Episode 60: Speed, stewardship and cardiac care: ADLM 2026 highlights

Stephanie Kleewein: Hi, I'm Stephanie Kleewein, and welcome to *QuidelOrtho Science Bytes*, your trusted source for diagnostic insights and innovations. This year, QuidelOrtho and our collaborators are excited to participate in the 2026 annual conference for the Association of Diagnostics and Laboratory Medicine, or ADLM, where experts from across healthcare and laboratory medicine have been sharing the latest research, technologies and clinical insights helping shape the future of diagnostics.

In this very special 60th episode of *QuidelOrtho Science Bytes*, we're bringing you a preview of three of our ADLM presentations and highlighting some of the key findings our speakers have been sharing with the conference attendees. First, we have Dr. Heather Danks, Chief Technology Officer at LEX Diagnostics. She'll be talking a little bit about our NULEXA™ System and the ultra-fast RT-PCR technology. Next up, we'll have Dr. Mike Broyles, Director of Medical Affairs for Biomarkers at Thermo Fisher Scientific, who will share some insights from more than 25 years of procalcitonin-guided antibiotic stewardship. And finally, we'll have Dr. Lindy Carlstrom, Medical Affairs Manager at QuidelOrtho. She'll give us a little bit of insight into the important role high-sensitivity troponin plays in modern cardiovascular diagnostics.

We'll go ahead and start with Dr. Heather Danks. Heather, thank you so much for joining us.

Dr. Heather Danks: It's a pleasure. Thanks for having me.

Stephanie Kleewein: Yeah. So, we'll jump right in. Before we start talking about the NULEXA System itself, let's really start with the challenge of PCR. PCR has long been considered the gold standard for molecular diagnostics, but it's not really known for speed. What has historically limited PCR performance?

Dr. Heather Danks: As a biologist, I like to win with physics. So, I think that the biology can go fast – it can keep up with the speed, but fundamentally you need to be able to get heat into and out of a solution. Traditional PCR is based on thermo-cycling. So, three different temperature zones and being able to get the heat into and out of those zones into the reaction really quickly. You tend to use 40 to 50 cycles. So, by the time you've done that multiple times, it adds up. It's really all about thermal transfer and good control over the heat.

Stephanie Kleewein: And that makes sense, you know, kind of leads into the next question: your presentation focused heavily on overcoming those limitations. So really what innovations make ultra-fast PCR possible on the NULEXA System?

Dr. Heather Danks: Yeah, so our system, the big change is really in two areas. The first is that we don't use Peltier. So, Peltier devices are traditionally used to hold and set temperatures. They can heat and cool, but they're really not efficient at doing that. So, we've kind of taken it on its head and removed the Peltier for the reason of thermal control and found innovative and now patented ways to get the heat into and out of the reaction quickly. The second is that we changed how we kind of structure the reaction vessel. Biologists love tubes, which are again not an efficient way of getting an even kind of thermally uniform temperature across the solution. So, we have small flat chambers and that helps us control temperature really precisely and really quickly.

Stephanie Kleewein: And your deck also showed PCR cycling speeds that are dramatically

faster than traditional systems. So why is that important clinically?

Dr. Heather Danks: I think when we look at point-of-care medicine, you want people in and out of clinics quickly with actionable results. It's about efficiency. And so, we think speed is one of the three big pillars that drive this kind of product and differentiate.

Stephanie Kleewein: That makes sense. So, you also spent some time discussing sample preparation. Why was simplifying the workflow such an important part of developing the platform?

Dr. Heather Danks: So, I think two reasons. Firstly, it's great having fast PCR, but if you then add complex sample preparation and clean up that takes time, you've sort of lost that value as a quick reaction. So, by eliminating complicated sample clean-up and DNA extraction, we keep that time short. And I think the simplified workflow is really important if you want to get into CLIA-waived settings. It's not a laboratory. You don't want to be metering liquids. So, the kind of simple workflow means again, it's efficient for the users. It reduces the risk to the test, and it makes it ideal for those kind of near-patient environments.

Stephanie Kleewein: Yeah. So, what are the key performance characteristics listeners should know about the NULEXA Influenza + SARS Test?

Dr. Heather Danks: So, it's a differential diagnostic. It can tell the difference between the presence of influenza A, influenza B and SARS-CoV-2. And importantly for us, it can do all of that all the way in negative samples in under 10 minutes. It’s got a run until feature, so, you'll start seeing positives if the target is there in as little as six minutes and you'll have the complete testing in under 10. So, it's really about efficiency without compromising, of course, on the sensitivity that people expect from PCR.

Stephanie Kleewein: Yeah. And I love this because you do describe the NULEXA System as a platform rather than just like a respiratory test. So, what features of the technology really are adaptable to additional assays?

Dr. Heather Danks: Yeah, I think that's the glory of kind of true RT-PCR. We can use this to interrogate any sample type and look for any target pathogen or bacteria. So, we've got a really strong reagents team who customize the reagents, the assay design and everything so that we've got a really sensitive, really specific assays. And hopefully that means we can apply this to go to a much wider menu as we move forward.

Stephanie Kleewein: Yeah, very exciting. Rapid diagnostics aren't only helping advance infectious disease detection or testing. They are really helping clinicians make those better decisions. So, I want to thank you so much for joining us today. I know it was a short while, but we really appreciate your time. Thank you for being here, Heather.

Dr. Heather Danks: Absolute pleasure. Thank you very much.

Stephanie Kleewein: Thank you. Let's turn now to Dr. Mike Broyles. Welcome back to *QuidelOrtho Science Bytes*. Thanks for taking the time to speak with us today. It’s busy here at ADLM.

Dr. Mike Broyles: Happy to. Happy to share.

Stephanie Kleewein: Yeah, so we'll jump right in. So, you've spent decades working in

infectious disease and antimicrobial stewardship. Why is there such a need for better tools to guide antibiotic decisions?

Dr. Mike Broyles: Well, that's kind of an easy one to answer. So obviously we have this overuse problem. And the issue has always been is that we've been taught that more is better, that longer durations are safer. And we were taught years ago that you're going to give antibiotics for the full duration. That's good to a point, but we don't know what the full duration is. We don't know that bacterial burden has changed over time. And so historically we've always erred in favor of caution because clinicians are always taught above all do no harm. And so, what we end up doing is treating longer than we should. So even back to the days when we were deciding how long do we treat, for instance, community-acquired pneumonia, this was back in 1940s. They said, well, we're going to take an average of three days for the patient to differ best, meaning they're going to get better, their O_2 stats are going to be better, the white count will go down, the temp will go down. And then they said, well just to be sure we're going to add two more days of antibiotics. So, we went from three days to five days. All right. And that was the guess. And so essentially this has been the case all along is – the weakest link in all medical literature is how long do we treat? Because we don't know what's going on at the micro level. So, we need a tool or tools to help us understand because what happens micro level-wise is well in advance of what we see in taking care of the patient, both clinically and radiographically – clinically is always ahead of radiographic – and so if you're looking at that patient, that micro piece has been either better or worse for days. And so, you're always behind. So, we need to give clinicians tools because you can't just walk up to somebody and say, "Hey, you know, our hospital is using 20 percent more antibiotics than we should, use fewer."

Stephanie Kleewein: Yeah.

Dr. Mike Broyles: I mean, there's that medical/legal thing. So, we have to say, okay, I'm giving you a tool so that you can understand what is going on with your patient at this micro level. Once you understand that, then you can make intelligent decisions to know, do I continue? Do I change therapy? When can I safely stop? And that's the whole key is giving people the option to know where they're at, because if not, it's always going to be above all do no harm, always going to be in favor of caution, and you're going to give way more antibiotics than you should. And that's historically what we've always done.

Stephanie Kleewein: Yeah, and that makes sense. So how does procalcitonin differ from biomarkers such as white blood cell count, CRP or even lactate?

Dr. Mike Broyles: Yeah, so this is a great question. And this is kind of the crux of understanding the value of PCT. So, you take other markers, which we've studied literally over 830 of these markers for infection. The problem has always been with white count, CRP, even the interleukin products, IL-1, -2, -6, soluble TRIM, CD64, the list just goes on and on. They don't have the ability to differentiate what they're seeing is this inflammation viral or is it bacterial? Okay, the beauty of procalcitonin is that unlike these other markers that elevate in both conditions, including fungal infections, PCT is very specific to bacterial infections only. So, there's actually requirement to have bacteria activate the toll receptor for you to make PCT. The other thing is, is in a pure viral infection, there's actually a negative feedback mechanism with the interferon gamma to keep that process in place that would make PCT. And the other thing is if you're a pure viral infection, there's no bacteria on the toll receptor, which is a requirement. So, because of this toll receptor requirement, it makes PCT very specific. But that's one part, which is very important. The other part is it's extremely reliable. So, the key is that you know people will think they'll use the terms, well, no test is perfect. And no test is perfect, but it is extremely reliable, meaning that,

historically things like steroids and similar drugs affect all of those other markers. It does not affect PCT because bacteria is the key component. So high-dose steroids, people that are on autoimmune with significant autoimmune diseases, people with leukopenia, neutropenia, people who are on chemotherapy, all provide a very robust PCT response that's measurable generally within three hours, always within six hours. So, the second part of that is that that response is reliable. And then the other piece that's extremely important is the kinetics. So, because PCT rises three to six hours, it'll peak in twelve hours. So, if that infection goes away, essentially the bacterial burden goes down, it peaks at 24 hours. But very, very importantly is that the elimination half-life is also 24 hours. So, by that I mean just like it's with drugs. So, if the PCT is say 10 and I, on admission ED, and I apply appropriate antibiotic therapy, the next day I can expect it to be 5, 2.5 and so on for every 24 hours. Well, that then tells me that my antibiotics are working, which is very, very important because remember what happens at the micro level, always way ahead of what happened clinically and radiographically. That's good. I know it's working. All right. The second piece of that is what if it goes up? I know I have treatment failure. I don't have to wait till my patient crashes. Okay, clinically, I can intervene and then I can see that trend down. And then the other thing that people don't even think about is two negative PCTs is literally a 99 percent normal PCTs. Two normal PCTs is literally a 99 percent plus negative predictive value, meaning you never had a bacterial infection in the first place. So the beauty of this is that like say, for instance, community-acquired pneumonia, sixty percent or fewer of those patients actually have a viral infection. Forty, thirty-eight percent actually had bacteria.

So that means if we follow the guidelines, we give six out of every 10 patients antibiotics and never need them in the first place, and we just gave them for five days. COPD exacerbations is 50-50. Even sepsis criteria is 40-60, meaning 40 percent or later found they don't need antibiotics. So, this piece of specificity, reliability and the piece about predictable kinetics gives us a lot of opportunities to evaluate therapy and to do things that we could never do before.

Stephanie Kleewein: One of the topics that you discussed here at ADLM is that PCT can guide antibiotic initiation and discontinuation. So, how does that work?

Dr. Mike Broyles: Yeah, so it's very important. So, there is a point at which we feel like your body needs help. Okay. And so basically the PCT value is .25. So, there is a level and PCT is approved for withholding therapy in lower respiratory tract infections, which is CAP, COPD and acute bronchitis. So that meaning is that if that PCT value is between .1 and .25, therapy is discouraged and if it's .1 or less, therapy is strongly discouraged. Now, obviously you're going take into account that patient's clinical presentation. But what that's telling you is that this point in time, this is what we are seeing bacterial-wise. Now, when we get to be 0.26 or more, we're saying at that point, we think your body needs help. So, we're going to give you help with antimicrobials. All right. And then that is helping you to determine, yes, I want to go ahead and treat this patient and then we can get in that piece about when we want to safely stop antibiotics, but again, that's based on change over time. So, the initiation piece is all about what is my bacterial burden at this point in time? Because you can look at a white count. I mean, we know that 40 percent of patients that are in sepsis and severe sepsis, septic shock, they never even elevate a white count. Sometimes it goes down. I had a necrotizing fasciitis patient for the PCT of seven ten, hugely elevated. Okay, I mean you get to that is gravely concerning. The white count was thirteen pounds and three times. Basically, telling you I don't feel like there's much infection going on, but when we had the PCT we knew immediately that something was going on, it required surgical intervention. So, lots of information.

Stephanie Kleewein: Yeah, absolutely. You have a lot of experience with this. You've reviewed over 70,000 PCT results throughout your career; what have you observed in real-life clinical practice?

Dr. Mike Broyles: Yeah. So, I started stewardship back in like 1992. And we didn't even call it stewardship then. We didn't even have a name for it. I went to my hospital. I was at this hospital for 30 years. And when I first came in, that was my evaluation. What I felt the weakest link in all of the things that we did was the use of antimicrobials. And so, I began a program. Now at that time, I also was supervising lab. So, for 30 years I ran pharmacy. I supervised lab. And I spent half my day taking care of patients. So that is why I've seen all these determinations. So, my hospital and lab was optimized for everything that we could do from the infectious disease standpoint because it was so critical for us. And I saw that was a big need. PCT came along. I began to evaluate the literature, and I go, like, this is such a no-brainer. Why don't we do this? And so, we implemented the protocol. And then people began to say, How's this working? So, we began to look at the results. And so, we did a pre- and we did a post-study. One year later, okay, over 2,152 patients, we found the reduced antibiotic exposure by 47 percent. Now that's on top of a mature stewardship program, already doing everything we needed to do, reduced mortality by 2.4 percent, 30-day readmissions from CAP, sepsis and COPD by 50 percent. All right. It was actually, I think, well, it was close. Yeah, right at 50 percent, reduced *C diff* by 64 percent and then we reduced 30-day, excuse me, adverse events by 50 percent also. So huge change in the way we looked at that. And of course, then we begin to apply the dollar amount to go to the C-suite and the C-suite instead of saying, atta boy, the first words out of their mouth was, "What about the dollars?" And we began to apply that, and we had a very effective cost, you know, a cost analysis where we looked at sepsis, lower respiratory tract infection. It was huge. So even though we averaged 3.1 PCTs across all the patient population, I was saving lab hundreds and hundreds of dollars. Inpatient radiology procedures were down like actually was right at 17 percent. And then even a pharmacy, you know, patient charges, depending on the diagnosis, between $800 and $2,100. So, it was kind of a no-brainer. And it changed. People would come in and it's like when you leave at the end of the day, it's like I always think if this is me or my family, how do I want them treated? So, if you don't have something like PCT, you're going, well, this change I made, I hope it works. Because remember, what's happened clinically is always well behind. When I leave at the end of the day, I know where my PCT was, I know where it is today, and I can feel comfortable when I get home. All right. So, it changes the way you practice, which is huge. And you know, the interesting thing is, and the one thing I'd like to drive towards laboratorians is laboratory stewardship is not about cutting something. Now it is if you don't use it, but you know, by definition, it's the right test at the right time for the right patient to aid in diagnosis and treatment. If you apply this and you have a process in place, it totally changes the management of your patient. So, we need this because, you know, estimates are now that we're going to lose by the year 2050 upwards of 39 million people that will die from infections we simply can't treat. Think about that though. So, if you get this infection, it's not like you got a diagnosis of cancer and you're going to die in a year or two years or three maybe, you're going to die within days. And that didn't include morbidity. It's a very sobering thought if we think about it. And just saying, well, I'll do what I want to do to somebody else to do a better job with antibiotics is not the right answer. We need the tools.

Stephanie Kleewein: What is the biggest message here at ADLM that you want the attendees to take home?

Dr. Mike Broyles: Sure, so for me, the biggest message is that lab is totally underappreciated, undervalued. I mean, I worked with lab for 30 years. I took care of patients for 40-some-odd years. The key is you provide the tools that help us make better

decisions about taking care of your patients. And every patient that I look at is, what if that was my family or my friends? How would I want them managed? Laboratorians provide great value, but we want to make sure that the proper tests get ordered, but then there's a process in place so it gets acted on. So, for instance, with procalcitonin is if you just dole it out willy-nilly and you say, okay, do what you want to do and you do mediocre education, it's going to fail. But if you could have a process in place where you educate, you educate separately for the ED, for ICU, and for the other departments, and you put in a process in place with an antimicrobial stewardship team, you make sure it's ordered correctly. Somebody's looking at it. And somebody is acting on it, it changes everything. And that's the whole key is you have a very valuable test, but it does require work and process. So, we do that through policies and procedures, protocols, the algorithms and those things, which are very simple, but there has to be a process in place. It's just like you don't say, "Okay, guys, I've got PCT, use it as you want to." That will be a total and utter failure.

Stephanie Kleewein: Yep. I just want to say thank you again for coming back on the podcast. It's great to have you back and just walking us through your presentation has been amazing and we appreciate your time.

Dr. Mike Broyles: Always happy to. I always have a lot more to say than you want to listen to. So, it's there's a lot to share. There's a lot to share and I'm happy that we had this opportunity.

Stephanie Kleewein: Absolutely, thank you.

Dr. Mike Broyles: You're welcome.

Stephanie Kleewein: Joining us now is Dr. Lindy Carlstrom. Lindy, first, thanks for joining us today and welcome back to the *QuidelOrtho Science Bytes*.

Dr. Lindy Carlstrom: It's great to be back, Stephanie. I love doing these podcasts with you.

Stephanie Kleewein: So, we'll just jump right in. Your presentation here at ADLM really focused on high-sensitivity troponin. Why has this biomarker become so important in cardiovascular care?

Dr. Lindy Carlstrom: Yes, so heart disease remains the leading cause of death in the United States and rapid diagnosis is critical to get to appropriate treatment. High-sensitivity troponin assays allow clinicians to detect extremely low levels of troponin with a high degree of precision compared to their contemporary predecessors. This means that myocardial injury can be identified earlier, allowing faster clinical decision-making and potentially resulting in better pitched outcomes because you get them to do definitive therapy faster. So high-sensitivity troponin testing is becoming more widely adopted, but we have to recognize that results are assay specific. The best way to do that from a lab perspective is to give clinicians good result comments to help them understand the reference limits and decision thresholds with each assay are different. So, if they change institutions that have different assays, they know what they're using where they are today as opposed to what they're using where they are tomorrow.

Stephanie Kleewein: In your presentation, you go over the serial testing of it and how it's frequently discussed with high-sensitivity troponin. So why is that precision so important in that landscape?

Dr. Lindy Carlstrom: Yeah. So, in the higher risk patients where you have high clinical suspicion, you're not going to rely on a single troponin result, nor will you rely on a single data point. You're looking at changes over time to see if what you're seeing is acute versus chronic. So, in order for those changes over time to be meaningful, the assay has to have really tight precision so that you know that the change you're seeing between values is change in the patient and not just change due to assay noise, assay variability. And then once they have that high analytical precision, they can have more confidence that they're diagnosing and restratifying and making the right treatment decisions. If those results don't align with the clinical picture, they may have to think about calling lab and asking about interferences, but this is going to be after going through the cardiac workup, getting additional tests, radiology to evaluate the heart, make sure they're not missing something. But good sample quality is also really key to this. Having good sample handling procedures, following good appropriate centrifuge settings, matching what the tube manufacturer recommends is how you avoid anything that can give a highflyer initially that doesn't reflect what's truly going on with the patient. So, there's a lot of ways that the lab can help the clinicians. There's details we know about the lab that the clinicians don't know to help make everything easier and get the right result out the first time.

Stephanie Kleewein: Are high-sensitivity troponin assays changing? How are they really changing the emergency department workflows?

Dr. Lindy Carlstrom: Yes, so with before high-sensitivity assays with contemporary and conventional assays, you had to wait three or even six hours between serial samples. With high-sensitivity assays with more precision and lower measuring ranges, you can detect very small troponin concentrations then; therefore, according to the guidelines, you can take those serial samples at shorter timeframes. So going from three to six hours for your second sample to one to two hours for your second sample. That's shaving two to four hours off the patient. Sitting there waiting for the second draw, you can make decisions faster. And if that patient is good to go home, they go home faster or you make a decision that they need to go upstairs and get them out of the emergency department faster because I was trained to say that the sickest patient is the one you haven't seen yet. They're in the waiting room. So, if you can clear out the ED, you can get them into the waiting room and find the next sick person.

Stephanie Kleewein: Quick assessment is super important. So, in speaking about that, many people just automatically think of elevated troponin and think, my gosh, heart attack, right? But is that always the case?

Dr. Lindy Carlstrom: No, well, do have, everybody has aid and diagnosis for myocardial infarction. The whole concept of myocardial injury, which is what you have when your troponin is abnormal, it's not always going to come from infarction. The question is, why is the troponin abnormal? And there's lots of other whys; there's a lot of other things that can go wrong with your heart besides a heart attack. So, heart failure, renal disease, becomes sort of a chicken or the egg. Did the same thing that made your kidneys sick also make your heart sick? Or is your troponin high because your kidneys aren't clearing it like they used to because your kidneys aren't functioning well? Often, it's both. And then there's other conditions that put stress on the heart. Sepsis, severe anemia, hypoxia, anything that makes the heart work harder could make it work so hard that it releases troponin. Even there's evidence out there that after running a marathon, which is heart stress, but like the good kind of heart stress.

Stephanie Kleewein: Right.

Dr. Lindy Carlstrom: That'll have troponin, but the elevation profile looks far different from a pathophysiological elevation of troponin and how it comes back down to normal. So, it's really all about like, why was it up? What was going on with the patient before they got that result?

Stephanie Kleewein: My final question is, where do you see high-sensitivity troponin having the greatest impact?

Dr. Lindy Carlstrom: Yeah, so it's going to expand and it becomes a very nuanced space that clinicians are good at navigating that's not so good to get into FDA claims, but research are looking at using troponin in other areas like cardiovascular risk assessment, long-term risk prognostication, other things that affect the heart like cardio-oncology. There are drugs like checkpoint inhibitors, which can really affect the heart. So, you have to balance that with the patient's before cancer cardiac status and how it evolves as you're treating the cancer. And then even in perioperative care, looking for things like MINS, which is myocardial injury after non-cardiac surgery. There's lots of other ways that clinicians may be using troponin to look for myocardial injury beyond just the ischemia. They understand; clinicians understand the not all injuries are infarction and they're looking at injury to make sure it's something they can intervene on more than just with the cath lab.

Stephanie Kleewein: I just want to say thank you again for joining us. I'm just going to kind of close out here. Our conversations with our experts here at ADLM highlight a common theme across healthcare: clinicians need faster, more actionable information to support better patient care. Whether it's ultra-fast molecular diagnostics, procalcitonin-guided antibiotic stewardship or high-sensitivity troponin and the rapid cardiac assessment, we really see that these innovations are helping healthcare providers make informed decisions when time matters most.

I want to thank you all again. Dr. Heather Danks, Dr. Mike Broyles and Dr. Lindy Carlstrom for sharing insights here this week.

Thank you all for listening in. If you haven't already, please subscribe to *QuidelOrtho Science Bytes*, our monthly podcast brought to you by QuidelOrtho Corporation, where we are advancing the power of diagnostics for a healthier future for all.

Until next time, take care, everyone.