

The Three Main Causes of Hypertension

First Cause of Hypertension

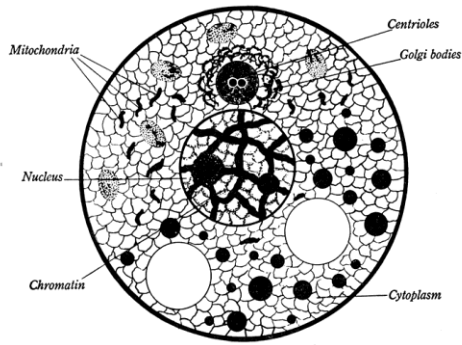


FIG. 26. A Typical Cell

Hypertension is a major contributor to heart disease, but do you know what the main hypertension cause is? Well, by now we pretty much know that the main cause of high blood pressure is an imbalance in our body cells caused by the food we eat. By learning how this imbalance happens, we can understand how to prevent and cure high blood pressure.

The sodium-potassium electric generator

A cell is an organism that is highly organized. If you disturb that mechanism, things start to go wrong in the body. And that is exactly what happens with hypertension. High blood pressure is a disturbance of the balance found in body cells.

Every living cell has an electrical system, formed by different electric generators. One of them is the sodium-potassium generator. In order for this generator to work properly, the level of sodium in the cells has to be lower than the level of potassium. It should be in a proportion of about 1 to 4, meaning, for each part of sodium there must be at least four parts of potassium.

Our cells get the sodium and potassium they need from food. Nature has provided for this order by making unprocessed food cells to contain more potassium than sodium. When we don't eat according to nature, we create an imbalance between sodium and potassium. This imbalance results in elevated blood pressure which in turn can cause other problems that we often see in hypertension.

The calcium pump

Another mineral needed to keep the cells electrical system working is calcium. Our muscles need a very low amount of calcium to move and relax. However, when the sodium-potassium ratio is out of balance, calcium levels increase inside the cell. This causes the tiny muscles that surround blood vessels and control blood pressure, to contract more and not to relax. The result:

hypertension.



Your blood pressure is created by your heart sending blood through your large arteries. If the blood could just navigate through the arteries to deliver nutrients to every cell in the body, not too much pressure would be created. However, the arteries branch into very tiny blood vessels, the arterioles.

Arterioles resist the flow of the blood thus elevating blood pressure.

The signals that tell the muscles in the walls of the arterioles whether or not to constrict or relax are carried mainly by the level of calcium inside the cells. And we know that a high level of calcium inside the cell is due to too much sodium and very little potassium.

An increase of calcium inside the sympathetic nerve cells that regulate blood contraction increases the releasing of hormones such as adrenalin, causing further contraction of the smooth muscle cells of the small arteries.

It is well established by now that much of the brain damage due to strokes is from an increase in calcium inside nerve cells but remember, the excess of calcium inside the cell is due to too much sodium and not enough potassium.

From what I have said, you may think that extra calcium in your diet may be bad for hypertension. Not really. Too little calcium we'll cause hypertension (too much will have the same effect). This is how it works:

Adequate levels of calcium in the body keep excess calcium from entering the cells. The reason is that the cell membrane has orifices. When there is enough calcium in the body, the calcium puts pressure on the cell membrane and prevents leakiness that allows extra calcium to get inside the cell. If there is not enough calcium in the body, the orifices in the membrane are open and calcium gets in.

How does magnesium help?

This is another mineral necessary for the cell battery to work. Magnesium helps the cell maintain a normal level of potassium which helps the cell's electrical system to function properly. A lack of magnesium will throw off the sodium-potassium balance which in turn, will increase the calcium inside the cell. Again, an excess of calcium inside the cell prevents the muscles of the tiny vessels to relax and the result is hypertension.



As you can see, minerals are needed in the right proportions in order for cells to function and prevent many chronic conditions such as hypertension. If you have read my article on hypertension drugs, you may remember that although these drugs may lower blood pressure, they often fail to prevent strokes or death. This is not surprising since drugs are not designed to keep a balance between all these minerals.

Hypertension can be reversed

Research done with groups of individuals with hypertension had shown high level of sodium and low level of potassium in their blood cells. Although there are other factors that can contribute to

hypertension -we'll go through them within the next few days- as you have seen by now, an imbalance between sodium and potassium is the major cause of hypertension.

How can you reverse this sodium-potassium imbalance in the cells? By eating more fruits and vegetables and less processed foods. Follow a Mediterranean Diet. It is the diet that has kept Mediterraneans free from high blood pressure.

Guys, this is not rocket science. Processed foods have a lot of sodium. If your diet consists of too many packaged foods, your cells we'll end up with too much sodium and not enough potassium. Read the [Nutrition Label](#) to understand how much sodium is too much.



On the other hand, if you eat more fruits and vegetables and less salt, your cells will receive more potassium than sodium, the calcium will do what it is supposed to do and your cells will not create a situation of high blood pressure.

The Second Main Cause of Hypertension

So far we have seen how an imbalance between four elements, sodium, potassium, calcium and magnesium causes your blood pressure to go up. If you have high blood pressure, a second hypertension cause can very well be that you are not physically active. This is due to the fact that lack of exercise is connected to higher levels of insulin in the blood which in turn is linked to high blood pressure as we will see.

Lack of exercise means high levels of blood insulin

People who have elevated blood levels of insulin, who have type 2 diabetics, are obese or don't exercise, tend to have hypertension. Having a high level of insulin in the blood is a very important issue when it comes to high blood pressure and should concern everyone belonging to any of these groups since it can cause the following:

1. Increase the production of triglycerides
2. Decrease the "good" HDL cholesterol
3. Promote a higher amount of cholesterol and triglycerides in the arteries
4. Increase the thickness of the arteries
5. Stimulate the growth of the muscles that constricts the arteries.

As you may have guessed by now, all these factors narrow the arteries, leaving less space for the blood to flow which means your blood pressure will go up. Thus, we can conclude that in an indirect way, high levels of insulin do the following:

1. They cause the arteries to narrow.
2. They increase the risk for strokes and heart attacks

So, you can see that elevated insulin levels that often occur in people with hypertension are of critical importance and cannot be ignored.

Exercise lowers high levels of blood insulin

If something is clear by now it is that the proper prevention of high blood pressure implies changing our lifestyle. This means not only changing our eating habits where we eat more fruits and vegetables and less processed foods, but also practicing adequate exercise.

We have seen in my articles on "[Diabetes and exercise](#)" how there are two kinds of exercise that lower blood sugar and consequently blood insulin. These two types of exercise are aerobic exercise such as brisk walking and building muscle strength. You can read now the whole series [Diabetes and exercise](#) to learn the mechanisms of how exercise lowers blood insulin.

Exercise makes muscles more responsive to insulin and decreases the blood level of this hormone. Lower levels of insulin also decrease any tendency of your body to convert calories into fat.



5 indirect ways exercise lowers your blood pressure

1. Exercise returns blood pressure toward normal.

The drop in blood pressure is connected to the decrease of insulin levels in the blood. Many scientific studies have shown that aerobic exercise can be remarkably effective in better regulating blood pressure and can even produce a fall in blood pressure in people with severe hypertension.

2. Exercise decreases body fat. Losing excess weight may be essential for reducing blood pressure. Exercising at least 3 times a week plays a very important part in maintaining normal weight. In fact, any effective program to reduce weight and lower blood pressure requires at least some

aerobic exercise in the long run.

- 3. Exercise decreases the level of triglycerides and LDL cholesterol, the one that causes heart attacks.** These two fats are responsible for the formation of fat deposits in your arteries. We should be careful not to let this happen. We have seen that high levels of insulin trigger the formation of triglycerides and LDL cholesterol and we also know that exercise can lower high levels of insulin. Thus, it is not surprising that exercise lowers the bad fats in the blood.

4. **Exercise increases HDL cholesterol, the “good” cholesterol.** HDL carries the bad cholesterol to the liver where it can be converted into bile and excreted through the feces. Given the fact that high levels of insulin in the blood lower HDL, we can state that exercise, through the mechanisms of decreasing blood insulin, increases HDL cholesterol.
5. **Exercise increases the stability of electrical activity of the heart.** Remember that the heart is a muscle and can benefit greatly from exercise. In fact, making the heart stronger through exercise increases the chances of surviving a heart attack. This is in part because exercise makes more stable the electrical activity of your heart muscle. In a study with animals, the chance of heart fibrillation (abnormal electrical activity that makes the heart stop pumping blood) was decreased in those animals that went through exercise training.



Warning

Before you embark on an exercise program, talk to your doctor. Through a blood test and an exercise stress test EKG he can assess your risk and let you know what precautions you need to take to prevent a heart attack while exercising.

Final Thought

You might as well get used to the idea that you need to make exercise a part of your life, the same way you need to sleep, eat, or drink (water, of course) to keep yourself alive.

You may argue that the fact you are still alive and reading this article is a sign you can live without exercising, therefore you are right and health authorities are wrong. You definitely have a point here, but if you continue this path of inactivity, eventually you will pay a high price. That price will be a shorter life or one with no quality, because health issues will be very much part of your life. Let's work on prevention, please!

Third Main Cause of Hypertension

Besides an imbalance between [sodium and potassium](#) in our cells and [lack of exercise](#), there is one more main factor that causes hypertension: overweight. Hypertension is one of many **obesity effects**, especially the one known as abdominal obesity. Thus, the third step for lowering your blood pressure is to get rid of excess body fat.

Obesity creates hormone imbalances

In an overweight person, certain blood hormones do not work properly, causing malfunctioning in the body cells. Two examples are:

1. Hormones that cause an imbalance between sodium and potassium in the cells, which contributes to hypertension. Getting rid of excess fat helps blood hormones return to normal levels, allowing the body to maintain the right ratio between sodium and potassium, as long, of course, as the diet includes enough potassium and not too much sodium.

2. Excess fat causes insulin resistance. Losing some extra pounds lowers blood insulin. In many people this helps the kidneys excrete more sodium, resulting in lower blood pressure. Clinical studies have shown that just losing one third to one half of extra weight brings blood pressure back to normal.



On the other hand, not losing the extra fat may prevent the balance between sodium and potassium from going back to normal. It may also prevent medication from lowering your blood pressure.

What causes you to gain weight?

Until not too long ago, common knowledge was that if you were overweight it was because you ate too much. However, contrary to what some people still believe, an overweight person doesn't necessarily eat too much. In fact, most of the times, it is just the opposite. Studies have shown that in a population of overweight people the following is true:

1. Only 15% eats too much
2. 34% eats normal portions
3. 51% eats little, too little in some of the cases, indeed



How do you build your body fat?

Most of our energy comes from food. When you eat, your body uses that food in three ways:

1. It produces heat
2. It maintains your organ functions working
3. It allows you to do physical work.

The rest of the energy is used to build body proteins or is stored in your fat cells. Based on these facts, we can think that eating less will solve the problem. No doubt it helps,

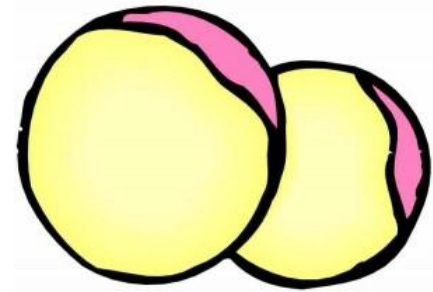
large portions have become a problem in the United States, but there are other mechanisms that also play a part in the storage of fat in body cells.

Mechanisms that determine what goes into the fat cells

The body has some regulatory systems that determine to a certain extent what is stored as fat and what it is used in the production of heat and work.

Factors that increase calories to be stored as fat: insulin and white fat cells. Insulin prevents fat from being used up, which means it is stored in fat cells. White fat cells tend to store fat also.

Factors that increase calories to be used as heat and work: thyroid hormone, brown fat cells, and the sodium-potassium mechanism. Thyroid hormone increases heat production. The mechanisms of sodium-potassium also produce heat. Brown fat cells tend to burn fat more than store it.



Fat Cells

Although these mechanisms control to a large extent the amount of fat in your body, it can be influenced as we will see in our next articles. You have probably understood by now why following a diet that cut calories down is not enough to lose fat. It definitely helps, but other factors need to be involved to accomplish that goal.

Factors that help you lose weight

- **Exercise.** Not only you produce more heat while exercising, but you influence your blood hormones such as insulin, thyroid, and adrenaline causing the body to lose more heat even when you are not exercising.
- **Cutting down in calories.** Just by cutting your food portions changes the levels of some hormones such as insulin and thyroid hormone which instruct the body to store more fat.
- **Restoring the balance between sodium and potassium.** Studies have shown that a potassium deficiency decrease the number of sodium-potassium pumps in the cells, producing less heat.
- **Influencing the way some blood hormones work through a proper diet.** Eating the proper way you can lower the level of blood insulin, one of the reasons why you store more fat.

Final Thoughts

Losing weight is not easy, and keeping it off is even more difficult, but hypertension occurs twice as often among obese people than does among people with normal weight. Dealing with hypertension, The Joint National Committee recommends that overweight people lose some extra pounds.

To your health!

Emilia Klapp, RD,BS

Your Diabetes Coach

www.TheDiabetesClub.com

Helping you lower blood sugar through nutrition and exercise