

## Diapers' contents could change way of finding intestinal disease

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A medical test initially researched for aging adults also could be helpful for premature babies, according to scientists with Texas AgriLife Research.

The procedure, which uses fecal samples rather than the oft-dreaded colonoscopy, was developed by Dr. Robert Chapkin and his colleagues, who have been studying the noninvasive technique at the genetic level for more than a decade.

"Babies have many, many intestinal conditions that can threaten their lives, such as necrotizing enterocolitis, or NEC, in premature infants," said Chapkin, a nutritional scientist. "Our test, we believe, may have utility for determining a baby's risk, and then would allow a physician to take different strategies in order to abate or prevent the possibility of this life threatening disorder."

Necrotizing enterocolitis can be fatal, Chapkin noted, and it's very difficult to determine which babies in the [premature baby intensive care unit](#) are going to develop the disease.

The researchers examined the fecal samples of 20 healthy babies in collaborative research with clinicians at the University of Illinois-Urbana.

Just as in the original research, in which the scientists detected genetic fingerprints from adult stools as a predictor of [colon cancer](#), the study

with babies found that genetic markers in their stools could also provide a picture of medical condition of an individual baby's intestines.

The study used fecal samples from 10 human babies that were exclusively breast-fed and 10 human babies that were exclusively formula-fed, Chapkin said.

"I think that all doctors would agree that the breast is best. But why? What is in the breast milk? How does it affect developmental biology, why are infections and complications in the intestine lower in a breast-fed baby than a formula-fed baby?" Chapkin said. "The only way to deal with that is to have a molecular signature of the intestinal cells from that baby and to follow it over time."

The team was able to identify genetic signatures from each baby, noninvasively, he said. In other words, each baby's diaper was the source of the samples.

Though it is early in the research, Chapkin said, the scientists found genetic pathways that appear to be induced differently by the breast milk than by formula.

"This may unlock a gold mine, allowing us to understand how that little baby's intestine is changing and developing and whether or not that formula is meeting those needs," Chapkin said. "That would allow formula companies to further enrich their formulas with essential molecules so that the two worlds - [breast milk](#) and formula - look very similar at some point in time.

"We have a long way to go to validate these markers, but we show it's feasible, it can be done," Chapkin said. "We have genetic signatures that are different in these babies' intestines."

The finding comes on the heels of the long-term study of colon cancer. The team had created a way to "noninvasively assess the status of a human being's intestine," Chapkin noted.

Adults, who at age 50 have a higher risk for developing colon cancer, have to be anesthetized while their colons are probed.

"A [colonoscopy](#) is absolutely essential as part of a surveillance process to assess your risk (for colon cancer)," Chapkin said. "Yet, many people would rather avoid the test and run the risk of developing the disease or not catching the disease early, because that test is so distasteful and unappealing to the public."

The test Chapkin's team developed and patented isolates the genetic material in a fecal sample focusing on the RNA to get a gene expression or signature.

"Humans have 20,000 or so of these genes. We look at them all and look for those that are informative, telling us what is going on. We're looking for a needle in a haystack," he said.

He said such a test, which is not yet available, might be as simple as an at-home kit. A person would put a fecal sample into a tube, seal the tube and return it to the lab, which would then use the RNA analysis developed by Chapkin's team.

In addition to colon cancer, the test might also reveal other inflammatory bowel diseases which affect millions of people in the U.S., he said.

"We could determine if these people have a signature that could point to when they are about to flare up or they are in the process of developing a clinical symptom," Chapkin explained. "And that might allow the doctor to intervene very early in the process and nip it in the bud, so to speak."

It's a tool for monitoring intestinal processes."

The test could be performed periodically, much like the blood tests that people now take to see if there are changes that need further examination.

Both studies - that of the infants and the aging adults - have preliminary findings but need additional resources to pursue further. He said both need more people to enlarge the data set and prove the authenticity of the results across a larger number. That, he added, would require millions in funding.

"We think we can really revolutionize this field of noninvasive detection, in this case targeting the gastrointestinal tract in everything from a baby all the way up to an adult in determining risk for cancer or normal intestinal development," Chapkin said.

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