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**Press release**
**For immediate release**

## Air pollution changes the placenta: New study the first to show the effects of particulate matter on pregnancy

Graz, 6 August 2025: Particulate matter is an environmental threat to human health that must be taken seriously—and its effects begin even earlier than previously assumed. An international research cooperation between Lund University in Sweden and the Medical University of Graz is the first to have shown that particulate matter from urban traffic not only changes the structure of the placenta but also influences how its immune cells function. Even brief contact with PM2.5 particles—fine particulate air pollution—led to measurable changes in placental tissue during the experiment. The study was recently published in the Journal of Environmental Sciences.

### Disrupted cell morphology and inflammatory immune reactions

During pregnancy, the placenta takes on central tasks: It supplies the unborn child with nutrients and oxygen, regulates the metabolism between the mother and the fetus and provides an inflammation-free, protective environment in the womb thanks to the presence of specialized immune cells. To better understanding how air pollution can interfere with these functions, the research team used a highly specialized experimental model—ex vivo dual placenta perfusion, which allows the investigation of placental tissue directly after birth under controlled conditions.

The analysis of samples with transmission electron microscopy showed that even brief contact with PM2.5 particles, the fine particulate matter from urban traffic, can result in clear damage to placental tissue. Collagen fibers, which stabilize the tissue, as well as mitochondria, which are critical to the supply of energy to the cells, were among the structures affected.
"Particularly striking was the reaction of the immune cells in the placenta: They changed from a normally anti-inflammatory state to a pro-inflammatory state—a pattern that is also observed in preeclampsia, a serious complication of pregnancy with potential risks for mother and child," says Med Uni Graz molecular biologist Birgit Hirschmugl.

**A possible risk factor for preeclampsia**

“Our data indicate that air pollution not only increases the risk of respiratory and cardiovascular disease but also represents a previously underestimated risk for pregnant women and their unborn child,” emphasizes Christian Wadsack, head of the Graz research group. The changes in the placenta might contribute to the development of preeclampsia, a disorder associated with high blood pressure, organ damage and delayed growth of the fetus.

**Scientific progress with societal relevance**

The findings underline the urgency of political and societal measures to reduce air pollution—especially in urban centers. At the same time, they show how important it is to conduct intensive research on the placenta as the main organ of pregnancy.

*Urban air pollution disrupts placental microarchitecture and shifts hofbauer cells towards a pro-inflammatory state*
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https://www.sciencedirect.com/science/article/pii/S1001074225001536

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