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Cigarette damage to unborn children revealed in stem cell study

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Chemicals found in cigarette smoke have been shown to damage foetal liver cells.

Scientists say the potent cocktail of chemicals in cigarettes is particularly

harmful to developing liver cells and affects male and female foetuses differently.

Researchers - led by the University of Edinburgh - have developed a novel way to study the effects of maternal smoking on liver tissue using embryonic stem cells.

The stem cell technique will provide important information about the long-term effects of maternal cigarette smoking, say experts.

The liver is vital in clearing toxic substances and plays a major role in regulating metabolism. Smoking cigarettes - which contain around 7000 chemicals - can damage foetal organs and may do lasting harm.

Scientists used pluripotent stem cells - non-specialised cells that have the distinctive ability to be able to transform into other cell types - to build foetal liver tissue.

Liver cells were exposed to harmful chemicals found in cigarettes, including specific substances known to circulate in foetuses when mothers smoke.

The study showed that a chemical cocktail - similar to that found in cigarettes - harmed foetal liver health more than individual components.

Findings also showed that cigarette chemicals damage the liver differently in male and female foetuses, with male tissue showing liver scarring and female tissue showing more damage to cell metabolism.

The study was carried out in collaboration with the Universities of Aberdeen and Glasgow and is published in the journal *Archives of Toxicology*.

Dr David Hay from the University of Edinburgh's Centre for Regenerative Medicine, said: "Cigarette smoke is known to have damaging effects on the foetus, yet we lack appropriate tools to study this in a very detailed way. This new approach means that we now have sources of renewable tissue that will enable us to understand the cellular effect of cigarettes on the unborn foetus."

Professor Paul Fowler, Director of the Institute of Medical Sciences at the University of Aberdeen, said: "This work is part of an ongoing project to understand how cigarette smoking by pregnant mothers has harmful effects on the developing foetus. These findings shed light on fundamental differences in damage between male and female foetuses."

More information: Baltasar Lucendo-Villarin et al, Modelling foetal exposure to maternal smoking using hepatoblasts from pluripotent stem cells, *Archives of Toxicology* (2017). DOI: 10.1007/s00204-017-1983-0

Provided by University of Edinburgh