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[Introduction]

Dr. Tim Lightfoot. Hello and welcome to the weekly podcast from the Huffines Institute for Sports Medicine and Human Performance. I'm your host, Tim Lightfoot and I'm so pleased that you took the time to download us and are listening. We're back from our summer vacation and all the construction that was going on here at the Huffines Institute and we're so glad that you all are back as well and we hope you had a great summer vacation and traveled well. We have a special podcast to kick off our fall series here, starting. This is August 2nd and our podcast today is with noted write writer Dave Epstein from *Sports Illustrated*. Welcome back to the podcast, Dave.

Dave Epstein. Thanks for having me.

Dr. Tim Lightfoot. You're more than welcome. I think you're our all time most podcasted guest. I think this is your fifth podcast with us.

Dave Epstein. Is it my fifth? All I know is that I think it will be easier than what I remember as my last one, which was standing outside a stadium in Qatar on a cell phone. At least that was one of the last few so this should be easier.

Dr. Tim Lightfoot. There you go. I think you fully represent about 4% of all of our podcasts. So, welcome. Welcome back. I want to tell the audience a little bit about number one, if they haven't heard your podcasts before, don't know anything about you, I want to tell them a little bit about you and then tell everybody why you're here, which is really a special occasion.

As I said, Dave is a senior writer for *Sports Illustrated*. He is coauthored many of the *Sports Illustrated* and sportsillustrated.com's highest profile sports medicine pieces and sports medicine investigative pieces, including many of the doping articles that have come out over the last five or six years. He has been awarded many awards in the field of journalism. He was given the Hypertrophic Cardiomyopathy Association's "Big Hearted Journalist" award. He was given Time, Incorporated's Henry Luce Award for Public Service for his articles on the dangers of the dietary supplement industry. He was given the Society of Professional Journalist's 2010 Deadline Club Award on the genetics of sports performance, which is what we're going to talk about today. And most recently, which was really cool, he was a finalist for the 2011 Livingston Award, which recognizes the best American journalist under the age of 35 years of age. And that was huge. That was a huge – congratulations again on the at finalist award there.

Dave Epstein. Thank you. It makes me sound much more distinguished than you know I really am. Thank you.

Dr. Tim Lightfoot. We're going just to jump into this. One of the reasons that we're here talking on August 2nd is that yesterday, on August 1st, your first book, *The Sports Gene: Inside the Extraordinary Athletic Performance* became available and it was based on that 2010 article in *Sports Illustrated*.

Dave Epstein. That's right. That sort of became the seed of it in many ways and I would say – I wouldn't used the word based on it just because I found so – my mind changed about certain things and certain science has changed between now and then. That article was written in mid-2010 and I got the contract in the summer of 2010. So it's been sort of three years in the process. And I learned a lot since then. That was certainly the seed of the idea, to explore the genetics of athleticism, to take on the 10,000-Hour Rule and that sort of thing but really the project ended up expanding in ways I had not envisioned at all when I wrote that article.

Dr. Tim Lightfoot. I guess let's back up a little bit and tell us why you got interested in researching about the genetics of sport because your background education and some of your earlier writing before *S.I.* was in environmental science and astronomy and you have publications in those kinds of areas and so the segue way into sports and writing for *Sports Illustrated* and now talking about exercise genetics. That's kind of an interesting segue way. How did all that happen?

Dave Epstein. I was also an overnight crime reporter for a New York tabloid.

Dr. Tim Lightfoot. Yes, we can't forget that one.

Dave Epstein. I always thought I would write but I thought I was going to be a scientist who writes and I was a Geology grad student in my previous life. But I really – one of the things that pushed me towards sports science writing was partly just my own interest in reading about training physiology when I was an 800 meter runner in college but also I had a good friend and training partner. A young man, a first generation immigrant from Jamaica, who was a state champion who I trained with in high school who dropped dead after a mile race and I got really interested in sudden death in athletes.

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And as I had his family sign away – and I write about this in one of the chapters in the book, I had his family sign away the rights to his medical records to me and I went and gathered them up and I tried to figure out what had happened because everybody was just saying heart attack, heart attack. I realized heart attack doesn't mean anything to me other than someone's heart stops. It doesn't really have any informational value. And so exploring that and it turned out that he had this genetic disease, hypertrophic cardiomyopathy and I got really interested in that and said, hey. I want to combine my passion for writing for sports and for science all in one and to do something that will make me feel a little less like my friend dies in vain here. In retrospect, I feel he did die in vain anyway but hopefully at least we can make a teachable moment out of it.

Dr. Tim Lightfoot. That episode, that was the basis or the seed, we'll use that terminology for that, the article, "Following the Trail of Broken Hearts," that you won the Hypertrophic Cardiomyopathy Association's Award for. Is that correct?

Dave Epstein. That's correct. So that article didn't – it only briefly mentions my friend. It's more about another young man and some other cases, but that was certainly the inspiration. What happened was I had been pitching on sudden cardiac death in athletes for *Sports Illustrated* two years before I ever got my foot in the door. And they liked what I had to write but they don't really take unsolicited freelance. So I kept in touch with them as I built journalism experience because I was dropping out of my science program – or finishing my science program and I kept pitching it. They brought me in as a temp for somebody who went on maternity leave and I kept pitching it and pitching it and they sort of said no. They didn't really know who I was, they didn't trust me that much but I was in the building as a temp fact checker.

And then one of the top marathoners in American dropped dead in the Olympic marathon trials for the 2008 Olympics, like, five blocks away from our office. It's funny how proximity, even for a national publication, has a big effect on what the editors decide to do. So all of a sudden they came and said, "Do you still have that stuff on sudden death in athletes?" And so we were able to put that out in the very next issue and that was really my first big sports science story and the first thing that helped me get a foothold in *Sports Illustrated*.

Dr. Tim Lightfoot. How did that evolve into looking into the genetics of exercise?

Dave Epstein. The disease that my friend Kevin had, the most common disease that causes sudden cardiac death in athletes and actually, it's the leading cause of sudden natural death in all Americans under 35 is hypertrophic cardiomyopathy, or HCM, and it's a disease that follows an autosomal dominance inheritance pattern. So it's a coin flip chance of getting a single nucleotide polymorphism that causes it. Actually now over 1,400 mutations, any one of which can cause it, mostly in genes associated with that build heart muscle, some that regulate heart contraction. And I got really interested. That just got me interested in genetics and learning about genetics, but really some of the fundamental questions. And I address HCM in a chapter called, "The Heartbreak Gene," which is chapter 15 of the book. But some of the fundamental questions about athleticism I think just came out of my own experience.

So track was a popular sport in my high school because we had a mini Jamaican diaspora to Evanston, Illinois in the 1980's so all the guys my age, there were a lot of Jamaicans in school so we had this great track team. And I was sort of curious. Some of these guys are so fast, I'm curious if they had imported some speed gene from Jamaica. And I got to college and I'm running against East Africans, this profusion of East Africans. I'm saying, "What's the deal? How can there be so many that are this good?" So I started wondering.

And I noticed in my own training group. We'd come into the season, everyone having done the same light training. And I'd train with a group of about eight guys. We'd do the exact same

workouts, stride for stride everyday and we would never finish the race next to each other. We'd do the same training, but we'd become different runners and I first started to ask myself, what are the sources of these sort of talent hotbeds of athleticism and what are the sources of this individualized response to training? Does this have anything to do with genetics? So in many ways, this book was just the chance for me, on somebody else's dime, to say, what are the greatest questions I have about the big nature versus nurture questions of athleticism and how can I go about best answering them with the available science and also whatever other anecdotes I can bring to bear.

Dr. Tim Lightfoot. And we'll come back to the nature versus training aspect. We don't want to give too much away about the book. But just say a word to our listeners about the readability of this book. I can speak to that because I've seen an early press release of that, or early copy of that. But so oftentimes in today's society, you say the word genetics and people's eyes either glaze over or they turn away and walk away really quickly, especially when it comes to popular science reading.

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How do we encourage people to read this book, to make them understand that this a book that they need to read to understand some of the things that are going on right now in sports medicine?

Dave Epstein. Speaking of the readability, I'm a basic narrative writer. So this book opens with Jenny Finch, the great softball pitcher, striking out major league hitters. It doesn't open with a scene in a lab. That said, I find some of the sort of scientific detective stories to be fascinating. So in the book, I tried to, and I find scientists to be really fascinating people and I what they do to be a really special kind of detective work. So I have lots of elite athletes. I did hundreds of interviews. Many are with Olympic and world champions. Some with people who have very rare physical traits or gene mutations so people can expect lots of interviews from elite athletes.

At the same time, when I did write about science, scientists or when I did have scenes in the lab, I tried to unfurl that in the way that I view scientists, which is as a sort of detectives and show a little bit of that process. And I'm a narrative writer and I will say the article, the original article that appeared in *Sports Illustrated*, I think is much more dry and less narrative than this book. If the article was able to appear in *Sports Illustrated*, my editors must have thought it had some popular appeal and I think the book is much more narrative than the article was so I think it's an easier read than the article that was in *S.I.*

Dr. Tim Lightfoot. Speaking of that, you can pick up this week's *S.I.* and see an excerpt from your book, right?

Dave Epstein. That's correct. That's correct. That's from that very first chapter that I just mentioned, with Jenny Finch striking out major leaguers. And you get to see Barry Bonds and Alex Rodriguez behaving as they always do and that's always fun.

Dr. Tim Lightfoot. Speaking of, you said you interviewed hundreds of folks for this and did quite a bit of traveling. I know you traveled to Africa and at least once you went to the Arctic Circle, didn't you?

Dave Epstein. That's right. Actually went to the Arctic Circle twice. So as I tell people in my one sentences, I reported from below the Equator and above the Arctic Circle. One of my trips above the Arctic Circle, when I had to cut back my word length for publishing, with one stroke of the delete key I said, "There goes a trip to Sweden." But I guess that's just how it works, right? But yes, I did, both places. And I'd never been below the Equator before. I had been above the Arctic Circle because I lived there when I was a Geology grad student in Alaska.

Dr. Tim Lightfoot. Wow. Folks will have to pick up. At least read the excerpt and then pick up the book to find out why you were above the Arctic Circle.

Dave Epstein. I guess you're implying that I shouldn't tell them. It wasn't Alaska this time. It was in Finland, tracking down the roots of a very famous bit of sports medicine that I think your listeners would be interested in.

Dr. Tim Lightfoot. I think there was reindeer involved, too. Weren't there?

Dave Epstein. Not just reindeer, but a reindeer farmer. I was visiting a very special reindeer farmer.

Dr. Tim Lightfoot. It was not Santa Claus. This is not a Christmas story, right?

Dave Epstein. That's right.

Dr. Tim Lightfoot. Again, we don't want to spoil it for the readers but certainly I can vouch for the fact that you went to great lengths to get this story and for the whole book and so it's a fascinating read.

Dave Epstein. Thanks, I appreciate that. And Tim, I don't know if you'll allow me to do this, but a lot of – some of what eventually motivated some of my questioning was how ubiquitously famous the 10,000-Hour Rule had become. So this is the idea that 10,000 hours of focused practice is both necessary and sufficient to achieve expertise. If anything, it became famous from Malcolm Gladwell's *Outliers*. The fundamental work actually comes from a study of a small number of violinists by K. Anders Ericsson and colleagues. He's known as the father of the 10,000-Hour Rule. And I have in front of me, when he was on a panel that I helped arrange at ACSM in 2012. One of the main issues that I investigated with some of his work was that he didn't report the variance around 10,000 hours for those expert violinists.

Dr. Tim Lightfoot. It's interesting about that whole argument. I've recently been rereading that and I don't know if you caught that Anders Ericsson has published a paper this past month in the *British Journal of Sports Medicine*, I believe is the name of the journal, because Ross Tucker and Malcolm Campbell did an article last summer, I believe, and this is a rebuttal to their argument. One of the things that he makes very clear, and I think we should make very clear is that as an individual, Dr. Ericsson is an incredibly nice individual. And I think, but one of the points he makes is, "I didn't say anything about the 10,000-Hour rule. You look at my data, it's like 7,461 hours."

Dave Epstein. That's true. He never used the word rule or anything like that. And I think that's absolutely true. I think it's great that he wrote that article because I think it's really important to address the popular portrayal of the work. And one interesting thing he put in his *British Journal of Sports Medicine* article is that he read *Outliers* for the first time for that article.

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He attributes the popularity of the phrase "10,000-Hour Rule" to Malcolm Gladwell's *Outliers* and he says in his paper that he uses the word misconstrued in relation to how it portrayed his conclusions.

Dr. Tim Lightfoot. So let's give our listeners a little bit of the end of the story there. And that is, is it just practice, if I just go out and practice for 10,000 hours? Can I become whatever I want to be? An elite athlete or there's some guy doing this with golf right now, isn't it?

Dave Epstein. There actually is a guy who quit his day job as a commercial photographer with zero hours of practice in golf and is now trying to say that with 10,000 hours, he'll be a pro. So I guess we'll see. But I think the ultimate, if I had to sum up the book, I'd say there's certain things that I assumed were innate, like the bullet fast reactions of major league hitters, that through my exploration I determined largely are not and other things, as you well know, that I thought were entirely voluntary, like an athlete's compulsive will to train that actually might have a large genetic component. And so some skills as I think it's shown in the book, it's in progress with others with practice but there is no 10,000-Hours Rule and I think that's why Anders Ericsson distanced himself from that. In fact, elite competitors almost never have attained 10,000 hours of practice by the time they reach the high level. And as you see in the book, there's some rare competitors who become, reach the world level or even become world champions with three digits worth or less of hours of practice.

Dr. Tim Lightfoot. And that kind of feeds into our American psyche right now, that we all think that we're special so that we all have inherent talents that all make us great at whatever. I'm thinking of *American Idol*, of course.

Dave Epstein. And you can see why, because of the incentives there but I will say, it did make me feel, going through the book, there were a two very prominent examples in the book of

people who stumbled on becoming world champions. And the more I learned about the individualized response to training, the more it did make me feel if something's not working for you, you should try something else. You should look for some other kind of training.

And I remember, long before I knew anything about genetics, when I was in college, I started to realize this type of training just doesn't work as well for me as the next guy. And this other type? When I dropped my mileage down and trained more like a sprinter, my times got better even in my distance events, even in the mile and things like that. And so I think it is important to recognize not everyone is going to run a 2:05 marathon but recognize that each of our genomes are completely unique and so if we wanted the perfect training, we'd each have a completely unique environment as well.

Dr. Tim Lightfoot. And that comes back to a podcast we did with Claude Bouchard here, where he talked about that huge variability and how people respond to training in a variety of different situations and that I think as scientists, we're all becoming much more appreciative and aware of those kind of variabilities in trainability and just inherent talent.

Dave Epstein. Intuitively, I never would have guessed that the variability would be as big as it is when standardized training protocols but it's in every single study. We're not talking about a little wiggle room. There are huge differences between people and that really surprised me, how big that is.

Dr. Tim Lightfoot. I've heard you speak before and one of the questions that always comes up is that if there is some kind of inherent talent, is there a way we can do genetic testing to tell parents what their kids may be best at?

Dave Epstein. At the moment, no. There's some tiny things you can do. You could get your kid tested for the ACTM3 gene and if they have at least one of the so-called "sprinter variant," then you can say, they're not ruled out from being in the Olympic 100 meter final, but neither are six billion other people in the world. It only rules out a billion people. So it's a very non-specific. It doesn't hold a candle to the quality of information you get by taking your kid to the park and making him race the other kid. So to me, it's like looking and trying to say what a puzzle with thousands of pieces depicts when you have one puzzle piece.

So there's obviously this avant garde allure of genetic testing for athleticism. And there's some sort of interesting research that shows elite athletes tend to have more of the so-called correct variance but it's not consistent. We don't know what most of the genes are. Tons of the studies are underpowered. So I wouldn't recommend anyone at this point getting direct to consumer testing for athleticism. That said, some of this sort of injury, illness and death genes I think should actually – parents and athletes should be more aware of and the athletic performance gene tests they should be less aware of. I mean, some of these companies – and it's completely the reverse.

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People are paying athletic performance gene panels. A couple of them – sometimes I can tell where these companies are getting their info from. There are studies published on the ACTm3 gene. But sometimes they're throwing in genes that I can't even find any literature behind. They're just making stuff up. So it's sort of frustrating.

Dr. Tim Lightfoot. That has come up, some of the supposed genes that pre-disposed to concussion or make the concussion injury worse. I know I've seen some of that literature and that's – it's a little bit scary what some of these companies are telling these parents of these kids.

Dave Epstein. You're talking about a market that's really sparsely regulated. Where the market has moved faster than any attempt to help people understand what genetic information really means. So I think if put in proper context, there's certain risk factors for, like you said, talking about the APOE4 gene, which affects one inflammatory response to brain trauma. Which does, I think repeated over and over again in studies, have some effect on how well people recover from brain injury. And if that could put the statistical risk information in proper context, there I think you're talking about some testing that could be useful. But the companies so far have not been good in helping people understand what they might actually be looking at.

Dr. Tim Lightfoot. Put on your forecasting hat. At this point in time, you probably know. If not, more than if not the most of anybody in the world about the genes that regulate performance or where the science is at in that. What do you think is going to happen in five years down the road and ten years down the road in this area?

Dave Epstein. I think there's going to be more interesting research but I don't think, from the direct to consumer standpoint we're going to be almost anywhere, for a number of reasons. One of which is the studies are difficult. Ideally, you would want hundreds of thousands of, say, elite sprinters to find out what these sprint genes are. But there aren't really hundreds of thousands of elite sprinters in the world. Maybe if you loosen the category, you can say there are hundreds, if you loosen the requirements. But there aren't thousands. So that's a problem because we now know there's not going to be one sprint gene. Most of these genes are going to have tiny effects, which means you're going to need bigger sample sizes to find them and that's pretty tricky to find for elite athletes and there are other reasons. There are population differences, right? You don't know, since you're testing one ethnic population versus ethnically matched controls, you don't know if you're finding genes that are applicable to other populations.

Dr. Tim Lightfoot. And that's been the criticism for some of the African studies, right?

Dave Epstein. That's exactly been the criticism, where it says you compare where people have tried to make conclusions about one ethnicity compared to another from a study that only uses one ethnicity in ethnically matched controls. So you really can't make wider conclusions.

So when we talk about HCM, the disease that causes sudden death. Of those 1,400 mutations, any one of which can cause the disease, two-thirds of them are so called private mutations. Meaning, they've been identified in one family. So there you have many, many different single nucleotide polymorphisms all that cause the same phenotype but in different families. You don't know if the person standing in Lane Two in the Olympic 100 meter finalist is fast because of the same genes as the person standing in Lane Three.

So to me, I think we've – because genetics are so alluring in the technology, we've started to overlook learning more about physiology and just simple things like body measurements. Great Britain did a pretty darn good job of talent search in increasing their medal hall in the Olympics with their "Tall and Talented" program, which was basically going into schools and measuring kids they thought were going to be tall or have long limbs.

They had this program called Tall and Talented. The first medal winner of the London Olympic for the home team was Helen Glover who was just identified as probably going to be tall as a young woman with extremely long limbs. They put her into rowing, which she had never done before. In two years, she was on the world circuit and she was just their first gold medalist. She could hardly stay in the boat when she first started but they could tell she had this huge, strong cardiovascular system, really long arms proportional to her height. And that's Great Britain's first gold medalist of the home Olympics. She goes in two years from never having tried the sport to the world scene just from basic body measurements.

Dr. Tim Lightfoot. So does that mean if you're tall and have long limbs, we should all get into rowing?

Dave Epstein. I think you should give it a try and if you have a good cardiovascular system. You can see anytime the country gets awarded the Olympics and starts one of these talent search programs. Same thing happened with Australia. Basically, all they do it try to – the big sports that everyone wants to participate in already have their natural talent siftings.

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So they don't have to worry about trying that hard. Everybody wants to play in the NFL so we're gonna get, for the most part, the best athletes in America trying to be football players. But for sports where that's not the case? Getting the right bodies in those sports makes a massive difference. And that's why you see these talent searches work where a country will increase its medal hall.

So Australia, when they hosted the Olympics, they won 3.03 medals per million citizens compared to 0.33 for the United States. And that was largely the result of finding athletes in certain sports and saying, "Your body actually fits better in this other sport." And some of those people ended up winning gold medals in sports that they liked from a skill standpoint in some cases were still a little shaky on it. The best example was Alyssa Camplin who won the aerial

skiing gold medal in Turn. She had been shuffled into aerial skiing as part of Australia's talent search program. She couldn't even ski when she won the gold medal. She fell and crushed her victory flowers on the way down the hill to her press conference for winning the gold medal.

Dr. Tim Lightfoot. And one of the well-known examples in our country is the move to move some of our football athletes and some of our track athletes into bobsled.

Dave Epstein. And that's been a huge success. Obviously, the most famous example of that was with the Jamaican sprinters that led to the movie, *Cool Running*. Here were guys who had never seen snow or ice before but they were really fast and that was enough to get them to the Olympics.

Dr. Tim Lightfoot. We could talk about this all day. You and I actually have talked about this quite a bit. We're running out of time here and so we always like to let our guests have a take home message. Other than, and I'll say it, buy Dave's book. It's available at Amazon and your local bookstores. And actually, the audio book is up on sites like Audible and so forth so you can listen to David's melodic voice. What's your other take home message?

Dave Epstein. I would just say I think some of the skills that we think are genetic or innate, if that's sort of code word for innate, and others that we think have no genetic component do. And that's what I learned over the course of this book and I hope people will really enjoy it. And particularly for people who work in science, I'd be interested to hear their thoughts about how I portrayed scientists because I think there are a lot of world champions and elite athletes in this book but in some ways I think the stars of this book are really scientists.

Dr. Tim Lightfoot. And I'll give you again kudos, because one of the things that you said to us before we started recording was that people find your email online, you will engage with them. You will, if they have questions, they can certainly send you those questions and you will chat with them about that stuff.

Dave Epstein. Absolutely. I'm easy to find. I've now got a website for the book and I'm on Twitter. I'm easy to find.

Dr. Tim Lightfoot. Super. Thanks again, Dave, for being with us today.

Dave Epstein. Thanks for having me.

Dr. Tim Lightfoot. And best wishes on the book. We'll be rooting for it here.

Dave Epstein. Thank you.

Dr. Tim Lightfoot. And thank you all for taking the time to download us and listen today. And as you know, every week we have this wonderful podcast question of the week and here with the podcast question of the week is our producer, Cheryl.

Cheryl. What is the leading cause of sudden death in athletes under 35 years old?

Dr. Tim Lightfoot. Super question and be the first one to answer that question and you will win the first t-shirt from our third edition of the podcast t-shirts. We have those. They have just come in and so we've been telling you this for the last couple of the months that the third additions are coming out and they're really cool. We even have new colors available. So be the first one to answer that question and send us the correct answer at huffinespodcast@hlkn.tamu.edu and you'll win that wonderful t-shirt. So again, thank you all for taking the time to be with us. Dave, thanks again for being with us this week.

Dave Epstein. My pleasure, as always.

Dr. Tim Lightfoot. And we always appreciate the support, Dave. And, again, we hope that you join us next week for our whole new lineup of the fall podcast series where we always have someone interesting from the world of sports medicine. Until then, we hope that you're active and healthy.

[Conclusion]

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