

Cardiovascular Disease

How to Save Your Patient's Lives

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Since the start of the 20th century, CVD or CardioVascular Disease, has been the number one killer in North America. Almost 60% of all deaths each year are a result of CVD. This number is greater than all the deaths from the next seven leading causes of death combined. CVD results in 33.3 percent of all hospitalization expenditures. In the United States alone this translates into a death every 33 seconds and results in a cost of more than \$326.6 billion each year to the health care system (1).

Medications and emergency rooms can and do save the lives of numerous patients, but the operating room will never bring this monstrous condition under control. However, as Chiropractors, we have the power to do something about CVD without ever stepping into a hospital by working with one patient at a time (2).

By providing correct lifestyle and dietary advice to our patients we can prevent a large percentage of CVDs from ever occurring. Even after a major episode of CVD there is good evidence that, with the correct advice and follow-through procedures, we can reverse much of the damage.

In this article, we will focus on some of the factors that lead to coronary heart disease including stroke, atherosclerosis, congestive heart failure and high blood pressure. These conditions makes up 78% of all CVD's and are the areas where we, as Chiropractors, can have the greatest influence. There are numerous factors that we can address with our patients to prevent CVD's from occurring.

This article addresses the following major factors:

- Hypertension
- Cholesterol
- Homocysteine
- Fibrinogen
- Insulin

Hypertension

Hypertension, or high blood pressure, occurs when the body's smaller blood vessels (known as the arterioles) narrow causing the blood to exert excessive pressure against the vessel. The heart must work harder to maintain this higher pressure resulting in damage to the heart, kidneys, brain, and eyes.

Between 50-60 million Americans ranging in age from 6 and older, have high blood pressure. High blood pressure causes arteries to become scarred, hardened, and less elastic. If hypertension is not treated it can lead to heart disease, stroke, kidney disease, and eye disorders. Only 18% of people with hypertension return to normal blood pressure levels while on medication (16).

In fact, it has been shown that the very medications patients take to reduce hypertension may indirectly act to increase blood pressure. This is due to the effect that hypertensive medications have on insulin sensitivity. Many of these medications cause a decrease in a cell's sensitivity to insulin, which in turn results in endothelial cell dysfunction. Endothelial cell dysfunction is related to increases in blood pressure. This is why it is so difficult to get a patient off hypertensive medications once they have started using them. (37)

Measuring Hypertension

Blood pressure readings should be taken in both arms. Usually there is a difference of 5-10 mm Hg between the left and right sides. Pressure differences of more than 10-15 mm Hg suggests arterial compression or obstruction on the side with the lower pressure. A fall in systolic pressure of 20 mm Hg or more, may be indicative of orthostatic hypotension caused by one or more of: adrenal stress, medications, decreased blood volume, or a disease of the peripheral autonomic nervous system (40).

Hypertension is typically defined as an a systolic pressure of 140 mg Hg or greater and a diastolic pressure of 90 mg Hg or greater. See the following table for a classification of blood pressure for adults aged 18 and older.

Your blood pressure is:	If your Systolic (mm Hg) is...		If your Diastolic (mm Hg) is...
Optimal	<120	and	<80
Normal	<130	and	<85
High Normal	130-139	or	85-89
Hypertension			
Stage 1	140-159	or	90-99
Stage 2	160-179	or	100-109
Stage 3	>180	or	>110

Lifestyle and dietary recommendation for hypertension

Note: Patients with blood pressures greater than 160/115 should immediately consult with a physician. Short-term medications may necessary, but do implement the following suggestions until blood pressure has decreased.

Make this lifestyle change...	More Information...
Increase physical activity	<p>When compared with their more active and fit peers, sedentary individuals with normal blood pressure have a 20 to 50 percent increased risk of developing hypertension (18).</p> <p>Encourage your patients to lead a physically active lifestyle. Activities could include anything from swimming and running, to the lifting of light weights, yoga, Tai Chi, or many of the other alternatives available to us.</p>
Manage insulin levels	<p>Insulin promotes glucose utilization, protein synthesis, and the formation and storage of neutral lipids through the regulation of sugar metabolism.</p> <p>Problems with blood pressure occur when individuals develop insulin resistance, due to a defect in insulin receptor-site or insulin receptor-directed metabolism. This leads to high levels of insulin in the blood stream. High insulin levels are associated with endothelial wall dysfunction and increased blood pressure. Pharmaceuticals used for the treatment of hypertension can also result in endothelial cell dysfunction.</p> <p>To resolve and control this problem, the practitioner must work with the patient to reduce the glycemic load by increasing protein intake, reducing saturated fats, and avoiding refined carbohydrates. (23)</p>
Decrease weight	<p>Many CVD patients suffer from weight gain, often due to a decrease in insulin sensitivity and poor diet. Increased weight results in greater stress upon the heart and circulatory system.</p> <p>Weight gain is also linked to insulin resistance and often leads to obesity and cardiovascular disease. "Insulin resistance in obese subjects is linked to obesity hypertension and the subsequent development of cardiovascular disease, perhaps through the effects of hyperinsulinemia on fatty acid metabolism".(23)</p> <p>Weight gain must be controlled and managed by reducing the glycemic load upon the body, increasing protein intake, reducing saturated fats, avoiding refined carbohydrates, and increasing physical activity.</p>
Make dietary changes	<p>The majority of CVD patients consume a diet rich in saturated fats and refined carbohydrates. This typically results in an imbalance of the sodium/potassium levels, an increase in cholesterol</p>

Make this lifestyle change...	More Information...
	<p>levels, increased insulin levels, and increased water retention. These factors combine to increase blood pressure.</p> <p>Dietary changes should include the consumption of greater quantities of fresh fruit and vegetables to assist in the balancing of sodium/potassium levels (19). Avoid all canned fruit and vegetables due to their high sodium content. Studies have shown that an average decrease of 95 mmol per day of sodium can result in a decrease in blood pressure by 6.3/2.2 mm Hg (17).</p> <p>Dietary potassium can also be increased by eating foods high in fiber and by avoiding all refined carbohydrates.</p> <p>See this site for a complete listing of foods that have a low glycemic index: http://www.mendoza.com/gilists.htm</p>
Stop smoking	<p>Blood pressures rises significantly with the smoking of only one cigarette (21). See www.drabelson.com and click the link for "Stop Smoking Now" for more information.</p>
Decrease alcohol & coffee consumption	<p>Caffeine sensitive individuals are susceptible to increased blood pressure caused by coffee and tea. One cup of coffee at 8:00 in the morning has been shown to cause a measurable increase in blood pressure at 10:00 that evening</p> <p>In contrast, low levels of red wine or beer has actually been shown to decrease cholesterol levels, but excessive consumption results in higher blood pressure. Alcohol intake should be limited to no more than 1 ounce of ethanol, 24 ounces of beer, or 10 ounces of wine (20).</p>
Avoid birth control pills	<p>Studies have shown that women using birth control pills have 2-3 time the rate of hypertension. (1). The combination of birth control pills and cigarettes is lethal.</p> <p>Work with your patients to find and use alternatives to the birth control pill, especially if your patient is a smoker.</p>
Decrease stress	<p>Increased stress results in the production of higher levels of cortisol which has been associated with hypertension (22) Chronic high stress can lead to high blood glucose levels, weight gain, and increases in LDL and cholesterol levels.</p> <p>Work with your patients to evaluate and implement stress reducing life-style changes. This could include the incorporation of regular exercise, meditation, Tai Chi, and personal time off into their daily schedules.</p>
Nutritional supplements	<p>Dietary and lifestyle changes alone are often not enough to adequately reduce CVD risks. Today's foods are sadly deficient in many essential nutrients and minerals. They also include many harmful additives, hormones, and chemicals. Supplementation should include:</p> <ul style="list-style-type: none"> ➤ Multivitamin and mineral tablets to support liver function in the removal of waste products, and to prevent the production of free radicals. ➤ Vitamin C at 500-1000 mg per day since Vitamin C acts as an anti-oxidant and prevents the harmful breakdown of LDL particles. ➤ Vitamin E at 400-800 iu. per day since Vitamin E acts as an anti-oxidant and prevents the harmful breakdown of LDL particles. ➤ Magnesium at 400 - 800 mg per day can help to reduce angina, blood pressure, and heart palpitations.(38) ➤ Co enzyme Q10 - 50 mg 3 times per day. "Findings indicate that treatment with coenzyme Q10 decreases blood pressure possibly by decreasing oxidative stress and insulin response in patients with known hypertension receiving conventional antihypertensive drugs." (39)

Cholesterol

The higher your serum cholesterol, the more likely you are to have heart disease or other CVD's (3). Unfortunately, lowering your cholesterol does not guarantee prevention of heart disease. The issues are much more complex. In fact studies have shown that 80 percent of people who have heart attacks have the same total cholesterol level as individuals who don't have an attack (4). In other words the majority of individuals who have heart attacks have what can be considered as normal cholesterol levels (4). Total cholesterol levels are important but may not be as important as cholesterol differentiation. Analysis must go far beyond the traditional measurement of LDL/HDL ratios.

Ages 30 and over:

Normal Total Cholesterol	Less than 5.2 mmol/L (or 200 mg/dl)
Borderline High	
Total Cholesterol	5.2 - 6.2 mmol/L (or 200 - 240 mg/dL)
LDL cholesterol	>3.4 mmol/L (130 MG/dL)
HDL cholesterol	<0.9 mmol/L (35 mg/dL)
Triglycerides	>2.3 mmol/L (200 mg/dL)
High Total Cholesterol	> 6.2 mmol/L (240 mg/dL)

Ages 18-29

Normal Total Cholesterol	Less than 4.7 mmol/L (180 mg/dL)
Borderline High	
Total Cholesterol	4.7 - 5.7 mmol/L (180 - 220 mg/dL)
LDL cholesterol	>3.0 mmol/L (115 mg/dL)
HDL cholesterol	<0.9 mmol/L (35 mg/dL)
Triglycerides	>2.3 mmol/L (200 mg/dL)
High Total Cholesterol	> 5.7 mmol/L (220 mg/dL)

LDL's (Low Density Lipoproteins). - bad guys come in different shapes and sizes

There are more than seven subclasses of LDL particles. Each particle varies in its ability to adhere to and penetrate arterial walls to form atherosclerotic plaque. This differentiation is one of the keys to determining how damaging a patient's LDL's are. A bad distribution of these LDL in the cells can cause a 300% greater chance of having heart disease than someone with the same LDL level and a good distribution (36).

LDL-B is an especially damaging particle. Since they are mixed with triglycerides and are smaller in size than the larger, less harmful LDL-A particles. These small particles are more damaging than larger particles because they can move easily into endothelial cells. The LDL-B particles are picked up by macrophages (scavenger cells) which eventually become foam cells. These foam cells eventually rupture and spill their toxic, oxidized contents onto the arterial wall. These oxidized substances start the formation of atherosclerotic plaque. Because this atherosclerotic lesion contains an oxidized LDL-B particle it grows at 30 times the rate of a LDL-A particle (36).

Obviously, it is important to know the ratio and types of LDL's in a patient's cholesterol readings. Especially since medications such as Lovastatin lower the number of large particles, but leave the smaller more damaging cholesterol particles intact. These medications also do nothing to reduce the oxidation properties of the triglycerides that are interwoven into the small LDL-B particles (36).

An LDL level over 160 mg/dL considerably increases the risk level for (1). Yet the average LDL level for individuals who have heart attacks is only 150 mg/dL.

HDL's (High Density Lipoproteins) - the good guys

It is theorized that HDL's acts as a scavenger, removing cholesterol from the circulation. In this process free cholesterol comes into contact with the surface of the HDL, where it is esterified by a substance called lecithin-cholesterol acyltransferase (LCAT). This cholesterol is then stored in the centre of the HDL particle (33).

It is also theorized the HDL acts as a powerful antioxidant. The enzyme associated with HDL, lecithin-cholesterol acyltransferase, blocks the oxidization of LDL cholesterol. LDL levels should be no higher than 3.0 mmol/L (115 mg/dL). An optimal level of HDL should be 45mg/dL or higher (35).

Lipoprotein(a)

Another factor that must be considered in conjunction with cholesterol levels is the level of Lipoprotein(a). This genetic factor has a large influence on clot formation in the arteries. Your body has a remarkable mechanism for dissolving clot formation called fibrinolysis. Lipoprotein(a) stops the process of fibrinolysis and greatly increases clot formation (5). This marker is so significant that many scientists consider this to be a better marker than cholesterol (6). When your patients have their cholesterol checked ask them to have their blood checked for Lipoprotein (a).

Lifestyle and dietary recommendation to address cholesterol issues:

In addition to the following suggestion it extremely important to reduce excess weight, stop smoking and to following a program of stress reduction if applicable. Each of following recommendation are important. Excellent results can be achieved from a synergy of the following program, no single factor is more important than the other.

Make this lifestyle change...	More Information...
Avoid saturated fats.	A reduction by 1% in saturated fatty acids can decrease total cholesterol by 3%. Foods that contain high levels of saturated fats include meats, dairy products, coconut oil, palm oil, palm kernel oil, and cocoa butter.
Avoid hydrogenated oils.	These oils increase LDL levels and decrease HDL levels. Avoid: salad dressings, margarine, shortening, deep fried foods and processed foods. For more information on the web go to http://www.afpafitness.com/TRANFAT.HTM
Use Omega 3 (EPA/DHA and alpha-linolenic acid).	Fish Oils: Combine the fish oil with garlic to decrease serum cholesterol. These oils cause a large reduction in triglyceride levels, a substantial increase in LDL particle size. (Remember it is the small LDL's that cause the problem) (37) Flax Seed Oil: Reduces serum cholesterol but does not effect triglyceride levels.
Use monounsaturated oils.	Olive oil (Dark green cold pressed) & canola oil results in a decrease of the total cholesterol and LDL counts. These oils are resistance to oxidation.
Use garlic in your food and as a supplement.	Garlic inhibits LDL oxidation, and prevents abnormal platelet aggregation (26). Human patients fed a daily dose of Kyolic ("Aged Garlic Extract") over a 10-month study showed that ". . . adhesion to fibrinogen (fibrinogen helps to form clots) was reduced by 30% (27). Take 900 to 8000 mg a day.
Drink green tea.	Green tea lowers LDL cholesterol and serum triglyceride levels. It also inhibits the oxidation of LDL cholesterol(32). Drink green tea with each meal or take green tea extract at 350 mg per day (37).

Make this lifestyle change...	More Information...
Increase soluble fiber intake.	Soluble fiber lowers total cholesterol and LDL levels while preserving HDL levels (30). Soluble fiber is found in oats, legumes, guar gum, guava, peas, beans, certain citrus fruits, and psyllium. Take 4-6 grams before any high-fat meal. A bowl of oatmeal contains 3 grams, Cheerios 1 gram (Not Honeynut Cheerios) (37),
Use soya products.	Soya products decrease total cholesterol levels, inhibits of LDL oxidation. Soya also has antiproliferative and antimigratory effects on smooth muscle cells, and contributes to atherosclerotic formation (29). Drink soya milk, eat tofu, soya nuts, soya burgers, or use soya beans in cooking.
Take selenium.	Individuals with diets low in selenium have two-to-three times greater risk of heart disease than those eating selenium rich diets (24). Selenium is an antioxidant that reduces oxidation of LDL's Take 200-600 micrograms daily.
Supplement Your Diet With Vitamin E.	Vitamin E lowers the oxidation rate of LDL's and slows the progression of atherosclerosis (28). Results of a study in the Journal of Circulation Research, August 1998 suggest that vitamin E and selenium inhibited atherosclerosis as effectively as an equally hypocholesterolemic dose of the drug Probucol. Take 400-800 IU daily.
Exercise and Lose Any Extra Weight.	Exercise increases HDL counts, removes triglycerides from the circulation, ratio of LDL particle size moves more harmful same particles to large particle size.

Three more factors you need to know about

Homocysteine

Homocysteine is an amino acid that promotes clotting and increases arterial damage (7). Studies have shown that individuals with high levels of homocysteine are three times more likely to have a heart attack (8)(9). For each three units that homocysteine increases, there is a 35% increase in heart attack risk (10).

Make this lifestyle change...	More Information...
Take folic acid, B6, B12 and trimethylglycine (TMG).	Testing for homocysteine levels is extremely important to determine the correct levels of these supplements for reducing homocysteine levels (8)(9).

Fibrinogen

High levels of fibrinogen are linked to both heart disease and stroke. Fibrinogen causes damage to arteries and restricts the blood flow. Factors associated with fibrinogen levels include smoking, stress, obesity, and the aging process (11).

Make this lifestyle change...	More Information...
Take antioxidants and fish oil.	Antioxidant capacity is important in reducing the effect and risk associated with fibrinogen and cardiovascular disease. Additionally, both fish and olive oil have been shown to lower fibrinogen in women who have elevated fibrinogen levels. The minimum daily amount of fish oil required to produce a fibrinogen-lowering effect is 6 grams (11).

Cardiovascular Disease and Insulin

Decreased insulin sensitivity can be a primary trigger for early endothelial dysfunction. When insulin sensitivity decreases there is reduction in dilation ability of the lining of a blood vessel. Decreased dilation ability is often one of the hallmark warning signals of future atherosclerosis (13).

Insulin resistance is also associated with increased triglycerides, elevated LDL cholesterol, lower HDL cholesterol, and oxidative stress--the potentially damaging combination of stimuli that typically drive the process of atherosclerosis (14)(15).

Make this lifestyle change...	More Information...
Change your diet and, take chromium.	To help increase insulin sensitivity and will enhance cellular absorption, take 200 mg of chromium twice daily. Reduce the glycemic load by increasing protein intake, reducing saturated fats, and avoiding refined carbohydrates. (23)

Conclusion

Testing or the proper markers is essential in the prevention of cardiovascular disease. Besides blood pressure levels, total cholesterol, triglycerides, LDL, and HDL levels we must test for several other factors. Specifically we inform our patient of the need for testing: LDL subclasses and particle size, Lipoproteins, Homocysteine levels, Fibrinogen levels, and LDL oxidation times.

With this information we can recommend appropriate lifestyle and dietary protocols to substantially decrease the risks of CVD.

Chiropractors must also research CVD. There is a mass of anecdotal evidence that spinal manipulation lowers blood pressure, but there are no conclusive studies. Research is now showing a relationship between the sympathetic nervous system, insulin levels and cardiovascular function. Either we help lead this new era of information or we get left behind, the choice is ours.

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