effects of adrenaline and maintains vascular elasticity. Arginine increases nitric oxide, but hypertension, hyperhomocysteinemia, diabetes, and smoking decrease it.

Arginine is frequently used as a treatment for hypertension. A defect in nitric oxide production is a possible mechanism of hypertensive vascular disease (Campese et al. 1997). Some cardiologists recommend arginine over nitroglycerine, since the two substances appear to replicate a similar vascular function, that is, the ability to relax smooth muscles and dilate blood vessels.

Maxwell, Andrew J. and Cooke, John P. Cardiovascular effects of arginine. *Current Opinion in Nephrology & Hypertension*, Vol. 7, January 1998, pp. 63-70

The inside of blood vessels is lined with a layer of single cells called the endothelium. Among other functions, the endothelium produces nitric oxide that serves to relax (vasodilate) the blood vessels so as to facilitate the flow of blood. It is now generally accepted that many heart problems involve a dysfunction of the endothelial vasodilator mechanism. Antioxidants, estrogen, exercise, folic acid, and fish oils can in a number of cases, reverse this dysfunction. Now researchers at the Stanford University School of Medicine report that **supplementation with the amino acid arginine is highly effective in reversing endothelial dysfunction.** It has been established that arginine is the precursor for endothelium-derived nitric oxide (EDNO). EDNO, in turn, is a potent vasodilator and inhibits platelet aggregation and the adherence of circulating blood cells to blood vessel walls. Arginine administration, either orally or intravenously, has been found useful in preventing and reversing atherosclerosis, in increasing coronary blood flow in heart disease patients, in alleviating intermittent claudication, and in improving functional status of heart failure patients. **Arginine infusions have been found to lower blood pressure** and to inhibit restenosis (reclosing of arteries) after balloon angioplasty. The most common used dosage of arginine is between six and thirty grams per day (113 references).