MEGHA PRASAD: Hello everyone. My name is Dr. Megha Prasad, and I'm a cardiology fellow at Mayo Clinic. I'm joined today by Dr. Todd Miller and Dr. Tom Allison, who both practice in our sports cardiology program here at Mayo Clinic. Both are actually experienced marathon runners, and Dr. Allison qualified for the Olympic trials.

TOM ALLISON: Just for clarification, it was not the 2016 Olympic trials that I qualified for.

MEGHA PRASAD: Well, thank you both for joining us today. It's a pleasure to have you here. To start off with, here at Mayo, we have over 150 cardiologists, so what is the need for specific sports cardiologists? And when I go through my everyday clinic, which patients should I be considering sending to you?

TOM ALLISON: Well, I'm thinking of a sample patient. He says, I can't break 20 hours any more for the Western States 100 mile run through the mountains at altitude. Now, how does the average cardiologist put that in perspective, and know what test results and demands we should be looking for at that high level of performance? And this guy comes in, and his ECG is abnormal, his echo is abnormal, his stress test is abnormal, yet he's completely healthy, and other than a decrease in performance, we don't really detect any other problem. So that's the kind of case we see, and this individual isn't so much interested in his health, he's interested in performance, and how can we solve that problem, and determine why he's not performing well and help him.

TODD MILLER: I would just add to that. I think there are a lot of unique things about potential cardiovascular disease in an athlete, and it helps to be familiar with the whole athletic scene. For instance, athletes may do a lot of things to try to enhance performance that may have adverse cardiovascular consequences, consuming large amounts of caffeine or other performance enhancers. It's important to be familiar with symptoms that raise concern, and other symptoms you can dismiss. For instance, syncope during an event versus immediately after an event, there are diagnostic dilemmas where because of the effects of athletic hearts and athletic training, the ECG, the treadmill test, ECG, the echo all get altered because of the athletic training. And then, finally, when you're applying treatment recommendations, what may be perfectly reasonable in a non-athlete, beta blocker or an anti-rhythmic drug, athletes will hate you because it impairs their performance. So there's all these unique issues that need to be applied in the athlete that may not apply to other patients.

TOM ALLISON: The patient with angina cutting the grass, you tell them take a little bit more time and take a couple of breaks during the day. You can't really tell that to someone who's trying to qualify for the Boston Marathon. Just slow down and don't run so far. So it often, it's a yes/no question. For example, a young person with a cardiac disorder, either they're allowed to play sports, or they're not allowed to play sports. It's not, well, you can play soccer but only play the first half. So there's a little bit more rigidity sometimes to the answers.

MEGHA PRASAD: Which subset of patients do you recommend completely refrain from any athletic sports?

TOM ALLISON: Well, those guidelines are pretty well-established, and typically a real dilemma is the hypertrophic cardiomyopathy patient, and we know that that has a high risk for sudden death. Although many patients with hypertrophic cardiomyopathy never experience sudden death, but again, that's the dilemma. Some inherent essentially untreatable genetic disease is probably the most common and usual cause for complete disqualification. Would you agree with that?

TODD MILLER: I think that pretty much applies to the younger athlete. I think in the older athlete, extensive coronary artery disease that hasn't been adequately treated, whatever that may mean, raises a concern. Everyone's going to have a concern about.

TOM ALLISON: If I get a stent, if I have atherosclerotic cardiovascular disease and I get a stent, can I run marathons again?

TODD MILLER: Well, it's tough issue.

TOM ALLISON: That's a sports cardiology question, and reviewing not only the anatomy and physiology, but the psychology of that becomes an important factor too.

TODD MILLER: But I think if you look at that in an older athlete, you might have a patient who has triple vessel disease with normal LB function, and that patient may have minimal symptoms and you might be comfortable managing that patient with medical therapy who is not an athlete. But if you're talking about telling that patient that we think it's OK for them to go back and run a marathon, it's a whole other issue, and I think we struggle with that all the time. We just don't have good data that addresses it.

TOM ALLISON: Or the individual with paraxysmal atrial fibrillation who may have one or two brief episodes of atrial fibrillation for a month, but, unfortunately, sometimes that happens during a half marathon. And so the management of that case might be very different than management of paraxysmal atrial fibrillation in someone who's just normally active.

MEGHA PRASAD: So for the general cardiologist, when they're seeing athletes, what symptoms or complaints should they be thinking about in patients that they should consider referring to a specialized sports cardiology department?

TODD MILLER: Well, I think any symptoms that are occurring during athletic participation that relate to potential cardiovascular disease, chest discomfort, excessive breathing out of proportion to the activity as being performed, syncope, declining performance without a specific reason. This type of symptomatology would raise concern about a potential underlying cardiovascular problem.

TOM ALLISON: And just to emphasize, I think that declining performance is a very, very common reason that people come to us. And understanding the dimensions of that performance, and what that really means in terms of the athlete's capability and the test results of the athlete is something that probably is a little bit beyond the usual scope of the general cardiologist. It's not exactly short of breath walking up the steps. It might be the two hour mark of my cycling event, I got a little bit dizzy, and knowing all of the factors that could be at play at that level might be a challenge.

MEGHA PRASAD: So when you have athletes that come to you, are there any ones that you say that should refrain from any sort of vigorous or rigorous activity?

TOM ALLISON: Well, we have had a few athletes that we have altered their program. One comes to mind. A bicuspid valve with a dilated aorta, and this athlete continued to run, but we eliminated strenuous weight training from the program. The athlete subsequently came back and had this repaired. That might be an example there, and basically with the athlete, it's when you say, refrain from vigorous activity, that means don't be an athlete anymore. I mean it's not like a coronary patient said, maybe use a snow blower instead of shoveling the snow. Here is, basically, don't race anymore. So it's maybe more of a black white, or on off issue.

MEGHA PRASAD: Dr. Miller, anything you'd like to add?

TODD MILLER: Well, I think it relates to a whole spectrum of eligibility and returning the athlete to their activity. So, at one end, you may have a division one athlete who's been diagnosed with hypertrophic cardiomyopathy or brugada syndrome. And there, the decision making becomes more black and white. If a high level athlete in an endurance sport has those types of diagnoses, there's guidelines in the schools that they're involved with, or perhaps a professional team is going to restrict those athletes.

On the other hand, a lot of what Tom and I see are the middle aged guy who might be diagnosed with coronary artery disease. He's undergone a coronary calcium screening study, for instance, and it's led to stress testing, and then he gets an angiogram, and he has a 80% cyanosis in his mid LAD. And then the question becomes, does he need to be treated differently because he has a mid LAD cyanosis that may not be causing any symptoms? And can he go back and keep running marathons, or do you need to do something differently? And that's a real dilemma, because we just don't have much data that addresses that.

MEGHA PRASAD: In general, there's a school of thought where people say athletes tend to have an increased risk of cardiovascular events. And many of us may not agree with this, but do you hear this school of thought? And how would you respond to people that say that?

TODD MILLER: I don't think that athletes have an increased risk of cardiovascular events. What happens is people should appreciate that athletes, in general, are pretty healthy population, and when we start talking about cardiovascular events in athletes, we're talking about uncommon events. For instance, in the younger athlete, usually defined as less than 25 or 30 years of age, there's an estimated 80 cardiovascular deaths per year. Now that's in contrast to 20,000 motor vehicle accidents, homicides, and suicides.

So you can see it's a much smaller percentage of the population being affected. It's harder to estimate event rates in the older athlete because the data isn't tracked as carefully, but people shouldn't have the impression that athletes are having these events all the time. But what happens is, because it's usually a very startling event, people don't expect young healthy athletes to have some type of cardiovascular event, it gets a lot of attention. So there's not good evidence that athletes are at higher risk of developing cardiovascular disease. If anything they probably get less cardiovascular disease, because they're generally a healthy segment of the population. But when events happen, it gets a lot of attention.

MEGHA PRASAD: Are there any specific screening tools you recommend for the average 35-year-old fellow getting ready to run their first marathon?

TOM ALLISON: Well, so I think, again, basically, personal history and physical exam leads us into whether tests need to be done or not. What's this person's history of physical activity? Often, someone is they go to the gym three or four days a week, and now they decided to start training harder. I'm not sure there's a whole lot we need to do for that individual, and there's a build up process. So someone who's 50 years old, and hasn't done any exercise for a while, obviously, there's a prescription to get fit before you start to train. And the usual tests, an echo if you see some certain ECG abnormalities, or hear a murmur, a stress test if there's enough of an indication. It's not that there are special tools. It's just the results may need to be interpreted a little bit differently.

TODD MILLER: If I could just add to that. So we've been focusing on athletes who come into our clinic who have an issue. If you look at screening in the general athletic population, a major area of controversy right now is should anything be added to the sports physical where you do a brief history in physical. And the topic that comes up is should an ECG be added. And it's been estimated that if you just add in a ECG to 10 million high school athletes being screened, it would be over $2 billion in costs.

And part of the diagnostic dilemma once you start doing testing is athletic training alters our diagnostic test. So it can alter the resting ECG, it can alter echo measurements, and you can start to get into a major quagmire where you're trying to sort out is this a disease entity or is it athletic heart syndrome. And we're seeing some alterations because of the athletic training, so it's a major issue. But if you start going down a diagnostic testing pathway, it's going to be extremely expensive, and there is a certain segment of the athletic population that gets there. The division one athletes, more and more, they're getting an ECG screening, echos. Pro teams are doing this, but you have to realize they have a major financial investment in these athletes. If we're talking about the routine athlete who is your average high school or college athlete or middle age person who's asymptomatic, the yield of testing is going to be very, very low and expensive.

MEGHA PRASAD: So, Dr. Allison, we hear a lot about sudden cardiac death in athletes. How many Olympians have actually died during Olympic competition?

TOM ALLISON: Interesting question, and let's talk about the summer Olympics. The winter Olympics is a little bit different because you have more opportunity for trauma dying, crash in the luge, bobsled things. But in the history of the summer Olympics going back to 1896, there have been two athletes who died in competition, both probably heatstroke. There was Francisco Lirano, a Portuguese marathon runner collapsed in the 1912 Olympics in the marathon at the 29 kilometer mark, and subsequently died the next day. Now, as it turns out, he had waxed much of his skin to prevent sunburn, and that, of course, interfered with sweating and heat transfer and likely led to the death.

There was also a Danish cyclist, a fellow named Jensen in 1960, who crashed during a 100 mile team time trial. It was 40 degrees centigrade, 104 degrees out, and they were doing 100 mile bike race, and he got heatstroke, collapsed during the ride, and skull fracture. Pretty much instant death. A lot of speculation he was taking amphetamines and other drugs, although the autopsy report was really never released. So two deaths in the summer Olympics, and what's that? 120 years of competition, and both from heat related problems and not direct cardiovascular issues.

MEGHA PRASAD: Interesting. Well, given that you're both specialists in the area, what guidelines or science that's on the horizon are you all both excited about in the field of sports cardiology?

TODD MILLER: Well, again, it's an area that's really at its infancy, and we don't have good data on so many things. We don't know what the yield of broad screening would be, how useful screening really is. Most of that's anecdotal, and a lot of it is based on the European experience where they're little bit more aggressive with screening, with additional testing than what we do in the United States.

We need that type of topic better addressed. We need to know, once you identify a disease in an athlete, should it be treated differently? If we go back to a mid-range coronary stenosis, you might be perfectly comfortable having your patient who's 65 years old who's walking 30 minutes a day for their exercise continue their walking, but you might have a little bit more hesitancy about a marathon runner who is going to go out with that type of anatomical finding. And you know that they're going to be pushing themselves in a marathon, and the extremes of environment, et cetera. So there's just so many areas that we need to start generating data, and hopefully this new ACC council will be able to do some of that.

TOM ALLISON: I think one of the most exciting things is actually going on here at Mayo, and I'll put in a plug for Dr. Mike Ackerman's clinic where he has personally changed the guidelines. Well, I won't give him entire credit. There are other centers in the world, but mostly him. In terms of young athletes with long QT syndrome and allowing them to continue to participate with defibrillators and other therapies. So that's a real exciting change, and an interesting thing would be at the other end of the spectrum, Todd. In the older athletes who are developing atrial fibrillation, if we could figure that out and was there a way to prevent that in older long term athletes, and how best is that treated.

There are some areas of research we really don't have a whole lot at this point. For hypertrophic cardiomyopathy, which is the most common cause of death in younger athletes and is largely, wouldn't you say, Todd, untreatable from an athletic perspective. Not a whole lot you can tell the poor kid or young adult with hypertrophic cardiomyopathy about what they can do to prevent dying during competition. Although we might be able to have a more sophisticated way of determining who's just going to have a syncope, and who's actually going to have a cardiac arrest which right now is difficult to do.

TODD MILLER: So we have a phenotype that we can identify, but we aren't really good at sudden death risk stratification within that phenotype. Another anecdote is Pete Maravich, so well-known college basketball player. He was born with an atretic left anterior descending coronary artery. He played a complete college and pro basketball career, and never had an issue, and then after he was retired, he died.

TOM ALLISON: His socks kept falling.

TODD MILLER: His socks kept falling, but after he was retired, he had a cardiac arrest. He was just standing on the side of a basketball court, throwing up some hoops one day. But if anyone had known about his anatomy at an early age, he would have been restricted and you would have prevented one of the most successful basketball careers in the history of the sport. So it gets at this issue of maybe people have anatomical findings that we know sometimes can cause something bad, but we really aren't very good at risk stratification.

MEGHA PRASAD: There are some tough decisions you make on a daily basis in the clinic, I'm sure. Well, thank you so much Dr. Miller and thank you so much Dr. Allison for joining us today, and thank you to our audience for listening in. Please join us again for more videos like this on theheart.org on Medscape.