Smoking while pregnant affects the livers of boys and girls differently

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Study shows smoking when pregnant affects male and female livers differently

Women smoking while pregnant could impact male babies differently to female babies because of the way it affects the liver, according to new research.

Smoking during pregnancy causes changes in the amounts of important proteins in the livers of foetuses. Scientists at the universities of Aberdeen, Glasgow and Edinburgh found that some of these changes were sex-specific and could manifest themselves in different ways in later life.

The research has been published in the *Journal of Clinical Endocrinology & Metabolism*.

"We found that the changes in the male foetuses are linked with liver cirrhosis while those in the female are linked with disorders of glucose metabolism," explains Professor Paul Fowler from the University of Aberdeen. "The implications are that the fetal livers are already being programmed towards metabolic syndrome, i.e. obesity, cardiovascular disease and liver disease. It is likely that these changes might make these individuals more susceptible to these diseases in adulthood."

Dr Panagiotis Filis, from the University of Aberdeen, adds: "The liver is a source of many secreted proteins which enter the blood stream as well as a being the main site in the body where chemicals are processed and detoxified. Some of the changes we observed when the mother smoked suggest that the fetal livers will be more likely to make less potent versions of some secreted products.

"Some of the other changes are the same as those seen in cancers, matching what we know about the increase in some cancers (such as childhood brain tumours) in people whose mothers smoked while pregnant."

The links between maternal cigarette smoking and reduced health in offspring are well known. Previous studies have suggested that smoke exposure in the womb has been associated with different health outcomes for boys and girls – with boys at a higher risk of conduct disorder while girls are more prone to drug dependence and increased body weight.

Professor Peter O'Shaughnessy, from the University of Glasgow, says: "The different responses between male and female livers suggest that sex-specific health outcomes might be related to important different

molecular responses in the womb, indicating that sex differences in fetal liver responses to maternal smoking may contribute to subsequent disease predisposition."

It is hoped that this latest research could be taken forward to help counteract any health issues that babies exposed to smoke in the womb may develop.

"Our findings suggest that changes in the protein profile of the human fetal liver are an important way in which the cigarette exposure in the womb is translated into ill health, such as liver disease, cancer and metabolic syndrome in adulthood", says Dr David Hay, from the University of Edinburgh.

"Even though maternal smoking modestly altered the levels of affected proteins, small changes in these levels can lead to significant alterations in organ function."

Dr Filis adds: "The next step is to find biomarkers for these changes that could be measured at birth as a first step towards developing personalized medical and lifestyle strategies to reduce the likelihood of later ill-health."

Provided by University of Aberdeen