Insulin Resistance: The Real Culprit

By Ron Rosedale

Let's talk about a couple of case histories. These are actual patients that I've seen

Patient A saw me one afternoon and said that he had literally just signed himself out of the hospital "AMA," or against medical advice. Like in the movies, he had ripped out his IV's.

The next day he was scheduled to have his second by-pass surgery. He had been told that if he did not follow through with this by-pass surgery, within two weeks he would be dead. He couldn't walk from the car to the office without severe chest pain. He was on eight different medications for various things. But his first by-pass surgery was such a miserable experience he said he would rather just die than have to go through the second one and had heard that I might be able to prevent that.

To make a long story short, this gentleman right now is on no insulin. I first saw him three and a half years ago. He plays golf four or five times a week. He is on no medications whatsoever, he has no chest pain, and he has not had any surgery.

Patient B had a triglyceride level of 2200. Patient B was referred by patient A. His cholesterol was 950. He was on maximum doses of all of his medications. He was 42 years old, and he was told that he had

familial hyperlipidema and that he had better get his affairs in order, that if that was what his lipids were despite the best medications with the highest doses, he was in trouble.

He was not fat at all, he was fairly thin. Whenever I see a patient on any of those medications, they're off the very first visit. They have no place in medicine. He was taken off the medications and in six weeks his lipid levels, both his Triglycerides and his cholesterol were hovering around 220. Six more weeks they were both under 200.

I should mention that this patient had a CPK (creatine phosphokinase, an enzyme found mainly in the heart, brain, and skeletal muscle) that was quite elevated. It was circled on the lab report that he brought in initially with a question mark by it because they didn't know why. The reason why was because he was eating off his muscles, because if you take (gyinfibrozole) and any of the HMG co-enzyme reductase inhibitors (cholesterol lowering drugs) together, that is a common side effect, and they shouldn't be given together. So he was chewing up his muscles, including his heart which they were trying to treat. So if indeed he was going to die, it was the treatment that was going to kill him.

Patient C: a lady with severe osteoporosis. A fairly young woman and she was put on a high carbohydrate diet and told that would be of benefit, and placed on estrogen, which is a fairly typical treatment. They wanted to put her on some other medicines which she didn't want, she wanted to know if there was an alternative. Although we didn't have as dramatic a turn around, we got her to one standard

deviation below the norm in a year, taking her off the estrogen she was on.

Insulin in Chronic Disease

What would be the typical treatment of cardiovascular disease? First they check the cholesterol. High cholesterol over 200, they put you on cholesterol lowering drugs and what does it do? It shuts off your CoQ10. What does CoQ10 do? It is involved in the energy production and protection of little energy furnaces in every cell, so energy production goes way down. A common side effect of people who are on all these HMG co-enzyme reductase inhibitors is that they tell you their arms feel heavy. Well, the heart is a muscle too, and it's going to feel heavy too. One of the best treatments for a weak heart is CoQ10 for congestive heart failure. But medicine has no trouble shutting CoQ10 production off so that they can treat a number (cholesterol figure).

The common therapies for osteoporosis are drugs

For cancer reduction there is nothing.

But all of these have a common cause.

The same cause as Aging.

Aging

There are three major centenarian studies going on around the world. They are trying to find the variable that would confer longevity among

these people. Why do centenarians become centenarians? Why are they so lucky? Is it because they have low cholesterol, exercise a lot, live a healthy, clean life? Well the longest recorded known person who has ever lived, Jean Calumet of France who died last year at 122 years, smoked all of her life and drank. What they are finding on these major centenarian studies is that there is hardly anything in common among them. They have high cholesterol and low cholesterol, some exercise and some don't, some smoke, some don't. Some are nasty and ornery as can be and some calm and nice.

But one thing is common, they all have low sugar, relatively for their age. They all have low triglycerides for their age. And they all have relatively low insulin. Insulin is the common denominator in everything I've just talked about. The way to treat cardiovascular disease, the way I treated the high risk cancer patient, and osteoporosis, high blood pressure, the way to treat virtually all the so-called chronic diseases of aging is to treat insulin itself.

The other major avenue of research in aging has to do with genetic studies of so-called lower organisms. We've the entire genes mapped out for several species of yeast and worms.

We think of life span as being fixed but in lower forms of life it is very plastic. Life span is strictly a variable depending on the environment. If there is a lot of food around they are going to reproduce quickly and die quickly, if not they will just bide their time until conditions are better.

We know now that the variability in life span is regulated by insulin.

Insulin is found as in even single celled organisms. It has been around for several billion years. And its purpose in some organisms is to regulate life span. The way genetics works is that genes are not replaced, they are built upon. We have the same genes as everything that came before us. We just have more of them. We have added books to our genetic library, but our base is the same. What we are finding is that we can use insulin to regulate lifespan too.

If there is a single marker for lifespan, as they are finding in the centenarian studies, it is insulin, specifically, insulin sensitivity or insulin resistance.

Insulin Resistance

Insulin resistance is the basis of all of the chronic diseases of aging.

In almost all cases if you treat a symptom, you are going to make the disease worse because the symptom is there as your body's attempt to heal itself. The medical profession calls the symptoms diseases. Using Ear Nose and Throat medicine for example, that patient will walk out of there with a diagnosis of Rhinitis which is inflammation of the nose. Is there a reason that patient has inflammation of the nose? I think so. Wouldn't that underlying cause be the disease as opposed to the descriptive term of Rhinitis or Pharyngitis? Some one can have the same virus and have Rhinitis or Pharyngitis, or Sinusitis, they can have all sorts of "itises" which is a descriptive term for inflammation. They treat what they think is the disease which is just a symptom.

It is the same thing with cholesterol. If you have high cholesterol it is called hypercholesterolemia. Hypercholesterolemia has become the code for the disease when it is only the symptom. So they treat that symptom and what are they doing to the heart? Messing it up.

If you are going to treat any disease, you need to get to the root of the disease. If you keep pulling a dandelion out by it's leaves, you are not going to get very far. But the problem is that we don't know what the root is, or we haven't. They know what it is in many other areas of science, but the problem is that medicine really isn't a science, it is a business.

It doesn't matter what disease you are talking about, whether you are talking about a common cold or about cardiovascular disease, or osteoporosis or cancer, the root is always going to be at the molecular and cellular level, and I will tell you that insulin is going to have its hand in it, if not totally controlling it.

The Purpose of Insulin

As I mentioned, in some organisms it is to control their lifespan, which is important. What is the purpose of insulin in humans? If you ask your doctor, they will say that it's to lower blood sugar and I will tell you right now, that is a trivial side effect. Insulin's evolutionary purpose is to **store excess nutrients**.

Storing Fat We come from a time of feast and famine and if we couldn't store the excess energy during times of feasting, we would all not be here, because we all have had ancestors that encountered

famine. So we are only here because our ancestors were able to store nutrients, and they were able to store nutrients because they were able to elevate their insulin in response to any elevation in energy rich foods that the organism encountered. When your body notices that the sugar is elevated, it is a sign that you've got more than you need right now, you are not burning it so it is accumulating in your blood. So insulin will be released to take that sugar and store it. How does it store it? Glycogen. Do you know how much glycogen you have in your body at any one time? Very little. All the glycogen stored in your liver and all the glycogen stored in your muscle if you had an active day wouldn't last you the day. Once you fill up your glycogen stores how that sugar is stored? Saturated fat.

So the idea of the medical profession to go on a high complex carbohydrate, low saturated-fat diet is an absolute oxymoron, because those high complex carbohydrate diets are nothing but a high glucose diet, or a high sugar diet, and your body is just going to store it as saturated fat. The body makes it into saturated fat quite readily.

Building Muscle It is an anabolic hormone. Body builders are using insulin now because it is legal, so they are injecting themselves with insulin because it builds muscle, it stores protein too.

Storing Magnesium

A lesser known fact is that insulin also stores magnesium. If your cells become resistant to insulin, since you can't store magnesium so you lose it, in the urine. What is one of magnesium's major roles? To relax

muscles. Intracellular magnesium relaxes muscles. You lose magnesium and your blood vessels constrict, which increases blood pressure, and reduces energy since intracellular magnesium is required for all energy producing reactions that take place in the cell. But most importantly, magnesium is also necessary for the action of insulin. It is also necessary for the manufacture of insulin. So then you raise your insulin, you lose magnesium, and the cells become even more insulin resistant. Blood vessels constrict, glucose and insulin can't get to the tissues, which makes them more insulin resistant, so the insulin levels go up and you lose more magnesium. This is the vicious cycle that goes on from before you were born.

Insulin sensitivity is going to start being determined from the moment the sperm combines with the egg. If your mother, while you were in the womb was eating a high carbohydrate diet which is turning into sugar, we have been able to show that the fetus in animals becomes more insulin resistant. Worse yet, we are able to use sophisticated measurements, and if that fetus happens to be a female, they find that the eggs of that fetus are more insulin resistant.**Retaining Sodium** What else does insulin do? We mentioned high blood pressure, if your magnesium levels go down you get high blood pressure. We mentioned that the blood vessels constrict and you get high blood pressure. Insulin also causes the retention of sodium, which causes the retention of fluid, which causes high blood pressure and fluid retention: congestive heart failure.

One of the strongest stimulants of the sympathetic nervous system is high levels of insulin. What does all of this do to the heart? Not very

good things.

There was a study done a couple of years ago, that showed that heart attacks are two to three times more likely to happen after a high carbohydrate meal. They said specifically NOT after a high fat meal. Why is that? Because the immediate effects of raising your blood sugar from a high carbohydrate meal is to raise insulin and that immediately triggers the sympathetic nervous system which will cause arterial spasm, constriction of the arteries. If you take anybody prone to a heart attack and that is when they are going to get it.

Mediating blood lipids. The way you control blood lipids is by controlling insulin. We won't go into a lot of detail, but we now know that LDL cholesterol comes in several fractions, and it is the small, dense LDL that plays the largest role in initiating plaque. It's the most oxidizable. It is the most able to actually fit through the small cracks in the endothelium. And that's the one that insulin actually raises the most. When I say insulin, I should say insulin resistance. It is insulin resistance that is causing this.

Cells become insulin resistant because they are trying to protect themselves from the toxic effects of high insulin. They down regulate their receptor activity and number of receptors so that they don't have to listen to that noxious stimuli all the time. It is like having this loud, disgusting rap music played and you want to turn the volume down. You might think of insulin resistance as like sitting in a smelly room and pretty soon you don't smell it anymore because you get desensitized. It's like you are starting to go deaf and your are telling

others to speak up because you can't hear them, so if I was your pancreas, I would just start talking louder, and what does that do to your hearing? You would become deafer.

Insulin Restistance Role in Heart Disease, Cancer and Osteoporosis

Insulin stimulates cells to divide. If all of the cells were to become resistant to insulin we wouldn't have that much of a problem. The problem is that all of the cells don't become resistant. Some cells are incapable of becoming very resistant. The liver becomes resistant first, then the muscle tissue, then the fat. When the liver becomes resistant insulin suppresses its production of sugar. When you wake up in the morning it is a reflection of how much sugar your liver has made. If your liver is listening to insulin properly it won't make much sugar in the middle of the night. If your liver is resistant, those brakes are lifted and your liver starts making a bunch of sugar so you wake up with a bunch of sugar.

The next tissue to become resistant is the muscle tissue. Insulin allows your muscles to burn sugar for so if your muscles become resistant to insulin it can't burn that sugar that was just manufactured by the liver. So the liver is producing too much, the muscles can't burn it, and this raises your blood sugar.

Fat cells also become resistant, but not for a while. It is only after a while that they become resistant. It takes them longer. Liver first, muscle second, and then your fat cells. So for a while your fat cells

retain their sensitivity. As people become more and more insulin resistant, their weight goes up. But eventually they plateau.

As all these major tissues become resistant, your liver, muscles and fat, your pancreas is putting out more insulin to compensate, so you are hyperinsulinemic and you've got insulin floating around all the time, 90 units, more. But there are certain tissues that **aren't** becoming resistant such as your endothelium, the lining of the arteries do not become resistant very readily. So all that insulin is effecting the lining of your arteries.

Insulin floating around in the blood causes a plaque build up. Insulin causes endothelial proliferation, that's the first step, it causes a tumor, an endothelial tumor. Insulin also causes the blood to clot too readily. Every step of the way, insulin's got its fingers in it and is causing cardiovascular disease. It fills it with plaque, it constricts the arteries, it stimulates the sympathetic nervous system, it increases platelet adhesiveness and coaguability of the blood. Any known cause of cardiovascular disease, insulin is a part of.

I mentioned that insulin increases cellular proliferation, what does that do to cancer? It increases it. And there are some pretty strong studies that show that one of the strongest correlations to breast and colon cancer are with levels of insulin.

Hyperinsulinemia causes the excretion of magnesium in the urine. What other big mineral does it cause the excretion of? Calcium. What is the cause of osteoporosis? There are two major causes, one is a high

carbohydrate diet which causes hyperinsulinemia. People walking around with hyperinsulinemia can take all the calcium they want by mouth and it's all going to go out in their urine.

The medical profession just assume a Calcium supplement has a homing device and it knows to go into your bone. What happens if you high levels of insulin and you take a bunch of calcium? Most of it is just going to go out in your urine. You would be lucky if that were the case because that part which doesn't does not have the instructions to go to your bone because the anabolic hormones aren't working. This is first of all because of insulin, then because of the IGF's from growth hormone, also testosterone and progesterone, they are all controlled by insulin and when they are insulin resistant they can't listen to any of the anabolic hormones. So your body doesn't know how to build tissue anymore, so some of the calcium may end up in your bone, but a good deal of it will end up everywhere else. Metastatic calcifications, including in your arteries.

Causes of Insulin Resistance

High Carbohydrate Diets

Any time your cell is exposed to insulin it is going to become more insulin resistant. That is inevitable, we cannot stop that, but the rate we can control. An inevitable sign of aging is an increase in insulin resistance. That rate is variable, if you can slow down that rate you can become a centenarian, and a healthy one. You can slow the rate of aging. Not just even the rate of disease, but the actual rate of aging itself can be modulated by insulin. We should be living to be 130, 140

years old routinely.

We talk about simple and complex carbohydrates, that is totally irrelevant, it means absolutely nothing. Carbohydrates are fiber or non-fiber. If you have a carbohydrate that is not a fiber it is going to be turned into a sugar, whether it be glucose or not. It may be fructose and won't necessarily raise your blood glucose, but fructose is worse for you than glucose.

Throughout most of the history of life on Earth there was no oxygen. Organisms had to develop very specific mechanisms of dealing with high levels of oxygen before there could ever be life with oxygen. So we evolved very quickly, as plants arose and developed a very easy means of acquiring energy, they could just lay back and catch rays, and they dealt with that oxygen with the carbon dioxide by spitting it out, they didn't want it around. So the oxygen in the atmosphere increased. All the other organisms then had to cope with that toxic oxygen. Many perished if they didn't have ways of dealing with it. One of the earliest ways of dealing with all that oxygen was for the cells to huddle together, so that at least the interior cells wouldn't be exposed to as much. So, multi-celled organisms arose after oxygen did. Of course, with that came the need for cellular communication.

Everyone knows that oxygen causes damage, but unfortunately, the press has not been as kind to publicize glycation. Glycation is the same as oxidation except substitute the word glucose. When you glycate something you combine it with glucose. Glucose combines with anything else really, it's a very sticky molecule. Just take sugar on your

fingers. It's very sticky. It sticks specifically to proteins. So the glycation of proteins is extremely important. If it sticks around a while it produces what are called advanced glycated end products: AGEs.

That acronym is not an accident. Glycation damages the protein to the extent that white blood cells will come around and gobble it up and get rid of it, so then you have to produce more, putting more of a strain on your ability to repair and maintain your body.

That is the best alternative; the worst alternative is when those proteins that can't turn over very rapidly get glycated , like collagen, or like a protein that makes up nerve tissue. These proteins cannot be gotten rid of, so the protein accumulates, and the AGEs accumulate and they continue to damage. That includes the collagen that makes up the matrix of your arteries. We know that there are receptors for AGEs, hundreds of receptors for every macrophage. They are designed to try to get rid of those AGEs, but what happens when a macrophage combines with an AGE product? It sets up an inflammatory reaction. We know that cardiovascular disease is an inflammatory process, any type of inflammation. You eat a diet that promotes elevated glucose, and you produce increased glycated proteins and AGEs, you are increasing your rate of inflammation of any kind. You get down to the roots of chronic illness, including arthritis, diabetes, headaches.

So we age and at least partially we accumulate damage by oxidation, and one of the most important types of tissues that oxygenate is the fatty component, the lipid, especially the poly-unsaturated fatty acids, they turn rancid. And they glycate, and the term for glycation in the

food industry is carmelization. They use it all the time, that is how you make caramel. So the way we age is that we turn rancid and we carmelize.

Diet for Healing Insulin Resistance

Caloric Restriction. There are thousands of studies done since the fifties on caloric restriction. They restrict calories of laboratory animals. It has been known since the fifties that if you restrict calories but maintain a high level of nutrition, called “C.R.O.N.’s:” **Caloric restriction with optimal nutrition**, these animals can live anywhere between thirty and two-hundred percent longer depending on the species. They’ve done it on several dozen species and the results are uniform throughout. They are doing it on primates now and it is working with primates, we won’t know for sure for about another ten years, they are about half way through the experiment, our nearest relatives are also living much longer.**Nutrient Dense foods are key.**

There are fifty-some essential nutrients to the human body. You know you need to breathe oxygen. It gives us life and it kills us. Same with glucose. Certain tissues require some glucose (which can be made from fat). It is essential. It gives us life and it kills us. We know that we have essential amino acids and we have essential fatty acids. They are essential for life, we better take them in as building blocks or we die. If we took all the essential nutrients that are known to man and computed the top ten foods that contain each nutrient that is required by the human body, grains would not come up in the top ten.

What is the minimum daily requirement for carbohydrates? ZERO. The food pyramid is based on a totally irrelevant nutrient.

Let's back up even further? Why do we eat?

41 **To gather energy**. The body stores excess energy as fat. Why does the body store it as fat? Because that is the body's desired fuel. That is the fuel the body wants to burn and that will sustain you and allow you to live. The body can store only a little bit of sugar. In an active day you would die if you had to rely one-hundred percent on sugar.

51 **To replace tissue,** to gather up building blocks for maintenance and repair.We need the building blocks and we need fuel, to have energy to obtain those building blocks and to fuel those chemical reactions to use those building blocks. So what are the building blocks that are needed? Proteins and Fatty acids. Not much in the way if carbohydrates. You can get all the carbohydrates you need from proteins and fats.

Sugar was never meant to be your primary energy source. Your brain will burn sugar, but it doesn't have to, it can burn by-products of fat metabolism called ketones. You can get enough sugar that your brain needs actually from fat; just eating one-hundred percent fat. Two triglycerides will give you a molecule of glucose. Glucose was meant to be fuel used if you had to, in an emergency situation, expend and extreme amount of energy, such as running from a saber tooth tiger. It is a turbo charger, a very hot burning fuel, if you need fuel over and above what fat can provide you will dig into your glycogen and burn sugar. But your primary energy source as we are here right now should be almost all fat.

But what happens if you eat sugar. Your body's main way of getting rid of it, because it is toxic, is to burn it. That which your body can't burn your body will get rid of by storing it as glycogen and when that gets filled up your body stores it as fat. If you eat sugar your body will burn it and you stop burning fat.

When you are insulin resistant and you have a bunch of insulin floating around all the time, you wake up in the morning with an insulin of 90. How much fat are you going to be burning? Virtually none. What are you going to burn if not fat? Sugar coming from your muscle. So you have all this fat that you've accumulated over the years that your body is very adept at adding to. Every time you have any excess energy you are going to store it as fat, but if you don't eat, you will still burn sugar because that is all your body is capable of burning anymore. Where is it going to get the sugar? Well you don't store much of it in the form of sugar so it will take it from your muscle. That's your body's major depot of sugar. You just eat up your muscle tissue. Any time you have excess you store it as fat and any time you are deficient you burn up your muscle.

So where do carbohydrates come in? They don't. **There is no essential need for carbohydrates.** SO why are we all eating carbohydrates? To keep the rate of aging up, we don't want to pay social security to everyone..

I didn't say you can't have any carbs, I said fiber is good. Vegetables are great, I want you to eat vegetables. The practical aspect of it is that you are going to get carbs, but there is no essential need. The

traditional Eskimo diet for most of the year subsists on almost no vegetables at all, but they get their vitamins from organ meats and things like eyeball which are a delicacy, or were. So, you don't really need it, but sure, vegetables are good for you and you should eat them. They are part of the diet that I would recommend, and that is where you'll get your vitamin C.

Fruit is a mixed blessing. You can divide food on a continuum. There are some foods that I really can't say anything good about since there is no reason really to recommend them. And the other end of the spectrum are foods that are totally essential, like:

Omega 3 fatty acids for instance which most people are very deficient in, and even those have a detriment because they are highly oxidizable, so you had better have the antioxidant capacity. So if you are going to supplement with cod liver oil you should supplement with **Vitamin E** too or it will actually do you more harm than good. Omega 3 oils can be a double edged sword. Most food is a double edged sword. Like oxygen and glucose, they keep us alive and they kill us, eating is the biggest stress we put on our body and that is why in **caloric restriction** experiments you can extend life as long as you maintain dense nutrition. This is the only proven way of actually reducing the rate of aging, not just the mortality rate, but the actual rate of aging, because eating is a big stress.

ChromiumChromium, it depends on who you are dealing with, but are we talking about a diabetic patient which is supposed to be the topic of this talk, yes, all my diabetics go on 1,000 mcg. Of chromium,

some a little bit more if they are really big people. Usually 500mcg for a non-diabetic. It depends on their insulin levels. I don't care so much what their sugar levels are, I care what their insulin levels are, which is a reflection of their insulin sensitivity.

CarnitineCarnitine is a shuttle. It takes fatty acids into the cell. You can't burn fat without it. I say they should take as much carnitine as they can afford.

Co Q10 It is involved in the energy production of all cells. It protects the mitochondria from electron leakage and damage. Give anywhere from 100 to 500mg, depending on the kind of Q10, some are more absorbable than others.

Vanadyl Sulfate An insulin mimic, so that it can basically do what insulin does by a different mechanism. If it went through the same insulin receptors, then it wouldn't offer any benefit, but it doesn't, it actually has been shown to go through a different mechanism to lower blood sugar, so it spares insulin and then it can help improve insulin sensitivity. On someone who I am trying to really get their insulin down I go 25mg 3X/day temporarily.

B Vitamins are necessary in the conversion of all energy, so they all get extra B Vitamins, usually in a multi.

GlutamineI put people on glutamine powder. Glutamine can act really as a brain fuel, so it helps eliminate carbohydrate cravings while they are in that transition period. I like to give it to them at night and I

tell them to use it whenever they feel they are craving carbohydrates. They can put several grams into a little water and drink it and it helps eliminate carbohydrate cravings between meals.

Other therapeutic doses of nutrients include:

Elemental magnesium 300 to 400 depending on what their gut can tolerate. I like I.V. magnesium to replenish them.

Vitamin E, big fan of Vitamin E, I would go to 2000mg.

Zinc, 30 to sixty mg, balanced with 2mg of copper per 15 mg of zinc, usually 4mg of copper sebacate.

Taurine: 1gm twice a day.

Vanadium 25mg for about two to three months. Then down to 71/2 mg three times a day, then I'll go down further, then I take them off completely once they are better.

They can have as much glutamine as they want and as much carnitine as they can afford. The more the better

I use **gymnema sylvestre** a lot.

Sardines are a very good therapeutic food. They are baby fish so they haven't had time to accumulate a bunch of metal. They are smoked so they are not cooked and the oil is not spoiled in them. You have to eat

the whole thing. Not the boneless and skinless. You need to eat all the organs and they are high in vitamins and magnesium.

DNA glycates. So if people are worried about chromosomal damage from chromium, what they should really be worried about instead is high blood sugar. DNA repair enzymes glycate as well. Insulin is by far your biggest poison. .

Insulin should be tested on everybody repeatedly, and why it is not is only strictly because there hasn't been drugs till recently that could effect insulin, so there is no way to make money off of it. Fasting insulin is one way to look at it, not necessarily the best way. But it is the way that everybody could do it. Any family doctor can measure a fasting insulin. There are other ways to measure insulin sensitivity that are more complex that we do sometimes. We use intravenous insulin and watch how rapidly their blood sugar crashes in a fasting state in 15 minutes and that assesses insulin sensitivity, then you give them dextrose to make sure they don't crash any further. There are other ways that are utilized to directly assess insulin sensitivity, but you can get a pretty good idea just by doing a fasting insulin.

Related Information

Acid/Alkaline It is a high protein diet that will increase an acid load in the body, but not necessarily a high fat diet. Vegetables and greens are alkalinizing, so if you are eating a lot of vegetables along with your protein it equalizes the acidifying effect of the protein. I don't recommend a high protein diet. I recommend an adequate protein diet. I think you should be using fat as your primary energy source,

and fat is kind of neutral when it comes to acidifying or alkalinizing. In general, over 50% of the calories should come from fat. When we get to fat, the carbohydrates are clear cut, no scientist out there is really going to dispute what I've said about carbohydrates. There is the science behind it. You can't dispute it. There is a little bit of a dispute as to how much protein a person requires. When you get to fat, there is a big grey area within science as to which fat a person requires. We just have one name for fat, we call it fat or oil. Eskimos have dozens of names for snow and east Indians have dozens of names for curry. We should have dozens of names for fat because they do many different things. And how much of which fat to take is still open to a lot of investigation and controversy.

My take on fat is that if I am treating a patient who is generally hyperinsulinemic or overweight, I want them on a low saturated fat diet. Because most of the fat they are storing is saturated fat. When their insulin goes down and they are able to start releasing triglycerides to burn as fat, what they are going to be releasing mostly is saturated fat. So you don't want to take anymore orally. There is a ration of fatty acids that is desirable, if you took them from the moment you were born, but we don't, we are dealing with an imbalance here that we are trying to correct as rapidly as we can. You have plenty of saturated fat. Most of us here have enough saturated fat to last the rest of our life. Truthfully. Your cell membranes require a balance of saturated and poly-unsaturated fat, and it is that balance that determines the fluidity. As I mentioned, your cells can become over-fluid if they don't have any saturated fat. Saturated fat is a hard fat. We can get the fats from foods to come mostly from nuts. Nuts are

a great food because it is mostly mono-unsaturated. Your primary energy source ideally would come mostly from mono-unsaturated fat. It's a good compromise. It is not an essential fat, but it is a more fluid fat. Your body can utilize it very well as an energy source.

Sugar and Hormones We only have one hormone that lowers sugar, and that's insulin. Its primary use was never to lower sugar. We've got a bunch of hormones that raise sugar, cortisone being one and growth hormone another, and epinephrine, and glucagon. Our primary evolutionary problem was to raise blood sugar to give your brain enough and your nerves enough and primarily red blood cells, which require glucose. So from an evolutionary sense if something is important we have redundant mechanisms. The fact that we only have one hormone that lowers sugar tells us that it was never something important in the past.

So you get this rush of sugar and your body panics, your pancreas panics and it stores, when it is healthy, insulin in these granules, ready to be released. It lets these granules out and it pours out a bunch of insulin to deal with this onslaught of sugar and what does that do? Well the pancreas generally overcompensates, and it causes your sugar to go down, and just as I mentioned, you have got a bunch of hormones then to raise your blood sugar, they are then released, including cortisone. The biggest stress on your body is eating a big glucose load. Then Epinephrine is released too, so it makes your nervous and it also stimulates your brain to crave carbohydrates, to seek out some sugar, my sugar is low. So you are craving carbohydrates, so you eat another bowl of cereal, or a big piece of fruit,

you eat something else so that after your sugar goes low, and with the hormone release, and with the sugar cravings and carbohydrate craving your sugars go way up again which causes your pancreas to release more insulin and then it goes way down. Now you are in to this sinusoidal wave of blood sugar, which causes insulin resistance. Your body can't stand that for very long. So you are constantly putting out cortisone.

The more hormones your cells are exposed to, the more resistant they will become to almost any hormone. Certain cells more than others, so there is a discrepancy. The problem with hormone resistance is that there is a dichotomy of resistance, that all the cells don't become resistant at the same time. And different hormones affect different cells, and the rate of hormone is different among different cells and this causes lots of problems with the feedback mechanisms. We know that one of the major areas of the body that becomes resistant to many feedback loops is the hypothalamus.

Hypothalamic resistance to feedback signals plays a very important role in aging and insulin resistance because the hypothalamus has receptors for insulin too. I mentioned that insulin stimulates sympathetic nervous system, it does so through the hypothalamus, which is the center of it all.