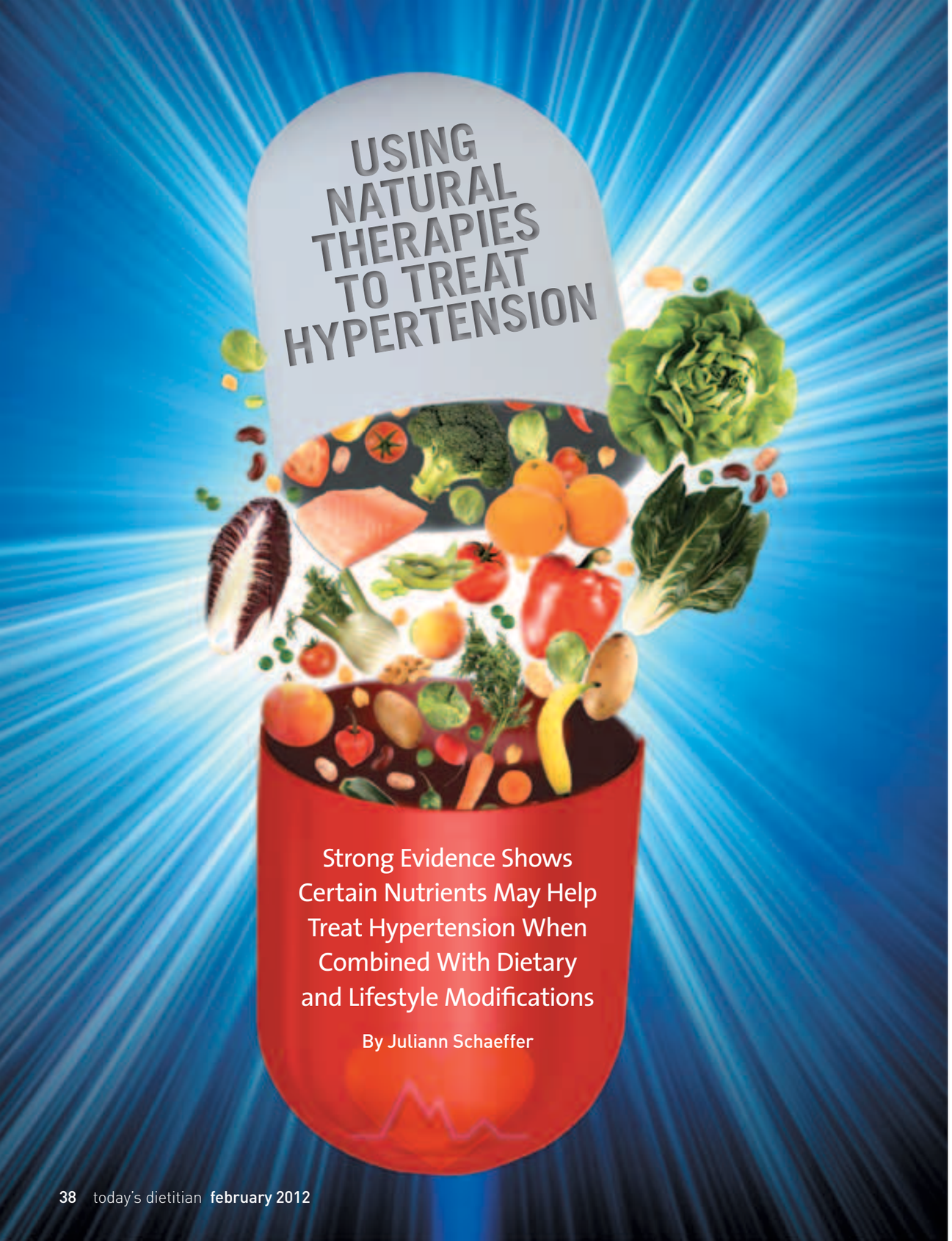

Strong Evidence Shows Certain Nutrients May Help Treat Hypertension When Combined With Dietary and Lifestyle Modifications

By Juliann Schaeffer

When it comes to heart health, dietary supplements may play a role in lowering blood pressure. Such news comes from a study published in the November 2011 issue of the ***Journal of Clinical Hypertension***, the most comprehensive review on the subject of natural therapies and blood pressure to date. For the estimated 30% of Americans with hypertension, many who feel burdened with the cost of pharmaceutical treatments or disillusioned by medication side effects, this may be welcome news.

But just how effective is nutritional supplementation for lowering blood pressure—and which vitamins and minerals have the most potential? To help dietitians best answer clients' questions, ***Today's Dietitian*** asked experts for their take on the supplements that have the most promise in treating hypertension in light of this research and tips for how they should be incorporated into an overall treatment plan.

High Cost of Hypertension

The Centers for Disease Control and Prevention estimates that almost one of every three people in the United States over the age of 20 has hypertension. Why is this number so troublesome? "The major health concern is that uncontrolled high blood pressure puts you at risk for heart disease and stroke, the first and third leading causes of death in the United States," says John Cuomo, PhD, executive director of research and development for USANA Health Sciences, who specializes in nutritional supplements.

"For those reasons alone, health professionals should be concerned about not only treating those with the condition but encouraging active and healthful lifestyles to help eliminate the incidence of hypertension in the general population," he adds.

"[Hypertension] causes more than half of all cardiovascular disease," says Eric Ding, PhD, a nutritionist and epidemiologist at Harvard Medical School. "Moreover, our recent national disease burden study in the United States [April 2009 issue of ***PLoS Medicine***] estimates that hypertension is responsible for almost 400,000 US deaths each year."

The Case for Supplementation

Lifestyle modifications such as engaging in regular physical activity, losing weight, and following the low-salt Dietary Approaches to Stop Hypertension (DASH) diet are the foundation of most hypertension treatment programs, and the experts interviewed here agree that no supplementation plan should change that.

But according to Elizabeth Somer, MA, RD, a dietitian and author of several books, including ***Eat Your Way to Sexy***, while nutritional supplements shouldn't be first-line treatment for hypertension, they can help compensate for the imperfect diet most Americans follow.

"Dropping the excess weight and following the DASH diet are the basics," Somer says. "But since few people eat perfectly, even when following the DASH diet, it makes sense to recommend supplements to fill in the gaps on days when patients don't eat perfectly and supply nutrients in amounts difficult to get from diet alone."

Cuomo also advocates for using supplements for hypertension treatment and advises people try getting their blood pressure under control with supplements and lifestyle modifications first before turning to pharmaceutical drugs.

"Supplements and lifestyle changes should be the first thing we do to help prevent or manage hypertension. Supplements certainly can help, particularly when combined with lifestyle modifications, such as exercise and diets low in sodium and high in plant-based foods like the DASH diet," he says.

Why So Much Interest?

Cuomo sees healthcare costs as one major driver for the interest in natural therapies as well as a desire to take more ownership of one's own health. "As healthcare costs have skyrocketed over the years, many people are looking for less costly and more natural approaches to maintain their health," he says. "They're also looking to take more control of what they put into their bodies."

Furthermore, hypertension treatment may lend itself better to natural therapies compared with a disease such as cancer, according to Ding. "Although there are a variety of drugs for lowering blood pressure, I don't feel they're as necessary as [they are for] other diseases, such as cancer, where medications are absolutely necessary, given that there are a variety of different dietary factors and nutritional supplements to naturally lower blood pressure," Ding adds.

FOODS THAT HELP LOWER THE PRESSURE

Recommend the following foods to clients looking to increase their intake of certain nutrients thought to help lower high blood pressure.

- **Calcium:** Almonds, herring, greens, canned sardines with bones, milk, calcium-fortified soy or almond milk, fat-free yogurt
- **Potassium:** Swiss chard, yellowfin tuna, acorn squash, sweet potatoes, edamame, cooked spinach, bananas, fat-free yogurt, orange juice, dried apricots, baked potatoes with skin, beans, cantaloupes, low-sodium V8 juice
- **Magnesium:** Brown rice, pumpkin seeds, sesame seeds, flaxseeds, Brazil nuts, cashews, dark chocolate, spinach, Swiss chard, high-fiber cereals, lentils, whole grain bread
- **Soy protein:** Edamame, soy milk, tofu, unsalted soy nuts, calcium-fortified tofu
- **Omega-3s:** Fatty fish (eg, salmon, tuna, halibut, mackerel), walnuts, soybeans, flaxseeds, chia seeds

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Sharon Richter, RD, who has a private practice in Manhattan, New York, says she's definitely noticed more interest in natural therapies from clients with hypertension, noting that a greater emphasis on nutrition topics in the media may be one reason for this. "Nutrition has become much more popular in the media, and therefore people are becoming more educated on the topic," she says. "[People are] also starting to realize there might be more long-term effects of their medication."

In addition, many medications, including those for hypertension, can come with their own side effects, which also could be contributing to this trend, says Janet Bond Brill, PhD, RD, LDN, author of ***Prevent a Second Heart Attack*** and ***Cholesterol Down***, and a nationally recognized nutrition, health, and fitness expert specializing in cardiovascular disease prevention.

"Many people simply cannot tolerate the side effects of prescription blood pressure medications, especially if high blood pressure never caused any symptoms before," she says. "For example, it's been estimated that 70% of men who have side effects from high blood pressure medicine stop taking them."

Reviewing the Research

For all these reasons and more, people are looking to dietary supplements to help treat their hypertension. But how effective are they in lowering blood pressure, and what does the research say?

In the study mentioned earlier that examined nutritional supplements, the authors noted how the treatment for high blood pressure "is no longer limited to the simple prescription of pharmaceuticals." After reviewing the evidence behind the various supplements used for lowering blood pressure, the study showed that dietary supplements "may be useful under the right circumstances."

What circumstances, you may ask? Study author Kevin Woolf, MD, a cardiology fellow at the University of Rochester Medical Center (URMC) in New York, who collaborated with John D. Bisognano, MD, PhD, also of the URMC, for this research, says that while nutritional supplements usually are safe for most patients, as a whole they aren't as effective as other therapies—and lifestyle modification remains a necessary and the most integral part of treatment for patients with hypertension. However, he says supplementation, when used with lifestyle modifications and under the guidance of a healthcare professional, can act as one piece to the puzzle of controlling high blood pressure for many patients.

Cuomo agrees, particularly because while there are numerous supplements that have been studied for their ability to lower blood pressure, only a short list of them hold up to rigorous scientific investigation. "However, a lifestyle change program that includes exercise and diet to help lose weight combined with proper supplementation is a great start. The science of a few supplements in this regard is quite good," he says.

Based on Woolf's recent review article and other experts' recommendations, we've listed a summary of what supplements may have a hand in lowering blood pressure.

Leaders of the Pack

• **Coenzyme Q10:** Woolf's research found that coenzyme Q10 (CoQ10), a mitochondrial enzyme involved in energy production and an antioxidant, may play a role in hypertension. After reviewing available data, the authors found that patients with hypertension tend to have lower levels of CoQ10.

"Treatment with coenzyme Q10 supplements was shown to reduce systolic blood pressure by 16 mm Hg in a meta-analysis of randomized controlled trials," the authors wrote, noting that this mechanism of action isn't well understood but may be related to its antioxidant effects.

Of all the dietary supplements he and his colleagues examined, Woolf singles out CoQ10 as having the most potential in treating hypertension. "The research relating to this supplement is considerable, and the evidence is good," Woolf asserts.

Cuomo agrees with CoQ10's potential for lowering high blood pressure and believes its abilities lie in its antioxidant properties. "There's a growing body of clinical data showing that antioxidants such as CoQ10, vitamin C, and bioflavonoids—particularly the class of bioflavonoids called proanthocyanidins found in red wine, grape seed extract, and chocolate or cocoa extract—do have blood pressure-lowering activity," he says. Cuomo says the doses required for this effect are relatively high and advises patients shoot for 100 to 300 mg/day of CoQ10; 500 to 1,000 mg/day of vitamin C; and 300 to 700 mg/day of grape seed or cocoa extract.

• **Flavonoids:** Flavonoids are compounds found in high concentrations in tea, cocoa, wine, and grapes. They also appear to have beneficial effects when it comes to lowering blood pressure, Woolf and colleagues say. "Diets high in cocoa appear to lower systolic blood pressure by 3 mm Hg to 5 mm Hg. However, tea didn't seem to show a benefit in pooled analysis," the authors found.

Ding says several studies have demonstrated flavonoids' blood pressure-lowering effects, particularly with respect to cocoa flavonoid supplements. "Recent studies review multiple randomized trials and show that 400 to 500 mg/day of cocoa flavonoids can significantly lower systolic blood pressure. There have been dozens of studies demonstrating this favorable effect," Ding says, citing one such study that he recently participated in, published in the ***Journal of Nutrition*** in late 2011.

However, Ding notes that 450 mg translates to approximately 33 bars of milk chocolate (100-g bars) or eight bars of dark chocolate, which is an abundance of sugar and fat in addition to flavonoids. Here's one instance where nutritional supplementation may be better than getting such substances from food.

"Although cocoa flavonoids are very beneficial, one must be careful to avoid excess calories and fats," Ding explains. "Thus, I recommend cocoa flavonoids in supplemental form (eg, CocoaWell) that would still provide the same blood pressure-lowering—as well as LDL cholesterol-lowering and HDL-raising—benefits without the risk of weight gain."

• **Soy protein:** According to Woolf and colleagues, the addition of vegetable protein appears to have a beneficial effect on

blood pressure and could provide another avenue for clients interested in supplementation.

The researchers found that a dose of 40 g/day has been shown to cause a subsequent decrease in systolic blood pressure of 7.8 mm Hg. "While the mechanism isn't well established, this may be due to high concentrations of the amino acid arginine, which is a nitric oxide precursor. Soy protein may also decrease plasma glucose concentration and decrease insulin resistance, which may be a risk factor for the development of hypertension," the authors wrote.

Brill also suggests soy protein for hypertensive patients and says the research supports adding soy protein to one's diet, whether through supplementation or soy-rich foods.

"A recent randomized controlled study [published in July 2011 in ***Circulation***] showed that both a soy protein and a milk protein supplement lowered blood pressure in prehypertensive and hypertensive subjects compared to a refined carbohydrate supplement. This study provides further evidence that inclusion of soy protein in the diet is an effective blood pressure-lowering strategy," she says.

• **Omega-3s:** In their review, Woolf and colleagues found that numerous studies showed a small but significant decrease in blood pressure in patients taking high-dose fish oil supplements, with a 2- to 3-mm Hg decrease in systolic blood pressure.

While Cuomo notes the small reductions in blood pressure, he recommends this supplement for its overall heart-health benefits. "Fish oil is another good supplement to consider," he says. "While clinical studies of its ability to lower blood pressure have shown modest reductions, fish oil has a host of beneficial effects on heart health.

"I'd get a minimum of 800 mg/day of the omega-3 fatty acids EPA and DHA in fish oil," he recommends, adding that this translates to about two 1-g capsules of a good-quality fish oil concentrate per day.

"[There's] lots of research to show that the omega-3s, especially the ones in seafood, including EPA and DHA, lower heart disease, stroke, and hypertension risk," Somer says, acknowledging that Americans consume far too little of this fat, averaging no more than 100 mg/day.

Somer suggests clients look for omega-3s in both foods and supplements to get the most benefit. "Aim for two servings of fatty seafood, such as wild salmon, every week plus foods fortified with a vegetarian algal DHA—it will say life'sDHA on the label—and/or take a supplement that includes at least 220 mg of DHA a day," she says.

• **Vitamin D:** Woolf and colleagues also found that patients with hypertension were more likely than controls to have diminished levels of vitamin D, with vitamin D supplementation causing a subsequent decrease in systolic blood pressure of approximately 2.4 mm Hg but with no apparent effect on diastolic blood pressure.

Cuomo believes vitamin D to be one of the most promising supplements for hypertension treatment. "There's a very strong correlation between vitamin D deficiency and hypertension, peripheral vascular disease, diabetes, and heart disease," he says. "Since most people in the US are vitamin D deficient—70% or more with serum vitamin D levels below 30 ng/mL—this could be a simple solution for many of us."

Cuomo advises clients take 2,000 to 4,000 IUs per day of vitamin D_3, which "would bring nearly everyone above 30 ng/mL and would help lower blood pressure in the majority."

Brill says there's scientific evidence supporting the role of vitamin D as a negative endocrine regulator of the renin-angiotensin system, which naturally controls blood pressure. However, the jury's still out on the effect of supplementation in individuals with insufficient vitamin D status and the vitamin's exact role in lowering blood pressure. Until more research is done, she says taking vitamin D_3 daily for patients interested in the supplement likely won't hurt.

Calcium, Potassium, and Magnesium

In their meta-analysis, Woolf and colleagues noted there's enough clinical evidence to show that diets low in potassium cause a rise in systemic blood pressure. "Conversely, it appears that potassium supplementation causes a decrease in [systolic blood pressure] on an order of magnitude of 3 mm Hg to 12 mm Hg," the authors wrote. Again, the mechanism of this effect isn't clear, yet Woolf and colleagues say there's evidence that an increase in dietary potassium may carry similar benefits to supplementation.

Similarly, while research shows that calcium supplementation causes a mild decrease in blood pressure, the authors found that high doses are necessary for minimal benefit (such as 1,500 mg/day of oral calcium for a nonsignificant reduction of 1.7 mm Hg in systolic blood pressure). As such, calcium supplementation may not produce noteworthy effects for patients looking to lower blood pressure levels.

Brill agrees, adding that patients may be better off looking for such nutrients in foods rather than in pills. "A consistent body of scientific evidence has found no statistically significant effect of calcium, potassium, and magnesium supplementation on blood pressure," she says. "However, it's important to understand that blood pressure is reduced when a large amount of these minerals are consumed from food."

"Because all of these minerals are also electrolytes that work with sodium in fluid balance, it makes sense to boost intake of these and lower sodium to treat and manage hypertension," says Somer, who agrees with the assertion of magnesium expert Mildred Seelig, MD, MPH, that three of four Americans are low in magnesium and that every national nutrition survey shows pervasive poor calcium intake in most populations.

"The best advice is to supplement with both at a ratio of two parts calcium to one part magnesium, or about 500 mg of calcium to every 250 mg of magnesium," she says. As for potassium, she steers clients to their grocery store's produce shelves.

Supplements With Inconclusive Data

• **Folate:** In his review article, Woolf looked at folate and its possible link to hypertension and found low dietary intake of the vitamin to be associated with elevations in blood pressure. "Women with an increased dietary or supplement-based intake of folate have been shown to have a lower incidence of hypertension," the authors wrote.

Acknowledging that the data for this research are limited, the study authors looked to a small study that showed a 4-mm Hg drop in nocturnal systolic blood pressure with high-dose folate supplementation as the basis for their statement.

• **Niacin:** While niacin wasn't reviewed in Woolf's study, Brill notes that upcoming data could point to its potential for lowering blood pressure. "Decreased vascular nitric oxide has been linked to hypertension. Hence, there's emerging evidence suggesting that niacin may be a valuable supplement in lowering blood pressure," she says.

Brill advises dietitians stay tuned for further research but suggests clients, in the meantime, discuss niacin supplementation with their physician.

• **Garlic:** Several studies have shown a 10- to 16-mm Hg decline in systolic blood pressure in patients taking garlic extract, but Woolf says suboptimal study design has called the data into question. For now, Woolf says the benefits of garlic in relation to hypertension treatment remain suspect and require further study before dietitians can recommend supplementation.

Lifestyle Changes + Supplements Are Key

While Cuomo notes that the supplements listed here are generally safe when taken as directed, he's quick to add that "uncontrolled blood pressure is a real risk and will most certainly lead to health issues and premature death." With that said, he advises patients that it's best to work with a qualified healthcare professional when incorporating supplementation into any hypertension treatment program.

"The best approach [to treating hypertension] is to combine a diet with plenty of colorful fruits and vegetables every day, with a modest amount of fish with lower levels of contaminants, like salmon, a few times a week. I'd pair that with an occasional glass of red wine and a good supplementation program to ensure you're not missing important nutrients," he adds.

And when in doubt, Brill says clients should take note from RDs that while supplementation has a place in hypertension treatment, that place is behind real lifestyle modification and healthful choices. "Emphasize that in the case of blood pressure, food, exercise, and stress management are the three most powerful blood pressure-lowering lifestyle strategies known to humankind. That said, certain supplements with some science-based supporting evidence can be used as an adjunct to lifestyle," she concludes.

— Juliann Schaeffer is an associate editor at Great Valley Publishing Company and a frequent contributor to *Today's Dietitian*.