
# A Grain of Truth: The Gluten Summit
# Presenter: Dr. Mark Houston, MD, MS, ABAARM, FACP, FAHA, FASH

## How Sensitivity to Gluten Can Impact Your Heart and Cardiovascular System

**Dr. O'Bryan:** Well, hello, everyone! And welcome to another edition of A Grain of Truth: The Gluten eSummit. It is my distinct privilege to bring to you today Dr. Mark Houston. Hold on to your chairs. You're in for quite a ride.

Dr. Mark Houston is Associate Clinical Professor of Medicine at Vanderbilt University School of Medicine. He's the Director of the Hypertension Institute and Vascular Biology, and Medical Director of the Division of Human Nutrition at St. Thomas Medical Group, St. Thomas Hospital and Health Services in Nashville, Tennessee.

How often do you hear of a cardiologist who is also specializing in nutrition? Dr. Houston has presented over 10,000 lectures nationally and internationally and has published over 200 articles and scientific abstracts in peer-reviewed medical journals. He is on the consulting editorial board for many medical journals, and is Editor in Chief of the *Journal of the American Nutraceutical Association*. He is an author, teacher, and active in clinical research.

Six best-selling books that he has authored are *The Handbook of Anti-Hypertensive Therapy, Vascular Biology for the Clinician, What Your Doctor May Not Tell You About Hypertension, Hypertension Handbook for Students and Clinicians* and *The Hypertension Handbook.* His latest book is *What Your Doctor May Not Tell You About Heart Disease*, and it is a bestseller that I recommend to all of my patients.

He is one of the most sought-after lecturers in the United States on the medical topics of hypertension, dyslipidemia, vascular aging, vascular biology, metabolic and functional medicine and integrative and preventive cardiovascular medicine.

Dr. Houston has an active clinical practice, teaches, and does clinical research at St. Thomas Hospital in Nashville, Tennessee. And, he's on the faculty at Vanderbilt University School of Medicine. He was selected as one of the top physicians in hypertension in the United States in 2008 through 2011 by the Consumer Research Council, and by USA Today as one of the most influential doctors in the U.S. in both hypertension and hyperlipidemia twice in 2009 and 2010. He was selected as the Patient's Choice Award in 2010 through 2012 **[2:30]** by Consumer Reports USA.


He is triple board-certified by the American Board of Internal Medicine, the American Society of Hypertension, and the American Board of Anti-Aging and Regenerative Medicine. He holds two masters of science degrees in human nutrition, and another in metabolic medicine. He is a fellow of the American College of Physicians, the American Heart Association, the American Society of Hypertension, the American College of Nutrition and the American Academy of Anti-Aging and Regenerative Medicine.

And, in my opinion, the greatest accolade I can give about Mark is that when two different members of my personal family had cardiovascular issues I demanded they go to Nashville and see Dr. Houston. He is the man, and the treatment for both of my family members, for which I am eternally grateful.

Mark, welcome to A Grain of Truth.

**Dr. Houston:** Thank you so much for this incredible invitation and thank you for those wonderful comments that you just made. Most appreciative, my good friend.

**Dr. O'Bryan:** Thank you, thank you. So, let's begin with this question, Dr. Houston. In the courses that you teach to physicians all over the world you emphasize a scientifically- based, but common sense approach which includes the not commonly recognized premise that vascular disease starts very early in life and is subclinical for ten to thirty years or more prior to any cardiovascular event. Can you elaborate on what you mean by that?

**Dr. Houston:** Absolutely. Coronary heart disease or atherosclerosis, abnormalities in both cardiac and vascular function, actually start in utero based on some recent studies with the mother being exposed to either malnutrition, poor nutrition, toxins, and other things. So, as soon as you're born, you, really already have some degree of vascular abnormalities.

And, depending on where you live, your environment, your genetics, the progression of that subclinical disease can be fairly rapid or fairly slow. But, based on autopsies of veterans from various wars, from autopsies of people that have been killed in automobile accidents, **[5:00]** we know that coronary heart disease, actual obstruction in all coronary arteries, as well as peripheral vascular disease, abnormalities in peripheral arteries, starts very early in life. And, by the time, in this country, at least, you're in your teen years, there's a somewhere close to thirty percent incidence of subclinical coronary heart disease that can be measured with some of our invasive and noninvasive testing in cardiology.

**Dr. O'Bryan:** Wow. By the age of 30?


**Dr. Houston:** Actually, it's earlier than that. The risk profile has actually moved up by almost a decade within the past fifteen or twenty years. The data from, for example, the Korean War and the Vietnamese War, we had men in their twenties and thirties with significant coronary heart disease based on some recent studies that is backtracked by almost another decade. Now, we're seeing it in teenagers.

**Dr. O'Bryan:** My goodness. My goodness.

**Dr. Houston:** And, the reason for that is, basically, as you know the epidemic of obesity, metabolic syndrome, and type 2 diabetes or sedentary lifestyle. And, all of that's contributing to an epidemic of vascular disease now in very young children.

I don't usually see children. But, I will see young adults--twelve and thirteen, who are children of my patients--for hypertension. Already they have type 2 diabetes. They're overweight. Their lipid profile is abnormal. And, they've got every risk factor for coronary heart disease. And, they're starting to develop that disease very early.

**Dr. O'Bryan:** My goodness. And, do you believe that diet has a role to play in why this is becoming an earlier epidemic?

**Dr. Houston:** I think that the two predominant factors in our risk for coronary heart disease and all the associated conditions are poor nutrition. And, by that, I mean, optimal nutrition is not available for most people, either because they don't want to do it, or because our food supply doesn't allow it. So, we're not getting enough vegetables, enough fresh fruit. We're eating too many fast foods and frozen foods.

And, the other big risk factor is the lack of proper exercise. If we did just those two things--if we had **[7:30]** proper exercise and proper nutrition--it is estimated in the *Chronicle Scientific Literature* that we could decrease the risk of, not just coronary heart disease, but all diseases, by up to seventy percent in the Untied States alone.

**Dr. O'Bryan:** That's a tremendous statistic. One of our guest panelists has been Dr. William Davis, the author of *Wheat Belly*. And, he has shown the correlation between eating gluten and the incidence of metabolic syndrome. Have you seen that correlation in your practice?

**Dr. Houston:** Absolutely! I started very aggressively testing for gluten sensitivity as well as celiac disease about eight years ago. And, as you know, the laboratory testing has come a long way and much better than it used to be because some tests would miss that disease completely. But, now you don't miss it if you order the right test. So, I'm seeing a huge number of clinical problems with gluten sensitivity.

But, related to cardiovascular disease, I'm seeing patients who have vascular problems. They have endothelial dysfunction. They have coronary heart disease, congestive heart failure, arrhythmias of the heart, whether it be premature atrial or premature ventricular contractions, and the whole host of other things associated with sensitivity, which this audience is well aware of with fatigue and memory issues and gastrointestinal issues. And, all of those things are tied into the picture of cardiovascular disease.

One of the things I've learned as I got my Master's in Nutrition and Metabolic Medicine is if you don't know how to clean up the gastrointestinal tract, you can never be a good cardiovascular medicine physician and get the patients fixed.

**Dr. O'Bryan:** I know from personal experience of my family members that in your clinic, at least with both of my family members, diet was addressed as a primary concern along with some other factors. How often do you find that when patients come to you with indicators of cardiovascular disease that there must be some discussion and attention placed on food selections?

**Dr. Houston:** I would say it's almost 100%. There are very few patients **[10:00]** who really follow the proper nutrition. And, if you educate them about what they should be doing and they follow your advice, many of their medical problems will eventually start to correct themselves just with the nutrition. And, then if you add the exercise program on top of that, it's even more powerful.

So, we actually published a study about two years ago looking at just nutrition and lifestyle modification with micronutrients and exercise in hypertensive patients. And, in one year, we were able to get sixty-two percent of the population with hypertension off all medications and only on lifestyle changes.

**Dr. O'Bryan:** My goodness. What do you include in lifestyle changes?

**Dr. Houston:** We included basically what's called the DASH-2 Diet, which is high potassium, low sodium, high magnesium, a lot of vegetables, some fruit depending on their glycemic index, minimal to no grains, and minimal to no dairy, and a lot of fiber. And, then we added a resistance and aerobic exercise program. And, we got their body weight down. But, their body composition improved--less body fat and more lean muscle mass. And, if they had any bad habits like tobacco or alcohol, we asked them to get off of that. Restricted their caffeine because that can be a risk factor, also, for hypertension.

**Dr. O'Bryan:** Sixty-two percent of the people in this study were able to eliminate their medications for hypertension. That's a tremendous statistic for one of the primary causes of cardiovascular disease in this country. That's tremendous!

 

**Dr. Houston:** And, it's very consistent with the scientific epidemiologic proposals that I quoted earlier that somewhere close to seventy percent of patients who followed nutrition and exercise could, in fact, have a reduction in either cardiovascular disease or other diseases. So, it's a very close number that we substantiate in our prospective clinical trial.

**Dr. O'Bryan:** That's just tremendous. Can you talk about the influence of autoimmunity on the development of cardiovascular disease?

**Dr. Houston:** Yes, it's actually one of the top three finite responses **[12:30]** in cardiovascular disease. One of my mantras, which everyone who has listened to me speak has heard, is that the blood vessel has an infinite number of insults, but only three finite response to the insults. And, the three finite response are inflammation, oxidative stress, and vascular autoimmune dysfunction.

So, autoimmune disease is one of the newest and most important factors that leads to endothelial dysfunction, peripheral vascular disease, coronary heart disease, heart failure, and other types of cardiovascular illness in this country and worldwide.

**Dr. O'Bryan:** We're seeing the correlation now. A paper came out in the medical journal *Circulation* that showed when there were antibodies to transglutaminase, one of the markers in a blood test for celiac disease, that those antibodies can also affect the endothelium, the inside lining of the blood vessels.

**Dr. Houston:** Exactly. And, what we're looking at...And, this is a very important breakthrough in our understanding of vascular medicine. So, I'm going to give you two catch words. Then I'll explain in detail what they mean.

The first catch word is the blood vessel is an innocent bystander. Okay? Number two is molecular mimicry. So, here's the way this happens. Let's take gluten as our example. The patient eats gluten. They're sensitive to gluten. They, then, make antibodies to the gluten. The body sees the gluten as a foreign protein, a foreign object, an invader. It is one of the infinite insults. The body responds to the infinite insult in the three finite ways we just talked about: inflammation, oxidative stress, autoimmune dysfunction.

The body is doing what it's supposed to. It is the correct response to an invading organism or an invading nutrient or an invading whatever. In this case, it's gluten. The body reacts, then, with one of those three responses. But, what happens is during the process, the blood vessel gets the bystanding **[15:00]** results of the insult. So, now, you set up those three processes within the arteries, which were directed initially at the gluten.

So, the body is doing what it's supposed to. But, it cross reacts with the blood vessel, the innocent bystander. And, now the blood vessel develops disease that is chronic unless you remove the insult, in this case, the gluten. And, if you take the gluten away, the body stops reacting to it. The blood vessel response of those three finite responses starts to diminish, and you reestablish arterial health over the long term.

**Dr. O'Bryan:** This may be one of the mechanisms by which there have been a number of papers showing reversal of idiopathic cardiomyopathy, which is a swelling of the heart. And, it can't work very well. And, they can't find a reason for it. But, it reverses on a gluten-free diet in gluten-sensitive people.

**Dr. Houston:** Absolutely. So, one of the things that has not been measured and looked at carefully is gluten sensitivity related to cardiovascular disease. So, it's probably one of those hidden subclinical--initially--and then clinical risk factors that develops into significant cardiovascular disease even in children. But, specifically, as it goes on longer and longer, more and more damage in adults.

So, the extent of the cardiovascular disease can be any of the following: coronary heart disease, myocardial infarction, congestive heart failure, cardiac arrhythmias, diastolic dysfunction, systolic dysfunction, idiopathic cardiomyopathy with a dilated left ventricle, and probably many others that have not even been looked at. But, at this point, with the data that's becoming available, gluten sensitivity and celiac disease are going to become predominant as a measurable risk factor for cardiovascular disease that we all now have to check for because if we remove that insult, we can make the patients improve dramatically.

**Dr. O'Bryan:** Well, that leads right into my next question for you, which is we know there's published medical literature on the correlation of a low serum HDL--the good guy cholesterol as most people think of it--if that's low, **[17:30]** it is an early marker of celiac disease.

To the thousands of clinicians who are listening to this conversation--not only the general public, but we have thousands of doctors listening to this conversation--what would the next step be when they see a low HDL cholesterol in their patients? Would it be rational to also consider gluten sensitivity as one of the possible reasons why they have a low HDL?

**Dr. Houston:** Yes. And, let me go back and make another breakthrough point that most clinicians do not know. And, that's related to dyslipidemia. And, here is the bottom line that is fairly new, but unrecognized by most physicians. The reason you have dyslipidemia is because you're supposed to have dyslipidemia as a correct response to one of about three or four different major categories.

 

**Dr. O'Bryan:** Excuse me. Prior to going into the different categories, can you tell our listening audience what dyslipidemia is?

**Dr. Houston:** Dyslipidemia is the general term for abnormalities in lipids, lipid particles, sizes, and numbers. So, it includes everything. It includes total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides. And, we do advanced lipid testing at The Hypertension Institute. So, we measure not just the total levels of these, but we measure their particle size, the particle number, and we measure the functionality. For example, HDL can be high or can be low. But, it doesn't really matter so much sometimes what the number is. But, it matters, really, does the HDL work? Is it functional or is it dysfunctional?

So, when we go to this new concept of dyslipidemia, here's the thing that we need to remember: seventy percent or more of patients who have dyslipidemia it's due to one of three things: infection, bad micronutrient intake, which would include gluten and many others, and toxins.

So, here's the way the body works. You have one of those three insults coming in. The response of the body is to produce a lipoprotein that tries to capture **[20:00]** and encapsulate that toxin, that micronutrient, or whatever else is coming in, and get it out of the body, isolate it, and then remove it and excrete it. And, the response to that is the cholesterol, the LDL can go up, the HDL can go up or go down, or the HDL becomes dysfunctional.

If you, then, remove one of the insults, over time the lipid profile returns to normal. So, if you're listening to what I've said, it's becoming obvious that the body's pretty smart. It has a very high I.Q. It does what it's supposed to to protect the organism to keep it from being injured or being killed. So, dyslipidemia, except in the genetic form, is a normal response of the body to an invading insult. And, the three we have to check for routinely now are the three things I mentioned, which are micronutrient intake which is bad, toxins, and infections.

**Dr. O'Bryan:** That is revolutionary. That is a revolutionary concept that makes so much sense. The body is doing exactly what it's supposed to do to try and protect us.

**Dr. Houston:** Right. So, when we go back to your question, which is the HDL story, now we would say, "Okay, if your HDL is, in a male, probably over 60, or in a female over 85, it's at least got a fifty percent chance of being dysfunctional because it's a response to one of those three things. So, you have to measure the functionality of the HDL if it's in those kind of ranges. If it's low, it could also be dysfunctional. But, it may not be the large kind of HDL.

 

So, what's happened is we have moved now to another whole level of lipidology, which, before we used to say, "Well, HDL total." Well, now that doesn't mean anything. It's a flag to help you move to the next step which is, okay, how big is the HDL? Is it big or small? Because the big ones are better. And, two, how many HLD particles do we have? The more, the better.

But, it's even more complicated because even if you do that with an advanced lipid test, now you have to ask the third question, which is **[22:30]** work? Is it functional or dysfunctional, no matter what the level is, which requires more sophisticated tests?

**Dr. O'Bryan:** That is revolutionary. And, let's hope that everyone who's listening today will rewind and listen to it again. Rewind, and write it down so that you have a basic understanding. And, take that question to your doctors. Have I been tested for this?

**Dr. Houston:** And, the way you test for dysfunctional HDL is very complicated. And, we don't really have the best tools yet. But, one test that I use routinely is called myeloperoxidase or MPO. And, myeloperoxidase is a response of the white blood cell to, usually, bacteria, micronutrients or other invading things. And, it produces various substances that oxidize and damage the apolipoprotein protein-A, which is the carrier for HDL cholesterol.

So, as you know, when oxidize something, you destroy its functionality. Well, there's a lot of proteins in HDL. So, that reaction to that MPO, which is produced by the white cell, damages HDL. It doesn't work. So, if you measure the MPO and it's very high, chances are pretty good your HDL is a dysfunctional form. And, then what you do is go to try to find out, well, what's making the white cell react that way? What's the offending agent, the offending nutrient, the offending organism that's making the MPO go up? And then try to correct the MPO and the offending organism. And, then, over time your HDL becomes functional. And, your risk for heart disease goes back to a normal level.

**Dr. O'Bryan:** That's just remarkable information that I know our listeners will have to listen to a couple of times to write it down to speak with their physicians about it.

So, even if you have good, healthy, or even elevated levels of HDL, the, quote, "good cholesterol", that concept was excellent ten years ago, fifteen years ago. But, now we need to know what type of HDLs they are. And, then, even if you have a high number of the good HDLs, we need to know if they are being suppressed in their function because they have elevated levels of myeloperoxidase.

**Dr. Houston:** That's exactly right. You got it.

**Dr. O'Bryan:** That's marvelous to hear. So, Dr. Houston, are there dietary contributions to elevated MPO levels? **[25:00]**

 

**Dr. Houston:** Absolutely. The way this system works...And, it sounds complicated, but it really isn't if you just remember a couple of basic things. Okay? Infinite insults result in three finite responses. So, let's take any insult you want to. Since we're talking about gluten, let's make gluten the insult of the day.

All right, so, the gluten comes in. And, it attaches to the zonulin receptors and all those things which we all know about. And, it sets off those three finite responses: inflammation, oxidative stress, and autoimmune disease. So, everything gets activated. And, then once you activate those systems, you start producing a lot of things. But, one of the things that is produced is myeloperoxidase from white cells. You also make cytokines and chemokines and TNF-alpha, interleukins, all these things that cause more and more damage. And, they're all related to this intertwining of those three finite responses.

So, the direct answer is, yes, gluten can directly cause elevations in MPO, which, then, can inactivate and cause your HDL to be dysfunctional.

**Dr. O'Bryan:** That is...I can't say heartening information. Well, maybe it is because you have better functioning heart with this information. [Laughs]

How often do you identify a gluten sensitivity in the patients that come to you?

**Dr. Houston:** I think that if you have a high index of suspicion clinically, it is very common. And, I would say, typically, because I have predominantly a cardiovascular practice, but because I do nutritional medicine, I see other things. I get people who come in for chronic fatigue or memory loss or a lot of things that have nothing to do with cardiovascular medicine. And, when I get them, I find that they have cardiovascular disease on top of why they came in. So, I'm routinely checking gluten sensitivity now in patients who have even a smidgen of a symptom or a sign that I think is appropriate to look for.

And, sometimes, honestly, the way things are going, it might be reasonable to routinely check almost everybody for gluten sensitivity because a lot people may not even complain about something. [**27:30]** But, when they remove the gluten from their diet, whatever they weren't complaining about, they say, "You know, I got better with [whatever that was] my fatigue," or, "my memory," or "my focus," or, "my bloating," or, "my diarrhea," or whatever because they don't think it's a big deal until they take it out of their diet. And, then a week or two later, they're going, "You know, I don't have that symptom anymore."

So, I'm beginning to think that one of the ways that I'm going to start looking at people is...And, as you know, there are a lot of questionnaires you can fill out to get to the bottom of this. And, I would recommend that everybody do that because you'll pick up

 

on things with a good questionnaire and a lot of detailed history that will lead you toward realizing a gluten sensitivity is very common. Honestly, Tom, I don't even know what the numerator denominator is. I just know it's a lot higher than we thought it was.

**Dr. O'Bryan:** Yes, yes. And, when you instruct your patients on being selective about their foods and conscious of their choices, how do you go about that? Do you do that yourself? Do you have trained staff people that work with them? How do you introduce them to a different way of choosing foods?

**Dr. Houston:** Well, because I have a very keen interest in education and nutrition, I would give them sort of the big picture and say this is why this is important and this is what it's going to do to you. And, this is what we're going to do to get you better. And, I'm going to send you over to my nutritionist. I have a full-time nutritionist who is also an exercise physiologist. He's got a master's in both.

And, he'll spend an hour on their first visit going through their nutritional history and then getting them on a gluten-free diet or a dairy-free diet or whatever they need. And, they have follow-up visits until we get them completely symptom-free. And, then later on, we'll recheck all of their gluten sensitivity biomarkers and see if they've gotten better and they're resolved.

**Dr. O'Bryan:** And, approximately what percentage of your patients, when you re-check, have found that by following the guidelines and changing their diet, that the biomarkers identifying a gluten sensitivity have resolved?

**Dr. Houston:** What's amazing is clinically very quickly, they get better. I mean, I've had people who come back in a week and tell me all their stuff's gone away. And, then, I say, "That's amazing! Let's give you about four months and we'll recheck everything," because it takes a while, I think, for the antibodies to kind of track back down. **[30:00]** And, I really don't know the timeline. You probably know better than I at which time the antibodies and all these markers start to go to a baseline. But, what I typically do is I'll recheck their Cyrex testing, which I think is the best lab to use, at about four months and see where they are.

**Dr. O'Bryan:** Yes, and we've had Dr. Vojdani on the show, Aristo Vojdani, who has said anywhere between three and six months, depending on the individuals. Because once we stop eating gluten, the production of the antibodies doesn't stop that day, that the system is turned on and continues to produce for a period of time. And, the ones that were produced yesterday have a life of somewhere between two to three months.

So, if it takes a month or two to stop the production of new antibodies, then those new ones that won't be produced until a month after you're on a gluten-free diet, they have a

 

life of two to three months. And, so, you've got to wait at least three months before you recheck.

**Dr. Houston:** Yeah, exactly. Well, I'm glad to hear that because I wasn't sure the timeline. But, when you look at the other data on antigen antibody responses to autoimmunity, typically what we've looked at in the literature is four to six months. And, this is exactly in line with all these other autoimmune things, as well.

**Dr. O'Bryan:** Yes, yes. What kind of response do you get from your patients when you look them in the eye and say, "I need you to give up gluten and dairy in order to get the results you want"?

**Dr. Houston:** Honestly, most of them are so ill and feel so bad, they will do anything necessary to get better. And, what I'll tell them, I'll said, "Look, if you don't have a sensitivity to either one of these, we're going to find out very quickly. So, can you hang in there for at least seven to ten days with a very strict diet and not cheat? And, if you get better, you're going to be so glad you're better." And, they will continue the diet. And, that's what happens. The compliance is like 100% because they know if they cheat just a little bit, they pay for it very quickly.

**Dr. O'Bryan:** That's a marvelous way of presenting it to them. And, I'm sure, with your clinical experience, you can tell the ones that may be a little resistant. So, you give them the seven-day request.

**Dr. Houston:** And, some of them, if you would tell them, "I think you're gluten sensitive. I want to put you on a gluten-free diet," **[32:30]** they'll say, "Well, I don't want to do that until you prove it." So, we prove it. And, then, they'll go do it.

**Dr. O'Bryan:** [Laughs] Yes, some people need to see it in writing. And, now we're blessed to have accurate testings so the false negatives are so much lower than in the past.

Dr. Houston, one of your most recent papers that you have produced, "New Concepts in Cardiovascular Disease," was just brilliant. And, in the introductory paragraph...I want to read a little bit of this and then ask a question to you from it.

You wrote, "We have reached a limit in our ability to reduce the incidence of coronary heart disease and cardiovascular disease utilizing the traditional evaluation, prevention, and treatment strategies for the top five cardiovascular risk factors: hypertension, diabetes mellitus dyslipidemia, obesity, and smoking. Statistics show that approximately fifty percent of patients continue to have coronary heart disease or myocardial infarction [that's a heart attack] despite 'normal' levels of these five risk factors as traditionally defined. Understanding translational cardiovascular medicine to correlate the coronary

 

heart disease risk factors to the presence or absence of vascular injury and disease with non-invasive vascular testing will allow for early identification, prevention, and treatment of coronary heart disease and cardiovascular disease."

Can you elaborate on this for us?

**Dr. Houston:** Most of the medical community looks only at the top five risk factors: blood pressure, cholesterol or dyslipidemia, dysglycemia, obesity, and smoking. And, those are important obviously. But, the problem is the way they've been defined in the past is not correct based on new science.

So, even if you correctly define those five risk factors, you're still left with a big gap in the ability to get those under control and prevent coronary heart disease. So, the old statistics, the poor definition of those five risk factors...Half the people have their first symptom of heart disease as a myocardial infarction. So, they drop dead **[35:00]** or they have extensive damage. And, you've heard stories like this all the time, people go out and run a marathon and die when they're running because they don't have any symptoms.

Now, the next phase is redefinition of the five risk factors. And, that'll move us into a better risk category. So, I don't know what the number is going to be. But, maybe it won't be fifty percent that die or have a heart attack. Maybe it'll only be twenty-five percent. But, there's still 395 other defined risk factors, which include gluten, which no one put in the list yet that are important to look at. And, no one looks at them.

So, here's what happens. This is where you get into the story of translational vascular medicine. And, all of us have seen this as clinicians. You'll have this 90-year-old farmer who walks in your office who's been eating hog jaw and lard and bacon grease and eggs and smoking five packs a day. He's overweight, and he's got no evidence whatsoever of heart disease. And, you're going, "What's this all about?!" And, you have another person who's like thirty-five years old who exercises every day, eats right, is slim, doesn't smoke, and has got horrible coronary heart disease. So, you're going, "What's with this?!"

So, what you're doing is you have people who have the risk factors of that disease. And, you have other people who have no risk factors who have horrible disease. And, that's what I call the translational vascular medicine, which is you can't really depend just on the risk factors anymore to define vascular disease. You've got to measure it.

So, we have tools that measure non-invasively--but also invasively--vascular function and heart function. So, I can tell you...I can look at your risk factors and say, "Well, you know, you've got a thirty percent chance of having heart disease." But, you know, really, I don't know that for sure. I've got to really get a good number. So, we do these tests

 

and we do endothelial dysfunction tests with the endoPAT. We do CT angiograms. And, we used to do electron beam tomographies for calcification and coronary artery obstruction. We do 2D echoes, carotid IMT to look at carotid artery thickness, plaque formation. And, then if we have to, we do coronary tear grams, magnetic resonance **[37:30]** imaging of the heart. But, all these things are available. So, I can tell you, “Yep, you’ve got risk factors, and this is what you have as your extent of disease.” So, the translation becomes accurate, not inaccurate.

**Dr. O’Bryan:** Well, that is the medicine of today that we all want. It’s not the medicine of tomorrow. It’s the medicine of today. The technology is out there. And, it’s clinicians like you, Dr. Houston, who are pulling it all together to make it in a presentable package form for the clinicians, for the doctors to learn and implement with their patients.

Thank you very much for the work that you do for the thousands of people who are impacted by what you teach to all of us out in the field in cardiovascular health and reducing the risk of cardiovascular disease. And, thank you so much for being on the show today and sharing that information with us.

**Dr. Houston:** Thank you, Tom. It’s been an absolute pleasure. And, thank you for getting this seminar together to educate the masses. That’s what we need. And, hopefully, it’ll help a lot more people in the future.

**Dr. O’Bryan:** Amen to that! Thanks, again.


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