

# The Job of Nutraceuticals in the Avoidance of Cardiovascular Disease

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## Abstract

One of the most well known health related and financial issues in the world is cardiovascular disease (CVD). Dietary factors affect other cardiovascular risk factors like hypertension, dyslipidemia, and diabetes mellitus, which can either directly or indirectly increase cardiovascular risk. Common dietary supplements known as Nutraceuticals have been proven to be successful in the treatment or prevention of disease. There is evidence that certain food groups and dietary supplements can slow the progression of CVD. This audit's goal is to report on the most recent research on the use of Nutraceuticals in the treatment and prevention of cardiovascular disease (CVD).

**Keywords:** Nutraceutical; Cardiovascular disease (CVD); Lycopene; Curcumin.

## INTRODUCTION

The term "Nutraceuticals" was first used in 1989 by Stephen De Felice, founder and executive director of the Organization for Developing in Medication. "Food, or portions of food, that provide clinical or medical benefits, such as the prevention and treatment of sickness," is the definition of a Nutraceutical.<sup>1</sup> Without a shadow of a doubt, most adults over the age of sixty will

suffer from some form of cardiovascular disease (CVD). It is estimated that cardiovascular disease kills 17.3 million people annually around the world based on statistics from 2012 and 2013.<sup>2</sup> Variables of CVD risk that are modifiable and those that are not can be distinguished. Weight, hypertension, hyperlipidemia, diabetes mellitus, metabolic state, and lifestyle risk factors such as poor eating habits, smoking, and inactivity can all be modified. Dietary factors are also important cardiovascular risk boosters, either directly or indirectly via their effects on other cardiovascular risk factors such as hypertension, dyslipidemia, and type-2 diabetes.<sup>3</sup> Reduced risk factors in the population, especially reduced lipid levels and circulatory strain, can significantly affect CVD mortality<sup>4</sup> A few food varieties and dietary improvements have been shown to have protective effects against CVD<sup>5</sup>, opening up new possibilities for the population level reduction of CVD risk. According to Proof, this methodology is very promising. In the ongoing PREDIMED study, There was a 54% increase in the risk of CVD among the highest polyphenol users

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compared to the lowest polyphenol users.<sup>6</sup> The goal of this review is to provide a report on the most up-to-date evidence demonstrating the effectiveness of nutraceuticals in the avoidance and therapy of CVD. Sadly, not many studies have tried to pin down the exact correlation between Nutraceutical consumption and "hard" outcomes like mortality. There is a lack of evidence because large scale randomised controlled trials are unusual in this field. In a similar vein, our discussion will centre on how nutraceuticals may or may not affect traditional CVD risk factors.

### *Various dietary supplements and their relationship to CVD*

**Garlic** The bulb of the garlic plant, *Allium sativum*, is now widely used for culinary and medicinal purposes.<sup>7</sup> Water (65%), carbohydrates like fructose, sulphur compounds, proteins, and free amino acids are the other main components of garlic.<sup>8</sup> The nutritional and therapeutic benefits of garlic are a result of the high concentrations of sulphur found in or produced by garlic.<sup>9</sup> Some of garlic's cardiovascular benefits have been linked to allicin, also called diallylic thiosulfate.<sup>10</sup> In response to changes in the garlic cell structure, C-S-lyase (alliinase) converts alliin (S-allyl-L-Cysteine sulfoxide) to allicin. Allicin, when exposed to air, breaks down into the potent antiplatelet compounds diallyl sulphide (DAS), diallyldisulfide (DADs), diallyltrisulfide (DATS), and methyl allyltrisulfide (MATs).<sup>11</sup> In humans, garlic consumption has been shown to decrease platelet aggregation<sup>12</sup>, and in animals, garlic consumption has been shown to increase vasodilation and fibrinolysis.<sup>13</sup> To create matured garlic remove (AGE), chopped raw garlic is kept in an ethanol solution at room temperature for a very long time. To determine the value of this, more study is required. In order to better understand the characteristics of AGE, future research could examine a variety of cell reinforcements over a longer time period and examine a diabetic spouse who is at a higher cardiovascular risk, such as people who already have heart disease.<sup>14</sup> Numerous garlic preparations, including oil, powder, and oil, have been shown to have positive effects regardless of age.<sup>10,15</sup> In spite of its previously mentioned negative effects on the heart, it has been found to have a cardioprotective effect as promoted by H<sub>2</sub>S. This effect is delivered through the transdifferentiation of garlic subordinates into human erythrocytes and protects the heart through cancer prevention, antiapoptotic, and mitigating activities. H<sub>2</sub>S is a cardioprotective gas that plays multiple roles in the tissues of mammals. It prevents

cell death, oxidative stress, and putrefaction, all of which are essential for cell function.<sup>16</sup> It's possible that exogenous H<sub>2</sub>S treatment is responsible for a dramatic attenuation of cardiac localised apoptosis in mouse sore and ischemia/reperfusion injured animals.<sup>17</sup> Considerable written evidence suggests that garlic has a substantial cardioprotective effect.<sup>18</sup> Despite its known cardiovascular benefits, a recent meta-analysis focused on patients with hypertension who were treated with garlic only arrangements instead of placebo and found a significant reduction in blood pressure.<sup>20</sup> A new study suggests that garlic, like common circulatory strain drugs like ACE inhibitors, ARBs, calcium channel blockers, and diuretics, may lower the pulse in hypertensive people.<sup>21</sup> Moreover, garlic supplements may be an important therapy option for hypertension, and studies should be conducted to determine if garlic has an anti-hypertensive effect on pre-hypertensive people, which would be significant in the fight against hypertension.<sup>20</sup> A meta-analysis found that garlic was effective for people with mild hypertension, but there wasn't enough evidence to support clinical treatment, and research on pulse and garlic combinations has been contradictory.<sup>19,23-25</sup> Although there is substantial evidence of garlic's beneficial heart effects, caution should be exercised in its use due to the presence of gastrointestinal disorders until more research is conducted to explain the benefits of garlic in the treatment of hypertension and cardiovascular disease.<sup>26</sup> Although more study is needed to confirm it, clinical evidence suggests that garlic may play a role in preventing or delaying cardiovascular infection.

### *Tomato and lycopene*

Lycopene, a carotenoid, can be found in watermelons, papayas, tomatoes, red peppers, and other naturally occurring red foods.<sup>27</sup> Tomatoes are well known for their dietary health benefits and culinary versatility.<sup>28</sup> Lycopene<sup>29</sup>, which makes up nearly 90% of the full carotenoids that make up the tomato, is also made up of carotene, folate, phenolic mixtures, and nutrients C and E. However, lycopene accounts for only a small portion of the total carotenoids that make up the tomato.<sup>30</sup> Researchers are interested in the association between tomato and lycopene consumption and a decrease in the risk of cardiovascular disease.<sup>28</sup> The Framingham Heart Offspring Study found a significant association between lycopene intake and in addition to the development of myocardial localised necrosis, coronary occlusion, and angina pectoris.<sup>31</sup> In addition, hypertension,

severe myocardial dead tissue, stroke, and atherosclerosis were all associated with low levels of the antioxidant lycopene in the plasma.<sup>32,33</sup> Lycopene, which is one of the major carotenoids, is the carotenoid that provides the most potent cell reinforcement, and it is an essential component in the fight against cardiovascular disease in adults.<sup>34</sup> There has not been as much research done on the bioavailability of lycopene in supplements, but it is still an interesting and potentially fruitful area. According to the findings of a trial investigation, Westar rats given tomato supplementation for a period of ninety days exhibited advanced modifications in miRNA articulation and decreased oxidative pressure. In addition, the cross-sectional space of the left ventricular myositis appears to have shrunk as a result of these changes, while the diastolic capacity has increased as a direct result of these changes. Despite this, additional research is required to discover the roles that tomatoes and lycopene are expected to play in the prevention and treatment of cardiovascular infections, as well as to explain the beneficial effects that tomatoes and lycopene have on the heart that have not yet been discovered.<sup>35</sup> It is important to emphasise the correlation between healthy vascular function and endothelial capacity (CITE). In addition, damage to the endothelium has been linked to the progression of atherosclerosis, and damage to the endothelium of the coronary or peripheral vascular system has all of the hallmarks of being a free indication of cardiovascular events.<sup>36</sup> It's possible that increased oxidative pressure is a major contributor to the breakdown of endothelial cells.<sup>37</sup> In a surprising finding, an eight weeks lycopene supplementation was shown to advance useful impacts of oxidative pressure biomarkers in a randomised, two fold, placebo-controlled trial with visually impaired participants (through the decrease of oxidative DNA harm and expanded plasma superoxide dismutase enzymatic action). In addition, the anti-cancer effects of these compounds might play a significant part in enhancing endothelial capability, which is strongly connected to incendiary indicators. These findings provide further evidence that consuming lycopene on a daily basis is beneficial to one's health.<sup>38</sup> Although a number of studies have found a correlation between lycopene and a reduced risk of cardiovascular disease<sup>32,33,39</sup>, the effect of lycopene supplementation is still unknown and has not been demonstrated.<sup>40</sup> Even though lycopene<sup>29</sup>, which accounts for about 90 percent of the total carotenoids found in tomatoes, it is important to focus on the other bioactive combinations found in tomatoes in order to gain a better understanding

of the positive effects they have. Additionally, until new research clarifies and confirms the significant benefits of lycopene supplementation in individuals, it is recommended that individuals consume foods that are high in natural carotenoids that have been cultivated from the ground.<sup>40</sup>

### *Spirulina*

Microalgae of a bluish green hue, such as spirulina, are known as nutrient power houses (Cyanobacterium). Spirulina is a food that has a long history of being consumed by humans with no discernible adverse effects on their health. It is high in protein, high in nutrients, high in minerals, high in carotene, and high in phycocyanins.<sup>41,42</sup> Positive alterations in blood lipid profiles have been associated with taking spirulina as a dietary supplement.<sup>43,44</sup> Significant changes in total cholesterol and low density lipoprotein concentrations were observed after oral administration of 4.5 grams of Spirulina maxima per day for approximately one and a half months.<sup>45</sup> In addition, the consumption of 1 gram of spirulina on a daily basis for a period of 12 weeks by a group of adults diagnosed with dyslipidemia was shown to lower mean levels of fatty oils, LDL-C, and TC without having an effect on plasma HDL-C convergences.<sup>46</sup> These findings appeared to be supported by a more recent meta-analysis that was comprised of seven randomised controlled preliminary studies with Spirulina.

### **CURCUMIN**

Curcumin has been shown to have a protective effect against the hypertrophy and breakdown of cardiovascular tissue. Consumption of it over an extended period of time seems to have an effect on the genetic expression linked to cholesterol homeostasis. It does this by reducing the levels of lipid peroxides and total cholesterol that are found in the blood. Additionally, curcuminoids have a layer settling effect, which is beneficial in the cases of myocardial ischemia, cardiovascular hypertrophy, and cardiovascular breakdown.<sup>48</sup> By enhancing the heart and vasculature's diminishing capacity, it has the potential to be useful in the treatment of cardiovascular disease (CVD), stroke, and cardiovascular breakdown. It has been demonstrated that curcumin can lessen the persistent discomfort brought on by metabolic disorders and obesity, as well as ease the effects of insulin resistance (IR) and improve vascular capacity. These benefits come as a result of curcumin's anti-inflammatory properties. The insulin resistance (IR),

metabolic syndrome, and obesity all contribute to continuous aggravation, which puts tissues under constant second rate oxidative strain and puts the body's uprightness in jeopardy. Homeostasis relies heavily on DNA, proteins, and a variety of other fundamental, primary, and functional particles.<sup>49</sup> Curcumin's ability to alleviate persistent irritation has been demonstrated in a few well designed and comprehensive human studies.<sup>50</sup> Recent research from three different sources confirmed that supplementation with curcumin that was fortified with bioperine in order to increase its bioavailability resulted in significant reductions in the levels of various inflammatory cytokines that mitigate the effects of chronic inflammation.<sup>51</sup> According to the findings of yet another study, taking curcumin supplements can affect lipid levels in a positive way.<sup>52</sup> It has an effect on virtually all of the ways in which cholesterol enters the circulatory system, including the retention of cholesterol from the diet, the excretion of cholesterol in the liver, the transportation of cholesterol out of cells, and the excretion of cholesterol from tissues located all over the body. In a similar vein, it contributes to the further development of HDL-C.<sup>53</sup> In addition, curcumin has the ability to scavenge reactive oxygen species (ROS), thereby lowering the risk of oxidative damage and, consequently, incendiary damage. Curcumin reduces the damage caused to vascular endothelial cells by rapamycin in animal studies<sup>54</sup> and appears to have an effect on endothelial capacity<sup>55</sup>, as well as preventing the progression of diabetic microangiopathy and cardiomyopathy.<sup>56,57</sup>

## SOYA

In adults with normal or low cholesterol levels, soy protein consumption does not seem to have a hypocholesterolemic effect. Therefore, there is no reason to be concerned that soy consumption could result in dangerously low cholesterol levels. In a study involving 12 adults, the consolidation of 66 to 80 g of soy protein (meat substituted with soy analogues and milk substituted with soy replenishment) did not result in any appreciable changes in blood lipids, with a mean absolute cholesterol level of 145 mg/dL at baseline.<sup>58</sup> When compared to a typical hypocaloric diet, soy protein significantly reduced aggregation and LDL cholesterol, according to other researchers who studied the impact of soy protein as a component of a hypocaloric diet.<sup>59,60,61</sup> found no appreciable change in serum lipids in 13 extreme vegans with baseline cholesterol of 129 mg/dL.<sup>62</sup> 13 males

with normocholesterolemia (mean gauge absolute cholesterol, 169 mg/dL) who consumed 50g of soy protein did not experience any appreciable changes despite eating a low fat low cholesterol diet. In their meta-analysis looking at the effect of soy protein on serum cholesterol levels, Anderson e found no evidence of a significant effect of soy protein on blood cholesterol levels. Adding soy protein to a low fat, low cholesterol diet lowers total and LDL cholesterol, despite some studies in adults with high serum cholesterol levels producing conflicting results. In a recent study, post menopausal women following the NCEP Step I diet, which is low in fat and cholesterol, ate 40 gram of soy protein daily along with either 56 or 90 milligram of isoflavones or casein for a period of six months. Both soy bunches had blood lipid profiles that were generally superior to the casein bunch (normal change from gauge, 8.2 percent reduction in non-HDL cholesterol, and 4.4 percent expansion in HDL cholesterol). Despite this, no differences in lipids between the two groups were found.<sup>63</sup> Using 32 g of soy protein to make soymilk increased HDL levels in all hypercholesterolemic patient types by 7% over baseline.<sup>64</sup> Crouse found that giving hypercholesterolemic patients 25 g of soy protein with isoflavones as part of a low-fat, low-cholesterol dietary pattern resulted in reductions in total and LDL cholesterol of 4% and 6%, respectively.

## Omega 3 fatty acid

One of the most recommended supplements right now is 3FAs.<sup>65</sup> They seem to improve blood rheology, endothelial function, and myocardial capacity, as well as decrease TG, aggravation, and platelet total. Treatment of gastrointestinal, rheumatic, metabolic, renal, dermatologic, pneumonic, and unexpected mental issues have all been reported, though they are most commonly used to treat essential and auxiliary symptoms of cardiovascular disease. The effects of 3FAs on atoms and cells are limited, but they do exist. Adding 3FAs to the cell layer alters the physicochemical properties of the cell layer and, according to animal studies, also affects cell function by connecting and adjusting film channels. It appears that film fused 3FAs are able to alter protein flagging at the cellular membrane. Adding 3FAs to the cell layer has also shown positive results.<sup>66</sup> The 3FAs deploy calming features using a wide range of methods and tools. They reduce inflammation by inhibiting the production of inflammatory eicosanoids like thromboxane A2 and leukotriene B4, and by decreasing the production of the intense stage reactant IL-2. As an added bonus, they stop

inflammation caused by lipopolysaccharide.<sup>67</sup> They modify expression levels by binding to specific nuclear receptors and transcription factors like PPAR-, HNF-4, and SREBP-1c. The anti-inflammatory properties of 3FAs may be useful in warding off the development of atherosclerosis in the blood vessels. However, there are concerns about the effects of 3FAs that have been brought to light by a few studies. Twenty strong competitors were given 3.6 gram of 3FAs daily for about a month and a half, but this did not alter their cytokine response to exhausting exercise or their blood centralizations of neutrophils and lymphocytes.<sup>68</sup> 3FAs may enhance endothelial capability by accelerating the arrival of nitric oxide from endothelial cells and reducing resting systolic and diastolic pulse by combining EPA and DHA into layer phospholipids and adjusting well the blood vessel consistency. The ability of 3FAs to inhibit platelets may account for the fact that high doses of 3FAs lengthen draining times and cause thrombosis.<sup>70</sup> Additionally, EPA and DHA decrease arachidonic acid levels in tissues and replace it with EPA-derived eicosanoids, which are less vasoconstrictive and have less platelet collecting effects in the cell membrane.<sup>71</sup> Thrombone A3 is synthesised from 3FAs rather than arachidonic acid, which is used to produce thromboxane A2. Compared to thromboxane A2, thromboxane A3 is much less effective at initiating platelets and causing vasoconstriction. Preliminary results in humans, however, show that even at the commonly recommended dosages of 3FAs, there is no consistent effect on coagulation factors and 442 platelet total. By blocking voltage gated sodium channels in myocytes, 3FAs can increase the generally uncontrollable period and modify the pulse. Blood lipid levels are lowered by 3FAs because they inhibit the hepatic aggregation of very low density lipoprotein and increase the degradation of unsaturated fats and the release of fatty oil from the plasma.<sup>72</sup> Multiple studies have shown that 3FAs increase the size and strength of blood vessels that cross a stream.<sup>73</sup> Preliminary randomised controlled studies have shown conflicting results on their effects on lipoproteins. There is no conclusive evidence of the benefits of omega-3 enhancements despite the plethora of studies on the topic, with both positive and negative preliminary findings. A long-awaited study that may be linked to industry information about promising discoveries, making it appear favourable to omega-3 nutritionists and academics while underestimating the unfavourable reality. Also, there could be risks and unintended consequences associated with these things. Paying close attention to one risk factor for draining and

haemorrhagic stroke is essential.<sup>74</sup> In conclusion, there is some evidence that omega-3 supplements are beneficial for cardiovascular health; however, these advantages may be small.

## CONCLUSION

Reduced risk of cardiovascular illnesses, cancer, osteoporosis, enhanced cognition, improved fatal health, and reduced risk of many other diseases are some of the positive impacts of functional foods and nutraceuticals. Functional foods and nutraceuticals are beneficial to one's health in the future. When ingested as part of a well balanced and healthy diet, they are beneficial for their intended purpose.

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