AI & Your Arteries: The Future Of Reversing Heart Disease Transcript

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Introduction to plaque reversal and Dr. Min

– Hello everybody sit down, get excited right now. Welcome back to Reversing Heart Disease Naturally. Summit, Joel Kahn. We have a world expert. I mean we're bringing world experts.

We have a world expert to talk about. Probably I'm so excited it could be the number one. I don't want anyone else to be offended. Most important interview of the entire summit because you cannot have a Reversing Heart Disease Naturally Summit if you can't actually talk scientifically academically that you can reverse plaque. In the last decade.

I've been using a digital carotid ultrasound called a C. I. M. T. And I see my patients plaques get smaller and smaller and smaller but that's a brain artery. Very important.

I have not had a technology to do that in heart arteries. I'm bringing you now Dr. James Min who is the world's expert on how you document reversal of plaque transformation of plaque. So this is really an important session.

One that may be very important to you. Dr. James Min is founder and CEO of clearly a healthcare come in the digital care pathway space supporting physicians and patients to reduce the risk of heart attacks Prior to being CEO of clearly he was full professor of radiology medicine, cardiology at the wild Cornell Medical Center in New York and director of the institute of cardiovascular imaging in New York Presby hospital.

Dr. Min is on every society in the world of rage and imaging. Published over 500 papers. He's a young man. A young doctor that is so many hours of work.

He's led more than 10 of the most important clinical trials on imaging of heart arteries. He's literally changing the paradigm. I just want to stress everything Grandpa knew.

Dr. Min is rewriting the book. So James Min without further ado, thank you for being here. – Oh thanks so much, Joel It's a pleasure to be here. – Truly the enthusiasm is high and you know, it's been fairly easy to try and throw out the term precision medicine and I give credit to the great Tony Robbins in his book, Life force of early 2022 really dedicated to enumerating pathways of precision medicine and they're highlighted probably more than any other technology is your company, clearly cardiac imaging. So hats off to you I had the pleasure of interacting with you this week to prove to a patient that all the hard work they're doing is shrinking their plaque in their heart arteries. And we did that with your technology.

Why traditional heart disease measures fall short

So, you know, this is very personal to me about how it's changed my practice. But let's start basic, basic, What do we measure today to diagnose heart disease?

What are the indicators were using that just aren't optimal all those years. You were involved in cardiac imaging and you know, in New York. – Yeah, it's a great question like the so, you know, I trained as a cardiology fellow at the University of Chicago about 20 years ago and everything that I was taught, like doesn't work in a precision way. As you pointed out in a personalized fashion, what we've gotten very good at I think is looking at indirect markers either upstream of heart disease or downstream cycle of heart disease.

But we've never really looked at the disease itself. So if you say, well what is heart disease? You commonly hear patients walking on the physician's office saying, oh my doctor told me have a blockage.

But fundamentally the blockage isn't the problem. The blockage is a sick Guella of the plaque that builds up silently within the walls of the heart arteries over many, many years and it's called atherosclerosis.

And what we thought 10 years ago 15 years ago was that there was a single phenotype. It turns out atherosclerosis like cancers, many, many different types of disease.

And they carry very, very different clinical importance that we learned through a number of large scale clinical trials over the course of the past decade or so.

So in some like we are really great at looking at these risk factors of disease like cholesterol and blood pressure and diabetes, which doesn't actually look at the disease itself, but it's more an association to the disease.

And we're very good at looking at downstream Sekula of disease like a blockage or narrowing. But we've never actually looked at the disease clinically and that's what our company focuses on. I think the simple analog oncological analog is if I were a woman and I was worried that I had breast cancer and somebody checked my lymph nodes in my ex illa or they checked a blood test and said, hey you look fine and the woman says, but you've never examined my breast for breast cancer. That would people would think that that would be absurd. But that is exactly what we've been doing in cardiology for the last 70 years. – Well, absolutely.

And some of the listeners may know for example, framing him risk or calculators, American college of Cardiology, risk calculators number his age, blood pressure's your prediction of having heart disease but never examined the breast.

In this case the heart arteries were changing that. But somebody's listening right now and say but I had a heart cath and they told me I have a 50% blockage. Before we go to precision this, let's talk about that. Somebody went through an invasive procedure, you're 50% narrowed. Mr. Jones, Mrs. Smith.

I mean how optimal or suboptimal is that measurement? – It answers a different question. Right? So 28 years ago again, when I was training, what we were taught was that symptomatic patients with chest pain or shortness of breath are the ones that are at risk for heart attacks.

And if we can relieve their symptoms will reduce the risk of heart attacks. That turned out to be wholly untrue. What we've learned through at least seven large scale randomized controlled trials is that symptom when you relieve symptoms that that's all you do is you relieve symptoms but you never reduced the risk of heart attacks.

And so the blockage, I think is an important metric. If you're asking, hey, is blood flow being reduced because of that blockage that's causing the symptoms? That's an entirely different question than how do I prevent myself from having a heart attack? And that question is related to the disease itself, which is the anthrax crisis, or the plaque build up in the artery, the walls of the artery.

– And you probably remember the studies during your training that were actually done in the 19 seventies, going back to Mrs. Jones, Mr. Smith, vice versa, 50% narrowing on a heart cath. I mean, that's a visual eyeball estimate by a trained doctor. But when you give that same image to 10 different cardiologist, it's not precision medicine, you can get a very wide range of visual estimates and, You know, the person listening now is a 50% blockage.

Thinking could be 30 could be 75 depends who's looking at it and the lighting in the room and your caffeine intake that morning. It's not precise and that's what I explained to patients. So let's go on to what are more direct measures of heart disease beyond both visual eyeball and cholesterol, blood pressure, blood sugar calculators. What are more direct measures?

Calcium scoring and the limits of calcified plaque

– Yeah, I think that about 30 years ago we saw the introduction of a technology called a coronary artery calcium score and what that is, is a very safe, non invasive way to look to see whether or not you have calcified or calcifications building up within the walls of your artery. We know that calcifications are essentially like rocks that are embedded and studied in the walls of the artery.

And we utilize that technology at the time 30 years ago because it was the best we had To be able to visualize

what is actually happening, not within the vessel itself, where the blood is flowing but within the wall of the artery.

What I think the listeners need to know is that nearly 70% of patients who will have a heart attack will never have a severe narrowing, significant blockage in their arteries.

But our field of cardiology has been so focused on looking for these severe narrowing, 50%, 70%, 90%. When actually the vast majority of the people having heart attack have less than 50% narrowings, They don't cause symptoms, they don't cause abnormal stress tests. And so the coronary artery calcium score was a way to visualize one type of plaque in the arteries.

What we've learned over the last 10 years is that type is actually associated with a lower risk of heart attacks than the other type, which is the non calcified plaque and the non calcified plaque is also an array of different types of plaque, but they tend towards being more fatty and cholesterol field.

They're softer, right, in some sense? And the way that we used to explain it to the patients is that what we found in the trials was that the non calcified plaques really noted the greater risk of having a heart attack. The calcified plaques, like once they become very dense and biologically inert are associated with a lower risk of heart attacks. Which conjured up this question of like, well then how do you turn the non calcified plaques into calcified plaques?

And it turns out that at least today, almost everything that we do that's good for patients seems to convert or transform that plaque. They include things like statin medications like increased physical activity, a low sodium diet Pcs K nine inhibitors, fish oil, all of these things. They serve in some cases to regress, but in the majority of cases to transform the and you were just mentioning Dr. Kahn one of your patients in whom the plaque regressed. And I think I can I can explain or unify both of the things that you just observed and what I just said, because if you take, like, let's say you take a bunch of gunky mud and you equate that to the non calcified plaques and then you start to dry it up and you start to make it denser and then you turn it into a rock and then you turn it into coal and then you turn it into a diamond.

Well what happened is that you've transformed the plaque. But it's like if you took a sheet of paper and you crumbled it all up. The apparent volume of that plaque has now gone down.

But it was from a transformation of that soft mud into the hard diamond that made it look like the volume reduced. But it was really through the transformation more than anything. I think that's what the previous studies are supporting. – Okay, fascinating.

And there's so much to unpack there. So we have had a wonderful conversation with a good friend of yours, matt booed off. harbor U. C. L. A. We talked a lot about calcium scoring.

But again we've gone from Imprecise risk factor calculators to a calcium score 30 years ago that at least gave some direct measurement of part of the plaque.

That can be an arteries the calcified portion of black. But you and clearly have gone beyond that, recognizing that calcium scoring has major deficits. You don't see soft black, you don't see the most dangerous black. So tell people what this is.

Clearly coronary ct angiogram maybe briefly, what does the patient go through? And what do you do with it in New York City when the digital images arrive for your analysis? – Yeah, it's a great question.

So like I was talking with Dr. Arthur Agatston last week, He's the inventor of the coronary artery calcium score and he refers to the calcium deposits in the walls of the arteries as the old plaques.

But and as you think about what you had discussed with matt booed off. Like there's an age dependence to this to the calcified plaque that younger people tend to not have as much calcium. And it's really the as we get older that the plaques get older. And what we want to do is identify as you pointed out the dangerous plaques, which tend to be the non calcified plaques.

So the the only way you can do that is non invasively in a routine way is using a coronary cT angiogram.

Coronary CT angiography and AI plaque analysis

So it's a very safe noninvasive procedure at any good site. It probably takes all in about 15, 20 minutes to do the procedure. The actual picture of the heart takes less than a second to cover the entire corner heart and all of the coronary arteries.

You have to use a little bit of contrast iodine contrast agent so that you can I'll pacify the arteries and visualize the wall and see the non calcified plaques.

In our case we use that coronary cT angiogram. So at any clearly enabled cT imaging facility. If somebody gets the CT scan, we automatically ingest that into a computational cloud where we can use high powered gpu s to analyze all of the data and a series of machine learning or ai algorithms process all the data to really get down to the submillimeter scale to tell somebody exactly what type of plaque is there. How much plaque is there where it is.

How diffuse it is, how it affects the artery. Both on the outside as well as the inside of the artery. So all of those quantitative metrics are delivered back to the user in about an hour or so.

– So amazing. And as a person who chose last year to go through a clearly health C. T. Angiogram no problems. But I'm a guinea pig for cutting edge hard technology.

I got an I. V. In my elbow portion of my arm like they were drawing blood. I laid down and relaxed very comfortably in the C. T. Scanner. I got hot for about 20 seconds as the iodine dye went through my vein and into my heart and then ultimately it ends up Exiting the body through the urine and over the next hour or so I held my breath for 20 seconds and after that I got a band aid and went home, drank a little bit of water and got a report the next day and where it was different from my calcium scoring CT scans was your company tells how much hard calcified plaque in cubic millimeters.

It's amazing artery battery, how much soft non calcified plaque in cubic millimeters. Artillery battery. The total of the plaque of which I'll probably announce I had nearly none.

Which was great. And then finally if there's a narrowing in the artery it's not that cup of coffee eyeball, 50% it's 17% 21% 22% 74%. Depending on what it is.

It's the precision and that's, I don't even know what a gpu is. You have to tell me, I know what a CPU is. But that's all done through algorithms and artificial intelligence software that you created patented sort of super genius that you are right. – Yeah. I mean it is like it's AI algorithms, but I want the listeners to understand that AI or machine learning it's just a tool, right? Like we have done conventional image processing in the past, this tech, this tool does it better, but it's, there's nothing magical about it. It's still mathematics and in and processing of the images. The other thing that I'd emphasize, Joel is that, you know, you're sophisticated, but a lot of the folks who will get undergo the clearly analysis actually don't have a medical background.

And so what our company has done is we spent an enormous amount of time thought and effort to take the advanced imaging science that does the phenotype ng of disease or characterizes the disease and translates it so that anybody can understand it.

I think that's a very important point. If I told somebody off the street, hey, you've got 173 cubic millimeters of, let's say, okay, what does that mean? Well, if you don't know what that means, then it's not helpful to you. So what we've done is we've made patient facing tools, primary care physician facing tools, general cardiologists facing tools, even tools for the radiologists, the interventional cardiologists, preventive cardiologists and so on. So we can translate the advanced imaging science into insights that people actually can act upon on a daily basis at home or and fully understand. – Yeah. So I think it's really novel.

Everybody needs to listen to this. You know hopefully we don't face that day were talking to an oncology cancer

specialist and here we have stage three pancreatic cancer or stage four breast cancer. But we never talk that way to cardiology patients. But intuitively we know mild and we know horrible but don't speak that language. You've translated this quantitative data into stage one through four corny artery disease. And this is a paradigm shift.

So it's gonna take a while for cardiologists to start talking that way.

Precision reporting and patient-friendly staging

But I can tell you as a practicing cardiologist, it grabs people's attention when the report says stage for atherosclerosis and they're way more likely to change your diet.

Get on the right prescription drugs, change the lifestyle and hope to see in a year if we repeat the clearly C. T. Angiogram that shrinking of particularly soft plaque that taking that piece of paper and grumbling it like you so nicely said so I mean who should get a clearly analysis what's your, I think people say your avatar who's your perfect candidate.

– Yeah, I think that right now coronary ct angiograms are covered by almost universally by both commercial and Medicare payers for patients who have symptomatic suspected heart disease, chest pain or shortness of breath. And our technology layers on top of that to really help illuminate what's going on in somebody's heart at a precision or personalized level. I think that what we've demonstrated is within the work up of a symptomatic patient um that that that definitely can reduce the total cost of care to the health care system while providing more and useful clinical information.

I think that like if you look at the data, nearly 60% of the people who will suffer a heart attack or die from one actually have no symptoms. And so how are we going to prevent heart attacks if we never actually evaluate patients who are at high risk but do not have symptoms? I think what we need for that is large scale randomized control trial data to really influence policy guidelines and professional societal guidance documents. So our company is committed to doing that.

We've designed to large scale randomized trials to really focus on the asymptomatic person who is at risk. Think about this question like why do we use advanced non invasive imaging to prevent the most common cause of cancer but not the most common cause of death. It does.

That makes sense. Like we used mammography and we use colonoscopies but the number one cause of death is coronary heart disease from either fatal heart attacks or in the end from the cycle of non fatal heart attacks.

We've got to find these people. It is the number one public health epidemic. Like somebody will die of cardiovascular disease in this world every 1.7 seconds.

Like in 2020 there were two fold More cardiovascular deaths than deaths from COVID-19. I mean that's how big this epidemic is. And so I think that like for those who are concerned and have the wherewithal to be able to offer themselves.

The clearly analysis. I think you'll do a huge service to yourself to find out whether or not you have disease or whether or not you don't have disease in which case it's very reassuring. Such as in your case.

– So my personal experience having ordered dozens of clearly ct angiograms and patients and I'm licensed in about 30 states. It's if a listener lives in L.

A. No problem we can arrange it lives in New York. No problem. That's in Florida Texas anywhere where there's a high quality hospital or imaging center with an advanced C.

T. Scanner. You can get a coronary ct angiogram and either mail the C. D. Two New York or transfer the images digitally and you know you don't have to have the C. T. You don't have to go see Dr. Min physically in New York City. You just got to get your data there.

And most of my patients have paid for this. They very cross section of economics in my practice.

Who should get Cleerly analysis

But they've understood after I explained it the value of precision cardiology is there you know very commonly people that are very interested in my experience have had a calcium score abnormal.

Is there a cut off where if the calcium scores over X it may become difficult to get a good standard coronary cT angiogram which therefore means it might be difficult to get the clearly analysis. – Yeah it's a great question.

I don't think there is any threshold like when we practiced at Cornell Medical College in New York Presbyterian Hospital we would take anybody independent of their calcium scores high calcium scores you know but for the listeners sake is severely elevated is considered at the threshold of 400. We've done coronary ct angiograms on patients with calcium scores of 9000 and and have gotten pristine results on those corners.

Cts. – Well that's good to know because there are centers and and certain other physicians that will say over 1000 reconsider but you're the world expert. I'm going with you and of course a severe life threatening iodine allergy would take somebody out of the selection usually.

And of course advanced kidney disease because of the need to clear the dye through healthy kidneys. So it's a small subset. I've not yet encountered anybody. I couldn't get a clearly ct on but It's absolutely transforming. So now we have this technology preventive cardiologists, preventive medicine, doctors, the public who say I want to know exactly how much black is in my coronaries. What kind of black, what stenosis burden I have, even though the stenosis is not ideal in predicting future heart attack, it obviously is of concern to patients if they're 20% or 70% black and the result comes back and somebody has Stage four coronary artery disease.

Their total black volumes 900 cubic millimeters in their 48 years old. That's a patient I'm thinking of in my own practice. I mean, what is the treatment paradigm entail now that we've identified their phenotype, a term you used as, you know, very advanced, very high risk.

– Yeah, it's a great question like so I think, and it's very relevant today. Five years ago we had a very limited armamentarium in our toolbox, essentially, we had statin medications and maybe ZD A or Zed.

I need to lower your cholesterol. That was about it in the last five years. We've seen the introduction of at least a dozen different classes of medications that have all been demonstrated to reduce heart attacks and other major adverse cardiovascular events.

So now the toolbox is very heavy and But what the problem is we don't actually know who to treat. We know that the risk factors that we have used are inadequate to figure out who is actually successfully undergoing therapy or not.

Let me give you an example, like let's say you take a statin medication, what a statin medication is associated with is about a 20% relative risk reduction in having a future adverse heart event or a heart attack. That means that that's 20 Percent after you lower the cholesterol. That means it implies that there's 80% of people who have residual risk that we don't know who's who's not responding to the medications because you put them on the medication, you've lowered their cholesterol.

And yet four out of five people are still at risk. So the simple solution is measure the disease. Don't measure an indirect marker of the disease.

Treatment after identifying plaque phenotype

And then in addition to all of these medications that are truly blockbuster medications, we tend to forget about lifestyle modification. There's so much lifestyle things that we can do to improve heart health.

They relate to not only activity but also to stress to anxiety, to sleep to diet. So that there's a whole number of things that you can approach. But I think to look at the patient as a person rather than just the lack number and say, hey, we're going to give you some medications, like, let's try to design the optimal lifestyle. And then try to control all of the, the propagation of disease over time. And then, you know, as you said, it's very quantitative. So you can track your plaque over time to make sure that whatever you're doing is actually working?

– Excellent and you know, I I just want to bring a little historical perspective. Thank you for bringing up lifestyle. This is a Reversing Heart Disease Naturally.

Summit people are hearing about nutrition a lot fitness, a lot sleep, a lot stress management a lot, even hyperbaric oxygen and vagal nerve stimulation and all kinds of interesting but science backed approaches because I agree the toolbox has gotten huge just in the pharmacologic area but it's even enormous if you bring in lifestyle.

A lot of the listeners are very familiar with Dr. Dean Ornish and the lifestyle heart trial 1990 lancet 1998 in the journal Jama. And you know he took coronary angiograms on the intense lifestyle group in the control group and documented with quantitative coronary angiography that there was a reduction in stenosis.

Now you've got a technology, you don't have to go through a heart cath, you don't have to spend $10,000 and be subject to a risk of bleeding or perforation or some other mishap which as a calf cardiologists are real deals.

It doesn't matter who you are, what your age is always a risk. So you have replaced maybe we should talk about for a minute accuracy of cardiac catheterization versus accuracy of what you're doing because that is published data but when Dr. Ornish published that data, if you had to go back and think about it, do you think he was observing soft plaque being reversed through intense lifestyle?

Is there really any evidence you can drop calcification of corners? – Not so much. What you can do is what we've observed in the trials is that people can make their calcium denser, right?

So the difference between mud and a rock and coal and a diamond like that goes in increasing density and as that density goes up um the the volume comes down so I don't quite I don't know but and I think somebody should do the study but I if I had to hazard to guess what he was observing was the transformation of plaque from sort of the what's on a ct scan it looks dark that that that non calcified plaque as it goes brighter, brighter and transforms into calcium. And then if there were calcium that the calcium would go into a denser calcium and that would be associated with an apparent reduction in volume. But it was mostly driven by the transformation of plaque rather than regression per se.

– And just finally a scenario Bob, Barbara, somebody reckoned they're a little short of breath on exertion and they get a treadmill stress test and the treadmill stress test.

Lifestyle, plaque transformation, and follow-up imaging

This is a common scenario shows some changes that suggest but do not prove that there could be coronary disease coronary obstruction? The doctor says you have an option you can go through an invasive coronary angiogram or we have at our imaging center ct angiography with clearly analysis what's the database for those listening as to the accuracy of that important decision for a patient to consider.

Or at least they may not hear it from their cardiologist but now they're hearing it. It is an option. – Yeah. Those stress tests I think were tried and true when we when they were developed. Right?

So we've been doing stress testing since the 1970s. So if you think about is the world and technology is advanced like things have gotten better. We know that like at the time we were using that they were best in class. But the use of stress testing to guide referral to an invasive procedure to look more closely at the arteries is associated with about two thirds of patients having no actionable disease. So you can think about the statistics on that if only one out of three people are actually diseased by, you know after undergoing a stress test and being referred for an invasive procedure, it's probably not an ideal one. It was very important to us that like we would validate the

diagnostic performance of what we were doing.

So we picked six gold standards and all in multi center clinical trials. And the first thing that we wanted to do was prove that against the expert readers, we were good against that that phrase that you use quantitative coronary angiography, which is the invasive catheterization procedure that many undergo each year.

And then a whole host of very advanced coronary imaging techniques. All invasive. So optical coherence tomography, intravascular ultrasound fractional flow reserve and then near field infrared spectroscopy. The words aren't so important as much as it is that each one of those advanced imaging invasive imaging catheters are aimed to try to deter a certain type of feature of heart disease.

And so no invasive catheter can do it all. We found that we were highly concordant with very high diagnostic accuracy against all of those things. And so we wanted to demonstrate that you don't need an invasive evaluation.

We can do this in the noninvasive setting and we can provide six and one types of information that you would otherwise need individual tests to do. – And I want to stress for the listener because you may not appreciate what Dr. Min James said is not opinion, it's completed research studies published in the top journals where one would have to conclude other than the setting if you're in an emergency room or you're in an extremist where an invasive catherization is clearly often the best approach. If it's an outpatient elective setting, why not do it in the less expensive, safer and possibly even more accurate way with the quantity ation you offer.

Stress testing, validation studies, and closing remarks

And it's a total paradigm shifter and the hospitals are going to fight it an invasive cardiologists are going to fight it to some degree because a procedure is being taken out of their hands and being given off into the radiology department or some combined cardiology radiology interpretive alignment.

But so be it for those listening coronary ct angiography with quantitative in and AI is the cat's meow and bring your cardiologist up to speed share this video with them because they will find Dr. Min in the National Library of Medicine 500 times and he is the authority.

So any final parting shots that you think are critical for the audience to hear? What's the website for Clearly? – Yep. So the website is www.cleerlyhealth.com and cleerly spelled with two E's.

And I think the only parting thing that I would say, which I think that many of the listeners may not know and certainly we as cardiologists know but tend to forget or tend to omit is that heart disease like causing heart attacks and sudden coronary death is a silent killer in the majority of people.

So just because you don't have any symptoms does not mean that you are severely, you're not severely diseased. So, to your point about the hospitals and the invasive cardiologists, I think if our field shifted from a symptom driven approach, like you have to have chest pain or shortness of breath for us to care about whether or not you have heart disease or not and shift that symptom driven approach to a disease focused care pay paradigm, I think that there's so many people that we can save.

And I think net net probably the invasive cardiologists are still going to see um the same amount of patients coming through because there's so many asymptomatic people walking around in the United States that are so ill, but they just don't realize it because again heart disease is a silent killer in the majority.

– Strong work. A whole lot of invasive cardiologists like you. Again. Good job. Well thank you so much. I think this is gonna be just an all star reception in terms of the information, the actionable information and people can go online and read about your software company and how it's transformed medicine, how it's being used by cardiologists like me on a daily basis.

And I welcome it precision medicine for the number one killer of men and women in the Western world. What a powerful 12 punch. So thank you very much. – Thank you much.

Dr. Kahn, it was a pleasure to be here