New study documents women's experiences with chromosome abnormalities found in new prenatal test

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(Medical Xpress)—We often hear that "knowledge is power." But, that isn't always the case, especially when the knowledge pertains to the health of an unborn child, with murky implications, at best. A new study, led by researchers from the Perelman School of Medicine at the University of Pennsylvania, begins to document this exception to the general rule.

Barbara Bernhardt, MS, CGC, a genetic counselor at the Hospital of the University of Pennsylvania, and colleagues contacted a small group of women who are participating in a larger Columbia University study investigating the use of a genetic test called a DNA microarray to identify the possibility of prenatal chromosomal abnormalities. Bernhardt is also co-director of the Penn Center for the Integration of Genetic Healthcare Technologies.

The study's goal: To document a woman's experience upon learning that her child's genetic material contained chromosomal abnormalities. The women's responses to this type of news were mostly negative, ranging from saying they "needed support" after getting the results to describing the results as "toxic knowledge," that they wish they hadn't received.

DNA microarrays represent a relatively new approach to genetic testing. Classically, chromosomal abnormalities are detected with karyotyping, which uses DNA staining and microscopy to identify such large-scale

abnormalities as trisomy 21, associated with Down's syndrome. Yet the technique lacks the resolution to detect smaller – yet still significant—chromosomal changes.

That's where DNA microarrays come in. Microarrays use an array of DNA "probes" to search for matching bits of DNA from across the genome. In theory, if a piece of DNA is missing or duplicated, that change can be detected on a microarray, even if it is too small to be detected by karyotyping.

DNA microarrays are often used by physicians following birth to identify chromosomal abnormalities in children with unexplained developmental delays or congenital defects. However, the technique is also being applied prenatally. The problem, though, unlike some genetic changes that definitely lead to disease, is that the significance of the changes DNA microarrays identify (called copy-number variants) isn't always clear. Nor is it necessarily obvious what actions parents, doctors, and genetic counselors should take in light of the findings.

Bernhardt set out to document the experiences of women receiving such information. Of the 4,450 women enrolled in the Columbia University trial, Bernhardt and her team selected 54 who had received chromosome microarray results that showed abnormalities in the previous six months. Of those, they interviewed 23 regarding the subjects' recollections of their informed-consent discussions, genetic counseling, test results, and follow-up.

The team identified five "key elements" that describe the women's experiences:

- "An offer too good to pass up." Many of the women accepted the offer for testing because it was offered at no cost and posed no

additional risk to them or their unborn child. Yet they did so without necessarily considering the potential significance and ambiguity of the information they could receive.

- "Blindsided by the results." Women reported being caught off-guard by the microarray data, which generally arrived one to two weeks after preliminary (and seemingly normal) karyotype information.
- "Uncertainty and unquantifiable risks." Women had difficulty making sense of the test results, as copy-number variants are often of either uncertain clinical significance, or produce a wide array of possible developmental outcomes. As a result, the women's time-critical and emotionally charged decisions about whether to terminate a pregnancy, for instance, were complicated.
- "Need for support." The women reported needing support from counselors, spouses or partners to digest and consider the information they had received and to make critical decisions regarding their pregnancies.
- "Toxic knowledge." The women noted that in many cases the array results constituted "toxic knowledge" that they, in retrospect, wish they hadn't learned, because it negatively impacted their pregnancy, birth, and postnatal experiences. As Bernhardt describes it, "They watch their babies like hawks, … always waiting for the other shoe to drop."

According to Bernhardt, chromosomal microarrays pose the same ambiguities after birth as prenatally. The difference is that postnatal testing is done because the child already exhibits an unexplained abnormality, and physicians hope the test can pinpoint its cause. "But when you find [an abnormality] in a fetus it puts the woman and couple into a tailspin because they have no clue what to expect," she says. "And the couple is immediately faced with whether or not to terminate the pregnancy."

The take-home message, Bernhardt says, is that genetic counselors must be prepared to spend more time with parents to help them explore their reasons for wanting microarray testing. Counselors also need to emphasize to parents the potentially ambiguous nature of the microarray results, how to consider potential responses, and how to make the best decisions they can based on both available scientific data and the clients' beliefs.

The study, "Women's experiences receiving abnormal prenatal chromosomal microarray testing results," was published online September 6 in the journal *Genetics in Medicine*.

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