

Is There a Non-Invasive Way to Detect Colorectal Activity?

Manometry has long been the standard to measure colorectal activity, but it's a lengthy and invasive test.

Doctors at Children's Mercy Kansas City wanted to know if there was a better, non-invasive way to monitor colonic activity. The search for an answer led to a promising innovation. Along with a scientific partner, John Rosen, MD, developed a device that monitors colorectal activity using electrical bio-impedance with electrodes on the skin.

Join Dr. John Rosen with the Division of Gastroenterology at Children's Mercy Kansas City, as he introduces us to colonic monitoring, his pre-clinical findings presented at a major gastroenterology conference in 2017, and the potential the new device holds to make colorectal activity detection more accessible to patients.



Featured Speaker:

John M. Rosen, MD

John M. Rosen, MD is a pediatric gastroenterologist with the Division of Gastroenterology at Children's Mercy Kansas City. He received his medical degree from the University of Kansas School of Medicine, completed a residency in pediatrics at Bellevue Hospital and Langone Medical Center in New York City, and a fellowship in pediatric gastroenterology at Ann & Robert H. Lurie Children's Hospital of Chicago.

[Learn more about John M. Rosen, MD](https://www.childrensmercy.org/profiles/john-m-rosen)

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Transcription:

Dr. Michael Smith, MD (Host): So, our topic today is, Is There a Noninvasive Way to Detect Colorectal Activity? My Guest is Dr. John Rosen. Dr. Rosen is a pediatric gastroenterologist at Children's Mercy Kansas City. Dr. Rosen, welcome to the show.

Dr. John M Rosen, MD (Guest): Thanks, Dr. Mike.

Dr. Smith: So, what is colonic activity detection or manometry? Tell us a little bit about that.

Dr. Rosen: Yeah, so, when we poop, the poop has to get down to the bottom before it comes out. And the colon is the large intestine that squeezes and moves the poop down and it is surprising how little we know about that and how hard it is to determine whether it is working well or not. And so, there are different types of tests that we can do and one of those tests is colonic manometry or the study of colon pressure. And pressure is a part of the squeezing and moving ability getting the poop down to the bottom and it involves placing a long tube in the bottom all the way around the colon and then measuring with a computer the pressures that are generated within the colon at various times of day, after medicines, after eating.

Dr. Smith: Well tell us a little bit about the device and how it actually is identifying when the colon is squeezing, signaling the need to stool. Tell us a little bit about that.

Dr. Rosen: So, the device colonic manometry uses, it uses a solid-state pressure transducer, so it measures pressure directly or with water to measure pressure and that's different than other devices, but it is a very specific one that measures pressure only.

Dr. Smith: So, as a community physician or a general pediatrician, maybe a nurse practitioner; when should we consider this type of test in our patients?

Dr. Rosen: That's a great question. So, most patients won't need that type of test. There are lots and lots of children with constipation and most of them need education and identification of the constipation and then treatment. No testing at all. Some children won't respond well to treatment or they will have other medical conditions or symptoms that may make somebody wonder is there a disease of the nerves or the muscles in the colon that needs to be investigated. Either to better explain why they are having trouble with pooping or what we could next to make it easier. And some examples of that might be an infant that is born and unable to poop from the time they are born. So, it didn't start when they are a toddler, but it has been their whole life. Or somebody with other diseases of nerves or muscles that is also having constipation. They may also have a disease of nerves or muscles within the colon.

Dr. Smith: So, I think Dr. Rosen, what I want to do, let's back up just for a second. Let's talk a little bit more about the device itself. So, in the past, right, we had manometry that was basically looking at pressure in the lower esophagus, this is not the same thing, right? This is a different device that is actually looking at that peristalsis. Can you maybe help us understand the difference?

Dr. Rosen: Oh sure, so the device that I was describing before, that is the same as esophageal manometry. The device that we developed is very different. And that device doesn't rely on measurement of pressure at all. The device that we have developed, relies on measurement of changes in configuration which could mean the density of liquid, the volume of liquid, or stool or solid within the colon. And so, it doesn't measure pressure at all, it measures the movement of things within that area of the colon.

Dr. Smith: So, what – so, knowing that now, how is that better than measuring pressure directly? How is this helping us to describe colonic activity better?

Dr. Rosen: Also a very good question. So, they are very different. And to say that one is better overall, I think would be difficult because it depends on what your goal is. Now if you are studying physiology, how things are squeezing; you need the traditional device, the manometry catheter is a good device, measures pressure, somewhat invasive, but it really does that one factor well. If you are trying to measure the body's ability to move that poop through the colon; under different conditions and not have to insert something that's invasive, then you need a totally different type of device like the one we developed. When we are going through the process of pooping, then part of it is the squeeze pressure which the traditional device measures. But part of it is also, do those squeezes produce coordinated contractions to actually propel substances through the colon or are they squeezing ineffectively? Is the poop actually moving anywhere when that happens? And the traditional device can't measure that at all. And so, looking to figure out can we measure that propulsion or movement of content as well as a way

to do that without having to go to the operating room and insert a catheter in a patient; is kind of why we started to develop our device in the first place.

Dr. Smith: So, you actually presented some of the, I think preclinical findings, right, I think at the North American Society for Pediatric Gastroenterology in 2017. Tell us a little bit about what you presented.

Dr. Rosen: So, we presented the initial preclinical data and our device essentially is based on impedance, the technology of measuring resistance within an electrical field and similar to devices used to measure the heart; but we use this to measure the colon. And so, we showed that it was feasible to measure changes in the colon using stickers on the abdomen, on the hips, that generate an electrical field and then measure changes within that electrical field. So, we showed, one, the feasibility, that it does measure things but also, we showed that what it measures is different depending on what's happening with a person. And if a person is resting, then their colon is doing one thing, but if they take medicine that causes their colon to squeeze; then we showed our device can distinguish that. It can show that as a change, as an event. And that's really important because there are lots of things that can affect your body, the movement of your hips, gurgling with our stomach, all these things are going on all the time and any useful clinical device should be able to measure important functions, like when squeezing is strong, when physically things are moving through the colon and we showed that that can happen with our device.

Dr. Smith: What's the scope of its potential use once you get to that clinical phase and what promise do you think it holds for hospitalized patients?

Dr. Rosen: I think that this started because a parent wanted to know can I get this information about when my son's colon is squeezing without having to come to the hospital and go through this two-day process and operating room procedure. And so, I think the initial reason that we developed the device and one of the scopes that it could lead to is a device that pediatricians, family doctors and consumers could use basically measuring when the colon is active and then taking whatever action is appropriate. So, for a kid; it would be sitting on the toilet. For a doctor, it might be assessing whether a certain medicine really does make a kid's colon move when they are at home. So, the scope from a consumer or an individual patient point of view, outside the hospital is huge and there are lots of steps between now and then, but the potential is there. Within the hospital, I think there is a very different scope. Currently, when we see patients in the hospital, when somebody is there for surgery or because they are sick; we monitor those patients, their heart rate, their breathing, their blood oxygen content and we monitor their bowels, but we do it in a very different way. When we monitor the heart and lungs; we put stickers on and we have a computer generating signals that we now know how to interpret, nurse, and doctors and staff. The colon, we listen with a stethoscope and try to interpret sounds that we hear. The device that we developed has the potential to be like this cardiorespiratory monitor but for the intestine and if we could continuously monitor the intestine, in a more objective way; then we could know what action to take to provide the best care. For instance, after somebody has intestinal surgery; when is their colon moving most effectively or starting to have the most activity? Maybe that's the right time to start feeding them. And so, I think within the hospital, there are lots of opportunities to use it in kind of a parallel what that we currently monitor the heart and lungs.

Dr. Smith: Right, that's awesome. That means better outcomes for hospitalized patients, getting them

out of the hospital quicker and all of that stuff is exactly what we want. So, this is amazing work, Dr. Rosen. I want to thank you for the work that you are doing at Children's Mercy and thank you for coming on the show today. You're listening to Transformational Pediatrics with Children's Mercy Kansas City. For more information, you can go to www.childrensmercy.org (<http://www.childrensmercy.org>) that's www.childrensmercy.org (<http://www.childrensmercy.org>). I'm Dr. Mike Smith. Thanks for listening.

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