CECE 2016

13th International Interdisciplinary Meeting on Bioanalysis

"… bringing people and ideas together …"

October 17 - 19, 2016
Hotel Continental
Brno, Czech Republic
www.ce-ce.org

Fig. 1. An example of the fabricated parallel dot-blotter.

4 Conclusion

CNC machining offers much freedom in designing and rapid prototyping of analytical devices. Instead of months or years of training, just a basic knowledge of the drafting software and basic computer skills are required to operate CNC machines. Accelerated evolution of the product provided by faster fabrication times allowed for more time spend experimenting with different functional and design concepts.

Acknowledgements

This work was supported by the grant 15-15479S from the Grant Agency of the Czech Republic.

P48 ANALYSIS OF SELECTED XENOESTROGENS IN NEOPLASTICALLY TISSUES USING COUPLED CHROMATOGRAPHIC TECHNIQUES

Martyna Pajewska, Renata Gadzała-Kopciuch, Bogusław Buszewski

Chair of Environmental Chemistry and Bioanalytics, Faculty of Chemistry Nicolaus Copernicus University, Toruń, Poland
martynapajewska@interia.pl, rgadz@chem.umk.pl

1 Introduction

One of the most commonly diagnosed cancers in women is endometrial cancer. Searching for compounds that contribute to the development of cancer cells in the reproductive organs, we should pay attention to Zearalenone (ZEA) and its metabolites. They belong to the group of endocrine disruptors, as the structures of ZEA and its

metabolites are similar to estrogens (macrocyclic lactone ring) and show high affinity for estrogen receptors. They are particularly dangerous for women because they can interfere with the endocrine (hormonal) system. Zearalenone is absorbed within a short time after ingestion of contaminated food and rapidly metabolized in the gastrointestinal tract to more toxic compounds. The most dangerous metabolite is α-ZAL. Detection of these compounds in tissues requires using of highly sensitive methods. Xenoestrogens are present in tissues at low concentrations, so isolation and extraction methods must be very selective and specific [1-3]. In our research we made attempts to develop an efficient method for sample preparation and qualitative and quantitative determination.

2 Experimental

As the sample preparation method we decided to use the QuEChERS technique. As a starting point, we used the procedure proposed by Woźniak [4]. Following suggestions from literature [5,6] we modified the various stages of the QuEChERS, looking for high recovery and purification of the sample. In the first step, dSPE, we used different sorbents. We tested a variety of sorbents (PSA, Diamine, Aminopropyl, C18) in different quantities. High-performance liquid chromatography (HPLC) with fluorescence detection was used for identification and quantitative determination, and Ultra-high performance liquid chromatography (UHPLC) with tandem mass spectrometry for qualitative analysis. The optimal parameters of the detectors, stationary phase and mobile phase composition were selected for our analysis. The above procedure for the isolation and determination of the selected analytes was validated based on the following criteria: linearity, precision, accuracy, limit of detection and limit of quantification. The developed procedure was used to study neoplastic tissues of the uterus (endometrial cancer).

3 Result and Discussion

The HPLC-FLD method is linear in the concentration range 100-748 ng/ml with regression coefficients >0,999. LOQ for the analyzed compounds is at a satisfactory level (ZEA 82 ng/ml and α-ZEL 73 ng/ml). The UHPLC-QTOF/MS method is linear in the tested range of concentrations and has low LOQ (ZEA 0,10 ng/ml; metabolites < 30 ng/ml). Unfortunately, the matrix effect prevented running a quantitative analysis. Mass spectrometry was used to identify the compounds. The selected extraction method (QuEChERS technique) enabled us to achieve a satisfactory level of isolation, enrichment and purification of extracts for two compounds ZEA (R = 82%) and α-ZEL (R= 51%). The results of the analysis show that in 33 to 58 examined neoplastically changed tissues α-zearalenol was detected and quantified.

4 Conclusion

Isolating analytes from tissue is a challenge for the analyst because such matrix is highly heterogeneous. The developed version of the QuEChERS procedure successfully allows to isolate an examined compound and purify the sample by selected

sorbent. The presence of the tested compounds in the analyzed tissues confirms the tendency of xenoestrogens to accumulate in the reproductive organs.

Acknowledgement
The work was financially supported by the National Science Centre in the frame of the project Maestro 6, No.2014/14/A/ST4/00641 (2015-2017).

References
[1] Fucic, A., Gamulin, M., Ferencic, Z., Katic, J., Krayer von Krauss, M., Bartonova, A., Merlo, D.F. *Environ. Health,* 2012, *11(S8),* 1-9.
[2] Zinedine, A., Soriano, J.M., Moltó, J.C., Manes, J. *Food Chem. Toxicol.*, 2007, *45*, 2-7.
[3] Gadzala-Kopciuch, R., Cendrowski, K., Cesarz, A., Kielbasa, P., Buszewski, B. *Anal. Bioanal. Chem.*, 2011, *401,* 2069-2070.
[4] Woźniak, B., Matraszek-Zuchowska, I., Zmudzki, J. J. *Chromatogr. B*, 2016, *940*, 15-23.
[5] Arroyo-Manzanares, N., Huerras-Perez, J., Gamiz-Gracia, L., Cracia-Campana, A.M. *Talanta*, 2016, *115(1),* 61-67.
[6] Liu, Y., Han, S., Lu, M., Wang, P., Han, J., Wang, J. *J. Chromatogr. B*, 2014, *970(1),* 68-76.

P49 HEXAHISTIDINE LABELING OF OLIGOSACCHARIDES

Jan Partyka, Jana Krenkova, Frantisek Foret

Institute of Analytical Chemistry of the CAS, v. v. i., Brno, Czech Republic
partyka@iach.cz

Summary
We have studied various aminoacids and peptides as alternative labels for saccharide analysis. A hexahistidine peptide was a starting pattern for our experiments because this sequence is very well known as HisTag for the protein purification. The hexahistidine label allows fast analysis by capillary zone electrophoresis thanks to high number of positive charges of histidine molecules. Thanks to this approach the analysis requires two or three times shorter separation time in comparison of analysis of oligosaccharides tagged by one times charged labels.

1 Introduction
Today glycomics plays important role in the field of the bioanalytical chemistry. However, the analysis of glycans requires suitable methods because of the complex structure of glycans. Many techniques include the labeling of oligosaccharides for improvement of separation or detection properties. Attachment of a small molecule with high number of positive charges should provide fast migration in the capillary zone