Hair samples may offer new insights into the relationship between asthma, cortisol, and complications in pregnancy

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Hair samples can be used to measure the effects of asthma on the cortisol levels of women during pregnancy, according to research presented today at the 2015 AACC Annual Meeting & Clinical Lab Expo in Atlanta. This research also shows that levels of cortisol, a stress-related hormone, tend to be lower among pregnant women with asthma than among pregnant women without the chronic, inflammatory lung disease.

These findings, which will be discussed during an oral poster presentation, suggest that hair samples may provide scientists with a simple, non-invasive tool for determining if and how cortisol is linked to poorer pregnancy outcomes.

While research has established that high levels of cortisol are associated with an elevated risk of miscarriage and premature birth, scientists believe that some increase in cortisol levels during pregnancy has a beneficial effect. Indeed, research suggests that higher levels of cortisol late in pregnancy are needed for fetal organs to mature, especially the lungs, thyroid, and digestive tract. Today's findings offer a simpler way forward in unraveling this complicated relationship.

"We hope hair samples will help establish the role that changes in cortisol levels throughout pregnancy have on the health of women and their children," said study co-author Laura Smy, a PhD student at the University of Toronto.

Currently, researchers would have to ask women for frequent blood or saliva samples to measure and track their cortisol levels during pregnancy. In addition to being time-consuming to collect, these measurements are difficult to interpret, as they reflect only one point in time. Cortisol fluctuates during the day. Hair, on the other hand, stores cortisol levels over a long period of time. Each 1-centimeter segment offers a look back at what the levels were during a particular month.

To investigate whether hair samples could be used to assess the effects of asthma on cortisol levels during pregnancy, a research team led by Gideon Koren, MD, a clinical pharmacologist at the University of Toronto, and Bruce Carleton, PharmD, at the University of British Columbia, collected hair samples from 93 pregnant women, of whom 62 had asthma and 31 did not. About half of the women with asthma were being treated with inhaled corticosteroids.

"For both the control and the asthma groups we could see a rise in cortisol over the course of the pregnancy and then a decline during the post-partum period," said Smy. This finding supports the use of hair samples as a tool for assessing cortisol levels during pregnancy.

The study also made an unanticipated finding, however. "For the individuals with asthma, whether or not they were using inhaled corticosteroids, their response to the cortisol increase was dampened," said Smy. "They had significantly lower hair-cortisol levels during both their second and third trimesters than the women in the control group."

The dampened response to cortisol observed in the current study may be due to "adrenal fatigue"—prolonged exposure to high cortisol levels that eventually causes the adrenal glands to significantly reduce their output of the hormone, said Smy. Future research will be needed, she added, to both confirm this study's findings and to determine the role that changes in cortisol during pregnancy may have on pregnancy outcomes and fetal wellbeing.