IP Retreat Healthy Planet

Report of Contributions

Contribution ID: **7** Type: **not specified**

Introduction to the IP

Wednesday 7 May 2025 09:00 (15 minutes)

Presenter: SCHOLZ, Stefan

Session Classification: Welcome and Introduction

Contribution ID: **8** Type: **not specified**

Sarah Stevens (ZELLTOX): Endocrine and metabolism disrupting chemicals in plastic food packaging: Addressing the unknowns

Wednesday 7 May 2025 09:15 (15 minutes)

Authors: Sarah Stevens, Molly McPartland, Zdenka Bartosova, Johannes Völker, Martin Wagner

Abstract:
Plastics are chemically highly complex materials with more than 16 000 chemicals likely used or present in plastics. Of these, more than one quarter is known to be hazardous, while more than 10 000 lack basic data on identity, functionality, and toxicity. In addition, plastics contain impurities, reaction byproducts, or degradation products in even greater numbers, further contributing to the knowledge gap regarding the composition of finished plastic articles. Therefore, this study aimed to characterize the endocrine and metabolic disrupting activity of the chemical mixtures leaching from plastic food contact articles (FCAs) and to identify drivers of toxicity. FCAs made of seven commodity polymers were purchased from five high plastic-waste countries. Chemicals were extracted with methanol and migrated into food simulants according to EU regulation. Reporter gene assays for four nuclear receptors relevant to human health were used for screening the leachates. Liquid chromatography high-resolution mass spectrometry was used in the nontarget analysis. Effect-directed analysis (EDA) was conducted to identify toxicity-driving chemicals. Most FCAs leached chemicals that activate receptors of the metabolic and endocrine system with the pregnane x receptor as the predominant target of leaching chemicals. While chemicals leaching from FCAs made of all polymers interfered with at least one receptor, PPARγ and estrogenic activity were associated with specific polymers. The chemical fingerprints of the FCAs were diverse, with 8 to 10 631 chemical features detected in a single product. Twenty-four percent of the extractable chemicals features also leached into both food simulants, making human exposure to these more likely. Using EDA, we confirmed 2-ethylhexyl paraben as responsible for the estrogenic activity in a PVC migrate. The migration of endocrine and metabolic disrupting chemicals into food simulants indicates potential for human exposure and challenges the safety of current FCAs.

Session Classification: Session I: Environmental Chemistry, Chair: tbd

Contribution ID: **9** Type: **not specified**

Maolida Nihemaiti (EAC): Novel highly polar sulfonated disinfection by-products in drinking water: identification and formation mechanisms

Wednesday 7 May 2025 09:30 (15 minutes)

Authors: Maolida Nihemaiti, Bettina Seiwert, Maik Icker, Jon Wullenweber, Mathias Ernst, Andreu Fargas-Marquès, Laura Kahle, Oliver Lechtenfeld, Thorsten Reemtsma

Abstract:
"Disinfection is a critical step during drinking water production and distribution to prevent waterborne disease. However, the chemical disinfectants (e.g., chlorine) can react with water matrices (organic matter, halides) to produce disinfection by-products (DBPs), which can cause adverse health effects like birth defect and bladder cancer. A small number of DBPs are regulated (e.g., trihalomethanes). However, the majority of them, especially the main toxicity drivers in disinfected water still remain unknown. The importance of drinking water disinfection is expected to increase with degrading surface water quality due to climate change.
High resolution mass spectrometry (HRMS) coupled to either gas chromatography (GC) or reversed-phase liquid chromatography (RPLC) is the generic method to identify unknown DBPs. But highly polar contaminates cannot be separated and detected by classical GC-MS or RPLC-MS methods. In this study, we applied supercritical fluid chromatography (SFC) coupled to HRMS to characterize DBPs in disinfected water from drinking water treatment plants and distribution network. We successfully identified 15 novel extremely polar DBPs as the sulfonic acid derivatives of haloacetonitriles, haloacetamides, and haloacetaldehydes. Despite the lack of analytical standards, we were able to conduct the structural confirmation and quantification of these newly identified DBPs by preparing their mixture via chlorination of a precursor compound and by combining nuclear magnetic resonance spectroscopy (NMR) analysis with SFC-HRMS. Various lab-scale chlorination experiments on different water matrices were conducted to investigate the precursors and formation mechanisms of sulfonated DBPs. The results indicate that the formation potential of sulfonated DBPs does not follow the trend observed for regulated DBPs, possibly due to their distinct precursors. In accordance with this, the ultrahigh-resolution MS (FT-ICR-MS) analysis suggests that sulfonated DBP formation is likely influenced by other precursors in the source water than those of regulated DBPs.
This study shows how innovative analytical approaches can broaden our understanding of the human health burden, which may escalate with climate change."

Session Classification: Session I: Environmental Chemistry, Chair: tbd

Contribution ID: **10** Type: **not specified**

Milena Latz (EAC): High-resolution TD-PTR-MS as a novel analytical technique for nanoplastic detection and quantification in environmental samples

Wednesday 7 May 2025 09:45 (15 minutes)

Authors: Milena Latz, Dušan Materić

Abstract: "Research during recent years has showed that plastic pollution has already penetrated all areas of the world. Not only in urban-, but also in rural regions, environmental research showed high contamination of primary and secondary plastic debris. While the majority of research focuses on plastic particles >1 µm (macro- and microplastics), smaller particles have been largely omitted due to their size-dependent difficulty to analyze.
To counteract this knowledge gap, TD-PTR-MS has been established as a novel analytical technique for plastic analysis in the sub 1 µm area (nanoplastics, NPs). This simple analytical method allows fast, real-time analysis, of various sample types including samples containing complex matrices. In the past, NPs have already been detected via TD-PTR-MS in a broad variety of environmental samples (air, water, ice, snow) even in remote regions such as the Siberian Tundra. Moreover, recent research on mussel tissue revealed contamination of plastic particles as small as 200 nm.
To increase application areas, subsequent work focuses on the implementation of high-resolution (>10000 FWHM) TD-PTR-MS in nanoplastic analysis. We will discuss advantages and challenges of high-resolution instrumentation compared to lower resolution methods. In previous research, a fingerprinting library, consisting of up to 40 plastic specific markers, has been developed for six of the most common plastic types (PE, PP, PS, PVC, PET, and Tire Wear). After mass spectrometric analysis of the sample, an algorithm then allowed for the exact discrimination between different plastic types. With this work we also present an improved high-resolution library for qualifying organic ions of the most common plastic types, scanning for a mass range from m/z 100-1000. Compared to other analytical methods, the large number of markers implemented greatly increases the probability of correct identification in the subsequent step.
While the upscaling to a high-resolution analysis technique allows for an increased resolution and selectivity as well as a lower detection limit during NPs analysis, challenges during data processing, and an increased complexity of the resulting mass spectrum resulting in an increase in data size have been observed as well."

Session Classification: Session I: Environmental Chemistry, Chair: tbd

Contribution ID: **12** Type: **not specified**

Alain Hoyek (EXPO): Identifying Source-Specific Contaminant Fingerprints in Wastewater and Surface Waters, and Key Features for Bioactivity and Toxicity Prediction Using Machine Learning

Wednesday 7 May 2025 11:15 (15 minutes)

Session Classification: Session II: Data science and modelling , Chair: tbd

Contribution ID: **13** Type: **not specified**

Marina Pozhidaeva (COMPBC): MeSyTo - Advancing Data Interoperability in Toxicology and Pharmacology Through Standardized Metadata and Ontologies Data Science and Modelling

Wednesday 7 May 2025 11:30 (15 minutes)

Author: Marina Pozhidaeva

Abstract: "Tackling chemical pollution as part of the Triple Planetary Crisis requires data science-based solutions that enable comprehensive environmental monitoring, risk assessment, and policy development. However, the lack of standardized and interoperable metadata in toxicology and pharmacology hinders the effective integration and reuse of critical data. The MeSyTo project aims to improve toxicological and pharmacological data interoperability and machine readability by developing standardised metadata frameworks. The project addresses inconsistencies in metadata annotations that hinder the integration and reuse of data in toxicology and pharmacology. By adopting the FAIR (Findable, Accessible, Interoperable, Reusable) principles, MeSyTo will create structured metadata to document exposure conditions, experimental settings and workflows for omics data from collection to storage in the data repositories.
Our key accomplishments include the development of a comprehensive metadata catalog through the integration and harmonization of metadata elements from the OECD Omics Reporting Framework, various omics data repositories, and wet lab protocols. Furthermore, we have established a domain-specific ontology by defining core classes and aligning them with external ontologies to ensure semantic consistency and interoperability across datasets.
Current efforts focus on validating the domain-specific ontology, developing constraints using SHACL for case-specific metadata annotation, and extending its application to multi-omics data integration. The overarching goal is to enhance reproducibility, data sharing and reuse, and to foster collaboration within Helmholtz and beyond, ultimately empowering researchers to tackle the grand challenges of chemical pollution and its impact on human and ecosystem health."

Session Classification: Session II: Data science and modelling , Chair: tbd

Contribution ID: **14** Type: **not specified**

Ilhan Mutlu (COMPBC): From Incomplete to Insightful: Curating Spatially Annotated Monitoring Data with CleanGeoStreamR

Wednesday 7 May 2025 11:45 (15 minutes)

Authors: Ilhan Mutlu, Jana Schor, Jörg Hackermüller

Abstract: "Environmental monitoring data is frequently compromised by inconsistent, incomplete, or erroneous spatial metadata, which restricts its effective utilization in research and informed decision-making processes. Recently, we have developed the CleanGeoStreamR to overcome such challenges in an automated way. CleanGeoStreamR utilizes an automated pipeline that normalizes textual entries, corrects spatial annotations, and systematically fills critical data gaps. By incorporating advanced data normalization and reverse geocoding techniques, the tool significantly enhances metadata quality while simultaneously increasing the volume of reliable data available for comprehensive analytics and artificial intelligence applications. For instance, we have automatically filled more than 107 million data gaps in the NORMAN surface waters database with CleanGeoStreamR. This corresponds to approximately 37% of the already existing data gaps.

Recent advancements in the CleanGeoStreamR tool have expanded its flexibility and adaptability, enabling broader applicability across various environmental monitoring datasets. Originally developed to address inconsistencies and gaps in spatial metadata—particularly in the surface water data set—CleanGeoStreamR now supports a more generic and configurable approach to data curation. Users can define both core and optional columns to be retained and tailor the curation workflow through editable configuration files. These enhancements make it possible to adapt the curation pipeline to other datasets, including but not limited to biota, sewage water, and wastewater monitoring, etc.

By offering a transparent, reusable, and highly customizable framework, CleanGeoStreamR facilitates harmonized data preparation across institutions and projects. Its open-source nature and adherence to FAIR principles make it an ideal tool for collaborative research and cross-organizational data integration efforts, fostering consistent and high-quality environmental datasets at scale."

Session Classification: Session II: Data science and modelling , Chair: tbd

Contribution ID: **15** Type: **not specified**

Dilshana Shanavas Rasheeda (COMPBC): Can We Use AI to Provide Quantitative Predictions for Chemical Bioactivity and Toxicity?

Wednesday 7 May 2025 12:00 (15 minutes)

Authors: Dr. Dilshana Shanavas Rasheeda, Prof. Dr. Jana Schor

Abstract: "Understanding and predicting chemical bioactivity is central to drug development, chemical safety, and environmental risk assessment. However, large numbers of unlabelled compounds remain unexplored due to the cost and scale of experimental testing. In this work, we investigate the potential of artificial intelligence (AI) to provide accurate, structure-based predictions for chemical toxicity and related properties.

We focus on cytotoxicity data from invitroDB and calculated lipophilicity as representative endpoints. Using molecular fingerprints and graph-based representations of chemical structures, we develop regression models with deepFPlearn (a feedforward neural network framework) and Graph Neural Networks (GNNs). Our automated workflow covers data preprocessing, model training, and prediction on unseen compounds.

The models show strong predictive performance and generalization cross datasets. The workflow is scalable, interpretable, and adaptable to other physicochemical or biological endpoints. By combining cheminformatics with deep learning, this work demonstrates a practical and extensible pipeline for predictive toxicology, supporting more efficient, data-driven chemical screening."

Session Classification: Session II: Data science and modelling , Chair: tbd

Contribution ID: **16** Type: **not specified**

Samuel Türken (ETOX): Additive Effects of PFAS Mixtures on Acute Toxicity and Phenotypic Endpoints in Zebrafish Embryos

Wednesday 7 May 2025 14:00 (15 minutes)

Authors: Samuel Türken, Jasmin Stockhause, Renee Owen, Lena Knödler, Janet Krüger, Nils Klüver, Dorte Herzke, Line Småstuen Haug, Oddvar Myhre, Paul Michaelis, Tamara Tal, Wibke Busch

Abstract: "Additive Effects of PFAS Mixtures on Acute Toxicity and Phenotypic Endpoints in Zebrafish Embryos
Samuel Türken1, Jasmin Stockhause1, Renee Owen1, Lena Knödler1, Janet Krüger1, Nils Klüver1, Dorte Herzke2, Line Småstuen Haug2, Oddvar Myhre2, Paul Michaelis1, Tamara Tal1,3, Wibke Busch1
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Per- and polyfluoroalkyl substances (PFAS) are synthetic organic chemicals linked to adverse human health and environmental effects. While many studies have examined individual PFAS toxicity in model organisms such as zebrafish, fewer have investigated mixture effects. To assess potential mixture interactions, we applied two classical modeling approaches—concentration addition (CA) and independent action (IA)—to evaluate single and combined exposures of PFOS, PFHxS, PFOA, PFNA, PFDA, and PFUnDA. One mixture was designed for equal toxicity (LC_{25}) using CA modeling, while another reflected environmentally relevant ratios found in Scandinavian populations. Zebrafish embryos were exposed from 0-5 days post fertilization (dpf) to individual PFAS or mixtures at varying concentrations. Acute toxicity and phenotypic abnormalities were assessed.
Our findings demonstrate that PFAS mixtures produce developmental effects in zebrafish, with toxicity largely explained by additive interactions. These results underscore the importance of considering mixture effects in PFAS risk assessment.
Future Directions: To further elucidate the toxicogenomic mechanisms underlying PFAS mixture toxicity, an upcoming study will compare the transcriptomic responses of individual PFAS and their mixtures using mixture modeling approaches for gene expression data."

Session Classification: Session IIIa: Environmental and Human Health, Chair: tbd

Contribution ID: **17** Type: **not specified**

Cassandra Uthoff (MOLTOX): Impact of Acute Pesticide Exposure on Honeybee Worker (Apis mellifera) Behaviour and Gut-Brain Molecular Changes

Wednesday 7 May 2025 14:15 (15 minutes)

Authors: Cassandra Uthoff, Abdulrahim T. Alkassab, Beatrice Engelmann, Ulrike-Rolle Kampczyk, Sven-Bastiaan Haange, Jens Pistorius, Andreas S. Thum, Nico Jehmlich, Martin von Bergen

Abstract: Honeybee colonies, as superorganisms, depend on effective communication and coordination that can be disrupted by pesticides on multiple levels. To understand this, we studied the molecular changes in the gut and brain of workers, along with in-hive behaviour investigations. We found effects of worker behaviour after one-day exposure in an in-hive feeding experiment to SIVANTO® Prime (Flupyradifurone), Cantus® (Boscalid), and Click Pro® (Terbuthylazine and Mesotrione) at environmentally relevant concentrations. SIVANTO® Prime significantly decreased colony maintenance behaviours, but increased allo-grooming shortly after exposure. Cantus® increased resting behaviour, whereas Click Pro® decreased brood care, mainly by reducing larval feeding. To unravel the mechanism by which pesticides affect the brain, we analysed the global proteome and amino acid and biogenic amine levels of exposed bees from the same colonies. We found significant changes in levels of neurotransmitters such as GABA and serotonin. Furthermore, a multi-omics approach was used to investigate structural and functional changes in the gut microbiome and lining to better understand the sub-lethal effects of pesticides on the microbiome-host relationship. Together, this gives us insight into structural and functional changes in the gut microbiome and brain function of worker bees pre- and post-exposure, while also examining behavioural phenotypes in nucleus colonies.

Session Classification: Session IIIa: Environmental and Human Health, Chair: tbd

Contribution ID: **18** Type: **not specified**

Ayesha Siddique (ETOX): Integrating NAMs and Field Studies for ERA

Wednesday 7 May 2025 14:30 (15 minutes)

Authors: Ayesha Siddique, Naeem Shahid, Matthias Liess and many others

Abstract: "Assessing pesticide effects across different biological levels remains a significant challenge, as field and laboratory studies are often conducted independently, leading to fragmented insights. Field studies, like those by Liess et al. (2021), have shown that pesticides can cause adverse effects even at lower concentrations, raising concerns that current Regulatory Acceptable Concentrations (RACs) may not offer adequate protection to non-target organisms. In contrast, laboratory and molecular-level studies typically observe effects at higher concentrations, which complicates the integration of field and laboratory data for risk assessments and creates difficulties in forming a unified risk assessment framework.
Siddique et al. (2024) made progress by linking pesticide effects across biological scales, from molecular to ecological levels, identifying consistent thresholds of impact. This helped bridge the gap between field and laboratory study results, offering a more cohesive understanding of pesticide risks. Building on this, we aim to advance pesticide risk assessment by combining field-based observations with New Approach Methodologies (NAMs) under PARC project. We are collecting field data to validate previous findings and assess the sufficiency of current RACs across EU. Simultaneously, molecular-level evidence is being collected to deepen mechanistic understanding. This integrative approach aims to establish a unified framework for pesticide risk assessment, ensuring that both ecological and molecular data contribute to a more comprehensive and protective evaluation of pesticide impacts across various biological scales."

Session Classification: Session IIIa: Environmental and Human Health, Chair: tbd

Contribution ID: **19** Type: **not specified**

Paula Reichelt (IMMU): Impact of the Covid-19 pandemic lockdown and associated changes of exposure to bioactive chemicals and immune parameters in children

Wednesday 7 May 2025 15:15 (15 minutes)

Authors: Paula Reichelt, Georg Braun, Arkadiusz Pierzchalski, Naroa Lopez-Herguedas, Sebastian Thieme, Beate Escher, Ana Zenclussen

Abstract: "Background
Children's immune systems significantly differ from adults. Particularly their adaptive immune defense is still developing. Contact with pathogens plays a crucial role, as with each infection, the immune system learns to specifically combat new pathogens. The COVID-19 pandemic lockdown, including daycare and school closures, reduced exposure to pathogens and shifted chemical exposure, potentially affecting immune development. Due to their developmental stage, children are particularly sensitive to these influences.
Objective
This project aims to analyze the impact of the pandemic and lockdown on children's immune systems, linking changes to environmental chemical exposure. The study also investigates the infectious epidemiological development during and after the pandemic and possible connections to autoimmunity.
Methods
Blood samples from 211 children (ages 10-15) before and after the lockdown were analyzed for chemical profiles and chemokine concentrations. These comprised markers from the human Proinflammatory Chemokine Panel 1 (Biolegend), assessed by a multiplex bead-based assay, allowing for simultaneous quantification of 12 chemokines, including MCP-1 (CCL2), IP-10 (CXCL10), Eotaxin (CCL11), TARC (CCL17), MIP-1α (CCL3), MIP-1β (CCL4), MIG (CXCL9), MIP-3α (CCL20), ENA-78 (CXCL5), GROα (CXCL1), I-TAC (CXCL11) and IL-8 (CXCL8). Furthermore, specific antibodies against EBV, Influenza (H1N1), RSV, and COVID will be measured. To elucidate potential developments of autoimmunity, levels of transglutaminase antibodies will be assessed. Samples were also screened for 940 chemicals from industrial use and consumer products, pesticides, food additives and endogenous compounds.
Results
Significant increases in pro-inflammatory chemokines such as Eotaxin, IP-10, and MIP-1α were observed, with sex- and age-specific differences. We could preliminarily quantify around 150 chemicals from all categories. Some individual chemicals such as tire additives, PFAS and BPA seem to shift in their concentrations and abundance, with age and lockdown being important factors.
Conclusion
Post-pandemic, changes in pro-inflammatory cytokine levels were noted and further investigations will determine potential changes in abundance of selected antibodies. Additional analyses will explore chemical expotypes and bioactivity correlations with neurotoxic bioassays. We also investigated changes in chemical composition and bioactivity of extracts of exposed and clean storage material."

Session Classification: Session IIIb: Environmental and Human Health Chair: tbd

Contribution ID: **20** Type: **not specified**

Cornelius Goerdeler (MOLTOX): 13C Metabolic Tracing in Human Adipocytes for Assessing Metabolism-Disrupting Properties

Wednesday 7 May 2025 15:30 (15 minutes)

Authors: Beatrice Engelmann, Helen Broghammer, Alix Sarah Aldehoff, Martin Wabitsch, Kristin Schubert, Matthias Blüher, John T. Heiker, Ulrike Rolle-Kampczyk, Martin von Bergen

Abstract: Exposure to certain environmental chemicals, including phthalates, may promote the development of metabolic diseases, including obesity. Since specific regulatory methods to identify metabolism-disrupting chemicals are currently lacking, the assessment of safer alternatives is hampered. The plasticizer DINCH was introduced as a replacement for banned phthalate plasticizers. However, previous studies have shown that its primary metabolite MINCH promotes adipogenesis of human adipocytes. To assess the effects of MINCH on adipocyte metabolism, human SGBS preadipocytes were exposed for 12 days to MINCH and subsequently incubated with different 13C tracing sources. The 13C labeling pattern of central carbon metabolites was analyzed using a targeted MRM approach and the effects were compared to cells differentiated with the PPARG agonist rosiglitazone and untreated control cells. After 24 h incubation with [U-13C]glucose, analysis of the 13C enrichment indicated a higher glycolytic and pentose phosphate pathway (PPP) flux for energy production and increased acetyl-CoA generation for lipid formation in MINCH-treated and rosiglitazone-differentiated cells. Analysis of the labeling pattern after [1,2-13C]glucose incubation confirmed the upregulation of glycolysis and the PPP cycle in MINCH- and rosiglitazone-treated cells, but showed an increase in the PPP/glucose metabolism ratio only in rosiglitazone-differentiated cells. The [U-13C]glutamine labeling pattern revealed reduced cycling through the TCA cycle and transient upregulation of reductive glutaminolysis for lipid production in MINCH and rosiglitazone-treated cells. In conclusion, our 13C tracer data indicate that MINCH leads to a rewiring of metabolism towards lipid accumulation and adipogenesis similar to the PPARG agonist rosiglitazone, but they also reveal subtle differences in metabolic pathway activity. This emphasizes the applicability as a potential New Approach Method for the assessment of adipogenic effects.

Session Classification: Session IIIb: Environmental and Human Health Chair: tbd

Contribution ID: **21** Type: **not specified**

Katharine Heyl (UPR): EU plastic governance for healthy soils

Wednesday 7 May 2025 15:45 (15 minutes)

Authors: Jessica Stubenrauch & Katharine Heyl

Abstract: "Soils are key in overcoming the interlinked climate and biodiversity crises. Having or restoring healthy soils is thus essential to achieve the goals of the Paris Agreement and the Convention on Biological Diversity. However, globally, soil degradation is rising including by plastic pollution. Plastic pollution is caused by large plastic debris as well as micro- and nanoplastics. Micro- and nanoplastics are a major issue due to their ubiquity, persistence, mobility and practical irreversibility from the environment. Micro- and nanoplastics threaten wildlife and human health and can be found even in the most pristine areas of Earth.

Against this background, effective legislation to curb and at best halt plastic pollution is urgently needed. The proposed presentation seeks to assess the extent to which EU policies protect soils against plastic pollution. To this end, results from a qualitative governance analysis will be presented. The qualitative governance analysis focussed on several EU policies including the REACH Regulation, the proposal for the first legally binding EU instrument on soil protection –the Soil Monitoring Law –and the Proposal for Plastic Pellet Losses. For the presentation, a snapshot of the investigated policies will be presented.

Overall, the results show that the EU takes important first steps to address (plastic) pollution in soils. Proposing a soil monitoring and assessment framework and targeting plastic pellets along the entire supply chain are essential prerequisite to achieve healthy soils in the EU. However, substantial governance issues of the investigated policies remain. These include enforcement problems, potential shifting effects and lacking target stringency. As a consequence, the actual impact on soil plastic pollution will remain limited.

To effectively address soil plastic pollution, policy instruments will have to address the driver of soil plastic pollution –fossil fuels –and aim at their phase out."

Session Classification: Session IIIb: Environmental and Human Health Chair: tbd

Contribution ID: **22** Type: **not specified**

Alix Sarah Aldehoff (MOLTOX) Advanced proteomics approaches hold potential for risk assessment of metabolism disrupting chemicals as omics-based NAM

Wednesday 7 May 2025 16:00 (15 minutes)

Authors: Alix Sarah Aldehoff, Isabel Karkossa, Helen Broghammer, Sontje Krupka, Juliane Weiner, Cornelius Goerdeler, Rima Nuwayhid, Stefan Langer, Martin Wabitsch, Ulrike Rolle-Kampczyk, Nora Klöting, Matthias Blüher, John T. Heiker, Martin von Bergen and Kristin Schubert

Abstract: The concept of metabolic disruption through exposure to chemicals has expanded our understanding of how environmental pollution can contribute to metabolic dysregulation and, ultimately, diseases like obesity, diabetes, and cardiovascular conditions. Current strategies for assessing the risks posed by chemicals need to break new ground. Omics technologies such as proteomics have proven to be powerful tools for investigating the molecular mechanisms of these metabolism disrupting chemicals (MDCs). Global proteomics, complemented by insights into the thermal stability of proteins and the profiles of post-translational modification (PTM), provides a near-phenotypic understanding of chemical modes of action. In addition, bioinformatics techniques enable the identification of hub protein candidates, modification sites and initiating events triggered by chemical exposure. One example of a potential MDC is diisononyl-cyclohexane-1,2-dicarboxylate (DINCH), a common alternative to legacy phthalates such as DEHP, which has been linked to the induction of adipogenesis and lipid accumulation. Here, we demonstrate the utility of advanced proteomics approaches in assessing the effects of potential MDCs such as DINCH and its metabolite MINCH by utilising the human Simpson-Golabi-Behmel syndrome (SGBS) adipocyte cell line and comparing it to primary human adipocytes and adipose tissue data from DINCH-exposed mice. The research sheds light on DINCHs molecular effects including protein interactions beyond its primary target, PPARγ. The results emphasize the potential of omics-based approaches to enhance risk assessment frameworks for emerging contaminants.

Session Classification: Session IIIb: Environmental and Human Health Chair: tbd

Contribution ID: **23** Type: **not specified**

All Poster Abstracts