

Mouse study links air pollution exposure to adverse outcomes in pregnancy

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A new study in mice by UCLA scientists reveals how exposure to traffic-related air pollutants causes cellular changes in the placenta that can lead to pregnancy complications and affect the health of both mother and offspring.

The researchers found that the cellular changes caused by chronic exposure to air pollutants were related to immune activation by foreign substances entering the blood from the lungs. This [immune response](#) attacks some of the placental cells that are required to maintain the placenta structurally, and most importantly, the [blood flow](#) from mother to developing baby.

Although previous research has analyzed the effect of air pollution on [pregnancy](#), those studies did not utilize cell-specific methods or focus on molecular signatures of the placenta. This study is the first to assess how such exposure can negatively affect the placenta, leading to adverse outcomes in pregnancy.

One group of female mice was exposed to environmental air pollutants nasally starting two months before conception and during pregnancy, while the control group of mice was exposed to saline. By the end of the study, [tissue samples](#) indicated that inhaled air pollutants had compromised the composition of the placental cells and molecular signatures. Researchers also identified inflammation in the mucosal lining of the uterus triggered by pollution.

The placenta is essential for a successful pregnancy and for maintaining the health of both the mother and the baby. These study findings suggest that maternal cells of immunity may be responsible for destruction of vital vascular cells in the [placenta](#). This auto-destruction of placental structures can disrupt the maintenance of a healthy pregnancy or at least affect nutrient supply from the mother to the baby, with the potential for adverse pregnancy consequences or outcomes such as preterm labor or uteroplacental insufficiency as encountered in pre-eclampsia.

"The [cellular changes](#) we have observed could provide the missing link between exposure to [air pollutants](#) and adverse pregnancy outcomes, thereby helping to focus development of preventive strategies for at-risk pregnancies," said Dr. Sherin Devaskar, lead author of the study and physician-in-chief of UCLA Mattel Children's Hospital and distinguished professor of pediatrics at the David Geffen School of Medicine at UCLA.

The research also underscores the need to examine the timing of exposure and whether acute v. chronic exposures have different effects.

The authors also plan to study dietary interventions to alleviate distress on placental molecular signatures, nutrient supply and development.

The study is published in *Scientific Reports*.

The collaborative study also involved Dr. Suhas G. Kallapur, chief of neonatology and [developmental biology](#); Amit Ganguly, staff research associate; Shubhamoy Ghosh, Ph.D., assistant project scientist; Monica Cappelletti, Ph.D., adjunct assistant professor of pathology and laboratory medicine, all four in the department of Pediatrics-Neonatology at UCLA; Matteo Pellegrini, a professor of molecular, cell and developmental biology at UCLA and Anela Tosevska, Ph.D., bioinformatics scientist in the division of rheumatology, internal medicine at Medical University of Vienna, Austria.

More information: Anela Tosevska et al, Integrated analysis of an in vivo model of intra-nasal exposure to instilled air pollutants reveals cell-type specific responses in the placenta, *Scientific Reports* (2022). [DOI: 10.1038/s41598-022-12340-z](https://doi.org/10.1038/s41598-022-12340-z)

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