The Lab 2x1 - Genetic Testing - AL

Who hasn't done more research on something being called a "miracle drug for weight loss" or looked at our desert surroundings and wondered if global warming is impacting the cacti?

Or wondered if chili peppers have always been this spicy, or even how family history is affecting our health?

As access to information grows, we all have science at our fingertips.

Our growing understanding of science can lead us down new pathways, many of them are life changing.

It is this quest for more information that has led to the second season of our podcast, The Lab, in conjunction with Valley 101, at azcentral.

Our reporting will take you across the state to answer bioscience questions big and small. In each episode, you'll find out how the answers affect real people, scientists or not.

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[00:03:23] **Solio Felix:** I had a bit of like a heat exposure, exhaustion and not stroke, but pretty much over the summer, last summer, some time in June. *[00:03:35][12.1] (dip audio of him talking underneath)*

Solio Felix found himself in the hospital last June.

At first, he thought it was a heat stroke or even a heart attack…

[00:03:54] **Solio Felix:** they ~~have, you know,~~ had all these tests done and things like that. *[00:03:58][3.4]*

The tests showed that he had neither a heat stroke or a heart attack. But something else entirely.

[00:03:58] **Solio Felix:** So we were there finishing up the post-test kind of consultation. And then one of the research nurses came in and said, Hey, ~~we think you guys would be great for her. It was actually just me.~~ We think you'd be

great for this. And, you know, and we're looking for participants in the study *[00:04:17][18.9]*

Solio fit perfectly into a demographic that Dignity Health Arizona had been looking into to evaluate the risk of heart disease. The test was a type of genetic testing.

His wife, Amy, would undergo the test as well, even though she was not experiencing any symptoms.

The doctors would then use the genetic tests to examine the risk of cardiovascular disease in people with no family history.

Our DNA can help tell a story about our past, present, and future through genetic testing, and it's becoming a more common practice.

But what is it and how is it improving?

Step into The Lab and let's find out…

theme music

Welcome to season two of The Lab, a science podcast by the Arizona Republic and azcentral.com. I'm producer Amanda Luberto.

Over the next month, we're going to tell four science stories impacting life here in Arizona.

This week: how genetic testing is being used to answer questions about our parentage, and how doctors are using it to help predict our future.

theme up to fade

[00:20:17] **Keith Maggert:** I mean, genetics is, to me, the most important of all the biological sciences *[00:20:22][5.7]*

This is Dr. Keith Maggert. He is an associate professor at the University of Arizona.

[00:20:22] **Keith Maggert:** because everything about biochemistry or evolution or disease or developmental biology or any of that stuff is basically genetics at its core. And so I think it would behoove everyone to understand a little bit about genetics. *[00:20:41][18.5]*

Genetics and DNA are all around us. Literally and in our lexicon. From ancestry tests sold online to sayings like “It’s in our DNA” or “I get it from my mother’s side.”

But what, really, is genetic testing? How does it work and what can it show us?

Let’s go back to Solio Felix. He was in the emergency room, suffering from exhaustion, when a nurse said he’d be a great candidate for a new genetic test study.

Solio Felix: *[00:14:40]* Obviously, having gone through those episodes I had gone through and knowing that it wasn't, you know, a heart attack or anything like that. And I thought to myself, well, I, I felt pretty, pretty, pretty sick, you know, when I had that that heat exhaustion and all that. And so I know I don't I don't want to go through the heart attack sickness and and so then that's that would have piqued my interest *[00:15:05][24.7]*

So he went through with it, and he didn’t do it alone.

Solio Felix: *[00:04:21]* ~~And then~~ my wife was there, so she was very much into like, What about me? Can I do it? And that's how we both got looped into it. *[00:04:28][6.7]*

Amy Felix: *[00:05:16]* It really was no stress. It was more of a curiosity to wonder what it's going to say *[00:05:22][5.4]*

Both of the Felixes are self-described science geeks. They are passionate about science and how it is constantly changing the world.

And now they had an opportunity to be a part of it.

The test results took a few weeks to come back, but it was worth the wait for them. Amy and Solio knew that it would be able to tell them not only risks they have, but risks they might pass onto their teenage daughter.

Solio Felix: *[00:10:17]* And she was ~~she was~~ very curious about the whole thing. And so I think ~~I think she~~ she really you know, when you talk about, ~~you know~~, your health and your parents, ~~you know~~, there's always a little bit of a concern. And she was ~~she was~~ like, why are you doing this? ~~You know, you know, is it~~ are you okay? ~~Should I wear it?~~ Should I be worried? No, we're we're just having this conversation about the science and how science can help. You have studies like this can really support and help us be better with our health. *[00:10:51][33.3]*

When you think of DNA, you probably think of traits that can be seen. I have blue eyes, I have light skin, I am of average height.

But going a step deeper, genetic testing uses our DNA to show us what *can't* be seen. It can tell us our risks, but also it can provide doctors a roadmap to treatment.

Amy Felix: *[00:09:38]* it's always interesting to see, okay, what else does our DNA say about us that we don't know about? *[00:09:44][5.5]*

Well, our DNA says a lot about us. In the instance of the Felix family, genetic testing showed them their risk for cardiovascular disease.

For more on that, we spoke with Dr. Robert Roberts.

Dr. Robert Roberts: *[00:00:16]* I'm a cardiologist and I am head of genomics and genetics here at Dignity Health System. *[00:00:25][9.5]*

Dr. Roberts is running the study in North America that Solio and Amy participated in and has worked researching the intersection of genetics and cardiology for years.

Dr. Robert Roberts: *[00:00:34]* And my job is to ~~warn~~ in this particular case is to bring genetics to the chemical arena. And what I will be talking about briefly is genetic testing for heart disease to determine those who are at high risk and what can be done about it. *[00:00:55][20.9]*

Currently, heart disease is the leading cause of death in the United States according to the Center for Disease Control. So identifying who is at high risk and what can be done about it could possibly change lives.

There have already been efforts to prevent heart disease.

Dr. Robert Roberts: *[00:01:17]* everyone is aware of the fact that heart disease can be prevented. It has been well known for probably now, certainly about five or six decades. Certain factors that increase your risk for heart disease such as cholesterol, diabetes, *[00:01:36][18.8]*

But the work Dr. Roberts is doing is finding another type of prevention.

Dr. Robert Roberts: *[00:01:37]* ~~However,~~ it's also been known that about 50% of your risk for heart disease, like heart attacks and so forth, or sudden death, ~~50%~~ is genetic. You inherit it. That ~~in terms~~ of course, is determined at conception. *[00:01:56][19.0]*

As you might remember from the beginning, Solio and Amy Felix don’t have a family history of heart disease. Which made them perfect for Dr. Roberts’ study.

Just because there’s no family history doesn’t mean they’re not at risk.

Also, not having the genetic code for heart disease doesn’t mean they’re safe from all cardiovascular problems. Nor if they DO have the genetic code does it mean they WILL develop heart disease, either.

It’s more complex than that.

Dr. Robert Roberts: *[00:02:40]* We now have confirmed and identified over 200 genes that predispose to heart disease. These have been put on a microchip so that we can use a blood sample or saliva and check to determine how many of those risk variants that we call them. How many do you have or have inherited as a predisposition for coronary artery disease? And from that, we can determine a score of intermediate, low or high risk. *[00:03:14][33.2]*

Like many health risks, there are other factors that can play into it. Like if the patients are regularly active or if they're smokers.

The test showed that the Felixes had moderate risk.

Solio Felix: *[00:06:19]* We were really looking to see what that would look like from just the genetic standpoint. I think that was probably the most anxiety part of it. The anxious part of it is just really trying to get to that answer. But ~~it's a great~~ it's great to have that knowledge and it's great to be able to ~~do~~ now say, Oh yeah, we've done this test and that test and we like testing it so we can now kind of frame our lives in a way so that we can certainly be, you know, live longer, have better heart health and things like that. *[00:06:48][29.4]*

In response, Solio and his family made some lifestyle changes – like eating differently and exercising more.

But what about those unlike the Felix family? What about those whose tests show they’re at high risk?

Dr. Robert Roberts: *[00:03:43]* They can come and be interviewed by a cardiologist or a genetic nurse or someone skilled in genetics, and we can advise them regarding the

treatment. We have already proven that if you change your lifestyle or take drugs such as statins to lower your cholesterol, it can decrease your genetic risk by 50%. *[00:04:10][26.3]*

The full test takes place over 10 years, the first part of which is the genetic testing that we've been talking about.

The rest of the study looks at how well preventive measures work. Knowing your genetic risk is one thing, but this study is also looking at what happens next.

Dr. Robert Roberts: *[00:04:09]*And keep in mind, we only need to do the test once in a lifetime because your genetic risk does not change. It also means they can do that risk at any time from the day you're born. *[00:04:22][12.9]*

As prevalent as heart disease is, Dr. Roberts says it's also preventable.

And the convergence of intervention and prevention can save lives.

Dr. Robert Roberts: *[00:04:38]* Many of us feel that given that heart disease is preventable, if really appropriately done, we think instead of being the number one killer in the whole world as it is now, it could be way down the list to a 20th or something like that by the end of the century. We feel this is both possible if indeed using both primary and secondary prevention. With the genetic test, of course, it's possible to determine someone in their teenage years, in their twenties, so therapy can be modified early from that point on. *[00:05:19][41.0]*

Medications, lifestyle changes and even just a general awareness of potential risk factors are some of the ways it can be prevented. And with this study, Dr. Roberts hopes to change how heart disease is treated.

Dr. Robert Roberts: *[00:22:17]* So this is really looking at something that will have, we hope, a broad application for the future. *[00:22:27][9.5]*

music

A study like this is really a big deal. It can not only change the lives of people who live close to Dr. Roberts in Arizona, but around the world.

Having that kind of significant impact is exciting to the Felix family.

Solio Felix: *[00:15:05]* I wanted to know what at what risk level I was that the other side of it, the other side of the coin is that my involvement, the involvement in the community science kind of project like this *[00:15:13][8.2]*

For participants, it affects their immediate lives.

Solio Felix: *[00:08:05]* You know that that does go down to genetics and so you know you have to be careful as well as you get older and things like that. So that's kind of how we have these conversations as a family. And it's great to have a conversation with family because it really puts us at a proactive stance when it comes to our heart health. *[00:08:22][17.5]*

theme music

Thank you all for listening to this week's episode of The Lab. If you're listening on the Valley 101 feed, be sure to check out Season 1 by searching The Lab on your favorite podcasting app.

This episode was edited and produced by me, Amanda Luberto. Original reporting was done by Alexandra Watts.

Editorial help from Kathy Tulumello, Shaun McKinnon and Kaely Monahan. Audio oversight by Kaely Monahan and web production by Karen Kurtz.

Today's musical scoring came from Universal Production Music.

music beat

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The Lab and Valley 101 are Arizona Republic and azcentral.com productions. The Lab is supported by a grant from the Flinn Foundation.

I'm Amanda Luberto – thanks for listening, and we'll see you next week.