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

DiMoPEx

WG1-WG7

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Background

Research addressing the links between environmental exposures and disease prevalence is key for preventing of the increase in non-communicable 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 health-environment (including gene-environment) interactions in the etiology of NCDs.

Results and Conclusion

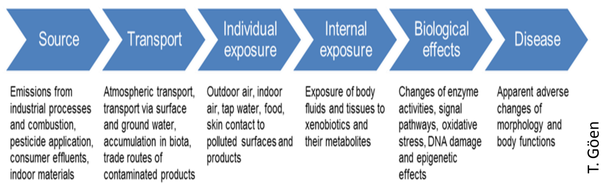
DiMoPEx partners have identified some of the emerging research needs, which include **the lack of evidence-based exposure data[3], the need for human-equivalent animal models mirroring human lifespan and low- dose cumulative exposures**. Utilizing an interdisciplinary approach, including seven working groups, **DiMoPEx will focus on aspects of air pollution[4] with particulate matter including dust and fibers, on exposures to low- dose solvents and sensitizing agents[1].** 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.

The overarching idea is to teach early career investigators 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 WG, are the analysis of skills, 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[1]. However, the most important tasks are the identification of limitations or crucial gaps of knowledge on exposure quantization and exposure–effect association, as well as preparing solutions for closure of these gaps.[1]

Assessment of chemical exposure:
- the individual pollution agents have to be
- clearly identified.
- qualitative detection
- (Ambient monitoring; Human Biomonitoring)[1,3]

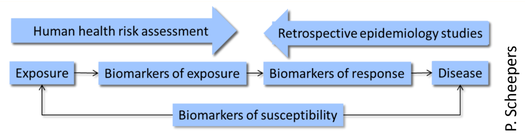


T. Göen

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

WG2 Toxicology group

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



P. Scheepers

Exposures to chemicals and particles:

Air pollution is a complex mixture of chemically different components. Particulate matter (PM) has been designated as one of the most important components of the burden of disease from air pollution

WG3 Environmental and occupational epidemiology overarching other WGs

Note: the groups selected to be compared for their biomarker should be well suited to the aims of the study

WG6 Clinical NCDs

Although experimental and toxicological methods to establish mechanisms for a certain exposure and its impact on organisms 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 exploring susceptibility and societal exposures simultaneously.

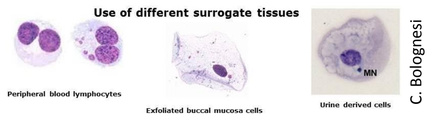
WG5 Genomic, epigenomic and transcriptomic profiles of diseases

➢**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

The neoplastic response depends not only on the kind of agent, its physicochemical and toxicological properties, the mode of exposure, and the type of animal, but also to a great extent, on the latency of the tumor, which varies and may be very long. Experimental findings agree that the latent neoplastic potential for causing a tumor increases with the length of the observation time or age. [1]
To satisfy the need to consider multiple effects (e.g., cancer and non-cancer) across multiple life stages and to reduce the overall number of animals required for separate studies of these end- points, we have recently proposed the adaptation of the carcinogenicity bioassay to integrate additional protocols for comprehensive long-term toxicity assessment.[1]


F. Belpoggi

➢**Biomarker of early response to assess the effects of preventive measures and identify individuals at high risk of developing a given NCD**



C. Bolognesi

WG4

Solutions for ethical aspects of data collection and communication

WG7

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

Since NCDs not only cause premature deaths and increased morbidity, but also have a significant economic impact, the cost-effective and evidence-based interventions and tools to prevent and control various NCDs must include:

- **reduction of causative exposures/risk factors;**
- **early detection and management of respective disorders;**
- **surveillance of endangered populations to monitor trends in risk factors and diseases**

References

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