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Challenging the Misconception That T1D Is a Childhood-Onset Disease

Dr. Buse:
Welcome to *Diabetes Discourse* on ReachMD. I'm Dr. John Buse, and joining us to talk about his study focusing on adult-onset type 1 diabetes is Dr. Michael Fang. He's a researcher and Assistant Professor in the Division of Cardiovascular and Clinical Epidemiology at Johns Hopkins University.

Mike, thanks for speaking with me today.

Dr. Fang:
Thanks for having me, John.

Dr. Buse:
Now, the issue of misdiagnosing the type of diabetes that adults have has been a concern of mine since my days as an MD-PhD student working with the late George Eisenbarth in the early 1980s, and your short report in the *Annals of Internal Medicine* can teach us so much. I'm really excited to speak with you about it, so let's just jump right into it. Can you tell us about the database you used, the analyses you did, and the top-line results?

Dr. Fang:
Sure. So the database that I used for this analysis was the National Health Interview Survey, and this is one of the big data sets run by the CDC. It's been run for decades and decades, and it's one of sort of the premiere nationally representative data sources in the U.S. And we used this data because it's the only data set that we currently have that asks the question about what type of diabetes an individual has. Right? So all the other sort of national data sets in the US just asks people "Do you have diabetes? Yes? No?" So this particular data set goes a step further and says, "Okay, if you do have diabetes, do you have type 1 or type 2?" They started asking this question in 2016, and it was a subtle change, but if you're kind of a diabetes epidemiologist like me, this was a very sort of exciting development because it meant for the first time that we could start analyzing and posing questions about the type 1 diabetes population and doing it on a national level.

So we analyzed this data, and we looked at how the age of type 1 diabetes diagnosis varied across a nationally representative sample of adults with type 1 diabetes, and the top-line finding was that the median age of diagnosis was about 24 for the US population, meaning about half of the population was diagnosed before the age of 24 and half of the population was diagnosed after the age of 24. And I think to me that's such a remarkable finding in part because I think there's this perception that type 1 diabetes is this childhood-onset disease. Right? It used to be called juvenile diabetes, and so I think that perception has persisted and still sort of exists among many, many providers, and if that were the case, you wouldn't expect half of the population to be diagnosed after the age of 24. Right? And so I think this notion that it doesn't occur in adults is an important contributor to what you were saying at the front of the, the show, which is this misdiagnosis of type 1 diabetes. We don't even think that it's possible for adults to develop type 1 diabetes past a certain age, and so we don't think to run additional tests and to sort of explore that more, and so it's a simple paper, but hopefully it can sort of show people with data that notion that it's this childhood disease just isn't true.

Dr. Buse:
And you also found some interesting differences by sex, race, and ethnicity.

Dr. Fang:
Yeah. So what we found was that women with type 1 diabetes tended to get diagnosed earlier than men with type 1 diabetes, and this is

consistent with some of the prior studies in the literature. We know from prior research that women tend to see their providers on a more consistent basis than men, and part of the question in the survey was "At what age were you diagnosed by a provider?" And embedded or implied in that question is that you go and actually see your provider. And so we know that because women may see their providers on a more consistent basis, they may end up getting diagnosed at an earlier age. We also found that non-Hispanic white patients tended to be diagnosed earlier than racial and ethnic minority patients. Again, the mechanisms that drive those differences, it's unclear. Right? But I suspect some of that may have to do with access to healthcare or differential access to healthcare. And we know that racial and ethnic minority patients may not have the same level of access as their non-Hispanic white counterparts, which may lead to a later diagnosis.

Dr. Buse:
I agree with you completely. And I think for many women during pregnancy are being screened for the presence of diabetes, and though we think of gestational diabetes as being a sort of an early manifestation of type 2 diabetes pathophysiology, clearly, some of those patients actually have early type 1 diabetes as well.

So what are some of the clinical characteristics that you're able to glean from your data that we should be on the lookout for to make us think that this adult with new-onset diabetes might have type 1 diabetes?

Dr. Fang:
So we didn't specifically look at this in our study, but the ADA has a very, very sort of beautiful flow chart in their guidelines, and I would recommend anybody who's interested in the topic look at that. Within the flow chart, they have a list of some of the most common clinical features that providers should be sort of aware of when they're trying to identify patients with new-onset adult type 1 diabetes. The major ones tend to be BMI, right? So if you have a patient who's leaner, that's often thought to be more indicative of type 1 than type 2, and that makes sense given what we know about type 2 diabetes and the strong link between that and adiposity. The other one is age of onset, right? The younger the patient is, the more likely it is to be type 1. I would add there's a caveat to that, which is our findings, which is that just because you have an older patient, it doesn't necessarily mean that you shouldn't just rule out type 1 just because they're an older patient.

The other things the ADA flow chart and their guidelines talk about is a family history of either type 1 diabetes or autoimmune diseases, unintentional weight loss complaining of frequent urination, and frequently being thirsty. Those things are thought to also be potential kind of predictors of having type 1 diabetes.

Dr. Buse:
And there was a case series from the Mayo Clinic that looked into this about 20 years ago, and they also found that people who presented with ketones in their urine were more likely to have type 1 diabetes. So, you know, I guess what we should be keeping in mind is people who are just not quite typical for type 2 diabetes—remember a proportion of adults with new-onset diabetes will have type 1 diabetes.

For those just tuning in, you're listening to *Diabetes Discourse* on ReachMD. I'm Dr. John Buse, and today I'm speaking with Dr. Michael Fang about his study on adult-onset type 1 diabetes.

Mike, from your data or data from other sources, what proportion of patients with type 1 diabetes are being diagnosed well into adulthood? Let's say over age 30.

Dr. Fang:
What we found in our particular study was it was about 40 percent. So I think the exact number was 37 percent, so almost 4 in every 10 adults with type 1 diabetes were diagnosed after the age of 30. So I think that would surprise a lot of people. I think that proportion is a lot higher than, again, most people would assume and it's quite common.

Dr. Buse:
If you looked at people, let's say, at age 50 or at age 70, what proportion of new-onset diabetes would actually have type 1 diabetes?

Dr. Fang:
We did this analysis for the paper, and it ended up getting left on the cutting room floor, so I don't remember the numbers off the top of my head, but in their 30s and 40s, it's a little bit less than 10 percent, if I remember correctly, and as you start getting into your 50s and 60s, type 1 diabetes proportionally becomes less and less common. And so that tendency for people to kind of default and say, "Well, it's a new-onset patient; they're in their 40s and 50s; it's automatically type 2," that's not completely misguided. Right? In the vast majority of cases in some of the older age ranges, it's going to be type 2, but we don't want people to just default and say, "type 2," right? If there's a reason to be suspicious, then we want people to know that there's a test available and they can rule that out.

Dr. Buse:
And there are data from various studies that have looked at antibody positivity rates, and I think in general, it's probably certainly in the single digits in the older population but never zero; but overall, sort of 5 to 10 percent of adults with new-onset diabetes have type 1 diabetes is what has been said.

And then the tests you mentioned, these antibody tests are probably the most specific for type 1 diabetes, but I think it's always important to remember that if you have a negative test, it doesn't mean that you don't have type 1 diabetes because there is a certain proportion of patients who fail to have type 1 diabetes who are not antibody positive.

Before we close, Mike, do you have any other advice for clinicians?

Dr. Fang:
Yeah. So much to the chagrin of my co-authors, I came up with a little slogan for the punchline of the paper, which is "When in doubt, rule it out." Right? The thinking is that we often default and say, "Look. This patient is new-onset. They're an adult. They're type 2." But if there are any signs that it's not a type 2 case, the ADA recommends running the antibody test. If there's a reason to suspect that this case doesn't quite fit what you would think for a type 2 case, then just sort of rule it out and run the test.

Dr. Buse:
This has been a really interesting conversation. I'd like to thank my guest, Dr. Michael Fang, for sharing his findings on adult-onset type 1 diabetes.

Mike, it was great speaking with you today.

Dr. Fang:
Thanks, John.

Dr. Buse:
For ReachMD, I'm Dr. John Buse. To access this and other episodes from our series, visit *Diabetes Discourse* at ReachMD.com, where you can Be Part of the Knowledge. Thanks for listening.