

Chocolate and High Blood Pressure

As you remember from Chapter Three, it was the unexpected discovery that dark chocolate lowered blood pressure that led to the current excitement over chocolate as a health food and launched the modern exploration of chocolate as a health food for the heart. The observation that the Guna of the San Blas Islands received blood pressure protection from chocolate was the clue that ignited all the modern research into dark chocolate.

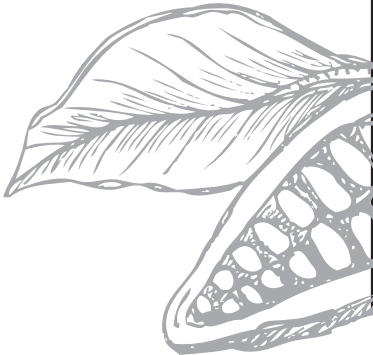
What is High Blood Pressure?

Your blood pressure is the measure of the pressure that builds up in your blood vessels each time your heart beats and forces blood through your arteries. High blood pressure is the result of the blood exerting too much pressure against the walls of the blood vessels, forcing your heart too work too hard to pump blood through your blood vessels.

High blood pressure is a major risk factor for heart attack, and it is the most important risk factor for stroke.

17.6% of all Canadians have high blood pressure, and 54.3% of all Americans between the ages of sixty-five and seventy-four suffer from high blood pressure.

Your blood pressure reading is expressed as two numbers: systolic blood pressure (SBP)



and diastolic blood pressure (DBP). Systolic blood pressure, the first number in your blood pressure reading, is a measure of the peak reading as your heart contracts; diastolic blood pressure, the second number in your blood pressure reading, is a measure of the low reading as your heart relaxes.

A normal, healthy blood pressure reading is 120/80. If your blood pressure elevates to 140-160/95-104, it is mildly elevated. A reading of 140-180/105-114 reflects moderately high blood pressure. And your blood pressure is severely elevated if the reading is 160+/115+. If you can lower your systolic blood pressure by 4-5 mm Hg and your diastolic blood pressure by 2-3 mm Hg, it is estimated that the effect will be a reduction in your risk of cardiovascular disease and death of up to 20%.

The Research: Dark Chocolate & People with Healthy Blood Pressure

After observing the blood pressure protecting affect that dark chocolate had on the people of the San Blas Islands, researchers began to put this amazing possibility to the test.

Could something as delicious as dark chocolate really control something as serious as high blood pressure? Researchers attempted to answer this question by comparing the results on people with healthy blood pressure of eating either dark chocolate or white chocolate. Since white chocolate has no cocoa liquor and no flavonoids, it served the researchers well as a placebo. At the end of the fifteen day study, blood pressure remained healthy in both groups, but, remarkably, it really was lower in the dark chocolate group: systolic blood pressure was 113.9 in the white chocolate group but 107.5 in the dark chocolate group.¹

And it wasn't a fluke. Another group of researchers confirmed the results: dark chocolate lowers systolic blood pressure in healthy people.²

And as the researchers continued to explore the effects of dark chocolate on blood pressure, the news got even better. Dark chocolate didn't just lower systolic blood pressure in people with healthy blood pressure: it lowered diastolic blood pressure too.³

In 2012, the highly respected Cochrane Collaboration published a meta-analysis of the research on dark chocolate and blood pressure done up until 2011. The analysis included twenty controlled studies of people with healthy blood pressure. It concluded that dark chocolate lowers systolic blood pressure by 2.77 mm HG and diastolic blood pressure by 2.20 mm Hg.⁴

The Cochrane review also suggested three other interesting things. It found that sugar free chocolate may have a greater effect than chocolate with sugar added. It also found that chocolate may have a more powerful effect on people under the age of fifty (suggesting that parents should no longer discourage their children from eating chocolate). And, interestingly, it also found that the blood pressure lowering effect of chocolate may be even greater than the research has suggested. Several studies compared high flavonol chocolate to a low flavonol chocolate control group. But the Cochrane researchers found that the low levels of flavonoids in the supposed control group may actually sometimes be sufficient to lower blood pressure. They argued that chocolate's blood pressure lowering effect may be more pronounced in studies that compare it, not to low flavonoid chocolate, but to flavonoid free chocolate.

Dark Chocolate & People with High Blood Pressure

So, what had been observed on the San Blas Islands had been confirmed by science: dark chocolate really can keep blood pressure levels healthy. But what about the important question of treatment? It had been proven that dark chocolate can keep your blood pressure low, making eating dark chocolate an important and delicious part of a strategy for preventing elevated blood pressure. But is dark chocolate's power over blood pressure great enough even to treat people who already have high blood pressure?

To answer this question, researchers gave either dark chocolate or a white chocolate placebo to people with prehypertension (130/85-139/89). Systolic and diastolic blood pressure both went down significantly in the dark chocolate group but not in the white chocolate group. The dark chocolate lowered the systolic

blood pressure by 2.9 mm Hg and the diastolic blood pressure by 1.9 mm Hg. It took six weeks for dark chocolate's blood pressure lowering effect to reach levels that were statistically significant. The study's authors made the amazing conclusion that the small 6.3g amount of daily dark chocolate was comparable to comprehensive dietary modifications in its ability to lower blood pressure.⁵

These researchers made one more interesting discovery. They found that chocolate worked by increasing nitric oxide, which dilates blood vessels, which, in turn, lowers blood pressure. We'll explore this mechanism more later. But what is interesting about this discovery is that it matches the explanation of chocolate's mechanism of action that we saw Hollenberg and Fisher discover in Chapter Three.

The results seemed too good to be true. Simply eating dark chocolate could make a significant impact in people whose blood pressure was nudging up to concerning levels. But it was true. And the research continued to validate the results. A later study found a whopping 10.55 mm Hg reduction in systolic blood pressure in people with prehypertension (120-139/80-89) who ate 30g of 70% dark chocolate instead of white chocolate.⁶

Like the previous researchers, these ones found that dark chocolate significantly increased levels of nitric oxide.

So, dark chocolate works in people with healthy blood pressure. It even works in people with pre-high blood pressure. But is it powerful enough to work even in people with actual high blood pressure?

The answer is yes. When the group of people being studied included, not only people with prehypertension, but also people with actual hypertension, dark chocolate still triumphed. When the people in this study were given flavanol-rich cocoa for three months, they had a significant reduction in blood pressure.⁷

In populations of people who all had actual high blood pressure, the results were just as encouraging. One early study found a significant 5.1 mm Hg drop in systolic blood pressure and a 1.8 mm Hg drop in diastolic blood pressure in just two weeks when 100g of dark chocolate was compared to white chocolate.⁸

A number of large reviews have put all the research on dark chocolate and high blood pressure together to see just how effective a treatment dark chocolate is.

A meta-analysis of fifteen placebo-controlled studies could not detect a blood pressure lowering power of dark chocolate in people with normal blood pressure but found a substantial power in people who did have high blood pressure, or pre-high blood pressure, and actually needed it lowered. The effect was significant, lowering systolic blood pressure by 5.0 mm Hg and diastolic blood pressure by 2.7 mm Hg. And the significance is not merely statistical: it is also clinical. You'll remember from the beginning of this chapter that drops in systolic blood pressure of 4-5 mm Hg and in diastolic blood pressure of 2-3 mm Hg were enough to reduce the risk of cardiovascular disease and death by up to 20%. Well, that's exactly what the authors of this study concluded. They said that the blood pressure reductions achieved simply by eating dark chocolate could translate into a 20% reduction in the risk of cardiovascular events.⁹ So eating dark chocolate can reduce your risk of suffering from a cardiovascular event by 20% if you have high blood pressure!

A second meta-analysis performed the same year as this one looked at ten controlled studies of people with either pre-high blood pressure or actual high blood pressure and found that flavanol-rich cocoa significantly lowers blood pressure. These researchers found that dark chocolate reduces systolic blood pressure by 4.5 mm Hg and diastolic blood pressure by 2.5 mm Hg.¹⁰

A third group of researchers put together two decades of research and looked at thirteen studies of chocolate and blood pressure conducted between the years 1999 and 2011. They found that, in people with pre-high blood pressure or high blood pressure, dark chocolate drops systolic blood pressure by 3.2 mm Hg and diastolic blood pressure by 2.0 mm Hg.¹¹

Even more recently, researchers conducted a meta-analysis of 2,013 people who had high blood pressure. What complicated things even more is that the people in this study had, not only high blood pressure to deal with: they had metabolic syndrome. Metabolic syndrome is a cluster of symptoms that includes three of five of high blood pressure, abdominal obesity, elevated tri-

glycerides, low heart healthy HDL cholesterol or elevated blood glucose. Metabolic syndrome is strongly associated with dying from cardiovascular disease. So, this study was a very important test of dark chocolate.

And dark chocolate passed the test. This large meta-analysis found that dark chocolate lowers systolic blood pressure by 5.0 mm Hg and diastolic blood pressure by 2.7 mm Hg in people with high blood pressure. We met this study already in the section on cholesterol, because the study also found that dark chocolate significantly lowers triglycerides and LDL cholesterol in people at high risk of a cardiovascular event. This is important because the researchers concluded that the blood pressure and cholesterol improvements demonstrated in this study suggest that dark chocolate can reduced heart attacks and strokes by 85 per 10,000 over ten years in people at risk because of metabolic syndrome.¹²

Several other studies have also demonstrated dark chocolate's power over blood pressure.^{13,14} Another meta-analysis showed dark chocolate's ability to significantly lower both systolic and diastolic blood pressure.¹⁵ Yet another meta-analysis found that four out of the five controlled studies it looked at showed that cocoa lowered both systolic and diastolic blood pressure. The combined results showed that dark chocolate lowers systolic blood pressure by 4.7 mm Hg and diastolic blood pressure by 2.8 mm Hg, which the authors noted is not only statistically relevant, but clinically relevant in the real world.¹⁶

And in a strange pair of dueling reviews, a 2011 meta-analysis of twenty-four controlled studies found a significant reduction in systolic blood pressure, but not diastolic blood pressure,¹⁷ while a 2012 meta-analysis of forty-two high quality controlled studies found a significant reduction in diastolic blood pressure and mean arterial blood pressure, but not systolic blood pressure.¹⁸

How Chocolate Works: The Secret Ingredient

Another meta-analysis not only reconfirmed dark chocolate's power over high blood pressure—4.1 mm Hg reductions in systolic blood pressure and 2.0 mm Hg reductions in diastolic blood pressure—but shed more light on which specific component in dark chocolate may be responsible. This interesting meta-analysis

of sixteen controlled studies found that dark chocolate's ability to reduce blood pressure is dependent on one of the flavanols found in the chocolate.

That flavonoids are the active ingredient in dark chocolate responsible for lowering blood pressure comes as no surprise. That's why white chocolate is used in studies as a placebo: because it has no flavanoids. That's also why the Cochrane group of researchers raised the concern over using low-flavonoid chocolate as a control: because even the small amount of flavonoids found in the supposed placebo could sometimes be enough to lower blood pressure.

But in uncovering the flavonoid that may be responsible for chocolate's blood pressure lowering effect, this meta-analysis did reveal something new, because it discovered specifically which flavonoid may be responsible. The researchers found that dark chocolate's ability to reduce blood pressure is dependent on the amount of the flavanol epicatechin that is found in the chocolate.¹⁹

Dark Chocolate, High Blood Pressure & Obesity

Studies have also shown the important promise of dark chocolate in lowering blood pressure in people with the additional cardiovascular burden of obesity.

Obesity is associated with high blood pressure. So, researchers conducted a small study to see what happens when obese people eat dark chocolate. The study gave 20g of dark chocolate with either 500mg or 1,000mg of polyphenols to fourteen obese people for a week. It didn't matter which dose they ate: both equally and significantly lowered their blood pressure.²⁰ So, contrary to conventional wisdom, it may be beneficial for overweight people to eat dark chocolate.

A second study adds even more weight to this suggestion. People who are obese or who have high blood pressure may need to be more careful when they exercise because impaired vasodilation could cause exaggerated elevations in blood pressure. So, researchers conducted a small double-blind study of twenty-one overweight exercisers. Some of them drank a high-flavanol cocoa

drink containing 701mg of flavanols and some drank a cocoa drink that contained only 22mg of flavanols. The encouraging result was that the high-flavanol chocolate drink caused significantly greater vasodilation than did the low-flavanol drink: 6.1% versus only 3.4%. And the result of the superior vasodilation was that the exercise induced increase in blood pressure was reduced by the flavanol-rich chocolate drink, again showing a blood pressure benefit for dark chocolate in overweight people, specifically, this time, while exercising.²¹

Nobody's Perfect

As you can see, there have been a lot of studies of dark chocolate and blood pressure. With all the studies that have been done, the overwhelming consensus is that eating dark chocolate is an effective way to maintain healthy blood pressure and to help lower high blood pressure. To date, we can find only four studies that were unable to show a protective effect of dark chocolate on blood pressure. In science, it is rare when researchers conduct multiple studies not to have some that disagree due to different populations, poor design or any of several other reasons.

There may be several reasons why a small minority of dark chocolate studies were negative. The first negative study found no improvement in blood pressure despite the fact that it did find an improvement in the diameter of arteries.²²

The second negative study found no effect of dark chocolate or a tomato extract when compared to a placebo in people with prehypertension.²³ However, though designed as a controlled study, the study was not fully blinded: the people in the tomato extract group didn't know if they were getting the extract or the placebo, but the people in the chocolate group were able to tell. One year later, the same group of researchers that designed this study would carry out one of the meta-analysis we looked at earlier and would find a significant blood pressure lowering effect that was impressive enough to translate into a 20% reduction in the risk of cardiovascular events.

The other two negative studies are interesting because of the information they do provide. The first found no effect on blood pressure when it delivered the chocolate in a dairy drink.²⁴ The

final study to find no effect on blood pressure gave chocolate in milk to people with moderately high cholesterol but no high blood pressure.²⁵ Both of these negative studies used milk.

We saw this possible confounding effect of milk in the cholesterol chapter also. As we saw there, the final negative blood pressure study also found no effect on total cholesterol, LDL cholesterol or triglycerides, which was anomalous. Taken together, these two studies suggest the possibility that milk neutralizes the cardiovascular benefits of chocolate.

A Comprehensive Approach to Controlling Blood Pressure Naturally

Eating dark chocolate has been demonstrated to be an important and significant way of controlling blood pressure. The results are not meaningful in a merely statistical or mathematical way. They have been shown to be clinically significant in a way that could substantially lower the real life cardiovascular effects of having high blood pressure. As effective as dark chocolate is, though, it should be a part of a more comprehensive natural approach to managing high blood pressure.

Diet

Cardiovascular diseases are very amenable to dietary solutions. So, as with cholesterol, the most important first step in returning your blood pressure to healthy levels is improving your diet.

Because it is rich in potassium, magnesium, calcium, complex carbohydrates, fiber, essential fatty acids, folic acid and vitamin C, but low in saturated fat, a vegetarian diet is ideally tailored to lowering blood pressure. That's why vegetarians have lower blood pressure than people who eat meat^{26,27} and lower rates of high blood pressure.²⁸ A vegetarian diet is not only effective at preventing high blood pressure, it is also effective at treating it.^{29,30}

The DASH (Dietary Approaches to Stop Hypertension) studies have shown that diets high in fruit, vegetables, low-fat dairy, nuts, fiber, potassium, magnesium and calcium and low in cholesterol, saturated fat, total fat, sugar and meat can massively reduce blood pressure in only two weeks.³¹

Sodium & Potassium

It is well known that reducing salt is important for lowering blood pressure. Adding salt increases blood pressure;³² reducing salt decreases blood pressure.^{33,34,35} What is less well known is that at least as important as reducing your intake of salt is increasing your ratio of potassium to salt. To fully address the problem of high blood pressure, you have to have a lot more potassium in your diet than salt. But the standard North American diet provides at least twice as much salt as potassium. The fastest and most effective way to increase the ratio of potassium to salt in your diet is to switch to a vegetarian diet. Plant foods are much higher in potassium. Most meats have a potassium:sodium ratio of about 4:1 to 6:1. Most fish have a potassium:sodium ratio of only about 2:1 to 4:1. Most fruits and vegetables have a potassium:sodium ratio of at least 50:1 and many of them of over 100:1.

Minerals that Lower Blood Pressure

The most important minerals for blood pressure are potassium and magnesium. A meta-analysis of nineteen studies shows that supplementing potassium significantly lowers blood pressure.³⁶ A meta-analysis of twenty-two studies of magnesium found that taking magnesium is associated with a decrease of both systolic and diastolic blood pressure.³⁷

Blood Pressure and the Fats You Eat

The kind of fat you feature in your diet is an important determinant of your blood pressure: saturated fat elevates your blood pressure; polyunsaturated fat lowers your blood pressure.^{38,39}

One important source of omega-3 polyunsaturated fats is flax seeds and flax seed oil. When people with peripheral artery disease were given either 30g of ground flax seed or a placebo for six months, those who had high blood pressure experienced an impressive drop of 15 mm Hg in systolic blood pressure and a 7 mm Hg drop in diastolic blood pressure.⁴⁰

Another heart healthy oil is olive oil. Olive oil is a monounsaturated fat. Double-blind research found that two to three teaspoons of olive oil a day allowed people with moderate high blood pressure

to reduce their medication by 48% and still significantly lower their blood pressure.⁴¹

Soy and Blood Pressure

When all the double-blind studies that had been done on soy protein and blood pressure were put together into a meta-analysis, the researchers concluded that soy isoflavones significantly decrease both systolic and diastolic blood pressure. They found that, in people who actually have high blood pressure, the reductions in systolic blood pressure are actually comparable to reductions achieved with blood pressure medications.⁴²

Vitamin C

Many population studies have found a correlation between higher vitamin C levels and lower blood pressure and that the more vitamin C you get in your diet, the lower your blood pressure.⁴³ A meta-analysis of twenty-nine studies found that supplementing vitamin C lowers systolic blood pressure by 3.84 mm Hg and diastolic blood pressure by 1.48 mm Hg. In people who had high blood pressure and actually needed to lower it, the results were even better: 4.85 mm Hg and 1.67 mm Hg.⁴⁴

B Vitamins

A group of B vitamins, made up of folic acid, B6 and B12, is also important for treating blood pressure. B6, for example, has been shown to significantly lower blood pressure in people with high blood pressure.⁴⁵ This group of B vitamins is capable of controlling homocysteine. Homocysteine is a crucial risk factor for atherosclerosis, and atherosclerosis is a major cause of high blood pressure.

Coenzyme Q10

Another crucial nutrient is coenzyme Q10. Research shows that CoQ10 significantly lowers high blood pressure.^{46,47} When people with high blood pressure were given either 60mg of CoQ10 or a placebo twice a day for twelve weeks in a double-blind study, there was a significantly greater reduction of blood pressure in the CoQ10 group.⁴⁸

Garlic

An important herb for high blood pressure is garlic. One double-blind study of people whose high blood pressure was not being adequately controlled by blood pressure medications found that adding aged garlic extract to the meds significantly lowered their systolic blood pressure.⁴⁹ A meta-analysis of placebo-controlled studies of garlic and people with high blood pressure demonstrated that garlic reduces both systolic and diastolic blood pressure better than a placebo. According to the study's authors, the effect is comparable to blood pressure medication.⁵⁰

Flavonoid Relatives of Chocolate

A group of flavonoids known as anthocyanins are found in berries like blueberries, cranberries, black currants and purple grapes. People who eat the most anthocyanins have 8% less risk of developing high blood pressure.⁵¹ And blueberries have been shown to significantly lower systolic blood pressure and to significantly lower diastolic blood pressure in people who actually have high blood pressure.⁵²

The closely related flavonoids known as proanthocyanidins are found in supplements like grapeseed extract and pine bark extract. Grapeseed extract has been shown to lower both systolic and diastolic blood pressure better than a placebo.⁵³ Double-blind research has also demonstrated the ability of pinebark extract to significantly lower blood pressure in people with mild high blood pressure.

Hawthorn and Olive Leaf Extract

The most valuable herb for heart health is hawthorn, and several studies have confirmed its ability to lower blood pressure. For high blood pressure, hawthorn works especially well when combined with olive leaf extract. Olive leaf extract is capable of significantly lowering blood pressure in people with high blood pressure.⁵⁴ In the most important study of olive leaf extract, the herb was shown to be as effective as the ACE-inhibitor captopril. Actually, the herb was better, because it reduced cholesterol and triglycerides significantly better than the drug.⁵⁵

Hibiscus

The herb hibiscus can lower blood pressure.^{56,57} People with mild to moderate high blood pressure have been shown to respond as well to a tea made from hibiscus extract that is standardized for anthocyanins as they do to the ACE-inhibitor captopril.⁵⁸

Reishi

The Chinese medicinal mushroom reishi, is a good heart herb and has been shown in double-blind research to significantly lower blood pressure. When people with high blood pressure who did not respond to ACE inhibitors (captopril or minodipine) added reishi to their meds, their blood pressure dropped significantly.⁵⁹

Yarrow and Other Herbs

The herb yarrow has also been shown to significantly lower blood pressure.⁶⁰

Other helpful blood pressure herbs include mistletoe, *Coleus forskoblii* and celery seed.

When treating high blood pressure, you should also lose extra weight, exercise, quit smoking and eliminate food allergies. Acupuncture is also very helpful.

