Fill in the first grey field by simply starting to type and move to the next field by hitting the "TAB" key. Start a new line by hitting the "Enter" key. Save your document under a different name. Please limit your abstract to ***one page***!

INNOVATIVE MINIMALLY-INVASIVE ANALYTICAL STRATEGIES FOR HUMAN BIOMONITORING: MEASUREMENT OF TOXICANTS IN DRIED-BLOOD SPOTS

L'homme B

L'homme B, Brasseur C, Focant JF

CART, Biological and Organic Analytical Chemistry, Mass Spectrometry Laboratory, University of Liège, Allée de la Chimie 3, B-6c Sart-Tilman, B-4000 Liège, BELGIUM (benjamin.lhomme@doct.ulg.ac.be)

The concept of sampling newborn infants for a few microliters of blood to screen for inherited endocrine, nutritional, or metabolic disorders has been introduced by Guthrie at the University of Buffalo in 1963[1]. Human dried-blood spots (DBS) are generally simply obtained by pricking the heel or finger by using single-use lancing devices to sample a few microliters (50-150 µl) of capillary blood. The blood is then collected on a piece of filter paper made of high purity cotton linters[2]. This sampling method has been extensively performed in North America and Europe (Newborn Screening Programs - NSPs), but also in developing countries because of the ease of collection, transport, and storage, as well as the reduced risk of contamination of the handlers due to infectious pathogens, compared to the use of classical liquid specimens. In recent years, DBS testing further evolved towards more extensive testing due to the availability of more sensitive and specific methodologies. DBS from NSPs have thus lately also been considered for exposure to toxicant assessment. To the best of our knowledge, only Dua *et al.* and Burse *et al.* briefly reported preliminary data on the potential use of DBS for hexachlorocyclohexane (HCH), dichlorodiphenyltrichloroethane (DDT), and dichlorodiphenyldichloroethylene (DDE) measurement using GC coupled to non-selective micro-electron capture detector (µECD)[3,4].

The aim of the work is to develop new analytical strategies to measure selected representative POPs (or metabolites or reaction products) in DBS to assess internal dose exposure by means of innovative minimally-invasive biomonitoring. The target analytes consisted in PCB-153 and DDE. They can be considered as indicator of PCBs and organochlorine pesticide (OCP) levels. The methodology is based on cryogenic modulation of gas chromatographic signals applied to comprehensive two-dimensional gas chromatography (GCxGC) hyphenated to high resolution (HR) time-of-flight (TOF) mass spectrometric (MS) analyzers.

Real human serum samples were analyzed. They consisted in 500 µL specimen volumes. Relative errors were around 20% or higher, especially for DDE for which measurements were performed at levels very close to iLODs (5 pg/µL). The size of human serum and whole blood DBS samples was reduced until 20 µL and they were also analyzed. Relative errors were under 20% for PCB-153, whose iLOD is 20 fg/µL. Moreover, recoveries for all samples were around 50%.

Those preliminary results demonstrate the feasibility of such a DBS approach for measuring selected POPs in human samples. The work has now to evolve towards validating steps and a wider paired-samples study to compare the results with classic standard methods.

[1] Guthrie, R., Susi, A., 1963. Pediatrics 32, 338-343.
[2] Turner, R.C., Holman, R.R., 1978. Lancet 2, 712.
[3] Dua, V.K., Pant, C.S., Sharma, V.P., Pathak, G.K., 1996. Bull. Environ. Contam. Toxicol. 56, 50-57.
[4] Burse, V.W, DeGuzman, M.R., Korver, M.P., Najam, A.R., Williams, C.C., Hannon, W.H., Therrell, B.L., 1997. Biochem. Mol. Med. 61, 236-239.