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Use of Volatile Compound Metabolic Signatures in Poultry Tissues to Back-Trace Dietary Exposure to Xenobiotics

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ABSTRACT We investigated the feasibility of using volatile compound signatures of liver in poultry to detect previous dietary exposure to different types of xenobiotic. Six groups of broiler chickens were fed a similar diet either non-contaminated or contaminated with polychlorinated dibenzo-*p*-dioxins/-furans (PCDD/Fs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), polycyclic aromatic hydrocarbons (PAHs) or coccidiostats. The liver of each chicken was analysed by solid-phase microextraction - mass spectrometry (SPME-MS) for volatile compound metabolic signature and by gas chromatography - high resolution mass spectrometry (GC-HRMS), gas chromatography - tandem mass spectrometry (GC-MS/MS) and liquid chromatography - tandem mass spectrometry (LC-MS/MS) to quantify xenobiotic residues. The results show that the volatile compound metabolic signature could clearly differentiate the non-contaminated chickens from those contaminated with PBDEs, PAHs or coccidiostats. The results for PAHs showed a clear metabolic response in the liver although these rapidly metabolized xenobiotics are undetectable in this organ by the targeted reference analytical method. However, the rough metabolic signature obtained by SPME-MS did not enable us to evidence previous exposure to slowly metabolized compounds such as PCDD/Fs and PCBs, the residues of which are clearly detected by targeted reference methods.

KEYWORDS : Non targeted approach, environmental micropollutant, drug, liver, poultry