

Reiwa 7<sup>th</sup> year

Public lectures for citizens

## **A simple story about high blood pressure2**

~What is treatable hypertension?~

Thank you for visiting our open on-line lecture today.

My name is Takashi Ando, and I work in the Nephrology Department at Kawasaki Municipal Hospital.

Today, as the second installment of our lectures on treatable high blood pressure, I would like to talk about a simple story of treatable hypertension.

First of all, what is blood pressure? You may have heard terms like voltage and water pressure. Like voltage and water pressure, blood pressure is determined by the product of blood flow and vascular resistance. Maintaining this blood pressure plays an important role in circulating blood to all organs throughout the body.

Therefore, if either blood flow, or vascular resistance, or both, increases, blood pressure will rise.

By viewing blood pressure as the product of blood flow and vascular resistance in this way, we can more easily understand what is causing our daily blood pressure to rise and what efforts we should make to improve it.

By factoring blood pressure and dividing it into blood flow and vascular resistance, we can see which lifestyle improvements are needed to lower our blood pressure - in other words, our weaknesses or challenges. Knowing whether the cause of your elevated blood pressure is vascular resistance or increased blood flow will more clearly clarify what you should focus on, such as correcting excessive salt intake, controlling stress, or improving lack of exercise.

The second benefit is that by separating each element, you can make your goals more specific. In the second half of today's lecture, I would like to talk about ways to overcome each challenge.

The third benefit is that, even so, improving your lifestyle is not easy. Difficult goals tend to be put off. By factoring these difficulties, you can make your progress a little more visible.

Now, returning to the topic of blood pressure, I would like to first explain how increased

blood flow causes blood pressure to rise.

On average, Japanese people consume about 11g of salt per day. It is said that in the past, people in some areas consumed nearly twice that amount, so this has decreased significantly.

While this is very good for blood pressure, as most salt is excreted through the kidneys, kidney function gradually declines with each passing year, and the body's ability to excrete salt weakens.

When we were young, even if we ingested a lot of salt, it was properly excreted through sweat and the kidneys, so blood flow did not increase and blood pressure did not rise. However, as we get older and our ability to excrete salt weakens, blood pressure is more likely to rise.

So, as the kidneys weaken with age, are you treating them roughly?

Of course, even the kidneys cannot defeat aging, but there are a few ways to protect your kidneys, which I would like to introduce.

For one thing, as I mentioned earlier, it is the kidneys that excrete salt. Be careful not to consume too much salt to avoid putting a strain on the kidneys.

Secondly, some painkillers and other medications put a strain on the kidneys. In particular, people who are taking painkillers should be careful not to take too much.

Thirdly, when blood pressure rises, it puts a strain on the kidneys. Please pay attention to your blood pressure on a regular basis, and if it is high, be sure to lower it properly.

Regarding salt restriction, I'd like to add that there are some people for whom salt restriction lowers their blood pressure more easily and some for whom it does not.

What I've shown is only a small portion of the examples, but on the left side of the slide, for example, elderly people and those with a history of kidney disease have reduced kidney function and are more likely to have their blood pressure rise when they ingest salt more than necessary.

Conversely, the fact that blood pressure is more likely to rise also means that limiting salt intake is more likely to lower blood pressure.

Similar reports have shown that salt restriction is more likely to be effective in women than men, black people than whites, and obese people.

Because salt is excreted by the kidneys, consuming salt may not raise blood pressure if the kidneys are functioning well. However, as you get older and your kidneys begin to function less well, consuming too much salt can raise your blood pressure. Conversely, restricting salt intake can help lower your blood pressure.

Now, let's consider vascular resistance, another cause of elevated blood pressure.

What causes blood vessels to continue constricting or not dilate?

It's true that tension raises blood pressure. It's difficult to imagine a completely stress-free life, but the question is whether that stress only occurs during short, intense competitions and is then relieved, or whether tension increases vascular resistance and keeps blood pressure high all day, even when you're sleeping. If your blood pressure is elevated all day, that's not good.

Exercise temporarily raises blood pressure, but many studies have shown that daily exercise and reducing obesity can lower vascular resistance and blood pressure in the long term.

If you want to improve your lifestyle or adjust your body weight to lower your blood pressure, please take the courage to make these lifestyle changes.

On the other hand, as blood vessels age and harden, they become more difficult to dilate. This arteriosclerosis gradually progresses with age, increasing vascular resistance. In a sense, elevated blood pressure is something we have no choice but to accept.

As you have all learned, there are simple factorizations where you can get an answer immediately by applying a formula, but there are also more difficult factorizations, and the subject is quite complex.

So, if you have complicated high blood pressure, please do not hesitate to consult a hypertension specialist.

Ninety percent of high blood pressure is essential hypertension, the so-called normal type that occurs when blood pressure gradually rises with age.

However, approximately 10% of high blood pressure is secondary hypertension, which occurs for a specific reason.

Secondary hypertension refers to high blood pressure where the cause is known, and some cases can be treated with surgery, etc. However, diagnosis and treatment can be somewhat difficult, and in some cases patients may need to visit several specialized hospitals or it may take a long time to receive a precise diagnosis. Secondary hypertension, which has a specific cause that is known, requires special treatment.

Secondary hypertension includes renal hypertension, which occurs when the kidneys deteriorate, and renal vascular hypertension, which occurs when the renal arteries that supply the kidneys become narrowed. Other types of hypertension include endocrine hypertension, which occurs when tumors that secrete hormones that increase blood

pressure develop in the adrenal glands or other endocrine organs. Other types include hypertension caused by sleep apnea syndrome and secondary hypertension caused by medications.

There is still much we do not understand about the mechanism behind elevated blood pressure, but today I have explained the causes of elevated blood pressure by dividing it into blood flow and vascular resistance.

Finally, I would like to share with you the words of Niebuhr. In his prayers to God, Niebuhr asked for three things.

First, an unwavering heart to accept the things that cannot be changed, such as arteriosclerosis that progresses with age.

Second, the courage to change the things that must be changed, such as lifestyle habits. And finally, he prayed for the intelligence to distinguish between what cannot be changed and what should be.

Some causes of elevated vascular resistance progress irreversibly with age, and not all cases of high blood pressure can be cured without the help of oral medication.

In that sense, we need to accept the passage of time, which we cannot change, with a firm and unwavering heart.

On the other hand, everyday lifestyle habits such as quitting smoking, not gaining weight, and not consuming too much salt can be changed with the power (courage) of each individual.

At a time of great change, Fukuzawa Yukichi wrote the following in his book "Encouragement of Learning." He said that the way to hone your judgment is to question things before making a decision. He said that judgment is necessary in order to make choices, and that learning is necessary to establish this judgment.

Understanding blood pressure is essential to lowering your blood pressure on your own. When you're young, your kidneys excrete excess salt without being conscious for health, and when you had a lifestyle and job that kept you physically active every day, you might have been able to eat as much as you wanted without gaining weight.

As times and society have changed, it seems we have also changed our lifestyles to adapt to the times.

I encourage everyone to deepen their understanding of blood pressure and make the effort to lower their blood pressure and reduce the diseases caused by high blood pressure.

Finally, a summary.

As I mentioned last time, blood pressure is determined by the product of blood flow and vascular resistance. If you can successfully factorize this blood pressure into blood flow and vascular resistance, you will be able to understand what is causing your blood pressure to rise.

If you do that, you will naturally see what you need to do to lower your blood pressure and what you should work on.

Once you've come this far, all that's left is your courage. So, be brave, understand your blood pressure, and do your best to live a long, healthy, and happy life.

Thank you for listening.

This concludes today's lecture.

Thank you for your hard work.