Diagnosis, Monitoring and Prevention of Exposure Related Non-Communicable Diseases: DiMoPEx project follow up

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WG1–WG7

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Background

Research addressing the links between environmental exposures and disease prevalence is key for preventing the increase in non-communable diseases (NCD)1,2 morbidity and mortality. However, because of their long latency and chronic course of some diseases and the necessity to address cumulative exposures over very long periods, it is often difficult to identify causal environmental exposures.

The EU-funded project Diagnosis, Monitoring and Prevention of Exposure Related Non-Communicable Diseases (DiMoPEx) aims at developing new concepts for a better understanding of how exposure (including gene-environment) interactions in the etiology of NCDs.

The overarching idea is to teach early career researchers and to train senior scientists/physicians through interdisciplinary exchange on how to include efficient and valid exposure assessments in cooperative research projects as well as how to apply this knowledge in public health initiatives.

WG1 Exposure assessment – from environmental to individual exposure

The tasks of WG1 are the analysis of studies, expertise, and capacities regarding exposure assessment within the consortium, the dissemination of resources and information on assessment procedures and quality assurance as well as the development of increased capacities. However, the most important task of the identification is the development and implementation of knowledge on exposure quantification and exposure–effect association, as well as in proposing solutions for closure of these gaps.

Assessment of chemical exposure:
• the individual population groups have to be clearly identified
• qualitative detection
• Ambient monitoring: Human Biomonitoring

IMPORTANT! timing of sample collection relative to the time point of suspected exposure

WG5 Genomic, epigenomic and transcriptomic profiles of diseases

• Hazards characterization, risk identification: carcinogenicity bioassays
• Diagnosis of cancer as NCD needs biomarker(s) of early effect (detection of preclinical lesions) and a new animal study approaches are needed

WG3 Environmental and occupational epidemiology

• monitoring the impact of occupational and environmental exposures over long periods of time
• identification of dose response relationships
• improvement of burden of disease and public health estimates

WG7 Public health protection – how to stimulate interaction between science and policy-makers

• Identification of health risks from workplace exposures and development of policies and interventions to prevent and control NCDs
• Public health promotion and prevention of NCDs

Results and Conclusion

DiMoPEx partners have identified some of the emerging research needs, which include the lack of evidence-based exposure data2, the need for human-equivalent animal models mirroring human lifespan and low-dose cumulative exposures. Utilizing an interdisciplinary approach, including seven working groups, DiMoPEx will focus on aspects of air pollution with particular matter including dust and fibers, on exposures to low-dose solvents and sensitizing agents1. Biomarkers of early exposures and the associated effects as indicators of disease-derived information will be tested and standardized within individual projects. Risks of some NCDs, like pneumoconioses, cancers and allergies, are predictable and preventable. Consequently, preventive actions could lead to decreasing disease morbidity and mortality for many of the NCDs, which are of major public concern.

WG2 Toxico-logic group

Human biological monitoring – more than just (analyses) of biomarkers

Exposures to chemicals and particles

Air pollution is a complex mixture of chemically different components. Particulate matter (PM) has been designated a major risk factor for cardiovascular disease, chronic obstructive pulmonary disease, lung cancer and various NCDs. Particulate matter has been defined as all solid and liquid particles, including those in the size range of 0.001 µm to 100 µm, that are small enough to be inhaled. Particulate matter in this size range can penetrate deep into the lung, and can be transported to the blood circulation, where it can cause adverse health effects.

WG4 Solutions for ethical aspects of data collection and communication

WG6 Clinical NCDs

Although experimental and toxicological methods to establish mechanisms for a certain exposure and its impact on organ systems are available, most often the only way to confirm the link between an exposure and the outcome is observational epidemiologic studies addressing disease occurrence in human populations. Such population based studies are the only way to address the exposure response relation and explore susceptibility and societal exposures simultaneously.

References


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