

Target analysis and suspect screening of per- and polyfluoroalkyl substances in maternal-newborn paired samples near the fluorochemical facilities

1 Introduction

Fuxin Fluorochemical Industrial Park is one of the mainly concentrated fluorochemical facilities in northeastern China. Our previous studies revealed that perfluorooctanoic acid (PFOA) and perfluorobutane sulfonate (PFBS) were the dominant PFAS contaminants determined in the environmental samples around local fluorochemical facilities, and the levels of those two PFASs showed an increasing temporal trend generally over time.

2 Method

In this study, 50 paired samples of maternal and cord serum as well as placenta were derived from Fuxin pregnant women. 21 legacy PFASs in all the samples were analyzed via high-performance liquid chromatography–tandem mass spectrometry (HPLC–MS/MS), and novel PFASs in all the samples were beneficial from the method of suspect screening.

3 Results

A total of 11 categories (49 species) of novel PFASs were identified in all samples, of which 4 categories (20 species) were first discovered in human serum and placenta, accounting for 90% of maternal serum and 96% higher in placenta and umbilical cord serum. Legacy PFASs had median values of 1.2, 1.3, and 1.6 for mother-placenta transfer ($R_{m/p}$), placenta-newborn transfer ($R_{p/n}$), and mother-newborn transfer ($R_{m/n}$), respectively. $R_{m/p}$, $R_{p/n}$, and $R_{m/n}$ for each novel PFAS were also able to be derived with the median values of 0.9, 1.2, and 0.8, respectively.

4 Conclusions

In summary, of the 11 classes (49 species) of novel PFASs detected, 4 classes (20 species) have never been reported previously in human blood and placenta samples. Different from legacy PFCA and PFSA, most of the novel PFASs observed in placentas and cord sera had higher levels than those in maternal sera.

Keywords: Per- and perfluoroalkyl substances (PFASs); PFASs congeners; target analysis; suspect screening; placental transfer; health risk