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## *Non-Drug Ways to Promote Health by Lowering Blood Pressure*

### **What is blood pressure?**

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Blood pressure is the force that blood exerts on the walls of the arteries (the blood vessels that carry blood away from the heart to the rest of the body). Blood pressure is measured while the heart is beating (systolic pressure) and when the heart is at rest between beats (diastolic pressure). Blood pressure is measured in millimeters of mercury recorded as mmHg. In a blood pressure reading, both numbers are given, with the systolic pressure always given first.

### **What is hypertension or high blood pressure?**

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Blood pressure can change during the day. It is lowest while sleeping and rises when a person is physically active, excited, or nervous. However, blood pressure remains at about the same level while a person is awake and sitting or standing still. For best health, those numbers should be lower than 120/80 mmHg. Pre-hypertension (systolic of 120-139, diastolic of 80-89) is when the blood pressure is borderline high. Blood pressure in this range is the level most likely to be lowered by the lifestyle habits discussed in this handout. A person is considered to have high blood pressure if one or both measurements remain at 140/90 mmHg or higher. High blood pressure is dangerous because there are no symptoms; yet, if left untreated over time, it can increase the chances of serious health conditions such as heart disease, stroke, and kidney disease.

### **How is high blood pressure treated?**

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Hypertension can be treated with a number of different prescription medications. It can also be prevented or treated through several non-drug approaches.

### **How can blood pressure be lowered without medication?**

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Non-drug approaches include healthy lifestyle habits, good nutrition, mind-body techniques, nutritional supplements, and a botanical.

### **What lifestyle habits can lower blood pressure?**

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Changes in lifestyle habits can lower blood pressure. This is especially true for younger people whose blood pressure is moderately high but at least 140/85. Exercising, eating plenty of fruits and vegetables and proper weight lowers systolic blood pressure by about 10-15 mmHG. These healthy habits also lower the risk of cancer, heart disease, diabetes and stroke. The following table shows the lifestyle changes a person can make and how the blood pressure may be reduced:



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| Lifestyle changes you can make | Blood Pressure Reduction     | Notes   |
|--------------------------------|------------------------------|---|
| Lose weight if overweight      | 5-20 mmHg/<br>10 kg wt. loss | As little as 10 lbs can have significant effects. See: <a href="http://www.nhlbisupport.com/bmi/">http://www.nhlbisupport.com/bmi/</a>  |
| Be active                      | 4-9 mmHg                     | Aim for 30-40 minutes of physical activity daily, most days of the week.  |
| Follow the DASH Diet           | 8-14 mmHg                    | <a href="http://www.nhlbi.nih.gov/health/public/heart/hbp/dash">www.nhlbi.nih.gov/health/public/heart/hbp/dash</a>  |
| Limit salt in your diet        | 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: <a href="http://www.nhlbi.nih.gov/hbp/prevent/sodium/sodium.htm">http://www.nhlbi.nih.gov/hbp/prevent/sodium/sodium.htm</a> . |
| Limit the alcohol you drink    | 2-4 mmHg                     | Limit to no more than 2 drinks/day for men and 1 drink a day for women.   |
| Do not use tobacco             | - -                          | Avoid first and second hand smoke and all tobacco products.   |

### How can blood pressure be lowered by nutrition?

#### **DASH**

DASH stands for Dietary Approaches to Stop Hypertension. 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. These minerals can lower blood pressure. The DASH diet is also low in saturated fat, cholesterol and simple sugars. These ingredients can worsen inflammation and increase the risk of diabetes and heart disease. The diet includes more protein from plant sources than from animals. A study showed that 40 grams of soy protein

(the amount in one soy burger or two glasses of soy milk) lowered systolic blood pressure by 7.88 mm Hg and diastolic by 5.27 mm Hg in people with hypertension. Eating all protein from one kind of food is not ideal. For example, high amounts of soy protein may increase the risk of bladder cancer. But protein from a variety of plants such as nuts, beans and vegetables appears to be helpful 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. It also increases bone strength, raises HDL (good cholesterol) by 21-33%, and lowers homocysteine levels. (Homocysteine is a substance used by the body, but high levels in the blood are thought to increase the risk for heart disease).

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



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### Limiting Salt

Shoot for less than 2400 mg a day of salt (one tsp). The body only needs 500 mg a day (1/4 tsp). 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

Studies have shown that people who drink milk seem to have lower blood pressure. This may be related to the calcium and proteins or peptides (compounds that contain two or more amino acids-the building block of proteins) found in milk. It appears that when milk is fermented by the bacteria, *Lactobacillus helveticus*, proteins are formed that block the action of an enzyme (ACE) that can cause high blood pressure. (Enzymes are proteins that speed up chemical reactions in the body).

Drinking pasteurized milk destroys the bacteria that activate these helpful peptides. To obtain the blood pressure lowering effects, 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 helpful peptides. Which types of yogurt contain the needed bacteria (*L. helveticus*) to create these blood pressure reducing proteins is yet to be determined but will likely be on food labels soon.

There are companies marketing supplements as “natural” ACE inhibitors (e.g. Ameal peptide {Ameal BP}). These are no better than generic versions of prescription medications that block the same enzyme (ACE inhibitors).

### Dark Chocolate

The cacao bean (*Theobroma cacao*) from which chocolate is made has a good effect on the cells that line the blood vessels. An analysis of 5 randomized controlled trials showed that it could reduce the systolic blood pressure by 4.7 (+/- 2.9) mm Hg and the diastolic pressure by 2.8 (+/- 2.0 mm Hg). Most commercial chocolate is processed under conditions that destroy the helpful ingredients (flavonoids), so look for “gourmet” chocolate that has at least 70% cocoa. Consider eating 10-30 gms daily (1/4 of a large chocolate bar). Take care to eat it in moderation since chocolate is high in calories.

#### The following are super-foods for lowering blood pressure and decreasing risk for heart disease

- Garlic (in food, not as a supplement) 1-2 cloves per day. Eating 10-15 minutes after crushing or chopping is most helpful.
- 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

### How can I exercise to lower blood pressure?

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Being active can increase your health beyond blood pressure. If you are exercising to lower



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blood pressure, stick with it. It can take 1-3 months to notice a difference. If you don't keep doing the activity, there will be little change. The American College of Sports Medicine recommends 20-60 minutes of endurance training 3-5 days a week at 50-85% maximal oxygen uptake. The time can be divided. It should include activities that you enjoy. An easy tool to help understand how to obtain 50-85% maximal oxygen uptake is the perceived exertion scale.

## Perceived Exertion Scale



On a scale from 1-20 with 20 being the point of exhaustion, shoot for 14 and work up to this over a 25-minute period of time. At this exertion, you should be able to talk but not sing. Shoot for doing this most days of the week. If you don't have time for structured exercise each day, consider using stairs, walking to lunch or biking to work.

## What are mind-body approaches, and how can they help lower blood pressure?

Mind-body approaches use the close connection between a person's body and mind to promote health. Holding onto emotions such as anxiety, hostility and anger can affect the body's nervous system. If you often feel these emotions, the blood pressure will rise, as will the risk of a heart attack.

## Meditation

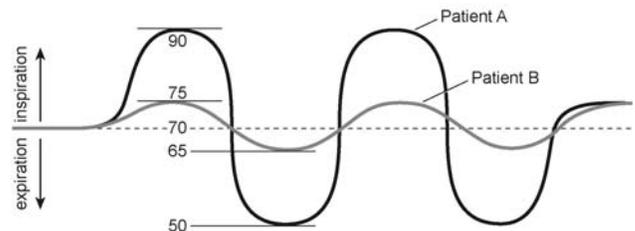
Meditation is a practice to relax and calm the mind and body. There are many forms of meditation. A recent study found that clearing the mind using transcendental meditation (TM) improved blood pressure and other risk factors in people who already had heart disease. In this study people focused on a mantra (a word or phrase they repeated) for 20 minutes a day for 16 weeks. Mindfulness meditation has shown similar benefits. In mindfulness meditation, the mind focuses on the present moment, not the past or the future.

- [See Handout "Meditation for Health and Happiness"](#)

## Breathing Exercises

Taking deep breaths lowers blood pressure while increasing heart rate variability. Heart rate variability is the difference between the rise in heart rate with breathing in and the drop with breathing out. The larger the difference, the more variability, which is good.

### Heart-Rate Variability



Heart-rate variability for Patient A = 90-50 = 40  
Heart-rate variability for Patient B = 75-65 = 10

GOAL: To ↑ heart-rate variability by slowing breathing rate to 6 breaths/min.



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A person with high variability may be less likely to die from conditions involving irregular heart beats (arrhythmias) and from coronary artery disease, where fatty deposits narrow the blood vessels. Deep breathing from the abdomen affects the nervous system, causing the body to relax. A good goal is to slow your breathing rate to less than 10 breaths/minute (ideal is 5-6 breaths/ minute).

A biofeedback device is a small machine that you can buy and use in your home to help you learn how to use your breath to lower blood pressure. It measures bodily processes such as breathing rate, heart rate and muscle tension. The device's constant feedback helps teach a person to gain control over these measurements. A review of studies evaluating a bio-feedback device to lower blood pressure by slowing the breathing rate found that after 8 weeks of treatment, there was an average drop of 14 mmHg systolic and 8 mmHg diastolic blood pressure. The more the bio-feedback device was used, the greater the drop in blood pressure. If using a biofeedback device, plan for 15 minutes each day with at least 45 minutes of slow breathing per week.

Some biofeedback devices to consider:

- Resp-e-rate (~\$300)  
A device that uses sound and a 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 feeling positive emotions can increase heart rate variability. Available as a handheld device, software program with heart rhythm monitor, or combination. Go to: [www.heartmath.com](http://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](http://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 you do 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. Breathe in for a count of 3-4 and breathe out for a count of 6-7. Take 60-80 slow breaths daily.

- [See Handout "Breathing Exercise"](#)

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### What supplements can lower blood pressure?

#### **Coenzyme Q10**

Co-Q10 is also known as *ubiquinone*. It is found in every cell in the human body and is used to help make energy. In eight small studies of Co-Q10, on average people reduced their systolic blood pressure by 16 mmHg and diastolic pressure by 10 mmHg.

It can take up to 4 weeks before you see a change in blood pressure. 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 help absorption. It can also be helpful when used with drugs that can decrease levels of Co-Q10 such as statins (taken to lower cholesterol), tricyclic anti-depressants (for depression) and Metformin (used for diabetes).



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### **Fish Oil**

Fish oil can help reduce the risk of heart disease. It does this more through decreasing inflammation and blood clots than by its effect on blood pressure. Data from 31 clinical trials (research studies) found that high doses (5.6 gms a day) reduced systolic blood pressure by only 3.4 mmHg and diastolic by 2.0 mmHg. Fish oil consists of two essential fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). DHA seems to be better at lowering blood pressure than EPA. We recommend that you use fish oil at a dose of 1 gm daily to reduce the risk of heart disease, especially if you have already had a heart attack.

### **Vitamin D**

If you live north of 40 degrees latitude (north of Iowa) or spend little time in the sun, you might be at increased risk for vitamin D deficiency along with high blood pressure. People with a 25 hydroxy vitamin D level less than 40 nmol/L are more than three times likely than others to develop high blood pressure. In 148 elderly women with high blood pressure treated with calcium and vitamin D, there was an average drop in systolic blood pressure of 13.1 mm Hg compared to 5.7 mm Hg drop with calcium alone. Beyond blood pressure, low vitamin D increases the risk of heart attack by almost two and half times according to the Health Professionals Follow-up Study.

You may want to take additional vitamin D 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 you use a tanning bed to raise vitamin D, UVB light (not UVA) has the largest effect on lowering BP. (Note, however, that tanning is also a risk factor for skin cancer).

- [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 relaxes smooth muscles that surround the arteries in the body. In both the Honolulu Heart Study and the Nurses Health Study low levels of magnesium were found to be the dietary factor most strongly associated with hypertension. Magnesium supplements have been helpful to some people, but not all. Your health care practitioner may order a blood test to check erythrocyte (or RBC) magnesium levels. This test is more sensitive than serum magnesium, which is sometimes done. It may help predict if you would benefit from magnesium supplements.

The dose is 6 mg/kg (about 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 and lowering sodium is an important goal and should be done with nutrition (see above). A summary of data from 19 studies showed that blood pressure can be reduced for individuals with hypertension when additional potassium is taken. Systolic pressure was reduced by 8.2 mmHg and diastolic pressure was lowered by 4.5 mmHg.

Eat foods rich in potassium such as bananas, grapefruit, broccoli, pumpkins, squash, dried beans and peas. If you take a supplement, potassium aspartate may have more blood pressure lowering effects than potassium



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chloride. People older than 65 years of age are more likely to lower their blood pressure by using potassium supplements. The dose is 1.5-3 mg a day (20-33 mEq). If you are taking a potassium supplement, your doctor should follow blood levels to make sure you are not taking too much, which can cause abnormalities of the heart rhythm.

- **Calcium**

Calcium seems to lower blood pressure the most for those who do not get much of it in their diet and for those who have low calcium levels in the blood. It can also be helpful in lowering blood pressure in those with kidney disease. Effects are modest with about a 2-3 mmHg decrease in systolic pressure and a 1-2 mmHg drop in diastolic pressure with 1200 mg calcium daily. Women older than 45 who get a lot of calcium through their diet or from supplements seen to have a lower risk of hypertension. This suggests that calcium may help prevent high blood pressure.

### What botanicals can help lower blood pressure?

#### **Hawthorn**

Hawthorn has been used to treat congestive heart failure. It also can lower blood pressure modestly. One of the active ingredients, proanthocyanidins, seems to do this. In a study of patients with diabetes, it was found to lower blood pressure an average of 5 mmHg. There were no major side effects or drug interactions reported. Generally prescription drugs 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.

### Summary for Non-Drug Ways to Lower Blood Pressure

#### **Lifestyle**

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

#### **Nutrition**

- Increase potassium and lower sodium ratio by reducing salt in the diet and eating more potassium rich fruits and vegetables (DASH diet)
- Replace coffee with green tea
- 10-30 gms (1/4 of a 70% cocoa dark chocolate bar) daily
- Limit alcohol and avoid tobacco products

#### **Mind-Body**

- Consider regular practice of some form of 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 promote 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 the dose and take twice a day.
- Fish oil (EPA + DHA=1000 mg/day)

If levels of the following are low, consider taking:

- Vitamin D3 1000 IU daily (1000 IU will raise level about 10 points)
- Magnesium glycinate or aspartate 500-750 mg daily
- Potassium aspartate 1.5-3 mg (20-33 mEq).  
Have your doctor follow blood 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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## *Non-Drug Ways to Promote Health by Lowering Blood Pressure*

***The information in this handout is for general education. It is not meant to be used by a patient alone. Please work with your health care practitioner to use the information in the best way possible to promote your health.***

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*Date updated: January 2009*

### NOTES