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Wonkblog

# Prenatal tests can now reveal whether a mom-to-be has cancer

By Carolyn Y. Johnson
, Reporter
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Early in her pregnancy, Danielle Bryant stepped out of her classroom of second graders to take a call from a genetic counselor. A prenatal blood test had come back with a high chance that her baby carried a genetic aberration -- an extra copy of a chromosome that meant he would not live long after birth. Bryant called her husband, Chris, and told him he needed to come pick her up.

“Days felt like months, weeks felt like years,” waiting for the results of a follow-up test that would confirm the results, Bryant said. Finally, the counselor called back. “I don’t know what’s happening," the counselor told her. "But the baby is completely fine. There’s no defect, nothing."

Relief overtook fear. Danielle and her husband, Chris, gave birth to a boy named Rhys in August 2013 -- a bit premature, but otherwise healthy. What no one could appreciate at the time – and wouldn’t for a few more months, as Danielle suffered from a slew of mysterious health problems – was that the aberrant DNA that the test had found in her blood was coming not from her unborn baby, but from a tumor that was growing in her colon.

A study published Monday in the Journal of the American Medical Association describes the cases of Danielle and nine other women who received abnormal prenatal test results that turned out to flag their own cancer. The study adds to a powerful and growing body of evidence that even as the market for non-invasive prenatal blood tests has ballooned -- with at least five companies in the U.S. competing intensely -- physicians are wrestling with the scope of what they might reveal.

For years, doctors and ethicists have been debating the problem of “incidental results,” as genome testing opens the possibility of learning unintended things about our own health. What happens when a test designed to answer one question -- say, whether a fetus has a genetic abnormality -- ends up revealing information we didn’t at all expect, such as that the expectant mother has cancer?

Now, the hypothetical scenarios are coming true in day-to-day medical practice.

“A concern that I’ve had is that in the pre-test counseling process there isn’t enough attention paid to the fact the test detects abnormalities in the mother and the placenta,” said Diana Bianchi, executive director

of the Mother Infant Research Institute at Tufts Medical Center, who led the study. “Part of consenting to the test, is that you have to be aware this is a possibility.”

With more than two million of these tests administered globally since the first one became available in 2011, Bianchi is concerned that doctors and patients don't sufficiently understand the possibility -- small though it may be -- that information may revealed about the mother. In June in the journal Nature, she reviewed the consent forms from the five major providers of tests and found that only one directly informed the expectant mother that the test might "reveal sensitive information about your own health."

“It’s a reminder that when we launch a particular technology in one direction, we may benefit by unexpected discoveries in another direction,” said Robert Green, a physician and scientist in the genetics division at Brigham and Women’s Hospital. “It's also a reminder of what all of the cautionary voices have told us: that when you do genetic testing … you may find out things you did not expect to find out.”

This isn’t the first study to point out that abnormal results on prenatal blood tests may in rare cases reveal more about the mother than they do about the fetus. There have been case reports of abnormal fetal test results that turn out to be cancer. Another study showed that the tests may also flag mothers with a sex-chromosome abnormality. When blood tests conflicted with other more invasive prenatal tests in three expectant mothers, Dutch researchers examined them with whole-body imaging. They reported in the journal JAMA Oncology last month that each woman had cancer: one with ovarian cancer, the other two with types of lymphoma.

Joe Wax, vice chairman of the committee on obstetrical practice at the American Congress of Obstetricians and Gynecologists, which writes guidelines on the use of such tests, said that the study raises as many questions as it answers.

“I don’t think it’s the time to sound the alarm yet," Wax said, pointing out that the cases of cancer were very rare.

The paper studied results from more than 125,000 samples. Only 3 percent of those were abnormal, and within those there were only 10 known cases of maternal cancer. It's possible that over-interpreting this study's results could cause alarm and create follow-up procedures for many women who don't have cancer at all. It's also unclear which cancers are being caught and at what stage, whether other cancers may go unnoticed by the test, and lastly whether catching the cancers early will result in better outcomes.

“It’s important to emphasize this test was not designed to detect cancer," Bianchi said. "Given that, this is the crudest possible way of detecting it, and yet it detects it apparently in a sensitive way."

The test didn't help Danielle, because physicians didn't yet understand what the results meant.
She participated in the study in hopes of helping other women avoid the suffering she went through after

Rhys was born -- a series of serious medical problems that culminated in being hospitalized on New Year's Eve in 2013. The next day she found out that she had a 4 inch-wide tumor in her colon.

Her genetic counselor suspected that the original prenatal test may have been detecting the cancer, so before Danielle went into surgery, she agreed to have her blood drawn and the test was done again. The researchers found the same pattern as before, but this time more exaggerated. The genomic imbalance the test had detected, that had seemed to be coming from her baby, was actually being caused by the tumor.

After her cancer treatment, they tested her blood again. It finally looked normal.

That suggests the next step, which many of the companies are pursuing: looking to see if what started as a way to test abnormalities in a fetus may be promising as a kind of liquid biopsy that can be used to monitor or diagnose cancer.

Sequenom, one of the companies that makes prenatal tests, said in an earnings call in May that it had seen 35 cases in which abnormal prenatal test results were indications of tumors -- about half of which were malignant.

"We continue to apply our technical and clinical expertise to the above liquid biopsy solutions in oncology and remain on track to release a research-use-only test for profile and circulating tumor DNA in the second half of 2015," Sequenom chief executive William Welch said.

Bert Vogelstein, a leader in the field of cancer genomics at Johns Hopkins University School of Medicine, said that he and his colleagues have been approached by pretty much every company in the space as they eye the possibility they could make tests for cancer, too.

"This is a wonderful example of what happens when genetics meets the clinics. In a real world, in real commercial settings, you get these things, what do you do? How should it be regulated? Should there be some standardized way [of handling it] that protects the patient, reduces anxiety, as much as possible?" Vogelstein said. "It's fascinating, and going to require a lot of thought."



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Carolyn Johnson is a reporter covering the business of health. She has written about the health care industry and the affordability of health care to consumers since 2015. She previously wrote about science at the Boston Globe. Follow