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WORKSHOP on

Food safety in China: Past, Present and Future

Organized by:

UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE

CFSA 国家食品安全风险评估中心 China National Center for Food Safety Risk Assessment

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WEDNESDAY, November 8, 2017

SESSIONS 7 & 8 & 9 & 10, *in parallel*

16:00–18:00
Leo & Virgo halls

SESSION 9: Workshop
Food Safety in China: Past, Present and Future

Chairs: Yongning Wu & Jingguang Li & Chunxia Wang

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16:00–16:20 L53
FOOD SAFETY MONITORING AND RISK ASSESSMENT: PAST, PRESENT AND FUTURE IN CHINA
Yongning Wu, *China National Center for Food Safety Risk Assessment, Beijing, China*

16:20–16:40 L54
FOOD ALLERGY RESEARCH PROGRAM IN CHINA
Yan Chen*, China National Center for Food Safety Risk Assessment, Beijing, China*

16:40–17:00 L55
DEVELOPMENT OF FOOD SAMPLE PRETREATMENT METHODS AND APPLICATION TO CHEMICAL POLLUTANT DETERMINATION
Guoliang Li, *School of Food and Biological Engineering, Shaanxi University of Science and Technology; China*

17:00–17:20 L56
SIMPLE, RAPID, AND ENVIRONMENTALLY FRIENDLY METHOD FOR THE SEPARATION OF ISOFLAVONES USING ULTRA-HIGH PERFORMANCE SUPERCRITICAL FLUID CHROMATOGRAPHY
Feng Feng, *Institute of Food Safety, Chinese Academy of Inspection & Quarantine, Beijing, China*

17:20–17:40 L57
HUMAN BIOMONITORING OF DEOXYNIVALENOL AND ZEARALENONE IN THE CHINESE POPULATION
Shuang Zhou*, China National Center for Food Safety Risk Assessment, Beijing, China*

17:40–18:00 L58
DIETARY INTAKE AS IMPORTANT PATHWAY FOR HUMAN EXPOSURE TO ISOMERIC PERFLUOROALKYL SUBSTANCES (PFASs)
Lingyan Zhu, *College of Environmental Science and Technology, Nankai University, Tianjin, China*

L53
FOOD SAFETY MONITORING AND RISK ASSESSMENT: PAST, PRESENT AND FUTURE IN CHINA

Yongning Wu*[1], **Jingguang Li**[1]

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The implementation of the Food Safety Law of the People's Republic of China since 2009 greatly promoted the application of the risk analysis framework in China.This paper is intended to review the progresses in national food safety risk monitoring/surveillance and risk assessment works in which China National Centre for Food Safety Risk Assessment (CFSA, established in 2011) has played the role of technical support and guidance. The contribution of monitoring/surveillance and risk assessment to the development of riskmanagement in China, including food safety standard system development, is described. However, in comparison with risk management needs and practices in developed countries, China should further strengthen capacity building in food safety monitoring/surveillance and risk assessment. Moreover, the Lecture thoroughly introduces the capacity building of risk analysis in China. Progress is particularly evident in carrying out food safety risk monitoring/surveillance and risk assessment work. Risk management work has somewhat improved, especially a step-wise approach was followed in reviewing, simplifying and integrating food safety standard based on risk assessment, leading to the integrated National Food Safety Standard (NFSS) framework, which anchored China NFSS in scientific evidence and created the sky for their future evolution. However, the implementation of risk communication is still weak.

[1] Wu, Y., and Chen, Y. (2013). Editorial: food safety in China. Journal of Epidemiology & Community Health, 67(6):478-9.
[2] Wu Y, Zhang Y (2013). Analytical chemistry, toxicology, epidemiology and health impact assessment of melamine in infant formula: recent progress and developments. Food and Chemical Toxicology, 56: 325-35.
[3] Jen, J., and Chen, J. eds. Food Safety in China: Science and Technology, Management and Regulation. John Wiley & Sons Ltd. Chichester, West Susses, UK.

Keywords: *food safety, monitoring, surveillance, risk analysis and risk assessment, China*

L54
FOOD ALLERGY RESEARCH PROGRAM IN CHINA

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Food allergy is becoming one of the serious problems of China´ food safety and public health emergency, which needs to be included in the national major research program. Currently, limited work indicated that the prevalence of food allergy in China is about 6% in children, supporting the global prevalence of an increasing trend. Therefore, it is necessary to set up a food allergy work group in China as soon as possible, to carry out food allergy epidemiological studies for allergen labelling in foods. It aims to identify allergic foods need to be labelled in Chinese food labels, and in a view of scientific frontier, such as the molecular characterization of food allergens, to establish food labeling system for food allergen that is more in line with China´ national conditions. During the 13th Five-Year Plan period, in the food safety major project, the following researches are planned to be carried out, including: multi-center epidemiological investigation on food allergy in Chinese population; research and development on food allergy diagnostic criteria and diagnostic reagents; the relationship between epitope structure and allergenic property of food allergens; multi-level technology system for allergenicity assessment; the validation technology of the testing of food allergens and related product development; and research on food allergy risk management measures.

L55
DEVELOPMENT OF FOOD SAMPLE PRETREATMENT METHODS AND APPLICATION TO CHEMICAL POLLUTANT DETERMINATION

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Although chromatographic instruments have enjoyed great technological advances, the food sample pretreatment step remains a critical component to improve detection sensitivity, selectivity, reproducibility and accuracy. Recently, plant growth regulator (PGR) has received more and more attentions in the field of food safety. But the simple and sensitive method for simultaneously analyzing multiple classes of PGR remains poorly investigated. PGRs can be labelled selectively by fluorescence labelling reagent and detected by FLD at specific excitation and emission wavelengths. Thus, the labelling procure could significantly decrease the interference of primary and secondary metabolites in real samples and improve the detection selectivity. A new pre-column fluorescence labelling method using 2-(11H-benzo[a]carbazol-11-yl)-ethyl-4-methyl-benzenesulfonate (BCETS) as the labelling reagent has been developed for simultaneous determination of seven PGRs (i.e., indole-3-acetic acid, 3-indolybutyric acid, 3-indolepropionic acid, jasmonic acid, gibberellin A_3, 1-naphthylacetic acid and 2-naphthaleneacetic acid) by HPLC with fluorescent detection (FLD). The proposed method offered the LOD of 0.34–0.73 ng/mL for seven PGRs, which were significantly lower than the reported methods. The crude extract without complex pre-treatments and purification was directly labelled by BCETS and analysed by HPLC-FLD, which facilitates the high-throughput sample screening. This method was proven to be inexpensive, simple, selective, sensitive, accurate and reliable for trace PGR determination. Porous materials have received burgeoning attentions over the past decade in the field of sample preparation because of their outstanding performance. We reported a quick, easy, cheap, effective, rugged, and safe (QuEChERS) method for determination of trace polycyclic aromatic hydrocarbons (PAHs) in food samples by employing a new core-shell nanostructure magnetic covalent organic framework hybrid microspheres (Fe_3O_4@COF(TpBD)) as the sorbent followed by HPLC-DAD. Fe_3O_4@COF(TpBD) was prepared with the retention of colloidal nanosize, larger specific surface area, higher porosity, uniform morphology and supermagnetism. By taking advantage of its merits, the as-prepared materials earned an excellent adsorption ability to PAHs, and the enrichment efficiency of Fe_3O_4@COF(TpBD) could reach 99.95%. The obtained materials had fast adsorption kinetics and realized adsorption equilibrium within 45 min. The eluent was further analyzed by HPLC-DAD. Good linearity was observed in the range of 1-100 ng/mL with the linear correlation being above 0.9990. The limits of detection (S/N=3) and limits of quantification (S/N=10) for 15 PAHs were in the range of 0.83-11.7 ng/L and 2.76-39.0 ng/L, respectively. The obtained materials were first employed for the enrichment of trace PAHs in food samples, and exhibited superior enrichment capacity and excellent applicability.

Keywords: *sample pretreatment, chemical derivatization, magnetic solid phase extraction, plant growth regulator, polycyclic aromatic hydrocarbons*

Acknowledgement: *This work was supported by The National Natural Science Foundation of China (No. 21677085, 21537001 and 81472986), and the Project funded by China Postdoctoral Science Foundation (No 2016M590071).*

L56
SIMPLE, RAPID, AND ENVIRONMENTALLY FRIENDLY METHOD FOR THE SEPARATION OF ISOFLAVONES USING ULTRA-HIGH PERFORMANCE SUPERCRITICAL FLUID CHROMATOGRAPHY

Wenjie Wu[1], **Feng Feng**[1], **Wei Yong**[1], **Feng Zhang***[1]

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Isoflavones are natural substances that exhibit hormone-like pharmacological activities. The separation of isoflavones remains an analytical challenge because of their similar structures. We show that ultra-high performance supercritical fluid chromatography can be an appropriate tool to achieve the fast separation of 12 common dietary isoflavones. Among the five tested columns the Torus DEA column was found to be the most effective column for the separation of these isoflavones. The impact of individual parameters on the retention time and separation factor was evaluated. These parameters were optimized to develop a simple, rapid and green method for the separation of the 12 target analytes. It only took 12.91 min using gradient elution with methanol as an organic modifier and formic acid as an additive. These isoflavones were determined with limit of quantitation ranging from 0.10 to 0.50 μg/mL, which was sufficient for reliable determination of various matrixes.

Acknowledgement: *This study was supported by the National Science and Technology Major Project of "Study on the Quality Detection Technology for Import and Export Medicine and Food Dual Purposes Products"(Project number:2017YFF0211000).*

L57
HUMAN BIOMONITORING OF DEOXYNIVALENOL AND ZEARALENONE IN THE CHINESE POPULATION

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Mycotoxins are secondary metabolites or biotransformation products of fungi. They commonly occur in various cereal crops and processed grains, and can also be found in animal-derived food as a consequence of a carry-over from contaminated feeds. Humans are easily exposed to mycotoxins through the diet. Assessment of human exposure to mycotoxins is conventionally performed by analysis of food contamination levels and calculation of intake based on consumption data. In recent years, biomarker-based strategies have gained increased acceptance.
A pilot study on human urinary biomonitoring of deoxynivalenol (DON) and zearalenone (ZEN) was recently conducted for the residents in Henan province located in the central part of China, where wheat as the staple food are highly consumed. High-throughput and sensitive UPLC-MS/MS methods following 96-well μElution solid-phase extraction were developed and validated for the determination of DON biomarkers (DON, DOM-1) and ZEN biomarkers (ZEN, α-zearalenol, β-zearalenol, α-zearalanol, β-zearalanol and zearalanone), using ^{13}C-DON and ^{13}C-ZEN as internal standards for accurate quantification. Urinary samples collected from 301 healthy volunteers aged 0-84 years were processed with and without enzyme hydrolysis to determine total and free biomarkers, respectively. DON, and DOM-1 to a le lesser extent, can be frequently detected in these samples both with and without enzyme hydrolysis. Free DOM-1 was detected at low level in human urine for the first time. Total DON was detected in all samples with a mean concentration at 52.8 ng mL^{-1}. The mean and median probable daily intakes (PDI) for the whole participants estimated to be 1.83 μg/kg bw and 1.14 μg/kg bw both exceeded the PMTDI (1 μg/kg bw/day), indicating a high potential risk for the residents in this area, especially for children and adolescents. For ZEN biomarkers, ZEN, α-zearalenol, β-zearalenol and zearalanone were detected in 71.4% urine samples in the range from 0.02-3.7 ng mL^{-1} after enzyme hydrolysis. The mean PDI was estimated to be 0.025 μg/kg bw, largely below the PMTDI set by JECFA (0.5 μg/kg bw/day) and the TDI set by EFSA (0.25 μg/kg bw/day).

Keywords: *deoxynivalenol, zearalenone, biomarkers, biomonitoring, risk assessment*

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L58
DIETARY INTAKE AS IMPORTANT PATHWAY FOR HUMAN EXPOSURE TO ISOMERIC PERFLUOROALKYL SUBSTANCES (PFASS)

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The presence of perfluoroalkyl substances (PFASs) have been well studied in human daily intakes from various exposure matrices. However, little is known about the isomeric compositions of PFASs in daily intakes and their influence on the isomeric profiles in humans. In this study, the occurrence of PFASs with isomeric analysis in multiple human exposure matrices including foodstuffs, tap water and indoor dust was investigated. Perfluorooctanesulfonate (PFOS) and/or perfluorooctanoate (PFOA) were predominant in these matrices collected in Tianjin, China. Dietary intake contributed >99% of the estimated daily intake (EDI) for the general population. In fish and meat, linear (*n*-) PFOA was enriched with a percentage of 92.2% and 99.6%, respectively. Although *n*-PFOS was higher in fish (84.8%) than in technical PFOS (ca. 70%), it was much lower in meat (63.1%) and vegetables (58.5%). The isomeric profiles of PFOA and PFOS in human serum were predicted based on a one-compartment, first-order pharmacokinetic model. The isomeric percentage of *n*-PFOA in the EDI (98.6%) was similar to that in human serum (predicted: 98.2%, previously measured: 99.7%) for Tianjin residents. The results suggest that direct PFOA intake plays an important role on its isomeric compositions in humans. For PFOS, the predicted *n*-PFOS (69.3%) was much higher than the previously measured values (59.2%) in human serum. This implies that other factors, such as indirect exposure to PFOS precursors and multiple excretion pathways, may contribute to the lower percentage of *n*-PFOS in humans than of technical PFOS.

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