



SMALL MOLECULE TECHNOLOGIES, INC.

# MOLECULES & HEALTH

HEALING THROUGH MODERN SCIENCE · A PUBLICATION BY SMALL MOLECULE TECHNOLOGIES, INC.

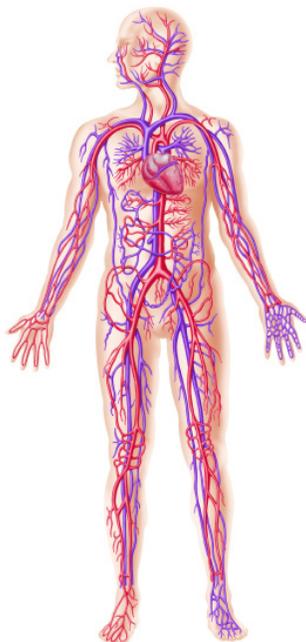
## Healthy Hearts for Diabetics



Find a “squishy” object like a stress ball, an orange, or even a clean rolled up sock. As you read this, firmly squeeze the object rhythmically in your hand about once every second (60 beats per minute). By the end of the article, you will likely notice a slight burning and increasing weakness in your hand and forearm as your muscles begin to fatigue. Now imagine your hand is your heart, and consider how hard your heart is working every day of your life. If you had a constant heart rate of 75 beats per minute (average for adults) and you lived to be 80 years old, your heart will have beat more than 3.1 BILLION times, pumping roughly 1.5 gallons of blood through approximately

60,000 miles of blood vessels that make up your circulatory system. Sounds exhausting, doesn't it?

When you consider all of the work that the heart is doing, it is easy to understand how important it is to maintain a healthy heart and circulatory system. This is especially true for people with diabetes that, according to the American Heart Association (AHA), have 2 to 4 times the risk of developing cardiovascular disease compared to somebody without diabetes. In fact, heart disease is the primary cause of death in over 65% of people with diabetes (AHA). The increased risk of heart disease is



due to a variety of factors including weight, diet, physical activity, inflammation, oxidative stress, high blood sugars, cholesterol, triglycerides, blood pressure, kidney disease, and genetics.



People with diabetes, or those at risk, are tasked with controlling these risk factors primarily through lifestyle changes and frequently prescription medications. While there is no doubt that these interventions offer significant benefits, healthcare providers and people with diabetes have been looking increasingly towards safer and more affordable alternatives to prescription medications such as targeted nutritional therapies. Research is continually identifying key nutrients that can play an important role both in the treatment and prevention of type-II diabetes and heart disease.

## Some of these key nutrients include:

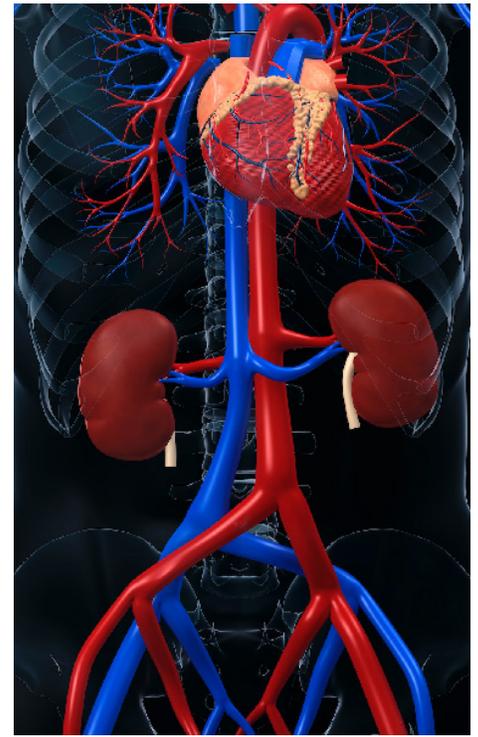
- **Hydroxytyrosol** from olives has been shown to reverse chronic inflammation and oxidative stress that can lead to the development of cardiovascular, hepatic, and metabolic syndrome from a high-carbohydrate and high-fat diet.<sup>1</sup> Olive leaf extract was shown to improve vascular function and reduce inflammation and fibrosis in heart tissues, reduce left ventricle stiffness, and improve aortic reactivity, while simultaneously improving abdominal fat deposition, plasma triglycerides, total cholesterol, glucose tolerance, and insulin sensitivity.<sup>1,2</sup> Hydroxytyrosol is a key component of the patented Olivamine 10<sup>®</sup> Max formula found in all Small Molecule Technologies Products.



- Olivamine 10<sup>®</sup> Max also contains two very important antioxidants called **N-acetyl-L-cysteine (NAC)** and **L-taurine**. The combination of these two nutrients has been shown to prevent hyperglycemia-induced insulin resistance – one of the primary mech-

anisms behind type-II diabetes.<sup>3</sup> NAC and L-taurine are included in all Small Molecule Technologies products with the highest doses found in ImmuneBoost™, Olivamine 10 Max, Brain Health, and Energy Support.

- **Co-enzyme Q10 (CoQ10)**, found in Small Molecule Technologies Multivitamin, is one of the most important molecules for healthy cellular metabolism due to its central role in the mitochondrial process that converts glucose into usable energy.<sup>4</sup> The highest concentrations are found in vital organs with high metabolic demands including the heart, liver, brain, kidneys, retinas, and skeletal muscle.<sup>4</sup> There are several drugs that can deplete your body's naturally produced CoQ10, and some that even inhibit your ability to produce it such as the cholesterol lowering "statin drugs" that are recommended for use in individuals with diabetes.<sup>5</sup> Depletion of CoQ10 results in oxidative stress and malfunctioning mitochondria, causing cell death and significant damage to the organs that require CoQ10 the most including heart.<sup>4,6</sup>
- **Acetyl-L-Carnitine**, provided in Small Molecule Technologies Multivitamin, has been shown to reduce cardiovascular risk factors in people with dia-



betes by reducing arterial blood pressure, insulin resistance, impaired glucose tolerance, and hypoalbuminemia (low levels of the protein-hormone called adiponectin that helps control metabolic processes including glucose and fat metabolism).<sup>7</sup>

- **Magnesium** is known to reduce blood pressure by helping blood vessels to relax and dilate. It is also essential for regulating the heart rhythm. For these reasons, magnesium can play an important role in preventing certain heart conditions and stroke, while preventing other effects from elevated blood pressure such as kidney disease and retinopathy.<sup>8-10</sup> Magnesium is included in Small Molecule Technologies D3+ Magnesium, Sleep Support, Brain Health, Mood Sup-

port, and Joint Health.

- **Sulforaphane** from broccoli extract was shown to improve cardiac health by preventing and even reversing diabetes-induced aortic fibrosis, inflammation, and oxidative stress by upregulating a cytoprotective transcription factor called Nrf2.<sup>11</sup> Another study showed that the same mechanism was responsible for preventing diabetes-induced hypertension, cardiac dysfunction, cardiac hypertrophy, fibrosis, and cardiomyopathy.<sup>12</sup> Sulforaphane is included in Small Molecule Technologies ImmuneBoost™, Brain



Health, and Joint Health.

- Homocysteine is a molecule found in the blood that is associated with increased risk of heart disease. Elevated levels are caused by increased oxidative stress and malfunctions in certain metabolic pathways that rely on vitamins like **B-12 (cobalamin)**, **B-9 (folic acid)**, **B-3 (niacin)**, and

**B-6 (pyridoxine)**. Supplementation with these vitamins has been shown to lower levels of homocysteine, reducing the risk of cardiovascular death.<sup>13-15</sup> The combination of B-12, folic acid, B-3, and B-6 can be found in Small Molecule Technologies Multivitamin and Brain Health. **L-taurine** is an amino acid found in all Small Molecule Technologies products that has

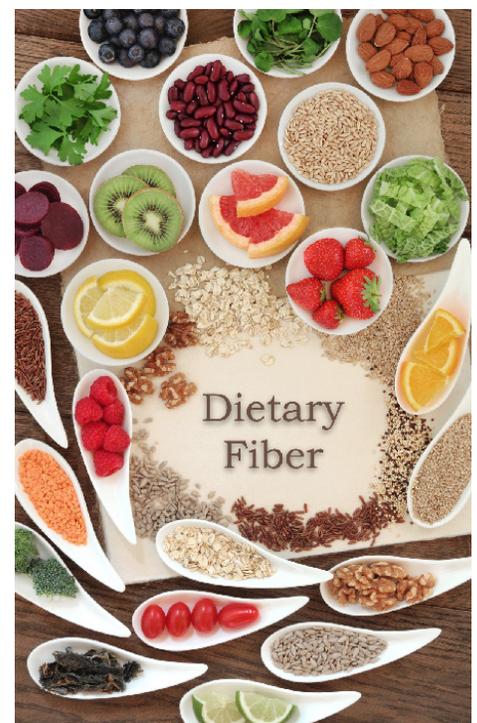


also been shown to protect the heart from elevated levels of homocysteine.<sup>16,17</sup>

- C-Reactive Protein (CRP) is a biological indicator of excess inflammation throughout the body, and elevated levels are associated with increased risk of heart disease.<sup>18</sup> Several nutrients have been shown to decrease CRP levels including **magnesium** and **fiber**.<sup>19-22</sup>
- High **fiber** diets in general have a strong correlation with improved heart health.<sup>23,24</sup> The fiber ingredient used in Small Molecule Technologies Prebiotic Fiber has been shown to help maintain healthy

glucose, triglyceride, and LDL-cholesterol levels in the blood especially after a meal.<sup>25-29</sup> Maintaining healthy blood levels of glucose, triglycerides, and cholesterol are all associated with improved cardiovascular health and lower risk of heart disease.

There are a lot of things you can do to reduce your risk of heart disease such as participating in regular moderate physical activity, eating a healthy and well-balanced diet, and quitting smoking. You can also give your heart targeted nutritional support based on scientific and clinical evidence by incorporating Small Molecule Technologies Supplements into your care plan today. Always consult with your personal trusted healthcare providers including your doctor and pharmacist before adding supplements to your care plan.



## References

1. Poudyal H, Campbell F, Brown L. Olive leaf extract attenuates cardiac, hepatic, and metabolic changes in high carbohydrate-, high fat-fed rats. *J Nutr*. 2010;140(5):946–53.
2. de Bock M, Derraik JGB, Brennan CM, et al. Olive (*Olea europaea* L.) leaf polyphenols improve insulin sensitivity in middle-aged overweight men: a randomized, placebo-controlled, crossover trial. *PLoS One*. 2013;8(3):e57622.
3. Haber CA, Lam TKT, Yu Z, et al. N-acetylcysteine and taurine prevent hyperglycemia-induced insulin resistance in vivo: possible role of oxidative stress. *Am J Physiol Endocrinol Metab*. 2003;285:E744–E753.
4. Littarru GP, Tiano L. Clinical aspects of coenzyme Q10: an update. *Nutrition*. 2010;26(3):250–4.
5. Rundek T, Naini A, Sacco R, Coates K, DiMauro S. Atorvastatin decreases the coenzyme Q10 level in the blood of patients at risk for cardiovascular disease and stroke. *Arch Neurol*. 2004;61(6):889–92.
6. Kumar A, Kaur H, Devi P, Mohan V. Role of coenzyme Q10 (CoQ10) in cardiac disease, hypertension and Meniere-like syndrome. *Pharmacol Ther*. 2009;124(3):259–68.
7. Ruggenenti P, Cattaneo D, Loriga G, et al. Ameliorating hypertension and insulin resistance in subjects at increased cardiovascular risk: effects of acetyl-L-carnitine therapy. *Hypertension*. 2009;54(3):567–74.
8. Abbott R. Dietary magnesium intake and the future risk of coronary heart disease (The Honolulu Heart Program). *Am J Cardiol*. 2003;92(6):665–669.
9. Al-Delaimy WK, Rimm EB, Willett WC, Stampfer MJ, Hu FB. Magnesium intake and risk of coronary heart disease among men. *J Am Coll Nutr*. 2004;23(1):63–70.
10. Johnson S. The multifaceted and widespread pathology of magnesium deficiency. *Med Hypotheses*. 2001;56(2):163–70.
11. Miao X, Bai Y, Sun W, et al. Sulforaphane prevention of diabetes-induced aortic damage was associated with the up-regulation of Nrf2 and its down-stream antioxidants. *Nutr Metab (Lond)*. 2012;9(1):84.
12. Bai Y, Cui W, Xin Y, et al. Prevention by sulforaphane of diabetic cardiomyopathy is associated with up-regulation of Nrf2 expression and transcription activation. *J Mol Cell Cardiol*. 2013;57:82–95.
13. Fairfield KM, Fletcher RH. Vitamins for chronic disease prevention in adults: scientific review. *JAMA*. 2002;287(23):3116–3126.
14. Mirmiran P, Bahadoran Z, Azizi F. Functional foods-based diet as a novel dietary approach for management of type 2 diabetes and its complications: A review. *World J Diabetes*. 2014;5(3):267–81.
15. Dell'edera D, Tinelli A, Milazzo GN, et al. Effect of multivitamins on plasma homocysteine in patients with the 5,10 methylenetetrahydrofolate reductase C677T homozygous state. *Mol Med Rep*. 2013;8(2):609–12.
16. Chang L, Xu J, Yu F, Zhao J, Tang X, Tang C. Taurine protected myocardial mitochondria injury induced by hyperhomocysteinemia in rats. *Amino Acids*. 2004;27(1):37–48.
17. Nonaka H, Tsujino T, Watari Y, Emoto N, Yokoyama M. Taurine Prevents the Decrease in Expression and Secretion of Extracellular Superoxide Dismutase Induced by Homocysteine: Amelioration of Homocysteine-Induced Endoplasmic Reticulum Stress by Taurine. *Circulation*. 2001;104(10):1165–1170.
18. Ridker PM, Rifai N, Rose L, Buring JE, Cook NR. Comparison of C-reactive protein and low-density lipoprotein cholesterol levels in the prediction of first cardiovascular events. *N Engl J Med*. 2002;347(20):1557–65.
19. Song Y, Ridker PM, Manson JE, Cook NR, Buring JE, Liu S. Magnesium intake, C-reactive protein, and the prevalence of metabolic syndrome in middle-aged and older U.S. women. *Diabetes Care*. 2005;28(6):1438–44.
20. King D, Mainous III A, Geesey M, Egan B, Rehman S. Magnesium supplement intake and C-reactive protein levels in adults. *Nutr Res*. 2006;26(5):193–196.
21. King D. Relation of dietary fat and fiber to elevation of C-reactive protein. *Am J Cardiol*. 2003;92(11):1335–1339.
22. Ajani UA, Ford ES, Mokdad AH. Nutritional Epidemiology - Dietary Fiber and C-Reactive Protein: Findings from National Health and Nutrition Examination Survey Data. *J Nutr*. 2004;(January):1181–1185.
23. Pereira MA, Reilly EO, Augustsson K, et al. Dietary Fiber and Risk of Coronary Heart Disease: a pooled analysis of cohort studies. *Arch Intern Med*. 2004;164:370–6.
24. Streppel MT, Ocké MC, Boshuizen HC, Kok FJ, Kromhout D. Dietary fiber intake in relation to coronary heart disease and all-cause mortality over 40 y: the Zutphen Study. *Am J Clin Nutr*. 2008;88(4):1119–25.
25. Maeda H, Yasuda K, Ohara I. Effects of Indigestible dextrin-containing soft drinks on postprandial blood glucose levels in healthy human subjects. *J Nutr Food*. 2001;4(3):73–79.
26. Mizushima N, Chiba Y, Katsuyama S, Daigo Y, Kobayashi C. Effect of indigestible dextrin-containing soft drinks on blood glucose level in healthy human subjects. *J Nutr Food*. 1999;2(4):17–23.
27. Kajimoto O, Hirata H, Takahashi T, Henmi M, Morimoto F, Ohki K. Beneficial effects of a new indigestible dextrin-containing beverage on lipid metabolism and obesity-related parameters. *J Nutr Food*. 2000;3(3):47–58.
28. Hironaka T, Kishimoto Y, Matsubara H, Matsuoka Y. Inhibitory Effect of Tea Containing Resistant Maltodextrin on the Elevation of Serum Triglyceride after Intake of Lipid. *Jpn Pharmacol Ther*. 2008;36:445–51.
29. Okuma K, Kishimoto Y. Effects of resistant maltodextrin on metabolism of glucose and lipids. *Diet fibre Bioact carbohydrates food Feed*. 2004:219–230.

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**About the author:** Kyle Hilsabeck, PharmD., is the Vice President of Pharmaceutical Affairs at McCord Holdings and licensed by the Iowa Board of Pharmacy. He completed bachelors degrees in biology and biochemistry at Wartburg College before earning his Doctorate of Pharmacy from the University of Iowa College of Pharmacy. Upon graduation, he completed a community pharmacy practice residency through the University of Iowa where he focused primarily on nutritional aspects of care including the use of vitamin, mineral, and herbal supplements. He has taught courses for the University of Iowa College of Pharmacy on vitamins, minerals, herbs, and nutritional supplements and given many presentations on the subject as well. He has a passion for improving patient care specifically with regards to the safety and quality of the nutritional supplements and health information people use.

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