

Non-Pharmaceutical Therapy for Hypertension

Lifestyle

Changes in lifestyle habits can be effective for lowering blood pressure, particularly in those who are younger and have a moderately elevated blood pressure of $>140/85$.¹ Healthy lifestyle changes also enhance the internal environment of the body to do more than simply lower blood pressure. Exercising, eating a diet rich in fruits and vegetables and maintaining appropriate weight also significantly reduce the risk of cancer, heart disease, diabetes and stroke while reducing systolic blood pressure by approximately 10-15 mmHG.^{2,3}

Review of Lifestyle Influences on Blood Pressure

Element	Blood Pressure Reduction	Notes
Weight loss if overweight	5-20 mmHg/ 10 kg wt. loss	As little as 10 lbs can have significant effects. See: http://www.nhlbi.support.com/bmi/
Physical Activity	4-9 mmHg	30-40 mins daily, most days of the week.
DASH Diet	8-14 mmHg	www.nhlbi.nih.gov/health/public/heart/hbp/dash
Sodium Restriction	2-8 mmHg	Limit to less than 2400 mg/day (1 tsp). The body only needs 500 mg (1/4 tsp) daily. For more information on lowering salt in the diet, go to: http://www.nhlbi.nih.gov/hbp/prevent/sodium/sodium.htm .
Alcohol Restriction	2-4 mmHg	Limit to no more than 2 drinks/day for men and 1 drink a day for women.
Tobacco Cessation	--	Avoid first and second hand smoke and all tobacco products.

Nutrition

DASH

The DASH diet can be most closely compared to a Mediterranean type diet. DASH stands for Dietary Approaches to Stop Hypertension.

To summarize, it consists of foods that are

- high in fruits and vegetables
- low in dairy, animal meat and saturated fat
- high in nuts, seeds and beans
- low in snacks and sweets.

Fruits and vegetables are high in magnesium, potassium and calcium which are minerals found to lower blood pressure. The DASH diet is also low in saturated fat, cholesterol and simple sugars, which can worsen inflammation and increase the risk of diabetes and heart disease. It incorporates protein more from plant sources than animal ones. A double blinded study showed that 40 gms (the amount in one soy burger or two glasses of soy milk) of soy protein lowered systolic blood pressure by 7.88 mm Hg and diastolic by 5.27 mm Hg in those with hypertension.⁴ Obtaining all protein from one food source is not ideal. There is some concern that high amounts of soy protein may increase the risk of bladder cancer. But protein from a variety of plant sources such as nuts, beans and vegetables appears to be beneficial in lowering blood pressure.

In those with high blood pressure, the DASH diet on average lowers the systolic blood pressure 11.6 points and the diastolic blood pressure 5.3 points.⁵ It also lowers homocysteine levels,⁶ has a positive effect on bone strength⁷ and raises HDL by 21-33%.⁸

For complete details on the DASH diet, go to: www.nhlbi.nih.gov/health/public/heart/hbp/dash



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Sodium Restriction

Encourage patients to shoot for less than 2400 mg a day of salt (one tsp). The body only needs 500 mg daily for optimal functioning (1/4 tsp).

Direct them to take the salt shaker off the table and avoid salt (sodium) rich foods.

Foods rich in salt include: canned soups, broths, frozen dinners, chips, lunch meats, salad dressings, pizza, packaged mixes and foods eaten away from home.

For more information on a low salt diet, go to: <http://www.nhlbi.nih.gov/hbp/prevent/sodium/sodium.htm>.

Milk Peptides

Epidemiological studies have shown an association with lower blood pressure in those who consume milk.⁹ This may be related to the calcium content in milk as well as milk derived proteins or peptides. It appears that when milk is fermented by specific bacterial strains (*Lactobacillus helveticus*) peptides are formed that have an inhibitory effect on the angiotensin converting enzyme (ACE) system, which have a blood pressure lowering effect.¹⁰

Drinking traditionally pasteurized milk will destroy the bacteria that activate these beneficial peptides. To obtain the blood pressure lowering effects of dairy, one would have to drink sour milk, which is not very pleasant. An alternative is to eat yogurt which includes many of the bacteria that break down the milk protein (casein, whey) into the beneficial peptides. Which types of yogurt contain the needed bacteria (*L. helveticus*) to create these ACE inhibiting peptides is yet to be determined but will likely be on a food label soon.

There are supplement companies marketing these peptides as a “natural” ACE inhibitor (e.g. *Ameal peptide {Ameal BP}*). There is

limited benefit of using this over generic ACE inhibitors that are readily available.

Dark Chocolate

The cacao bean (*Theobroma cacao*) is rich in polyphenols such as procyanidins that have beneficial influences on the endothelium. A meta-analysis of 5 randomized controlled trials reveal a reduction of 4.7 (+/- 2.9) mm Hg in systolic blood pressure and 2.8 (+/- 2.0 mm Hg) reduction in diastolic blood pressure.¹¹ Since most commercial chocolate is processed under conditions that destroy flavonoids, look for “gourmet” chocolate that has at least 70% cocoa.¹² Consider recommending 10-30 gms daily of dark chocolate (about ¼ of a regular sized chocolate bar).

Super-foods for Lowering Blood Pressure and Cardiovascular Risk

- Garlic (in food, not as a supplement) 1-2 cloves per day. Eating 10-15 minutes after crushing or chopping results in the most medicinal benefit.
- Cocoa (dark chocolate in moderation)
- Olive oil
- Onions
- Celery
- Soy protein
- Green tea
- Pomegranate
- Blueberries
- Cold water fish (salmon, sardines, herring, albacore tuna)
- Nuts
- Beans

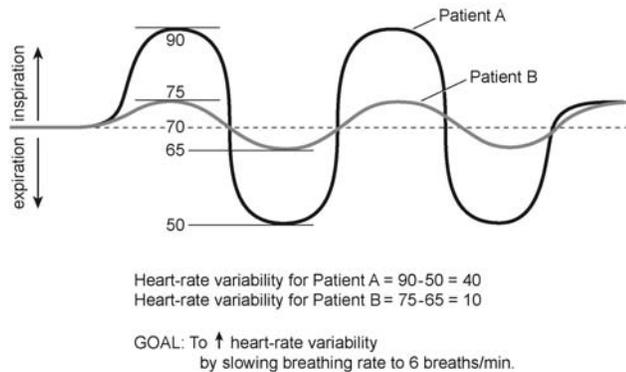
Exercise

Movement and physical activity benefit health beyond blood pressure. If patients are using exercise to lower blood pressure, persistence is



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Heart-Rate Variability



A review of studies evaluating a bio-feedback device to lower blood pressure by slowing respiratory rate found that after 8 weeks of treatment, there was an average drop of 14 mmHg systolic and 8 mmHg diastolic blood pressure.^{19, 20} The more the bio-feedback device was used, the greater the drop in blood pressure. The recommended dose is 15 minutes of use each day with at least 45 minutes of slow breathing per week.

Biofeedback devices:

- Resp-e-rate (~\$300)
A device that uses sound and a respiration monitor one wears around the chest to slow breathing down to 5-6 breaths per minute. For more information, go to: <http://www.resperate.com/>
- EmWave Products (~\$199-425)
These biofeedback devices not only help reduce breathing rate but also help understand how facilitating positive emotions can enhance heart rate variability. Available as a handheld device, software program with heart rhythm monitor or combination. Go to: www.heartmath.com.
- Wild Divine products (~\$300 each)
Two biofeedback products using computer technology to monitor breathing. Healing Rhythms offers breathing and guided

meditation exercises. The Passage is like a video game and is great for both adolescents and adults. Go to: www.wilddivine.com.

- Stress Eraser (~\$179)
A portable biofeedback device about the size of a large deck of cards that includes a finger sensor and feedback screen that regulates breathing. Go to: <http://stresseraser.com/>

If one does not want to spend money on one of these devices, the same results can be obtained using a simple breathing exercise.

The key is to slow the breath to 6 breaths per minute or one “in and out” breath every 10 seconds. Exhalation should be about twice as long as inhalation. Direct individuals to breathe in for a count of 3-4 and breathe out for a count of 6-7 and to take 60-80 slow breaths daily.

- [See Handout “Breathing Exercise”](#)

Supplements to Lower Blood Pressure

Coenzyme Q10

Also known as *ubiquinone*, Co-Q10 is found in every cell in the human body and is used in the mitochondria to facilitate energy production. For reducing blood pressure, it is thought to work by preserving nitric oxide in the endothelium allowing for vasodilation. This is a unique mechanism of action that may also support its promising effects on congestive heart failure²¹ and diabetes.²² In 8 small human studies of Co-Q10 (four placebo controlled), there was an average reduction of systolic blood pressure by 16 mmHg and a diastolic decrease of 10 mmHg.²³

Beneficial effects can take up to 4 weeks to occur. The dose is 60-120 mg in the gel form, and 100 mg twice daily for the tablet form. Co-Q10 should be taken with a meal that includes some fat to enhance absorption. It can also be beneficial when used with drugs that can deplete levels of Co-Q10 such as statins and tricyclic antidepressants and Metformin.



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Fish Oil

Fish oil is likely more beneficial at reducing the risk of heart disease through its anti-platelet and anti-inflammatory effects than by its effect on blood pressure. A meta-analysis of 31 trials found high doses (5.6 gms a day) reduced systolic blood pressure by only 3.4 mmHg and diastolic by 2.0 mmHg.^{24, 25} Fish oil consists of two essential fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Evidence suggests that DHA has more of a hypotensive effect than EPA.²⁶ We recommend that patients use fish oil at a dose of 1 gm daily to reduce the risk of heart disease, particularly in those who have already had a documented heart attack.^{27, 28}

Vitamin D

If you live north of 40 degrees latitude (north of Iowa) or spend little time in the sun, there is a risk of vitamin D deficiency that has been associated with a risk of high blood pressure. Those with a 25 hydroxy vitamin D level < 40 nmol/L had a relative risk of 3.18 for developing HTN over 4 yrs.²⁹ In 148 elderly women with HTN treated with calcium and vitamin D, there was an average drop in systolic BP of 13.1 mm Hg compared to 5.7 mm Hg drop with calcium alone.³⁰ Beyond blood pressure, low vitamin D increases the risk of myocardial infarction by 2.42 according to the Health Professionals Follow-up Study.³¹

Supplement to keep 25 hydroxy vitamin D levels at or above 40 ng/ml (or 75 nmol/L). 1000 IU of vitamin D3 will raise levels approximately 8-10 points. If your patient is using a tanning bed to raise vitamin D, UVB light (not UVA) has the largest effect on lowering BP.¹²

- [For more information on vitamin D replacement, see our Supplement Sampler on Vitamin D.](#)

Minerals (Magnesium, Potassium and Calcium)

These minerals can have a mild blood pressure lowering effect:

- **Magnesium**

Magnesium is a smooth muscle relaxer, and low levels were found to be the dietary factor most strongly associated with hypertension in the Honolulu Heart Study and the Nurses Health Study.³² Supplementation has been found to have mixed results in treating hypertension. Consider checking erythrocyte (or RBC) magnesium levels. This is more sensitive than serum magnesium and may help predict responders.

The dose is 6 mg/kg (~420 mg for a 154 lb person). Average dose is 500-750 mg daily. Taking magnesium bound to glycinate or aspartate results in less diarrhea.

- **Potassium**

Increasing the potassium:sodium ratio is an important goal and should be done with nutrition (see above). A meta-analysis of 19 studies showed a reduction of blood pressure in hypertensive individuals when potassium was supplemented (↓SBP by 8.2 mmHg, ↓DBP by 4.5 mmHg).³³

Encourage potassium rich foods such as bananas, grapefruit, broccoli, pumpkins, squash, dried beans and peas. If supplementing, potassium aspartate may have more blood pressure lowering effects than potassium chloride. And a positive response is more likely in those > 65 yrs of age. The dose is 1.5-3 mg a day (20-33 mEq). Follow serum levels if supplementing.

- **Calcium**

Calcium seems to have a more significant blood pressure lowering effect in those who have poor sources of nutritional calcium and



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low calcium levels in the blood. It can also be helpful in lowering blood pressure in those with renal disease.³⁴ Effects are modest with about a 2-3 mmHg decrease in SBP and a 1-2 mmHg drop in DBP with 1200 mg calcium daily.³⁵ In women older than 45, high intake of calcium through nutrition or supplementation has been found to be associated with a lower risk of hypertension suggesting that calcium may be beneficial in preventing elevation of blood pressure.³⁶

Botanicals for Lowering Blood Pressure

Hawthorn

Hawthorn has been traditionally used to treat congestive heart failure, and it also has a modest hypotensive effect through stimulation of peripheral vasodilation and induction of endothelium-dependent arterial relaxation. One of the active ingredients, proanthocyanidins, seem to cause this effect.³⁷ In a double blinded study of Hawthorn on blood pressure in diabetic patients, it was found to lower blood pressure an average of 5 mmHg, and there were no significant side effects or drug interactions documented. Generally pharmaceuticals are a more trusted therapy, but Hawthorn can be used if needed. Hawthorn extract can be used at a dose of 0.5-1.0 mL three times a day or 600-1800 mg daily of the whole herb.

Therapeutic Summary

Lifestyle

- Maintain ideal weight
- Include movement and exercise in an active lifestyle

Nutrition

- Increase potassium : sodium ratio by reducing salt intake and increasing consumption of potassium rich fruits and vegetables (DASH diet)
- Replace coffee with green tea
- Dark chocolate (70% cocoa, 10-30 gms daily)
- Limit alcohol/avoid tobacco products

Mind-Body

- Consider regular meditation practice
- Abdominal breathing, slowing the breath to 6 breaths per minute for 30 breaths three times a day
- Consider a bio-feedback device to train breathing and positive emotions

Supplements

- Co-Enzyme Q10 60-120 mg in gel form or 100-200 mg in tablet form. If taking more than 60 in gel or 100 in tablet, divide dosing to twice a day.
- Fish oil (EPA + DHA=1000 mg/day)

If levels of the following are low, consider:

- Vitamin D3 1000 IU daily (will raise serum level~10 ng/ml)
- Magnesium glycinate or aspartate 500-750 mg daily
- Potassium aspartate 1.5-3 mg (20-33 mEq)
Follow serum levels.
- Calcium 1200 mg daily

Botanicals

- Hawthorn Extract 0.5-1 mL three times a day or 600-1800 mg of whole herb daily



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