What Did the Vegan Twin Experiment REALLY Find? - Professor Christopher Gardner Transcript

(Transcripts are generated by AI and may contain errors)

Diet Changes and the Study Idea

Look at you all. >> I can see some differences just by looking at you. >> We actually saw profound changes based on what diet they were eating. >> Those lines look very different, don't they? >> That's a huge difference.

>> In just 8 weeks, >> it shocked me. >> We can solve a lot of the issues that are hurting us by just rethinking what's at the end of our fork. I met a girl. She lived in California. I had been on the East Coast. I quit my job. Moved back to California for her with her. And then she dumped me and she was a vegetarian and I was not. And I thought maybe if I become a vegetarian she'll take me back. So I became a vegetarian in 1983 which is what 42 years ago. She did not take me back but I stayed vegetarian. This study that turned into a Netflix docue series. I'm going to focus on that for a number of reasons. One because part of the intervention is a vegan diet. Now I got to tell you this was never my idea from the beginning. This guy Luis Ahoyos approached us. He had won an Academy Award more than a decade ago for The Cove. This was a documentary about dolphin slaughter in Japan and they were feeding Japanese school children mercury laden dolphin meat and and getting away with it. So this was a documentary expose the cove. We got an Academy Award. I don't know how many of you are athletes or have ever heard of this, but four or five years ago, he had another documentary called The Game Changers. And this was all vegan athletes. This is all elite vegan athletes at the top of their game, not eating any animal products whatsoever.

That was pretty popular. He came to me and a colleague who works on the microbiome, which is a hot topic in my field of health right now, your gut microbiome and the microbes in there.

They said,"I would really like to do a new movie and I would like it have to do the it should involve diet and it should involve the microbiome." And it has become such an important part of my life that I now differentiate my life into these three segments right here. Before Louie, before Netflix, and after Netflix. So, let me get you my quick little story of how this all happened.

He approached us in the fall of 2021.

How the Twin Study Was Designed

At which point my career was already doing pretty well. I had grown up in New Hampshire, the live free or die state. Went to college in the east east coast. Got my job at Stanford. I do a lot with the American Heart Association, the American Diabetes Association. I worked with the chefs to create a group called the Menus of Change University Research Collaborative. on the Stanford campus. I started a plant-based diet initiative.

And I get to work with some of the world's authorities on the microbiome, Justin and Erica Sundenberg, both PhDs. They both work in the same lab together, husband and wife, and they are just phenomenal.

Louie approached us and he said, "Okay, I got this idea. I have money for you to do a study and I have a potential contract with Netflix if you will run a study and let me film the study participants and go off on my own while you're doing other things and film other people and put it together.

The only guidelines I have for you is I want the diet to be vegan and I want the participants to be identical twins. I thought I identical twins, man, it's really hard to recruit for a study. Won't it be really really hard to recruit identical twins for a study? So, we had a whole bunch of Zoom calls. And he said, you know, I do have money. He said, "All right, all right. All right. All right. All right. You got money. You're going to help us recruit the twins. This sounds fascinating. We've never done anything like this before working with a film producer. We are willing to give it a try. We designed a study that would have 22 pairs of twins where we would deliver food. I'm going to go into this in

more detail in a little bit for four weeks and then they'd be on their own for four weeks and we get their blood and their poop and other stuff and we'd have a study and we'd send everything out to the lab. And he said, "Yeah, you can do that and I'll be filming your participants and I'll be filming other things at the same time." And we got pretty much wrapped up in the study more than the movie because they did all this and we finished the study quicker than we've ever finished a study before. We finished like from January to August of 2022. We did the whole study. At which point when we're done with a study, we have to take blood and poop and other samples and send them out to laboratories and wait to get the results back. And then we have to type it up and then we have to submit it to a journal. And by now it's 2023 and we've submitted to the journal and we're waiting to get it published. If you don't know how how this works, it's horribly slow. You submit it, they reject it, you submit it somewhere else. They say maybe only if you fix it, if you do this other thing and time goes on and on and on and we actually kind of completely forgot about the whole movie thing cuz we were trying so hard to do the science and get it published. And in the end of 2023, we got this published in one of the JAMA networks of publications, JAMA Network Open, which is a really, it's not the top medical journal, but it's pretty good. It's a sister journal of the main journal, American Medical Association. So, super happy that we got this in a good scientific paper. It looks good on my resume. And then there's a thing called an altmetric score that I'm going to tell you about later about how much the social media and traditional media have covered it. And they covered the heck out of it. So in November and December of 23, our lives were super busy talking science with everybody about our new paper. And to be honest, we had pretty much completely forgotten about the whole movie thing. And then the movie had always, according to Louie, been planned to be released on January 1st, 2024 when people make their New Year's resolutions. That was his original contract with Netflix. He started this in the fall of 2021 and knew he wanted to release it in January of 2024. And he did. And oh my gosh, we got so much love at first.

Running the Trial and Publishing the Results

50 million people watched the docue series in January. And then came the criticism. So people, it got so many people watched it that some people watched it and gave us a hard time. And all of a sudden a huge amount of my time was saying, "Yes, thank you for the praise." And oh my god, why are you slandering me and why is social media ripping us apart? This is ah this isn't fun. Okay, so that was kind of what was behind what was going on. And and in retrospect, I can already say given how many people have told me they changed their diet because of the docu series and are eating more plants or going vegetarian. That was not the best study I've ever run. I've run more than 25 studies. That was like my 10th best study, but nothing I've done in my entire career has been imp as impactful as this thing that ended up on Netflix. It's just been amazing. So, I want to just quickly tell you the scientific part of the study. I don't know how many of you will like these details, but just so you know, it had a hypothesis. If we I if we randomize identical twins to a healthy vegan or a healthy omnivorous diet, and I'm going to describe later why I said healthy, for just eight weeks, which is really not that long, those randomized to the healthy vegan group would lower their LDL cholesterol, which would be the primary outcome of the study, which wasn't really rocket science. If you go vegan, you're going to have less saturated fat and more fiber. I would actually be stunned if that did not lower your LDL cholesterol. So, this is not really a very risky hypothesis. This is pretty darn straightforward, but we did measure everything else under the sun that we could with the money that we had. We thought many other things might improve. Also, they were filming us while we were doing this. We had 44 individuals, 22 pairs. You're going to see in a minute who was featured in the documentary. It looked like we had a very diverse group of people featured, but to be honest, it was like 3/4 women and very much a non-Hispanic white population. It's in the PaloAlto area, so they were quite educated.

The nice thing was of all the people in the study, only one person quit in the middle, which is very good for something like a nutrition intervention trial.

Because they were twins, that meant their twin couldn't be in the final study either because you had to m we were matching them to themselves. So the other twin was mad, but other than that, we only had one person drop out in the whole study just out of a term that we use called internal validity. This is really good for our internal validity that so many people finished. They all got food delivered for the first four weeks, whether they were vegan or staying omnivore. They were all omnivores to begin with, and then they had to make food on their own for the next four weeks. And the blood was for cholesterol and glucose and things like that. And the poop was for the microbiome. And we did lots of questionnaers.

We found a company that would deliver food to them. So they delivered delicious vegan and delicious omnivorous diets. And the two of the words that I use in my in my world are efficacy and effectiveness. Efficacy sort of is if if you've made this as rigorous as possible and controlled everything you can like delivering them the food. That's a different question than if people are cooking for themselves. We call that effectiveness. It's more generalizable.

So really this this particular study had two domains. In the first one, it was more rigorous when we delivered the food and it was more generalizable when they were cooking or themselves, if that makes sense. So we're trying to hit both of those. In my world of nutrition, there's something called the healthy eating index. And if you add up all the different foods you're eating, people have come up with an algorithm that says how healthy the overall set of meals you're eating are. And the scale goes from zero to 100. And these are some data points with three here's a some graphs, some lines with three data points. Baseline when they when they were finished getting their meals delivered and when they finished making them their on their own. Here for reference, I want to tell you that the average American on a score of 0 to 100 scores a 60. I'm a professor. When I grade people's papers, if they got a 60, they fail. That is a D. So, America fails. America's diet is not good.

Okay. So, we made a really great healthy vegan diet for people. But I got a little side story to tell you here. We also didn't want to set the omnivore group up to be a straw man to knock over and we actually made their diet better than it was at baseline. Does that make sense? We were actually serving them healthier omnivorous food than they normally ate. Now, both of them dropped off when we stopped feeding them. But we're super proud that both groups at the end of the study, even the omnivores, were eating what would objectively be called a healthier diet than they were at the beginning. Now, keep in mind that probably undermines our opportunity to show a difference. If the omnivores had stayed at their crappy usual diet and that there were health benefits of changing your diet, this actually undermined our ability to show the difference if we made their diet better. Does that make sense? But I'm a firm believer in my new favorite word, equipoise, which basically means try to make it fair. Try to give both diets a fair shot. Don't rig it for the purpose of headlines that you won because you made the other diet crappy on purpose and it's not really fair. So, we're super proud that we did that. Here's the results. Drum roll, please. The main outcome had been LDL cholesterol. And son of a gun, the vegans lowered their LDL cholesterol and the omnivores didn't. That's pretty much to be expected. They had less saturated fat and more fiber, which is pretty normal for a vegan diet.

Netflix Release and Public Reaction

That was statistically significant. This is called a probability score. It's like a percentage. 0.02 is like there's a 2% chance this difference was by chance alone and there's a 98% chance this is real. So we did that with lots of other things, HDL cholesterol, triglyceride, glucose, insulin, other things. And it turned out two other things were statistically significant. The fasting insulin levels had a low probability of being by chance alone. And their weight dropped on the vegan diet compared to the omnivores. Some of these others were in the right direction, but as a scientist, I have to focus on the things that were statistically significant. So, as LDL, insulin, and weight were all better. Okay. Tada. What are the strengths of this? Oh, it was a randomized clinical trial in my world. That's a big deal. Identical twins. Oh my god, that was such a cool aspect of this. Like, there's always genetic differences between people. And because they were identical twins, we negated that. And boy, we had really high retention. We kept people in the study except for that one person and they did a good job of adhering to the diet. Even when they were on their own, they were eating better than before the study according to the data. Now, it honestly it was a small sample size and it was only 8 weeks and it really wasn't very generalizable. It was mostly white well-educated women, but it's pretty good for what it was. No studies are perfect. So we concluded that the vegan diet led to improved cardioabolic outcomes. According to all the standard processes of science that we went through, clinicians can consider this dietary approach as a healthy alternative for their patients. And that's the science of it. Well, what was interesting after that was some of our colleagues said, "Oh, that's so great that you have blood. Can we borrow some of it? And can we look at some biological clock things that we found? I don't have time to go into this in detail. So, I'm just going to use this word epigenetic.

So, epigenetics is different than genetics. You can't change your genetics, but there's a way to modify what kind of proteins get made from your genes. And so, this is called the field of epigenetics. So you can actually modify what happens with your DNA. And the people in this field have come up with what they call biological clocks. And they say that biological clock is different than your chronological clock.

You might be 60 years old, but it might be that if we look at your epigenetics, there's a biological clock that says you're 40 years old or or older. You could be younger or older because of your metabolism. And there's another thing called tieamir length. Tieumirs are the caps on the end of your chromosomes. And as we age, the caps get shorter and shorter.

It looks like people with the longest caps, they're like protective caps on the end of our chromosomes. As those get longer, people tend to be live longer lives, have more longevity. So a group said, "Hey, we want to look at this in your data set." I said, "Are you crazy? It was only eight weeks. What what is gonna happen to longevity in eight weeks? Well, they actually found that the biological clocks and the telomeirs looked better for the vegans than their omnivore identical twins in just 8 weeks.

Secondary Analyses and Media Attention

And they published their own paper and oh my god, the headlines were all over the place for their paper which was a secondary analysis. This is like after the fact. Let's look at this.

So remember I mentioned before this thing called an altmetric score. This is the thing about news outlets and Twitter users and Facebook and Wikipedia and other things. And so a good almetric score like social and traditional media if you get a score of 20 it's pretty good. People noticed your publication.

So here's our main paper. We got a score of 2,000. Okay. So people really noticed our research paper. Okay. But this is a little humiliating. The genetics people who just did a little thing on the side had more press than we did in social and traditional media. I think that's pretty funny. And we actually have some positive microbiome results that were better for the vegans than the omnivores, but those are pending and haven't been published yet, so I can't talk about them yet. That was our study. Okay, so hopefully you got at least a rough idea of what the study was. Okay, so here's what was bizarre again. So let me go back to this old map of, oh, we were going through this thing. Louie came to this with the idea in the fall and wow, we didn't finish the study till the end of 2022 and then it took us a year to get published and we forgot about all the other stuff that was going to happen until oh my god, it's a Netflix movie. Here I am actually in Kyua on January 1st, 2024. And my wife says, "Quick, come come and look." I said, "What?" And she said, "Holy crap, you're third on Netflix with your study." Said, "Oh my god, like I I actually didn't know all the other stuff he was filming." And I thought, "Wow, maybe we'll be on the cutting room floor. I know he was filming a lot of other stuff. I wonder how much will be included. Holy crap. And here's where I finally realized Louis genius. I thought he picked genetic identical twins as sort of a scientific leg up. Oh, and I do think this is why a good scientific journal took our research paper and published it cuz wow, what a novel thing to do a diet intervention in identical twins where genetics is controlled for.

How scientific. But Louie was much smarter than that. Aren't they adorable? Look at that. Identical twins are so fun. Oh my god, they were hilarious. And they handpicked four pairs that were particularly adorable and that were very racially, ethnically diverse, too. I'm sure they did that on purpose. Okay, so here they are in the study for eight weeks. They fil they just featured those four. They couldn't follow 44 people around, but they followed eight people around and filmed all kinds of things that they did. One of the things they filmed them doing was working out. They actually had an exercise instructor, and this is a small point of contention that I'm going to bring up just to defend myself. We really measured a lot of stuff and paid a lot of money. And there's a way to get a really detailed analysis of how much body fat, body muscle, and bone you have. and my budget was out.

Documentary Highlights and Broader Food Issues

I didn't have any more money. And I told a producer I could not do that. He said, "Well, I'm just going to do it in the eight people then. I'm going to do it on my own without you, Christopher." I said, "That's fine, but I'm not going to put it in the research paper cuz eight isn't enough. I have to have it for everybody." And there were people who watched the documentary. And some of the vegans lost muscle in this small group. And they read our research paper and they said, "Oh, Professor Garter, you are so unethical. You only published the things that work. You didn't publish the things that didn't work. Oh, you're corrupt." And I I had to defend myself and I said, "No, I never saw these data.

The guy just did this on his own." I'm thinking, Louie, why did you publish that that part where it's like they actually did lose more liver fat and visceral fat, but they also lost muscle. It wasn't a very easy message. I was like, God, of all the great stuff you filmed, I I kind of don't even know why you included in the documentary, but then it was quite obvious. This was the trainer for the movie. This is Nei Delgado. He's been vegan since he was born. This is like the opportunity to say, "Here's the super uber ripped buff vegan dude. You can all be like him if you go vegan." Right? So, this part wasn't actually very scientific, but it cracked me up. And Neimi is a really interesting guy and he is vegan and he's enormous and he wins medals and he was in the previous movie Game Changers. But then Louiesie found a three-star Michelin restaurant in New York where the owner had gone vegan.

Uh he actually stayed vegan for many years. Just recently he started adding a few animal source things to stay afloat. But this is a big deal. He filmed why chef Daniel Hum went vegan at a Michelin star restaurant. And after going vegan, he retained his three stars. And he knew that Cy Booker was vegetarian. And so he interviewed him in the movie. And he knew that Eric Adams, the mayor of New York City, was vegetarian and had helped the hospitals in New York go plantforward first. So New York City hospitals now take their hospital patients. Ruth, I don't know if they did this for you, but they said the first option is plant-based. Oh, if you want something else, you have to ask for it.

So he even wrote a book about this. He interviewed a chicken farmer who had quit being a concentrated animal feeding operation chicken farmer and transitioned to mushrooms. And in the movie, he talked about all the different things that were going on in the world of food. How many animals were raised in industrial feed lots as opposed to being grass-fed.

He talked to a regenerative cattle rancher who went to eat at the vegan restaurant owner's restaurant. I thought that was pretty clever. He brought up all the masses of the wild animals across the planet compared to how many cows raised for meat, which is just horrifying. Like a 20fold difference in cows raised for meat versus all the other wild animals on the earth. He talked about how much the how much of the animals come from concentrated animal feeding operations in the US. I don't know what it is on the islands, but it is almost all kayo on the states. talked about the lagoons of manure that get generated as they wash the poop and pee out of these huge facilities. And even what do they do with that? They spray it on the fields.

And one of the interviewees for the documentary was this woman who lives next to a concentrated animal feeding operation. Her home, her laundry, and her kids were being sprayed with the feces coming from these lagoons of manure. talked to a trial lawyer activist that did a weird little series about the contamination of chicken under a black light. That was actually pretty funny. These are one pair of twins react. Look at their teeth showing up bright white in the light. Marian Nestle, who's a famous public health nutritionist, and somebody from the NRDC.

Brilliant. So, we didn't end up on the cutting room floor. We were featured throughout the whole documentary. we were the theme that tied four different 90minute segments together. So, it's like six hours of video, but he also brought in all these different voices around a plant-based vegan diet. And it was brilliant. It was really well done. [music] >> [music] >> Heat. Hey, heat. Hey, heat.