SoyConnection

Health & Nutrition News About Soy

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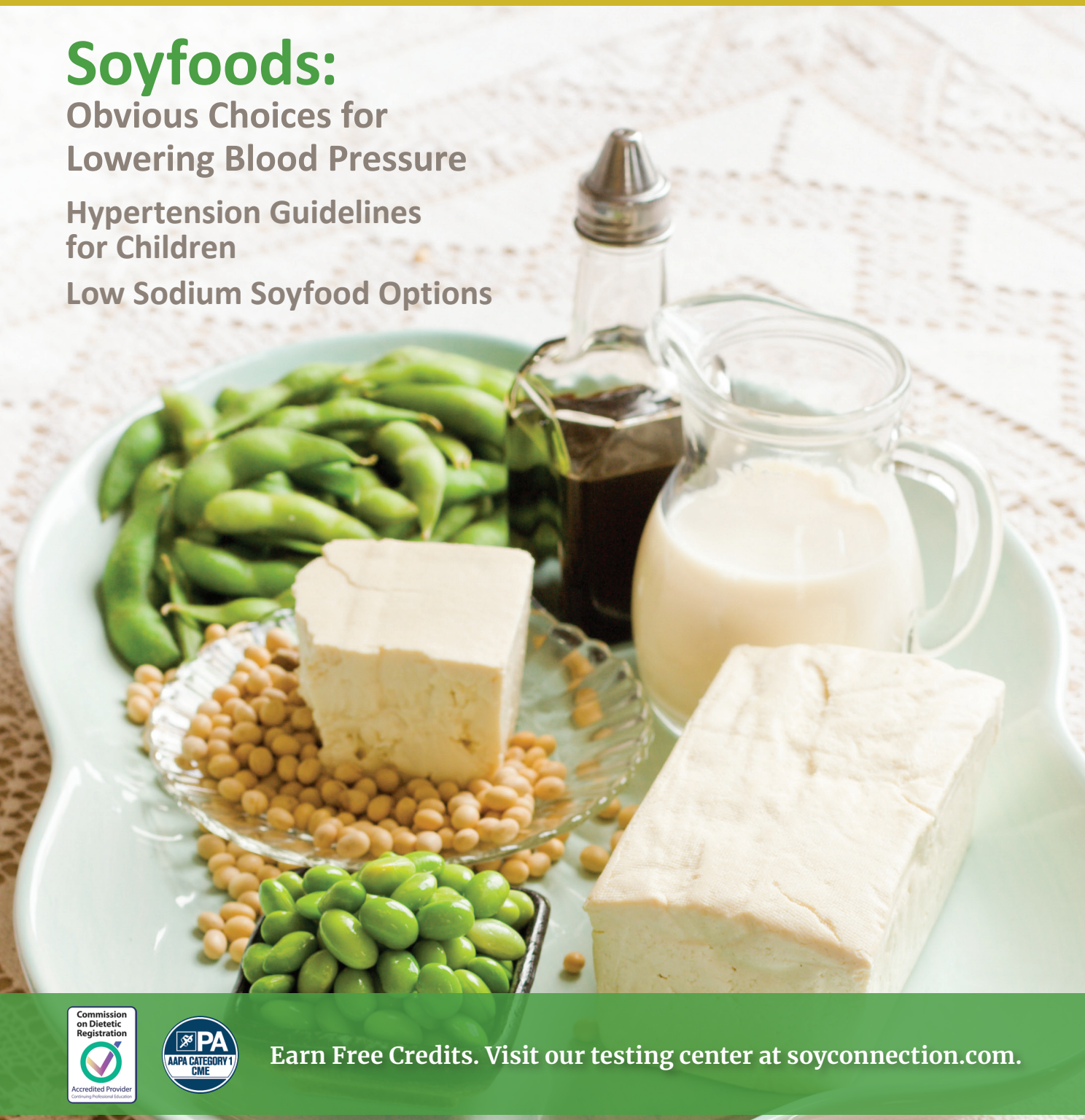
Soyfoods:

Obvious Choices for Lowering Blood Pressure

Hypertension Guidelines for Children

Low Sodium Soyfood Options



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SOYFOODS HYPOTENSIVE?
EXAMINING THE CLINICAL EVIDENCE

By Mark Messina, PhD, MS

High blood pressure (BP) is an important risk factor for cardiovascular disease (CVD) worldwide.[1,2] Current guidelines classify adults with an average systolic blood pressure (SBP) of 130 to 139 mmHg and/or diastolic blood pressure (DBP) of 80 to 89 mmHg as having Stage 1 hypertension (previously, these numbers would have qualified as only prehypertension).[3] Adults with Stage 1 hypertension have about a 2-fold increase in CVD risk compared with their counterparts with a normal BP (SBP<120 mmHg and DBP<80 mmHg).[3] Furthermore, evidence suggests that lowering SPB to below 130 mmHg further reduces CVD risk.[4]

Sodium is undoubtedly the dietary constituent that is most linked with BP. Warnings about the hypertensive effects of salt actually date back centuries, although in 1904 Ambard and Beaujard are credited with first suggesting salt increases blood pressure.[5] Close behind in recognition, is potassium, which in contrast to sodium, is hypotensive.[6] Besides these two minerals, there are almost certainly many other dietary factors, including alcohol and fiber, that affect BP as well. Although soy has received relatively little attention in this regard, there is intriguing evidence that one or more soy components lower blood pressure.

Not surprisingly, health authorities emphasize the benefit of adopting an overall dietary pattern that lowers disease risk rather than focusing on making single dietary changes. That sentiment certainly applies to elevated BP because there is ample evidence that overall dietary pattern impacts this condition. For example, clinical and population studies show that vegetarian diets can have BP-lowering effects,[7] likely as a result of multiple dietary factors common to these diets.[8] Vegetarians do typically consume greater amounts of soyfoods than their nonvegetarian counterparts, but even vegetarian diets lacking in soy are associated with lower BP.[9]

Perhaps the diet best known for its hypotensive effects is the DASH (Dietary Approaches to Stop Hypertension) diet.[10,11] This diet is rich in fruits and vegetables and low-fat dairy products and is low in total and saturated fat. Less well recognized, however, is that the portfolio diet, which was first shown to markedly lower circulating cholesterol levels in 2002.[12] It also lowers blood pressure. In fact, this diet was shown to lower SBP and DBP in comparison to the DASH diet.[13] The portfolio diet contains 22 g soy protein per 1,000 calories.

The potential hypotensive effects of soy began to receive serious attention with the publication of a 2002 study conducted by Spanish investigators. For this 3-month trial, 40 men and women with mild-to-moderate hypertension were randomly assigned to consume either 500 ml of soymilk (made from whole soybeans) twice per day or equal amounts of cow's milk.[14] At the study's conclusion, SBP decreased (mean±SD) in the soy group by 18.4±10.7 mmHg compared with a 1.4±7.2 mmHg reduction in the cow's milk group (P<0.0001). DBP decreased in the soy group by 15.9±9.8 mmHg vs. a 3.7±5.0 mmHg reduction in the cow's milk group (P<0.0001). Urinary genistein, the primary soybean isoflavone, was strongly and significantly (p=0.002) correlated with the decrease in BP.

Three years later, similar results were reported by Chinese investigators, although in this case the intervention product was an isoflavone-rich isolated soy protein (ISP).[15] Participants (N=302) were 35 to 64 years of age with an initial untreated SBP between 130 and 159 mmHg and/or a DBP of 80 to 99 mmHg. Study participants were randomly assigned to receive 40 g of ISP or complex carbohydrate for 12 weeks. Compared with the control group, SBP and DPB decreased by 4.31 mmHg (P<0.001) and 2.76 mmHg (P<0.001), respectively. It is notable that this study led to an article in the *Canadian Medical Association Journal* entitled "Soy protein: the next antihypertensive agent?".[16]

Interest in the hypotensive effects of soy protein gained further momentum in 2007 when a U.S. trial showed soynuts dramatically lowered BP in both normo- and hypertensives, although the effect was especially pronounced

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in the latter.[17] In this study, 60 healthy postmenopausal women were randomized in a crossover design to a Therapeutic Lifestyle Changes (TLC) diet alone or a TLC diet of similar energy, fat, and protein content in which soynuts (containing 25 g of soy protein and 101 mg of aglycone isoflavones) replaced 25 g of non-soy protein. Each diet was followed for 8 weeks. Compared with the TLC diet alone, the TLC diet plus soynuts lowered SBP and DBP 9.9% and 6.8%, respectively, in hypertensive women and 5.2% and 2.9%, respectively, in normotensive women.

Each of the 3 aforementioned clinical trials show very robust hypotensive effects of soy, although their experimental designs do not allow insight to be gained about the soy component(s) responsible for these effects. More importantly, as discussed next, most studies show much more modest reductions in BP in response to soy.

The first meta-analysis of the clinical data to examine the effects of soy on BP was published in 2008. Hooper et al.[18] found that soyfoods (5 studies, n=299), ISP (9 studies, n=962) and isoflavone extracts (7 studies, n=401) lowered SPB (mean, 95% confidence interval) by 5.76 mmHg (-12.29, 0.77), 1.60 mmHg (-3.62, 0.42) and 2.60 mmHg (-5.20, 0.00), respectively. For DPB, these values were -4.04 mmHg (8.30, 0.22), -1.99 mmHg (-2.86, -1.12) and 0.05 mmHg (-1.66, 1.76), respectively. Although 5 of the 6 measures were in the direction of a hypotensive effect, only the effect of ISP on DBP was statistically significant.[18] The fact that only the effect of ISP was significant suggests that the protein in soy is the primary hypotensive agent. However, this speculation directly contrasts with the results of a meta-analysis published one year later.

In 2010, a meta-analysis by Taku et al.[19] involving 14 randomized controlled trials (N=789) found that in normotensive and prehypertensive participants, in comparison to the placebo, isoflavone supplements lowered SBP by 1.92 mmHg (p=0.01) whereas there were no effects on DBP. The duration of the trials ranged from 2 to 24 weeks and the isoflavone intervention dose from 25 to 375 mg/d (aglycone equivalents). Although Hooper et al.[19] didn't find a significant effect of isoflavone supplements, the non-significant decrease in this meta-analysis was actually larger (-2.60 vs -1.92 mmHg) than the significant effect found by Taku et al.[19]

The largest meta-analysis conducted to date, which was published in 2011 and involved 27 studies, found that relative to the control, soy lowered SBP by 2.21 mmHg (p=0.021) and DBP by 1.44 mmHg (p=0.012).[20] Soy lowered BP in both normo- and hypertensives, although the decrease was much larger in the latter. More importantly, significant reductions were found only in trials using carbohydrate as the control, not in trials that used milk products as the control.

That latter finding is particularly interesting because of research suggesting dairy/milk reduces blood pressure[21] (although the evidence is rather inconsistent[22]) and a subsequently published meta-analysis that reported a similar finding. More specifically, when all 12 trials were included in the analysis, soy lowered SBP and DBP in postmenopausal women by 3.03 (p=0.003) and 0.71 (p=0.012) mmHg, respectively. However, in the 5 trials in which the control was a non-dairy, non-soy protein, the reduction in SBP and DBP was 6.45 and 0.85 mmHg, respectively, whereas in the 5 trials in which the control was milk or caseinate, there was no effect of soy. Sub-analysis also showed that trials that intervened with ≥25 g/d soy protein and ≥100 mg/d isoflavones, produced significantly greater decreases in BP than trials intervening with lesser amounts of each of these soy components.

In summary, despite the encouraging evidence, the data do not allow definitive conclusions to be made about the impact of soy on BP. Much of the data are derived from studies in which BP was not the primary outcome of interest, so considerable caution is warranted. Furthermore, because the trials intervened with a variety of soy products, including whole soyfoods, soy isoflavones and soy protein, it is difficult to make generalizations. It may be that each of these products is comprised of hypotensive components. Soy protein could lower BP as a result of hypotensive peptides formed upon digestion.[23] Isoflavones could lower BP by lowering vascular resistance, potentiating vasodilator mechanisms and reducing the activity of vasoconstriction inhibitors.[24]

Finally, although it is premature to conclude that soy lowers BP, it is not too early to recommend that those individuals concerned about BP incorporate soyfoods into their diet. As noted, elevated BP is a major risk factor for CVD. Meta-analyses indicate that soy protein lowers LDL-cholesterol levels[25-27] and whole soyfoods are sources of heart-healthy polyunsaturated fat.[28-30] Isoflavones may also possess coronary benefits.[31-33] When these attributes are considered along with the preliminary evidence in support of the hypotensive effects of soy, soyfoods seem like obvious choices for those with elevated BP.

References on pg. 6

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HEALTHY HANDOUT

High Blood Pressure? Soyfoods May be a Good Fit.

By Sandra Allonen, RD, MEd, LDN

Are soyfoods a good fit for people with high blood pressure? Absolutely.

Low sodium soy products such as unsalted edamame, roasted (unsalted) soy nuts, soy milk, tempeh and tofu can make important contributions to heart-healthy diets.

Multiple components of soybeans may have blood-pressure lowering effects. For example, digestion of soy protein may produce small chains of amino acids, the building blocks of protein, that lower blood pressure. And compounds in soybeans called isoflavones, appear to boost the activity of enzymes that increase the production of nitric oxide, a molecule which widens blood vessels and reduces blood pressure.[1]

Despite all the encouraging evidence, more research is needed to definitively conclude that soy lowers blood pressure. Nevertheless, given the nutritional attributes of soyfoods, it seems prudent for all those concerned about blood pressure to incorporate low-sodium soyfoods into their diet.

The American Heart Association says the recommended amount of sodium per day for individuals with hypertension is 1,500 mg.[2] Try to limit sodium content to 400 mg for a meal and 100 mg for a snack. Some processed soyfoods can have upward of 800 mg of sodium, which is over half of what is recommended for someone with hypertension.

To keep sodium consumption in check, be a label reader; the sodium content is always listed. Consider soyfoods as an option that might be of help in keeping blood pressure down.

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Edamame, Black Bean and Corn Succotash

1 cup frozen no added salt edamame (shelled), thawed
1 cup frozen no added salt corn kernels, thawed
1 cup no added salt black beans, rinsed and drained
1 tablespoon soy oil
½ cup chopped red bell pepper
½ cup chopped red onion
Garlic cloves minced
2 tablespoons white balsamic vinegar
2–4 tablespoons chopped fresh herbs of your choice (cilantro, oregano, basil or a mix) or 1 teaspoon dried
Freshly ground pepper to taste

Directions

Heat oil in a large, nonstick skillet over medium heat. Add bell pepper, red onion and garlic; cook, stir in the edamame, corn and black beans. Cook, stirring frequently, for 4 minutes. Remove from heat. Stir in vinegar, herbs and pepper.

Serve immediately.

Per serving: 172 calories, 7g of protein, 4g of fat, 23g of carbohydrate, 6g of fiber, 45mg of sodium, 397g of potassium

(Six ½ cup servings)

2017 HYPERTENSION GUIDELINES FOR CHILDREN

By Julia Driggers, RD, LDN, CNSC

The Guidelines for Children with Hypertension were updated by the American Academy of Pediatrics (AAP) in 2017.[1] Prior to this publication, the guidelines for hypertension (HTN) were issued by the National Heart, Lung, and Blood Institute (NHLBI). In 2013, the AAP acquired sponsorship of cardiovascular disease guidelines in children with a goal of developing evidence-based clinical practice recommendations for the practitioner. A sub-committee of experts established guidelines for the diagnosis, evaluation, and management of childhood HTN.

Prior to the 2017 revisions, data establishing diagnosis guidelines for HTN were generated from a population of healthy children, however, many were overweight or obese. Due to the likelihood of upwardly skewed normative blood pressure values from the overweight population, revised 2017 HTN guidelines were based on healthy children of normal weight.[1] To supplement changes in practice, blood pressure (BP) tables and screening tools for the physician were simplified to provide only BP values that require further medical evaluation.

Recommendations for age of initial screening of BP continue to be three years of age, with new guidelines to check annually unless high-risk factors are present.[1] These criteria include obesity, diabetes, renal disease, and history of aortic arch obstruction. Also considered high-risk, are patients taking medications known to elevate blood pressure.

In children, BP may vary considerably. Elevated BP measurement should be repeated over time at different visits before diagnosis of HTN. Confirmed auscultatory measurements >95th percentile in children and >130/80 in adolescents 13 or older at three separate visits indicate diagnosis for HTN. BP >90th percentile, but <95th percentile are categorized as elevated BP. The latter were previously deemed to be prehypertensive. The use of ambulatory blood pressure monitoring is recommended to confirm HTN in pediatrics.

The overall treatment goal for children and adolescents with primary or secondary hypertension is to achieve a BP level that reduces risk of organ damage as well as risk of HTN and related cardiovascular disease (CVD) in adulthood. Previous recommendations for target BP for patients without renal disease or diabetes were measurements <95th percentile, however, recent evidence has shown that organ damage can occur in children with BP >90th percentile, but <95th percentile.[2] In addition, in adolescents, risk of CVD in adulthood was found to increase with BP levels exceeding 120/80 mmHg.[1] As a result, new recommendations emphasize lower target BP with optimal treatment levels for HTN at <90th percentile or <130/80 mmHg, whichever measurement is lower.[1]

Management of hypertension to achieve target BP is based on the degree of severity. Lifestyle modifications and nonpharmacologic interventions are recommended as initial treatment in conjunction with frequent auscultation in patients with elevated BP and those with Stage 1 hypertension who are asymptomatic. Clinical trials in adults demonstrate that nutritional interventions, specifically salt reduction and high intake of polyphenol oils, can lower BP—a major risk factor for cardiovascular mortality.[1,3] Clinical trials in hypertensive youth suggest similar benefits of dietary intervention and physical activity as in adults.[1]

In most cases, the Dietary Approaches to Stop Hypertension (DASH) diet is recommended for children and adolescents with HTN. Guidelines for following a DASH diet include high fruit and vegetable intake, whole grains, low-fat milk products, fish, poultry, nuts, legumes, and lean red meats with restrictions on sugar and salt.[1] The DASH diet has been found to lower BP especially with a plant-strong meal plan including high intake of fruits, vegetables, legumes and low-fat milk products.[1,4] In addition to dietary management, an increase in physical activity can lower BP.[1] Patients with HTN should perform moderate to vigorous physical activity 3 to 5 days per week lasting 30 to 60 minutes.[1] Regular physical activity and adherence to the DASH diet in children with HTN and obesity

Continued on pg. 6

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Continued from pg. 3, *Soyfoods Hypotensive?* Examining the Clinical Evidence

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Continued from pg. 5, 2017 Hypertension Guidelines for Children

can lead to weight loss and a decrease in CV risk factors.[1] Other research suggests stress reduction, meditation, and yoga may also be beneficial for HTN.[1]

In patients with HTN where lifestyle and nonpharmacologic interventions do not meet target BP or in patients with high-risk factors, pharmaceutical interventions are required to achieve treatment goals.[1]

Editor's Note: *Please see the lead article of this issue for dietary interventions that include soyfoods.*

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