



A New Study Reveals ...

Benfotiamine Fights

Vascular and Nerve

AGEing!

Benfotiamine, a fat-soluble form of the vitamin thiamine, is a pharmaceutical-grade supplement proven to reduce the formation of *Advanced Glycation Endproducts (AGE)* in the body. AGEs are body proteins which have been rendered malfunctioning by being twisted out of shape by reactions with sugar. They not only don't do the job they're supposed to be doing in the body, but they promote inflammatory gene cascades and gunk up the body's protein detoxification and renewal machinery, contributing to biological aging. While many supplements - such as **thyme extract**,¹ **inositol**,² **acetyl-L-carnitine**,³ and a whole host of **antioxidants** (including **n-acetyl-cysteine (NAC)**⁴ and **flavonoids**, such as **quercetin**,¹ **resveratrol**,⁵ and others) - are touted AGE-fighters, these nutrients have only been shown to inhibit AGE chemistry in beakers at food chemistry labs. None of them has yet been shown to fight

AGE in a living organism, and there's plenty of reason to believe that they will *not* do so, because the chemistry of the stove top - or the lab bench - is so totally unlike what happens in living systems.⁶

Other substances - such as **taurine**⁷ and **curcumin**⁸ - have been shown to reduce AGE in animal models, but only at doses many times greater than is used by even the most dedicated pill-popper.

Benfotiamine is the exception to the string of bogus claims. **Benfotiamine has been proven in clinical trials to restore nerve function in diabetic neuropathy**, the AGE-related nerve damage which is all too common in people with diabetes.^{9,10,11,12,13,14,15,16} Experimental studies have shown **Benfotiamine's** powerful anti-AGE effects in the prevention and amelioration of AGE-related diabetic complications in experimental models of diabetic **retinopathy**¹⁷ and **nephropathy** (kidney dysfunction).¹⁸

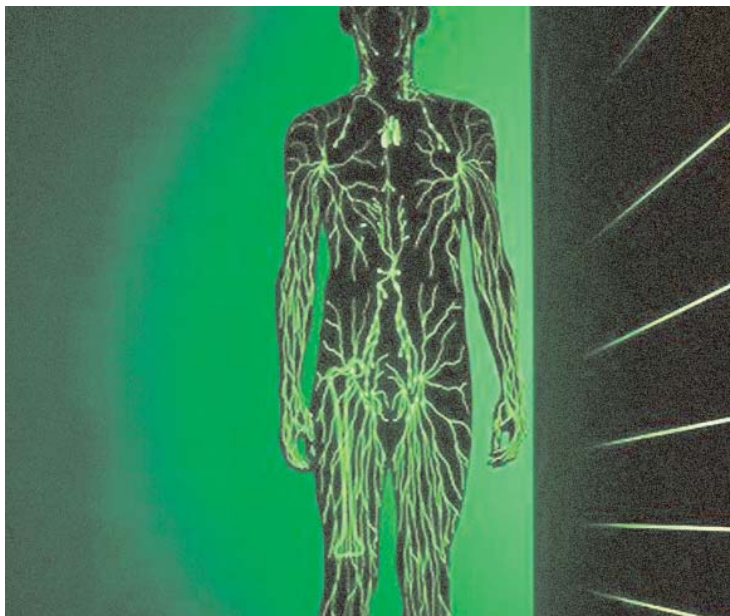
Now, at the **American Diabetes Association's 64th Annual Scientific Sessions**, the news on Benfotiamine just

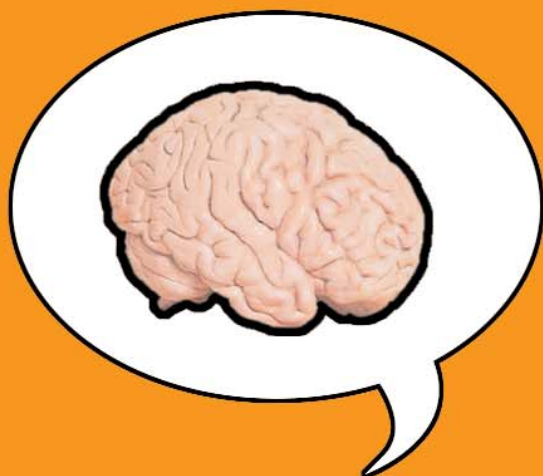
Benfotiamine has been proven in clinical trials to restore

got better. A new study¹⁹ has not only confirmed that **Benfotiamine helps to restore the function of nerves ravaged by experimental diabetes**, but has shown for the first time that **Benfotiamine improves the function of AGE-afflicted blood vessels, too!**

The researchers first studied the nerve and vascular function of experimental animals that had been suffering with diabetes for 24 weeks - the rough equivalent of 17 years in a human diabetic. The picture wasn't pretty. Compared to healthy animals, the delivery of blood to the delicate bands of connective tissue that support the nerves that enliven the body below the base of the spine was impeded by 48.6% in diabetics. The flow of sensory information in the nerves of the lower leg, and of movement commands along the nerves from the base of the spine downward, were both slowed by over 19% by diabetes.

Yet **the assaults of 17 animal-years of diabetes were largely reversed by Benfotiamine supplementation**, which restored 62.6% of their blood flow, 74.6% of motor neuron velocity, and an amazing 91.7% of the sensory nerve deficit!¹⁹ The dramatic restoration took just two weeks - the rodent equivalent of less than a year and a half. The researchers were also able to show that much of the restoration of blood flow was the result of a restored





Citicoline is a brain phospholipids booster that has been clinically studied for its benefits in Alzheimer's disease, stroke, Parkinson's disease, head trauma and that it improves the odds of a good outcome after high-risk brain surgery.

For the rest of us, Citicoline helps to maintain, protect, boost and restore healthy brain function and has been confirmed in double-blind, placebo-controlled trials to improve memory.

**These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.*

ability of the blood vessels to release **nitric oxide (NO)**, a key vessel-relaxing chemical messenger.

The researchers concluded that **"benfotiamine reversed some neural and vascular deficits in diabetic rats, with particular benefits for NO-mediated processes, which may have therapeutic implications for diabetic vasculopathy and neuropathy,"**¹⁹ but the implications go far further. AGEs are a key molecular mechanism of aging, and their effects in diabetes are just a fast-forward version of what happens in all of us. For the healthy life extensionist, the study is great news, revealing yet another way that this powerful supplement protects against the ravages of AGE.

References

- 1 Morimitsu Y, Yoshida K, Esaki S, Hirota A. Protein glycation inhibitors from thyme (*Thymus vulgaris*). *Biosci Biotechnol Biochem*. 1995 Nov;59(11):2018-21.
- 2 Ramakrishnan S, Sulochana KN, Punitham R. Two new functions of inositol in the eye lens: antioxidation and antiglycation and possible mechanisms. *Indian J Biochem Biophys*. 1999 Apr;36(2):129-33.
- 3 Swamy-mruthinti S, Carter AL. Acetyl-L-carnitine decreases glycation of lens proteins: in vitro studies. *Exp Eye Res* 1999 Jul;69(1):109-15.
- 4 Haleva-Toledo E, Naim M, Zehavi U, Rouseff RL. Effects of L-cysteine and N-acetyl-L-cysteine on 4-hydroxy-2, 5-dimethyl-3(2H)-furanone (furanol), 5-(hydroxymethyl)furfural, and 5-methylfurfural formation and browning in buffer solutions containing either rhamnose or glucose and arginine. *J Agric Food Chem*. 1999 Oct;47(10):4140-5.
- 5 Mizutani K, Ikeda K, Yamori Y. Resveratrol inhibits AGEs-induced proliferation and collagen synthesis activity in vascular smooth muscle cells from stroke-prone spontaneously hypertensive rats. *Biochem Biophys Res Commun*. 2000 Jul 21;274(1):61-7.
- 6 Khalifah RG, Baynes JW, Hudson BG. Amadorins: novel post-Amadori inhibitors of advanced glycation reactions. *Biochem Biophys Res Commun*. 1999 Apr 13;257(2):251-8.
- 7 Nandhini AT, Thirunavukkarasu V, Anuradha CV. Stimulation of glucose utilization and inhibition of protein glycation and AGE products by taurine. *Acta Physiol Scand*. 2004 Jul;181(3):297-303.
- 8 Sajithlal GB, Chithra P, Chandrakasan G. Effect of curcumin on the advanced glycation and cross-linking of collagen in diabetic rats. *Biochem Pharmacol*. 1998 Dec 15;56(12):1607-14.
- 9 Barkai L, Feher A, Vamosi I, Kempler P. Treatment of diabetic sensory neuropathy in children and adolescents with a Benfotiamin combination. In Gries FA, Federlin K. *Benfotiamin in the Therapy of Polyneuropathy*. New York: Georg Thieme Verlag, 1998;77-82.
- 10 Stracke H, Lindemann A, Federlin K. A Benfotiamin-vitamin B combination in treatment of diabetic polyneuropathy. *Exp Clin Endocrinol Diabetes*. 1996;104(4):311-6.
- 11 Haupt E, Ledermann H, Kopcke W. Diabetic polyneuropathy: the effectiveness of Benfotiamin in Pain. In Gries FA, Federlin K. *Benfotiamin in the Therapy of Polyneuropathy*. New York: Georg Thieme Verlag, 1998;61-4.
- 12 Winkler G, Pal B, Nagybeganyi E, Ory I, Porochnavac M, Kempler P. Effectiveness of different Benfotiamin dosage regimens in the treatment of painful diabetic neuropathy. *Arzneimittelforschung*. 1999 Mar;49(3):220-4.
- 13 Sadekov RA, Danilov AB, Vein AM. Diabetic polyneuropathy treatment by milgamma-100 preparation. *Zh Nevrol Psikhiatr Im S S Korsakova*. 1998;98(9):30-2.
- 14 Jermendy G. Diabetic polyneuropathy: results of an open multicenter study. In Gries FA, Federlin K. *Benfotiamin in the Therapy of Polyneuropathy*. New York: Georg Thieme Verlag, 1998;71-6.
- 15 Simeonov S, Pavlova M, Mitkov M, Mincheva L, Troev D. Therapeutic efficacy of "Milgamma" in patients with painful diabetic neuropathy. *Folia Med (Plovdiv)*. 1997;39(4):5-10.
- 16 Ledermann H, Wiedey KD. Treatment of manifest diabetic polyneuropathy. Therapeutic effect of a neurotropic vitamin B1-B6-B12 combination. *Therapiewoche*. 1989;39(20):1445-9.
- 17 Hammes HP, Du X, Edelstein D, Taguchi T, Matsumura T, Ju Q, Lin J, Bierhaus A, Nawroth P, Hannak D, Neumaier M, Bergfeld R, Giardino I, Brownlee M. Benfotiamine blocks three major pathways of hyperglycemic damage and prevents experimental diabetic retinopathy. *Nat Med*. 2003 Mar;9(3):294-9.
- 18 Babaei-Jadidi R, Karachalias N, Ahmed N, Battah S, Thornalley PJ. Prevention of incipient diabetic nephropathy by high-dose thiamine and benfotiamine. *Diabetes*. 2003 Aug;52(8):2110-20.
- 19 Cameron NE, Nangle MR, Gibson TM, Cotter MA. Benfotiamine Treatment Improves Vascular Endothelium and Nerve Function in Diabetic Rats. *American Diabetes Association's 64th Annual Scientific Sessions*. Presented during: *Neuropathy: Experimental*. Abs 148-OR.