BOOK OF ABSTRACTS

Understanding mycotoxin-induced adverse health effects through exposome research

The Human Exposome, the first in the series of virtual pre-conferences preceding WMF*meets*ITALY, the in-person conference of The World Mycotoxin Forum®, 16-18 May 2022, Parma, Italy.

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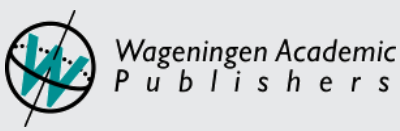

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THE WORLD MYCOTOXIN FORUM® *CONNECTS*

The World Mycotoxin Forum® is the leading international meeting series on mycotoxins dedicated to assembling the world's best minds across the spectrum of integrated strategies ensuring the safety and security of the food and feed supply chain. **The World Mycotoxin Forum®** brings together a holistic conference programme covering the latest issues in mycotoxin management and is targeted at everyone working in the mycotoxin space - researchers, food and feed industry, laboratories, policy makers, and enforcement agencies from around the world.

Since the previous conferences of **The World Mycotoxin Forum®** in Belfast (October 2019) and in Bangkok (January 2020), the world has changed due to the COVID-19 outbreak. We haven't met each other for quite while but the "Times they are a- (hopefully) changin" (to paraphrase the legendary singer-songwriter Bob Dylan). Therefore, we are happy to announce that the 13th conference of **The World Mycotoxin Forum®** – WMF*meets*Italy – takes place IN-PERSON again. Mark your calendar: 16-18 May 2022, Parma, Italy.

What's happening in the meantime? In the run-up to the in-person conference, **The World Mycotoxin Forum®** will present virtually three one-day pre-conferences focusing on specific mycotoxin topics to keep you informed and connected:

- Human exposome, 12 October 2021
- Animal health, 30 November 2021
- Analysis, 1 February 2022

These three pre-conferences will be held on a highly interactive platform with great networking opportunities.

The General Conference Chairs – Prof. Rudolf Krska and Prof. Chris Elliott – and the members of the Steering Committee and the Advisory Committee are looking forward to getting you informed and connected.

See you in the cloud for the three pre-conferences and in Parma for the in-person event!

Rudolf Krska
Chris Elliott
General Conference Chairs

PROGRAMME

All times are in Central European Summer Time (CEST)

12:15 **The World Mycotoxin Forum® *Connects***
General conference chairs: Prof. Rudolf Krska, Department IFA-Tulln, BOKU Vienna, Austria and Prof. Chris Elliott, Institute for Global Food Security, Queen's University of Belfast, UK

12:30 *The human exposome – understanding mycotoxin-induced adverse health effects through exposome research*
Pre-conference chair: Prof. Sarah De Saeger, Centre of Excellence in Mycotoxicology and Public Health, Ghent University Belgium

12:40 *The role of mycotoxin research in the era of exposomics*
Dr Benedikt Warth, Department of Food Chemistry and Toxicology, University of Vienna, Austria

13:05 *Biomonitoring and human exposure to multiple mycotoxins*
Dr Beatriz Arce-López, Université de Brest, France and Universidad de Navarra, Spain

13:30 *Validated biomarker standards are needed for reliable assessment of multi-mycotoxin exposure in human populations*
Dr Mark W. Sumarah, London Research and Development Centre, Agriculture and Agri-Food Canada, Canada

13:55 *The promise of DNA adductomics in exposomics*
Dr Lieselot Y. Hemeryck, Department of Translational Physiology, Infectiology and Public Health, Ghent University, Belgium

14:20 *The internal exposome in cohort studies – from concept to practice*
Dr Augustin Scalbert, Nutrition and Metabolism Branch, International Agency for Research on Cancer, France

14:45 **EXHIBITION:** Visit the booths and live chat with our sponsors.
PIAZZA CONNECTS: Meet & Greet the chairs, the speakers and the WMF community.

15:15 *FlexiGUT: towards a comprehensive understanding of the life-course impact of dietary and environmental exposure on chronic low-grade gut inflammation*
Prof. Sarah De Saeger
Centre of Excellence in Mycotoxicology and Public Health, Ghent University, Belgium

15:40 *Beyond the randomized clinical trial (RCT) method: time for a more holistic approach in nutrition interventions*
Laeticia Celine Toe, Institut de Recherche en Sciences de la Santé, Burkina Faso and Ghent University, Belgium

16:00 *Personal exposomes and human health*
Prof. Michael P. Snyder, Department of Genetics, Stanford University School of Medicine, USA

16:25 *The exposome: future directons, future challenges*
Prof. Gary W. Miller, Department of Environmental Health Sciences, Mailman School of Public Health, Columbia University, New York, USA

16:50 **EXHIBITION:** Visit the booths and live chat with our sponsors.
PIAZZA CONNECTS: Meet & Greet the chairs, the speakers and the WMF community.

17:15 **Young scientist pitches** chaired by Prof. Chris Elliott

Young scientists are given the floor to pitch their research. The time slot per pitch is 7 minutes. The presenter of the best pitch will win the WMF Pitch Award.

- *Impact of early-life multi-mycotoxin exposure on B cells epigenetic profile and infection by oncogenic viruses: unravelling interaction with immune-regulatory cytokines profiles and co-infections in young children*
  Thanos M. Michailidis, Ghent University, Belgium and International Agency for Research on Cancer, France
- *Potential impact of mycotoxins on the developing gut microbiome in Nigerian infants*
  Kolawole Ayeni, Babcock University, Nigeria and University of Vienna
- *Human mycotoxins intervention trial: a standardized protocol*
  Lia Visintin, Ghent University, Belgium

17:40 **Presentation of the Pitch Award** by Prof. Chris Elliott

17:45 Closing remarks and outlook for:
- Virtual pre-conferences on Animal Health (30 November 2021) and on Analysis (1 February 2022)
  Prof. Rudolf Krska and Prof. Chris Elliott
- WMF*meets*ITALY, 16-18 May 2022, Parma, Italy
  Dr Michele Suman and Prof. Chiara Dall'Asta

18:15 End of pre-conference

ABOUT THE SPEAKERS

Benedikt Warth
Dr Warth is an associate professor at the University of Vienna, Austria, where he founded the 'Global Exposomics and Biomonitoring Laboratory' in 2017. Dr Warth's research focus is in the area of omics-scale exposure assessment and analytical food chemistry to better understand the *in vivo* and *in vitro* effects of environmental and food contaminants.

Beatriz Arce-López
Dr Arce-López holds a PhD in Food Science, Physiology and Health from the University of Navarra, Spain, in the area of analytical chemistry. Her field of research is human biomonitoring of exposure to mycotoxins.

Mark Sumarah
Dr Sumarah is a research scientist at Agriculture and Agri-Food Canada in London (ON), Canada. His expertise is in the isolation, structural elucidation, and analysis of small organic molecules from complex matrices using mass spectrometry and NMR. The majority of his research is focused on the development and implementation of better tools using LC-MS for the detection and monitoring of emerging mycotoxins and contaminants.

Lieselot Hemeryck
Dr Hemeryck is a post-doctoral researcher at Ghent University, Belgium. Her research interests include environmental and food toxicology, mass spectrometry-based metabolomics, as well as the further development and optimization of mass spectrometry-based DNA adductomics methodologies and data analysis workflows.

Augustin Scalbert
Dr Scalbert is is a scientist at the International Agency for Research on Cancer, (IARC), France. His current research focusses on the development and implementation of metabolomic approaches in cancer epidemiology. Main objectives of his group are to discover novel biomarkers of exposure for dietary, environmental, and other lifestyle factors, and to identify risk factors for cancer and intermediate end-points through biomarker approaches.

Sarah De Saeger
Prof. De Saeger is head of the Centre of Excellence in Mycotoxicology and Public Health at Ghent University, Belgium. She is coordinator of the international thematic network MYTOX-SOUTH. Her research focuses on mycotoxins and human health, mycotoxin detection methods, metabolomics and untargeted analysis, and exposomics.

Laeticia Celine Toe
Dr Toe works as a researcher at the Institut de Recherche en Sciences de la Santé in Burkina Faso. As the local principal investigator, she directs the MISAME-III study (MIcronutriments pour la SAnté de la Mère et de l'Enfant), the third in a row to elucidate the relationship between maternal nutrition and birth outcome, infant growth and morbidity using multidisciplinary approaches.

Michael P. Snyder
Prof. Snyder is leader in the field of functional genomics and multiomics. His laboratory at Stanford University School of Medicine, USA, develops and uses a variety of approaches to analyse genomes, other comes, and regulatory networks to understand human variation and health.

Gary W. Miller
Prof. Miller is a leader in the exposome field. He authored the first book on the topic, The Exposome: A Primer. His research at the Mailman School of Public Health, The Columbia University in the city of New York, USA, explores how the total of all exposures throughout an individual's life can impact their resulting health.

Thanos M. Michailidis
Thanos M. Michailidis is a PhD student at Ghent University, Belgium. The project he is working on, is funded by FWO and is a collaboration with the Epigenetics Group at IARC, France.

Kolawole Ayeni
Kolawole Ayeni is a PhD student and OeAD scholar from Babcock University, Nigeria. He is currently carrying out his PhD research at the University of Vienna, Austria.

Lia Visintin
Lia Visintin is affiliated with the Centre of Excellence in Mycotoxicology and Public Health at Ghent University, Belgium, working as a PhD student on human exposure to mycotoxins in the framework of the ERC project HUMYCO.

LECTURES

THE ROLE OF MYCOTOXIN RESEARCH IN THE ERA OF EXPOSOMICS

Benedikt Warth

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Throughout their lifetime humans are exposed to a multitude of food and environmental contaminants. These exposures may impact the etiology and course of a large share of human disease. However, occurrence and mechanisms often remain elusive and toxicological interactions are poorly understood. To address this key issue in environmental health research, the concept of the exposome, i.e., investigating the sum of lifespan exposures and their biological effect, was proposed but analytical technology remains a major limitation to the field. Mycotoxin research is a well-suited research field for developing and optimizing assays suitable for omics-scale investigations as this class of natural food toxins is highly diverse in terms of physico-chemical properties, concentrations found in vivo, and toxicological impact/mode of actions.

This contribution will introduce the concept of the exposome and the role of mycotoxins in the field. Current analytical and biological issues in exposomics will be discussed and specific methodological advances presented. This includes targeted and untargeted workflows that are based on liquid chromatography coupled to mass spectrometry. Pilot applications will be presented to showcase complex and dynamic exposure scenarios during early life.

BIOMONITORING AND HUMAN EXPOSURE TO MULTIPLE MYCOTOXINS

Beatriz Arce-López[1,2]

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The presence of mycotoxins in food is a global problem in terms of food safety, and therefore it is of real interest to evaluate their exposure to humans. Human biological monitoring of mycotoxins (HBM) is an important approach to assess chronic exposure to toxins in biological samples [1]. This contribution will include the concept and challenges facing HBM and some recent studies in the field. To gain insight in such an important topic, the state-of-the-art of analytical methodologies and biomarkers in HBM and the specific relationships between biomarkers and certain diseases will be discussed.

In Spain, two different HBM studies have recently been conducted to determine exposure to multiple mycotoxins through the presence in plasma samples from adults and children [2,3]. A total of 172 samples (healthy adults and patients (n=93, 43-85 years), healthy children and children with digestive or behavioural pathologies (attention deficit hyperactivity and autism spectrum disorders) (n=79, 2-16 years)) were analysed by a validated LC-MS/MS method [4] in several regions of northern Spain. Samples were analysed before and after an enzymatic treatment with β-glucuronidase/arylsulfatase for possible mycotoxin conjugates. From the present HBM studies, reliable and critical data on the exposure of the Spanish population to mycotoxins have been generated. Ochratoxin A and sterigmatocystin should be highly considered in mycotoxin risk assessment. However, to date, there is still no clear relationship between exposure to these environmental toxins and the development of certain diseases. Therefore, these studies are of utmost importance for mycotoxins and require the inclusion of other mycotoxins in HBM programmes, to increase the knowledge of mycotoxin metabolism and toxicokinetics, and to make available reference materials and new methodologies for sample treatment. Besides, guidelines for the validation of analytical methods are needed, as well as equations to establish the relationship between human fluid levels and mycotoxin intake. This topic is an exceptional opportunity for further research with an impact on public health.

Acknowledgements
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VALIDATED BIOMARKER STANDARDS ARE NEEDED FOR RELIABLE ASSESSMENT OF MULTI-MYCOTOXIN EXPOSURE IN HUMAN POPULATIONS

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Mycotoxin exposure from our food is a serious concern for human health, especially in the developing world where people can be exposed at orders of magnitude above tolerable limits. The big five agricultural mycotoxins: aflatoxins, fumonisins, ochratoxin A, zearalenone, and deoxynivalenol are of greatest concern. In order to perform reliable multi-mycotoxin exposure assessments in humans validated biomarker standards are needed. This involves synthesizing the necessary isotopically labelled and unlabelled standards. We have produced standards of AFB1-lysine, AFG1-lysine and DON-glucuronide and will make them available for research groups to use.

These standards were used for two studies, the first looked at aflatoxin exposure in Nigerian children with severe acute malnutrition (SAM). AFB1-lysine was detected in 81% of the children, with significantly elevated levels in individuals with SAM. In the second study, we performed a multi-mycotoxin exposure assessment of Rwandan women of childbearing age. AFB1-lysine was indicative of exposures 1-2 orders of magnitude above current guidance. Exposures to zearalenone and deoxynivalenol were more frequent that expected and in some cases at levels above the PMTDIs for each. This work highlights the need for inclusion of these mycotoxins in addition to aflatoxins and fumonisins when studying mycotoxin exposure in Africa. Moving forward it is important for the mycotoxin community to standardize these analyses and validate the results so that proper comparisons can be made between studies. This should also include standardized protocols for sample preparation and LC-MS/MS methods for analysis. Efforts are underway to compare the existing AFB1-lysine standards and available methods with the goal of improving data quality and reproducibility.

THE PROMISE OF DNA ADDUCTOMICS IN EXPOSOMICS

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Exposure to chemicals that attack, alter and/or covalently bind to DNA nucleobases results in the formation of DNA adducts that can accumulate over time and contribute to the onset of developmental aberrations and/or chemically induced carcinogenesis. Studying the formation of DNA adducts in relation to certain exposures is extremely relevant in environmental health research since DNA adducts can (i) serve as markers of exposure, (ii) provide information on the biologically effective dose, and (iii) inform about the potential adverse health effects of both exo- and endogenous stressors. Exposure to aflatoxin B1, which is a risk factor for hepatocellular carcinoma, is for example marked by the formation of aflatoxin B1 specific DNA adducts. The detection and quantification of these adducts can be highly informative in investigating both cause and effect more in depth.

Complimentary to targeted DNA adduct analysis, DNA adductomics entails the untargeted detection of all DNA adducts in a DNA sample to study the occurrence of both known and yet unknown DNA adducts. DNA adductomics is a relatively young omics branch, which has not yet been implemented in large-scale exposomics studies. The new technology holds great promise, however. Therefore, in this presentation, Dr Hemeryck will provide a brief introduction on mass-spectrometry-based DNA adductomics as well as elaborate on its potential in exposomics.

THE INTERNAL EXPOSOME IN COHORT STUDIES – FROM CONCEPT TO PRACTICE

Augustin Scalbert

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The internal exposome, can be defined as the sum of all exogenous chemicals and endogenous metabolites measured in human biospecimens that can be linked to environmental and lifestyle exposures to which an individual is subjected along life course. It includes a considerable variety of compounds, such as dietary compounds, drugs, pollutants, hormones, etc., that may directly affect health and risk of diseases or be used as biomarkers of exposure. High-resolution mass spectrometry (MS) techniques, combined with biostatistics and bioinformatics, are increasingly used to measure hundreds of these chemicals/metabolites in cohort studies, to discover new risk factors for diseases and explore mechanisms of action. Development of such exposome-wide association studies also face a number of challenges. These include a more comprehensive coverage of the exposome, particularly for chemicals present at low concentrations, the technical reproducibility of measurements in large or very large populations, and the identification of chemicals/biomarkers that provide most sensitive, specific, and accurate measures of exposures. Examples of applications in large cohort studies will be given.

FLEXiGUT: TOWARDS A COMPREHENSIVE UNDERSTANDING OF THE LIFE-COURSE IMPACT OF DIETARY & ENVIRONMENTAL EXPOSURE ON CHRONIC LOW-GRADE GUT INFLAMMATION

R. Pero-Gascon[1], N. Kellner[1], L.Y. Hemeryck[2], G. Poma[3], G. Falony[4,5], T.S. Nawrot[6,7], J. Raes[4,5], A. Covaci[3], L. Vanhaecke[2], M. De Boevre[1] and **Sarah De Saeger**[1]

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FLEXiGUT, the Flemish exposome project, is the first large-scale exposomics study focused on chronic low-grade gut inflammation. The project aims to characterize human life course environmental exposure to assess and validate its impact on gut inflammation and related biological processes and diseases. The identification of environment-related risk factors and the development of evidence-based health prevention and intervention strategies regarding chronic low-grade gut inflammation and related diseases, will serve as a basis for preventive policy measures to safeguard public health. The main research question of FLEXIGUT is 'What is the importance of the exposome in the development and progression of low-grade gut inflammation and related biological processes and diseases?'. To unravel this question, we will investigate the influence of environmental and dietary contaminants on certain biological responses related to chronic gut inflammation throughout the lifespan. Two prospective Flemish cohorts have been selected for the collection of detailed information on individuals in a wide age range: the 'ENVIRONAGE birth cohort' and the 'Flemish Gut Flora Project longitudinal cohort'.

To characterise the exposome and assess the development and progression of chronic low-grade gut inflammation, we will combine exposure science and high-throughput -omics technologies with epidemiological studies. We use three main sources of data: (i) available metadata on location, dietary intake and lifestyle; (ii) biomonitoring of environmental and dietary contaminants in biofluids and tissues such as urine, blood and placenta; and (iii) analysis of associated biological responses by -omics techniques, including metagenomics, DNA adductomics and metabolomics, as well as the assessment of telomere length (as a marker for accelerated biological ageing) and measurement of inflammatory markers. The analysis of multiple types of -omics datasets in an integrative way, that is, the multi-omics approach, will give opportunities for finding correlations between features, developing classifier and predictive models, discovery of biomarkers of exposure and disease risk or early molecular events in the pathways leading to disease.

To conclude, in FLEXiGUT, environmental and dietary contaminants and -omics profiles are investigated, encompassing both exposure and effect. A central role is given to the gut microbiome to study the development and progression of chronic low-grade gut inflammation and related biological processes and diseases.

References

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BEYOND THE RANDOMIZED CLINICAL TRIAL (RCT) METHOD: TIME FOR A MORE HOLISTIC APPROACH IN NUTRITION INTERVENTIONS

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Misame III (MIcronutriments pour la SAnté de la Mère et de l'Enfant) is a randomized controlled trial that aims to test the effect of a balanced energy protein supplement on the incidence of small for gestational age babies and the on the length for age z-score of infants at 6 months of age. The trial is being carried on in the health district of Houndé, rural Burkina Faso, West Africa.

The MISAME III trial has the particularity to integrate an extended collection of metadata, thus exploring a large array of factors the participants are exposed to in their daily life. We present here how the MISAME trial is carrying such a work, and outline how these explorations are important in a nutrition intervention study, as well as for public health policies.

PERSONAL EXPOSOMES AND HUMAN HEALTH

Michael P. Snyder

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We have developed a method for mapping personal exposures. Airborne particulates, including bacteria, fungi, plants (e.g., pollen) and animal components, are captured onto a fine filter and chemicals onto a chemical absorbent using an air drawing device that is carried by the individual. Analysis of the nucleic acids captured by the filter and chemicals captured by the absorbent reveals large numbers of species and chemical exposures. Individual exposures vary considerably by location and season. Importantly, both biological and chemical exposures correlate with clinical health, metabolome, and microbiome markers. Our results demonstrate that personal exposures are highly varied and potentially have broad impact on human health.

THE EXPOSOME: FUTURE DIRECTIONS, FUTURE CHALLENGES

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Derived from the term exposure, the exposome is an omic-scale characterization of the non-genetic drivers of health and disease. With the genome, it defines the phenome of an individual. The measurement of complex environmental factors that exert pressure on our health, has not kept pace with genomics and has not provided a similar level of resolution, this is especially true with regards to pharmacological agents. Emerging technologies make it possible to obtain detailed information on drugs, toxicants, pollutants, nutrients, and toxins in a systematic manner. In collaboration with investigators at Emory University, a platform for enzymatic generation of xenobiotic metabolites for use with high-resolution mass pectrometry (HRMS) for chemical identification was developed and validated. Generated xenobiotic metabolites were used to confirm identities of respective metabolites in mouse and human samples based upon accurate mass, retention time and co-occurrence with related xenobiotic metabolites. Human liver S9 enzyme prepared in a 96-well plate format allowed analysis of multiple xenobiotic reactions in a single plate. Human liver S9 enzymes mediated Phase I and II biotransformation reactions to generate xenobiotic metabolites or other downstream adducts from reactive intermediates. High-resolution mass spectrometry (HRMS) analysis of enzyme-generated xenobiotic metabolites provided authentic metabolites for matching accurate mass m/z, retention time (RT), and MS2 to detected metabolites in humans. Similar approaches to provide validation without authentic standards could be applied to the identification of mycotoxins and their metabolites. The use of HRMS to assess endogenous and exogenous molecules can facilitate our understanding of drug interactions, improve the detection of adverse effects of drugs and toxicants. and provide data on biological responses to exposures. This model can provide data at the individual level for precision medicine, group level for clinical trials, and population level for public health.

PITCHES

IMPACT OF EARLY-LIFE MULTI-MYCOTOXIN EXPOSURE ON B CELLS EPIGENETIC PROFILE AND INFECTION BY ONCOGENIC VIRUSES: UNRAVELLING INTERACTION WITH IMMUNE-REGULATORY CYTOKINES PROFILES AND CO-INFECTIONS IN YOUNG CHILDREN

Thanos M. Michailidis[1,2], M. De Boevre[1], S. De Saeger[1] and Z. Herceg[2]

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Mycotoxin exposure may contribute to a diversity of adverse health outcomes in humans, that range from acute poisoning to long-term effects, such as immune deficiency and cancer. Mycotoxins are highly prevalent contaminants of staple foods in low- and middle-income countries. Populations in underdeveloped areas face additional environmental challenges, including exposure to endemic oncogenic viruses. Chronic intake of multiple mycotoxins is hypothesized to interact with oncogenic viruses enhancing the risk of developing several carcinomas. For example, infection by Epstein Barr virus (EBV) is linked to a form of childhood non-Hodgkin lymphoma, Burkitt's lymphoma (eBL) that is endemic in parts of Africa (lymphoma belt), where chronic mycotoxin exposure co-exists. Mycotoxin exposure could then promote EBV infection (and other infections), by diminishing host immune response. Moreover, mycotoxins may act synergistically with EBV to alter the B-cells fate by deregulating the expression of cancer-related genes, eventually leading to the development of eBL. Aim of this study is to assess the interaction between EBV (and other infections) and mycotoxins in children in affected populations and validate the underlying mechanisms using *in vitro* and animal models. Accurate exposure assessments of mycotoxins and oncogenic viruses will be conducted, using metabolomic and genomic approaches, in a cohort of African infants and children. Furthermore, the epigenetic mechanisms of the co-exposure will be integrated with cytokine profiling, in the cohort, as well as in cell lines and humanized mice. The outcome of this research will elucidate the mechanistic pathway of environmentally induced cancer. Given the omnipresence of mycotoxins and viruses, it is imperative to assess their contribution to cancer. Furthermore, understanding the mechanisms by which mycotoxins and viruses interact to induce tumours will provide insights to researchers and public health officials on how to overcome this challenge.

POTENTIAL IMPACT OF MYCOTOXINS ON THE DEVELOPING GUT MICROBIOME IN NIGERIAN INFANTS

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Early-life exposure to toxic chemicals can adversely influence infant development into adulthood. Mycotoxins are important toxicants that are frequently ingested by infants and young children (IYC), especially in economically less developed countries such as Nigeria. Upon ingestion, mycotoxins transit the gastrointestinal tract where they might distort the gut microbiome and potentially adversely influence child development. Currently, data is still lacking on the *in-vivo* effects of dietary mycotoxins on the early-life microbiome. Thus, this study was designed to investigate the influence of mycotoxins on early-life microbiome of Nigerian infants. Specifically, ultra-sensitive human biomonitoring assays based on LC-MS/MS methods were applied to quantify mycotoxins in food (breastmilk and complementary food) consumed by the IYC and in their bio-fluids (stool and urine), collected in a longitudinal design from birth until 18 months. 16S rRNA gene amplicon metabarcoding was employed to characterize the microbial communities in collected stool samples and were correlated to mycotoxin data in the stool over 18 months. This study is expected to provide novel insights into the impact of mycotoxin on the early life gut microbiome.

HUMAN MYCOTOXINS INTERVENTION TRIAL: A STANDARDIZED PROTOCOL

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Mycotoxin exposure is known to contribute to adverse human health outcomes, however, data regarding human exposure remain lacking. Understanding the health consequences in humans requires the capability of conducting accurate exposure assessments of mycotoxins at individual level. The physiological compartments involved in mycotoxins absorption, distribution, metabolization and excretion (ADME-principle) are the kidneys, liver, and gastrointestinal tract. The full mycobolome, identified in urine, blood, and faeces, forms the basis for a toxicokinetic model built by applying state-of-the-art modelling schemes. The standardized study protocol will be applied in the ERC project HuMyco (ERC 946192) providing with a holistic procedure to unravel mycotoxin biomarkers of exposure through a human intervention trial. The aim of the protocol is to identify new biomarkers, determine the ADME-toxicokinetic properties of the mycotoxins considered, and build a toxicokinetic profile-based model. The clinical trial will emphasize on implementing non- and minimally-invasive sampling strategies. Throughout the intervention trial, the participants will visit the Research Centre twice on five consecutive days. During the first visit, the volunteers provide the informed consent forms signed and the sociodemographic questionnaires completed. Moreover, they collect the materials for the sample collection and the aqueous solutions containing the mycotoxins bolus. The second visit comprises the deposit of the collected biological samples and the written documents (schedule of collection and food diary). During the pitch, the main aspects of ethical considerations, informed consent, recruitment of the volunteers, and study settings of the intervention trial will be explained with a focus on the sample collection. Information about sample preparation, analysis, and data elaboration will be provided as well. The integration of the acquired data, involving the different matrices, improves the model's predictivity and highlights the superiority of multi-matrix approaches in biomarker detection, pathway elucidation, and future clinical purposes. The harmonization of the protocol will improve the repeatability and reproducibility of the experimental results obtained. The resulting data will offer public health authorities the opportunity to define specific recommendations and legislation based on the risk for the population.

LOOKING FORWARD TO SEEING YOU AGAIN!