Insulin and Its Metabolic Effects
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Let's talk about a couple of case histories. These are actual patients that I've seen; let's start with patient A. This patient who we will just call 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 102 units of insulin and his blood sugars were 300 plus. 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. He started an organization called "Heart Support of America" to educated people that there are alternatives to by-pass surgery that have nothing to do with surgery or medication. That organization, he last told me had a mailing list of over a million people, a large organization, "Heart Support of America."

Patient B is a patient who had a triglyceride level of 2200. Patient B was referred by patient A. He had a triglyceride of 2200, cholesterol of 950 and 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, off of the medications. They have no place in medicine.

I should mention that this patient had a CPK 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 (gemfibrozole) and any of the HMG co-enzyme reductase inhibitors together, that is a common side effect that is in the PDR, 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 going to be that treatment that was going to kill him.

Let's go to something totally different, a lady with severe osteoporosis. She is almost three standard deviations below the norm in both the hip femeral neck and the cervical vertebrae, and she is very worried about getting a fracture. 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 and she didn't want to, 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, anyway.

Let's go to claudication.

That is severe angina of the leg when you walk, same thing as angina of the heart except of the leg. While walking, after walking a certain distance, there is pain. There was a gentleman who had extremely severe claudication, who happens to be my stepfather. It was a typical case, he would walk about fifty yards and then he would get severe, crampy pain in his legs. He was quite well off and was going to see the best doctors in Chicago, and they couldn't figure out what was wrong with him initially.

He went to a neurologist, they thought it might be neurological pain or back pain. He finally went to a vascular surgeon who said he thought it was vascular disease, so they did an arthrogram and sure enough, he had severe vascular disease. They wanted to do the typical by-pass surgery that they normally do on this. He was thinking of going in for the surgery for one reason, they had a trip planned to Europe in two weeks, and he wanted to be able to walk since they normally do a lot of walking.

Ten years previously he'd had an angioplasty for heart disease. At the time ten years ago, I told him he had to change his diet and he didn't of course. But this time he listened. I said that if he was not going to have a by-pass, then do exactly what I tell you to do and in two weeks you'll be walking just fine because by modulating this one aspect of his disease, I have never seen it not work, and it works very quickly to open up the artery.

We can talk about a patient with a very high cancer risk.

She had a mother and a sister who both died of breast cancer and she didn't want to, so she came in and I put her on the exact same treatment as the other cases I just mentioned. They were all treated virtually identically because they all had the same thing wrong with them.

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 they have no trouble shutting CoQ10 production off so that they can treat a number. And the common therapies for osteoporosis are drugs, and the common therapy for calaudication is surgery. For cancer reduction there is nothing. But all of these have a common cause.

The same cause as three major avenues of research in aging. One is called caloric restriction. There are thousands of studies done since the fifties on caloric restriction. They restrict calories of laboratory animals.

They have 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, or adequate nutrition, which would be CRAN"S, 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.

Then there are Centenarian studies.

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 as can be and some nice and calm and nice. Some are ornery, but they all 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. They way to treat cardiovascular disease and the way I treated my stepfather, 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 know the genetics involved. We've got the entire genes mapped out of several species now, of yeast and worms. We think of life span as being fixed, sort of.

Humans kind of have an average life span of seventy-six, and the maximum life-span was this French lady at one-hundred and twenty-two. In humans we feel it is relatively fixed, but in lower forms of life it is very plastic. Life span is strictly a variable depending on the environment. They can live two weeks, two years, or sometimes twenty years depending on what they want themselves to do, which depends very much 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.

One thinks of insulin as strictly to lower blood sugar. Today in the clinic there was a patient listing off her drugs, she listed about eight drugs she was on and didn't even mention insulin. Insulin is not treated as a drug. In fact, in some places you don't even need a prescription, you can just get it over the counter, it's treated like candy.

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.

How sensitive are your cells to insulin. When they are not sensitive, the insulin levels go up. Who has heard of the term insulin resistance?

Insulin resistance is the basis of all of the chronic diseases of aging, because the disease itself is actually aging.

We know now that aging is a disease. The other case studies that I mentioned, cardiovascular disease, osteoporosis, obesity, diabetes, cancer, all the so-called chronic diseases of aging, auto-immune diseases, those are symptoms.

If you have a cold and you go to the doctor, you have a runny nose, I did Ear, Nose and Throat for ten years, I know what the common treatment for that is, they give you a decongestant. I can't tell you how many patients I saw who had been given Sudafed by their family doctors for a cold and they came to see me after because of a really bad sinus infection.

What happens when you treat the symptom of a runny nose from a cold and you take a decongestant? It certainly decongests you by shutting off the mucus. Why do you have the mucus, because you are trying to clean and wash out the membranes, and what else? What else is in mucus? Secretory IgA, a very strong antibody to kill the virus is in the mucus. If there is no mucus, there is no secretory IgA.

Decongestants also constrict blood vessels, the little capillaries, or arterioles that go to those capillaries, the cilia, the little hair-like projections that beat to push mucus along to create a stream, they get paralyzed because they don't have blood flow so there is no more ciliary movement. What happens if you dam a stream and create a pond?

In days you've got larvae growing. If the stream is moving, you are fine. You need a constant stream of mucus to get rid of and prevent an infection. I am going in to this in some detail because 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.

Now, the medical profession is continuously segregating more and more symptoms into diseases, they call the symptoms diseases. Using ENT 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 "itis's" which is a descriptive term for inflammation. That is what the code will be and that is what the disease will be. So 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.

So what you have to do if you are going to treat any disease is 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, but I don't want to get in to that, we can talk hours on that. But if you really look at the root of what is causing it, we can use that cold as a further example.

Why does that person have a cold?

If he saw the doctor, the doctor might tell him to take an antibiotic along with the decongestant. You see this all the time because the doctor wants to get rid of the patient. Well we all know that in almost all cases of an upper respiratory infection it is a virus, and the antibiotic is going to do worse than nothing because it is going to kill the bacterial flora in the gut and impair the immune system, making the immune system worse.

The patient might see someone else more knowledgeable who will say no, you caught a virus, don't do anything, go home and sleep, let your body heal itself. That's better. You might see someone else who would ask why you caught a virus without being out there trying to hunt for viruses with a net. We are breathing viruses every day; right now we are breathing viruses, cold viruses, rhinoviruses.

Why doesn't everybody catch a cold tomorrow?

The Chinese will tell you that it is because the milieu has to be right, if the Chinese were to quote the French. Your body has to be receptive to that virus. Only if your immune system is depressed will it allow that virus to take hold.

So maybe a depressed immune system is the disease. So you can be given a bunch of vitamin C because your immune system is depressed and it is likely that the person has a vitamin C deficiency. That's where most of us are at right now, where we would give a bunch of vitamin C to try to pick up the immune system.

But why is the vitamin C not working. Vitamin C is make in almost all living mammals except humans and a couple other species. Vitamin C is made directly from glucose and actually has a similar structure and they compete for one another.

We've known for many years that sugar depresses the immune system.

We have known that for decades. It was only in the 70's that they found out that vitamin C was needed by white blood cells so that they could phagocytize bacteria and viruses. White blood cells require a fifty times higher concentration at least inside the cell as outside so they have to accumulate vitamin C.

There is something called a phagocytic index which tells you how rapidly a particular macrophage or lymphocyte can gobble up a virus, bacteria, or cancer cell. It was in the 70's that Linus Pauling knew that white blood cells needed a high dose of vitamin C and that is when he came up with his theory that you need high doses of vitamin C to combat the common cold.

But if we know that vitamin C and glucose have similar chemical structure, what happens when the sugar levels go up? They compete for one another upon entering the cells. And the thing that mediates the entry of vitamin C into the cells is the same thing that mediates the entry of glucose into the cells. If there is more glucose around there is going to be less vitamin C allowed into the cell and it doesn't take much. A blood sugar value of 120 reduces the phagocytic index seventy-five percent.

Here we are getting a little bit further down into the roots of disease. 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.

What is 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, among others at least known right now, we are looking at others, is to store excess nutrients.

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 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? (Someone in the audience suggest the answer glycogen)…Glycogen?

How much glycogen do you store?

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 is that sugar is stored, as what particular kind of triglyceride, or fatty acid? Palmitic acid. Saturated fat, ninety-eight percent of which is palmitic acid.

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.

What else does insulin do?

It doesn't just store carbohydrates, by the way. Somebody mentioned that it is an anabolic hormone, it absolutely is. 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.

A lesser known fact is that insulin also stores magnesium. We mentioned it's role in vitamin C, it stores all sorts of nutrients. But what happens if your cells become resistant to insulin? First of all you can't store magnesium so you lose it, that's one effect, you lose it out the urine.

What is one of magnesium's major roles?

To relax muscles. Intracellular magnesium relaxes muscles. What happens when you can't store magnesium because the cell is resistant? You lose magnesium and your blood vessels constrict, what does that do?

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, they 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. Does that mean it is genetic? No, you can be born with something and it doesn't mean that it is genetic. Diabetes is not a genetic disease as such. You can have a genetic predisposition. But it should be an extremely rare disease.

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, a good, down to earth nicely conducted study 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.

What else does insulin do?

Insulin mediates blood lipids. That patient who had a triglyceride of 2200, one of the easiest things we can do is lower triglyceride levels. It is so simple. There was just an article in J.A.M.A. an article and they were saying that the medical profession doesn't know how to reduce triglycerides dietarily, that drugs still need to be used.

It is so ridiculous because you will find that it is the easiest thing to do. They come tumbling down. There is almost a direct correlation between triglyceride levels and insulin levels. In some people more than others. The gentleman who had a triglyceride level of 2200 while on all the drugs only had an insulin level of 14.7.

That is only slightly elevated, but it doesn't take much in some people, all we had to do was get his insulin level down to 8 initially and then it went down to six and that got his triglycerides down to under 200.

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.

You can think about it, its not that you are not thinking about it anymore. But if you walk out of the room and come back, the smell is back. You can get resensitized is what that is telling you. It would be 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. Most cases of deafness, especially in old age is due to excessive noise exposure. All the noise exposure your ears have been exposed to, well the hair cells that end up triggering your brain to allow you to hear eventually get killed. Sometimes it just takes a single firecracker.

This is the same thing with insulin resistance. What happens is that if your cells are exposed to insulin at all they get a little bit more resistant to it. So the pancreas just puts out more insulin. I saw a patient today, her blood sugar was 102 and her insulin was 90! She wasn't sure if she was fasting or not, but I've seen other patients where their blood sugar was under 100 and their fasting insulin has been over 90.

That is a fasting insulin. I'm not sure how many people are familiar with seeing fasting insulins. But if I drank all the glucose I could possibly drink my insulin would never go above probably 40. So she was extremely insulin resistant.

What was happening was she was controlling her blood sugar. Statistically she was not diabetic. She is not even impaired glucose tolerant. Her glucose is totally normal supposedly. But her cells aren't listening to insulin, she just has an exceptionally strong pancreas.

Her islet cells that produce insulin are extremely strong and are able to compensate for that insulin resistance by producing thirty times more insulin than what my fasting insulin is. And just by mass action her pancreas is yelling so loud that her cells are able to listen, but they are not going to listen forever. Her pancreas is not going to be able keep up that production forever.

Well the usual treatment once she becomes diabetic, which would be inevitable, once her production of insulin starts slowing down or her resistance goes up any more, than her blood sugar goes up and she becomes a diabetic. For many years, decades before that her insulin levels have been elevated.

They have been elevated for thirty years probably and have never been checked. That insulin resistance is associated with the hyperinsulinemia that produces all of the co-called chronic diseases of aging or at least contributes to them. As far as we know in many venues of science, it is the main cause of aging in virtually all life.

Insulin is that important. So controlling insulin sensitivity is extremely important.

How else does insulin affect cardiovascular disease?

We've only just touched upon it. Insulin is a so-called mytogenic hormone. It stimulates cell proliferation. It 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, what is the effect of insulin on the liver, it is to suppress the production of sugar.

The sugar floating around in your body at any one time is the result of two things, the sugar that you have eaten and how much sugar your liver has made. When you wake up in the morning it is more of 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. What is the action of insulin in muscles? It allows your muscles to burn sugar for one thing. 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.

Well the fat cells 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. What is the action of insulin on your fat cells? To store that fat. It takes sugar and it stores it as fat. So until your fat cells become resistant you get fat, and that is what you see. As people become more and more insulin resistant, they get fat and their weight goes up.

But eventually they plateau. They might plateau at three hundred pounds, two hundred and twenty pounds, one hundred and fifty pounds, but they will eventually plateau as the fat cells protect themselves and become insulin resistant.

As all these major tissues, this massive body becomes 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.

If you drip insulin into the artery of a dog, there was a Dr. Cruz who did this in the early 70's by accident, he was doing a diabetic experiment and found out that the femoral artery that the insulin was being dripped into was almost totally occluded with plaque after about three months.

The contra lateral side was totally clear, just contact of insulin in the artery caused it to fill up with plaque. That has been known since the 70's, it has been repeated in chickens, in dogs, it is really a well-known fact. Insulin floating around in the blood causes a plaque build up. They didn't know why, but we know that insulin causes endothelial proliferation, that's the first step, it causes a tumor, an endothelial tumor.

Insulin causes the blood to clot too readily.

Insulin causes the conversion of macrophages into foam cells, which are the cells that accumulate the fatty deposits. 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. It influences nitric oxide synthase. You produce less nitric oxide in the endothelium. We know that helps mediate vasodilatation and constriction, i.e. angina.

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.

Insulin is one of the first hormones that any organism ever developed, and as I mentioned in genetics, things are built upon what was there before. So all the other hormones we have in our body were actually built upon insulin. In other words, insulin controls growth hormone.

How does growth hormone work?

The pituitary produces growth hormone, and then it goes to the liver and the liver produces what are called IgF 1 thru 4, there are probably more. What does IgF stand for? Insulin-like growth factor. They are the active ingredients. Growth hormone has some small effects on its own, but the major growth factors are the IgF's that then circulate throughout the body.

Why are they called IgF's or insulin like growth factors? Because they have an almost identical molecular structure to insulin. When I said that insulin promotes cellular proliferation, it is because it cross reacts with IgF receptors. So somewhere in the evolutionary tree, IgF's diverged from insulin. Insulin can work very well all by itself, it doesn't need growth hormone. Growth hormone can't do anything without insulin.

Thyroid. How does thyroid work?

The thyroid produces mostly T4. T4 goes to the liver and is converted to T3, mostly there, other tissues too, but mostly in the liver. We are getting the idea that insulin controls a lot of what goes on in the liver, and the liver is the primary organ that becomes insulin resistant.

When the liver can no longer listen to insulin, you can't convert T4 to T3 very well. Usually in people who are hyperinsulinemic with a thyroid hormone that comes back totally normal, it is important to measure their T3. Their free T3 will just as often as not be low. Get their insulin down and it comes back up.

Sex hormones, estrogen, progesterone, and testosterone, does insulin help control them? Absolutely, in various ways. Insulin helps control the manufacture of cholesterol and where do all the sex hormones come from? All the stearic hormones are originally derived from cholesterol, so that's one way. Dr Nestler from the University of Virginia who has spent the last eight years doing multiple studies to show that DHEA levels are directly correlated with insulin levels, or I should say insulin resistance.

The more insulin resistant you are, the lower your DHEA levels. He firmly believes this and has a lot of studies to back it up, that the decline in DHEA is strictly due to the increase in insulin resistance with age. If you reduce the insulin resistance, the DHEA rises.

And how are these sex hormones carried around the body? Something called sex hormone binding globulins. The more that is bound, the less free, active hormone you have. Sex hormone binding globulin is controlled by what? Insulin. There is not a hormone in the body that insulin doesn't affect, if not directly control.

Let's talk about osteoporosis.

You take a bunch of calcium. The medical profession just assumes that it 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. Number one, 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.

Diseases are a result of a lack of communication. There are certain things that your cells need to be healthy. If you learn nothing else today, you should know that everything is at the cellular and molecular level and we are nothing but a community of cells. We are a commune of cells. We are a metropolis of cells that have been given instructions to cooperate.

When you have a large number of cells, like we are, ten trillion or so, there must be proper communication so that there will be proper division of labor. You can take most any cell in your body and under the right conditions you can put it in a petrie dish and it can live all on it's own. They each have a life of their own.

You can manipulate the genetics of a cell, and we've now made a blood cell in to a nerve cell. Pretty soon we are going to be able to take any cell we want and make it into any other cell, because every cell in your body has the identical genetics, all derived from that egg and that sperm that came together. Why is one cell different from another? Because they are reading different parts of the same library.

You can influence which part of that genetic library that every cell reads by the environment of that cell. The environment of that cell is going to be very much dictated by, number one, hormones, and what you eat. Eating is just internalizing the external environment. That is what you have circulation for, to bring that external environment to each and every one of those cells that is inside of you.

I hope that by now you have gotten the idea that high insulin resistance is not very good for you. So now let's talk about what causes insulin resistance. We have been talking about high carbohydrate diets, let's start talking about that a little bit more.

This is what causes insulin resistance.

That is definitely what worsens it. 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 talked about some of the lower animals and there is some pretty good evidence that even in humans we still retain the capacity to control lifespan at least partially. We should be living to be 130, 140 years old routinely.

Let's talk about carbohydrates, what are they? We talk about simple and complex carbohydrates, that is totally irrelevant, it means absolutely nothing. Carbohydrates are fiber or non-fiber. Few things in life are as clear-cut as this. Fiber is good for you, and a non-fiber carb is bad for you. You can bank on that.

There is not a whole lot of middle ground. 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, fructose is worse for you then glucose, so if you just go by blood sugar, which is just glucose, it doesn't mean that you are not raising your blood fructose, or your blood galactose which is the other half of lactose.

All of those sugars are as bad or worse for you than glucose. You can't just go by so-called blood sugar which is just blood glucose, because we just don't measure blood fructose or blood galactose, but they are all bad for you. Why are they bad, well number one we know that it provokes insulin and every time you provoke insulin it exposes yourself to more insulin and just like walking in a smelly room it is going to become more resistant to insulin.

So every time you have a surge of sugar and you have a surge of insulin, you get more and more insulin resistant and all of the problems we've talked about.

What else is bad about sugar?

We know it increases insulin, but even by itself, sugar is bad for you. You can divide aging into basically two major categories, there is genetic causes of aging, we know that cells have a limited capacity to divide, normally we never get there, but the more rapidly you make cells divide, the more rapidly they age.

One of the effects of insulin is to stimulate cellular proliferation and division. So we know that it increases the rate of aging of a cell population just by that, that is another whole discussion. Let's go to the other half. Our cells accumulate damage with age we cannot help that.

When I say aging, we really are talking about something called senescence, or the damage associated with aging, but the common usage is the word aging. I cannot prevent you from being a day older tomorrow, that is aging, tomorrow you will be a day older than today, and that we cannot do anything about. When we talk about aging we normally think about the damage that is associated with that day.

We have accumulated more damage during that day, that is called senescence. What causes that damage? There is often an example of test tubes in a laboratory. You don't think of test tubes as aging, yet if you mark test tubes with a little red dot and counted the number of test tubes there were at the end of the year with a little red dot left, there would hardly be any, why, because they have encountered damage. They've broken, so even though there is not aging they do have immortality rates. Aging is an increase in the rate of mortality.

In humans, the rate of mortality doubles every eight years.

That is really how you gauge the rate of aging. We found in animal studies that the rate of aging can be largely controlled by insulin. But the damage that accumulates during that aging is caused by largely by sugar.

The two major causes of accumulated damage are oxygenation, and glycation. I'm not going to spend my time talking about oxidation. Most of you know all about that.

What is oxidation?

There are several definitions but we can use a very common one, whenever oxygen combines with something, it oxidizes. Oxygen is a very poisonous substance. 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.

So let's talk about glycation.

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.

That acronym is not an accident; it stands for A.G.E.'s. If you can turn over, or re-manufacture the protein that's good, and it increases the rate of protein turnover if you are lucky. 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 get glycated that can't turn over very rapidly, like collagen, or like a protein that makes up nerve tissue. These proteins cannot be gotten rid of, so the protein accumulates, and the A.G.E.'s accumulate and they continue to damage.

That includes the collagen that makes up the matrix of your arteries. A.G.E.'s are so bad that we know that there are receptors for A.G.E.'s, hundreds of receptors for every macrophage. They are designed to try to get rid of those A.G.E.'s, but what happens when a macrophage combines with an A.G.E. product?

It sets up an inflammatory reaction. We know that cardiovascular is an inflammatory process, any type of inflammation. You eat a diet that promotes elevated glucose, and you produce increased glycated proteins and A.G.E.'s, you are increasing your rate of inflammation of any kind. You get down to the roots, including arthritis, headaches.

When you start putting people on a diet to remedy all of this, my practice is largely diabetes, so my patients are more concerned with their blood sugar and their heart, things like that, but it is so common to have them come back and tell me they used to have horrible headaches and now don't have them anymore, or that they had a horrible pain in their shoulder, or terrible Achilles tendonitis that they don't have any more.

The glycated proteins are making the person very pro-inflammatory.

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. It's very true. And that is what gets most of us. If that doesn't get us, then the genetic causes of aging will, because every cell in your body has genetic programs to commit suicide. There are various theories for this, one is that if they didn't, virtually every cell in your body would eventually turn cancerous.

Whether those so-called applopatic genes developed as a means to prevent cancer or not is open to speculation but it is a good theory. We know that all cancer cells have turned off the mechanisms for applotosis, which is the medical term for chemical suicide. So we know that it plays a role.

Let's get to diet.

Diet really becomes pretty simple. Carbohydrates we started talking about. You've got fiber and non-fiber and that's real clear-cut. Fiber is good, non-fiber is bad. Fibrous carbs, like vegetables and broccoli, those are great. What is a potato? A potato is a big lump of sugar. That's all it is. You chew a potato, what are you swallowing? Glucose. You may not remember, but you learned that in eighth grade, but the medical profession still hasn't learned that.

What is the major salivary enzyme?

Amylase. What is amylase used for? To break down amylose which is just a tree of glucose molecules. What is a slice of bread? A slice of sugar. Does it have anything else good about it? Virtually no. Somebody emailed me who had decided to do a little research. And 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. We wouldn't be here if there were no glucose, 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. So what he did is he took all the essential nutrients that are known to man and plugged it in to this computer data bank and he asked the computer what are the top ten foods that contain each nutrient that is required by the human body. Each of the fifty-three or fifty-four, depending on who you talk to, essential nutrients that there are were plugged in, and did you know that grains did not come up in the top ten on any one.

What is the minimum daily requirement for carbohydrates?

ZERO.

What is the food pyramid based on?

A totally irrelevant nutrient.

Let's go beyond Carbohydrates.

Let's back up even further? Why do we eat? One reason is energy. That's half of the reason. It is very simple, there are two reasons why we eat, one is to gather energy. We need to obtain energy. The other essential reason (Not just for fun! Fun is a good one, but you won't have much fun if you eat too much) is to replace tissue, to gather up building blocks for maintenance and repair.

Those are the two essential reasons that we need to eat. We need the building blocks and we need fuel, not the least of which is to have energy to obtain those building blocks and then to have energy 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. So the building blocks are covered by proteins and fats.

What about fuel?

That's the other reason we eat. There are two kinds of fuel that your body can use with minor exceptions, sugar and fat. We mentioned earlier that the body is going to store 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.

Why doesn't your body store more sugar if it is so needed? Sugar was never meant to be your primary energy source.

Sugar is meant to be your body's turbo charger.

Everybody right here, right now should be burning mostly, almost all fat with minor exceptions. Your brain will burn sugar, it doesn't have to, it can do very well, even better by burning by-products of fat metabolism called ketones. That is what it has to burn when you fast for any length of time. They have shown that if your brain was really good at burning ketones from fat that you can get enough sugar that your brain needs actually from fat; just eating one-hundred percent fat.

You can make a little bit of sugar out of the glycerol molecule of fat. Take two glycerol molecules and you have a molecule of glucose. Two triglycerides will give you a molecule of glucose. The brain can actually exist without a whole lot of sugar, contrary to popular belief. 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.

We talked about a lot of the effects of high insulin. We talked about insulin causing the formation of saturated fat from sugar. Another major effect of insulin on fat is it prevents you from burning it. What happens 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, where you would otherwise be able to burn it, you cannot and 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.

Getting back to the macronutrients, fuel, fat is your best fuel by far and the fuel that your body wants to use. So there are two reasons to eat, you need to gather the building blocks for maintenance and repair, that's protein and fat, no carbohydrate needed, and you eat for fuel, without question, fat is your most efficient fuel and the fuel that your body desires the most.

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. I recommend Vitamin C supplements, I don't have anything against taking supplements, I use a lot of them.

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.

But most foods fall in the middle somewhere. Things like strawberries, you are going to get something bad with strawberries, you are going to get a lot of sugar with strawberries, but you are also going to get a food that is also the second or third highest in antioxidant potential of any food known, the first being garlic the second either being strawberries or blueberries. So, there is something good to be had from it. So I will let some patients put some strawberries in let's say a protein smoothie in the morning. But if they are a hard core diabetic, strawberries are out.

It doesn't take much, if you have a type I diabetic who is not producing any insulin they can tell you what foods do to their blood sugar. It doesn't take much. What is very surprising to these people once they really measure is what little carbohydrate it takes to cause your blood sugar to skyrocket.

One saltine cracker will take the blood sugar to go over 100 and in many people it will cause the blood sugar to go to 150 for a variety of reasons, not just the sugar in it.

When you are eating a high carbohydrate diet, when you are born, your mother, everbody is telling you to eat a bowl of Cheerios for breakfast. You eat that bowl of cheerios and that turns to sugar, and your sugar goes up very rapidly and that causes a big rush of insulin and your body all of a sudden senses a huge amount of sugar being delivered to it at once, of which it was never used to, in an evolutionary sense.

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 cheerios, 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.

We can talk about insulin resistance.

We hear a lot about insulin resistance, but stop and think a little bit, do you think our cells only become resistant to insulin? 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. The various interrelationships there I really don't have time to go in to here.

But 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.

The receptors self-regulate.

If you want to know if insulin sensitivity can be restored to its original state, well, perhaps not to its original state, but you can restore it to the state of about a ten year old.

One of my first experiences with this, I had a patient who literally had sugars over 300. He was taking 200+ units of insulin, he was a bad cardiovascular patient, and it only made sense to me that you don't want to feed these people carbohydrates, so I put him on a low carbohydrate diet.

He was an exceptional case, after a month to six weeks he was totally off of insulin. He had been on 200 some units of insulin for twenty-five years. He was so insulin resistant, one thing good about it is that when you lower that insulin, that insulin is having such little effect on him that you can massively lower the insulin and its not going to have much of an effect on his blood sugar either. 200 units of insulin is not going to lower your sugar any more that 300 mg/deciliter.

You know that the insulin is not doing much. So we could rapidly take him off the insulin and he was actually cured of his diabetes in a matter of weeks. So he became sensitive enough, he was still producing a lot of insulin on his own, then we were able to measure his own insulin and it was still elevated, and then it took a long time, maybe six months or longer to bring that insulin down.

It will probably never get to the point of the sensitivity of a ten year old, but yes, your number of insulin receptors increases, and the activity of the receptors, the chemical reactions that occur beyond the receptor occur more efficiently.

You can increase sensitivity by diet, that is one of the major reasons you want to take Omega 3 oils. We think of circulation as that which flows through arteries and veins, and that is not a minor part of our circulation, but it might not even be the major part. The major part of circulation is what goes in and out of the cell.

The cell membrane is a fluid mosaic. The major part of our circulation is determined by what goes in and out. It doesn't make any difference what gets to that cell if it can't get into the cell. We know that one of the major ways that you can affect cellular circulation is by modulating the kinds of fatty acids that you eat. So you can increase receptor sensitivity by increasing the fluidity of the cell membrane, which means increasing the omega 3 content, because most people are very deficient.

They say that you are what you eat and that mostly pertains to fat because the fatty acids that you eat are the ones that will generally get incorporated into the cell membrane. The cell membranes are going to be a reflection of your dietary fat and that will determine the fluidity of your cell membrane. You can actually make them over fluid.

If you eat too much and you incorporate too many omega 3 oils then they will become highly oxidizable (so you have to eat Vitamin E as well and monounsaturates as well) There was an interesting article pertaining to this where they had a breed of rat that was genetically susceptible to cancer.

What they did was they fed them a high omega 3 diet, plus iron, without any extra Vitamin E and they were able to almost shrink down the tumors to nothing, because tumors are rapidly dividing. This is like a form of chemotherapy, and the membranes that were being formed in these tumor cells were very high in omega three oils, the iron acted as a catalyst for that oxidation, and the cells were exploding from getting oxidized so rapidly. So 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 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.

It has actually been shown by quite a number of papers that resistance training for insulin resistance is better than aerobic training. There are a variety of other reasons too. Resistance training is referring to muscular exercises. If you just do a bicep curl, you immediately increase the insulin sensitivity of your bicep. Just by exercising, and what you are doing is you are increasing the blood flow to that muscle. That is one of the factors that determines insulin sensitivity is how much can get there. It has been shown conclusively that resistance training will increase insulin sensitivity.

Back to the macronutrients because that is real simple, you don't want very much in the way of non-fiber carbs, fiber carbs are great, you are going to get some non-fiber carbs. Even if you just eat broccoli you are going to get some non-fiber carbs. That is OK since at least for the most part you are getting something that is really pretty good for you. Protein is an essential nutrient.

You want to use it as a building block because your body requires protein to repair damage and replenish enzymes. All of the encoded instructions from your DNA are to encode for proteins. That is all the DNA encodes for. You need protein, but you want to use it as a building block, but I don't believe in going over and above the protein that you need to use for maintenance, repair and building blocks.

I don't think you should be using protein as a primary fuel source. Your body can use protein very well as a fuel source. It is good to lose weight while using it a s a fuel source because it is an inefficient fuel source. Protein is very thermogenic, it produces a lot of heat, which means that less of it is going into stored energy, more is being dissipated. Just like throwing a log into a fireplace.

Your primary fuel should be coming from fat.

So you can calculate the amount of protein a person requires, or at least estimate it by their activity level. The book Protein Power actually went very well in to this. You have to calculate how much protein is required by their activity level and their lean body mass. There is still some gray area as to how many grams per kilogram of lean body mass, depending on the activity that person requires.

Anywhere perhaps one to two grams of protein per kilogram of lean body mass, maybe even a little bit higher if someone is really active.

You don't want to go under that for very long. I'd say that it is better to go over than to go under that amount for very long. But I especially don't want my diabetic patients, which means all of us, because in a very real sense we really all have diabetes, it is just a matter of degree, we all have a certain degree of insulin resistance.

If you can cure a diabetic of diabetes, you can do the same thing to a so-called non-diabetic person and still improve that person. I want to improve my insulin sensitivity just as much as I do my diabetics because insulin sensitivity is going to determine for the most part how long you are going to live and how healthy you are going to be. It determines the rate of aging more so than anything else we know right now.

What about supplements such as Chromium for example?

Chromium, it depends on whom you are dealing with, but are we talking about a diabetic patient, who 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 500 mcg 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. We are talking about hyperinsulinemia or non-hyper-insulinemia. Its insulin we should be concerned about.

I use a lot of supplements. What you really want to do, and my purpose mostly is to try to convert that person back into being an efficient burner of fat. We talked about when you are very insulin resistant and you are waking up in the morning with an insulin that is elevated, you cannot burn fat, you are burning sugar.

They don't know how to burn fat anymore and that is your best fuel.

One of the reasons that sugar goes up so high is because that is what your cell is needing to burn, but if it is so insulin resistant it requires a blood sugar of 300 so that just by mass action some can get in to the cell and be used as fuel. If you eliminate that need to burn sugar, you don't need such high levels of sugar even if you are insulin resistant.

So you want to increase the ability of the cells in the body to burn fat.

You want to make that glucose burner into a fat burner. You want to make a gasoline burning car into a diesel burning car. Did anyone ever look at the molecular structure of diesel fuel in your spare time? It looks almost identical to a fatty acid. There is a company right now that can tell you how to alter vegetable oil to use in your Mercedes. It's just a matter of thinning it out a little bit. It is a very efficient fuel.

You can look at other variables that will give you some idea too such as triglycerides. If they are very sensitive to high levels of insulin, they come in with insulin levels of 14 and they have triglycerides of 1000, then you would treat them just as you would if they had an insulin level of 50. It gives you some idea of the effect of the hyperinsulinemia on the body.

You can use triglycerides as a gauge, which I often do. The objective is to try to get the insulin level just as low as you possibly can. There is no limit. They classify diabetes now as a fasting blood sugar of 126 or higher. A few months ago it might have been 140. It is just an arbitrary number, does that mean that someone with a blood sugar of 125 is non-diabetic and fine? If you have a blood sugar of 125 you are worse than if you had a blood sugar of 124. Same with insulin. If you have a fasting insulin of 10 you are worse off than if you had an insulin of 9. You want to get it just as low as you can.

With athletes, let's think about that. What is the effect of carbohydrate loading before an event. What happens if you eat a bowl of pasta before you have to run a marathon. What does that bowl of pasta do? It raises your insulin. What is the instruction of insulin to your body?

To store energy and not burn it. I see a fair amount of athletes and this is what I tell them, you want everybody, athletes especially, to be able to burn fat efficiently. So when they train, they are on a very low carbohydrate diet. The night before their event, they can stock up on sugar and load their glycogen if they would like.

They are not going to become insulin resistant in one day. Just enough to make sure, it has been shown that if you eat a big carbohydrate meal that you will increase your glycogen stores, that is true and that is what you want. But you don't want to train that way because if you do you won't be able to burn fat, you can only burn sugar, and if you are an athlete you want to be able to burn both.

Few people have problems burning sugar if they are an athlete, but they have lots of problems burning fat, so they hit the wall. And for a certain event like sprinting it is less important, truthfully, for their health it is very important to be able to burn fat, but a sprinter will go right into burning sugar. If you are a 50 yard dash man, whether you can burn fat or not is not going to make a huge difference in your final performance.

Beyond your athletic years if you don't want to become a diabetic, and if you don't want to die of heart disease and if you don't want to age quickly…It is certainly not going to do you any harm to be able to burn fat efficiently in addition to sugar.

Vanadyl Sulfate is 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.

I 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.

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, but not from saturated 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.

Animal proteins are fine and are good for you, but not the ones that are fed grains.

Grainfed animals are going to make saturated fat out of the grains. Saturated fat in nature occurs to a very tiny degree. Not in the wild there is very little saturated fat out there. If you talk about the Paleolithic diet, we didn't eat a saturated fat diet. Saturated fat diets are new to mankind. We manufactured a saturated fat diet by feeding animals grains. You can consider saturated fat to be second generation carbohydrates. We eat the saturated fats that other animals produce from carbohydrates.

Zone was a good diet compared to the American diet it was unusual. Is it an optimal diet? No. Is it optimal for what is known today about nutrition, it is not. He is stuck in this mold he can't get out of but now he is trying to get out of it through the back door. Initially the author spoke about how it made no difference if you got your carbohydrate from candy or vegetables.

The Volkswagen was a good car, but eventually they had to change it to keep up with modern technology. What he is doing now is changing his recipes so that the 40% carbohydrates are coming primarily from vegetables, and the carbohydrates are going way down because he knows that if he doesn't it's not as good a diet.

I would go 20% of calories from carbs. Depending on the size of the person, 25 to 30% of calories from protein, and 60-65% from fat. You can get non-grain fed beef.

Insulin is not the only cause of disease.

There are other considerations such as iron. We know that high iron levels are bad for you. If a person's ferritin is high, red meat is out for a while, till we get their iron down. SO there are other things involved about if we are going to allow a person to eat red meat or not.

There is a great deal of difference between a non-grain fed cow and a grain fed cow.

Non-grain fed will have only 10% or less saturated fat. Grain fed can have over 50%.

There is a big difference. A non-grain fed cow will actually be high in Omega 3 oils. Plants have a pretty high percentage of Omega 3, and if you accumulate it by eating it all day, every day for most of your life, your fat gets a pretty high proportion of Omega 3. I would try for 50% oleic fat, and the others would depend on the individual, but about 25% of the other two.

In a fat diabetic I would probably go down on the saturated fat and go 60% oleic. I would go 1 to 1 on the omega 6 to 3, that would be therapeutic. The maintenance ratio would be about 2.5 to 1 omega 6 to 3. Arachadonic acid, DHA, to EFA. Therapeutic, I would go lesser on the saturated fats. I would try to do most of this through diet. There are some practicalities involved. I would ask the person if they like fish and if they practically puke in front of me they are going on a tablespoon of cod liver oil, the best brand is made by Carlson which doesn't taste fishy at all.

There are probably some others too that are okay. Most people end up going on a supplement of Omega 3 oils because most of them are not going to eat enough fish to get it, which would be about four days a week, and it can't be overcooked etc., it is a little hard to get that much entirely from diet.

I like sardines if they will eat them. 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. They disproved that study that was against chromium many times. They showed that it only happens if you put cells in a petrie dish with chromium but in vivo studies prove otherwise. The lowering of insulin is going to be better than any possible detriment of any of the therapies you are using. Insulin is associated with cancer, everything.

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.

Ron Rosedale, M.D. 1999

People keep repeating the **myths**, **distortions** and **lies** about the percentage of saturated fat in grass-fed, free-range beef versus grain-fed, feedlot beef. Again, they have the mindset that saturated fat is unhealthy when it is not. As an example, Dr. Ron Rosedale in the speech stated,

"There is a great deal of difference between a non-grain fed cow and a grain fed cow. Non-grain fed will have only 10% or less saturated fat. Grain fed can have over 50%. There is a big difference. A non-grain fed cow will actually be high in Omega 3 oils."

The difference in saturated fat content between grain-fed feedlot beef and grass-fed beef is negligible, if any whatsoever. In any case, saturated fat is very healthy and heals the body. The same can be said about the Omega-3 fatty acids. However, the transcript is from a very interesting speech which has great information about diabetes, heart disease, osteoporosis and cancer.

The actual percentage of saturated fat in the fat of free-range buffalo is 43%, deer/venison is 38%, elk is 37% and domestic grain-fed beef is 39%. The statements that grain-fed beef has a higher percentage of saturated than wild game or grass-fed free-range beef is simply **false**. In fact, wild game can have a higher percentage of saturated fat in the fat than that of the feed-lot, grain-fed steer. This correct information can be found in the following book.