Monitoring exposure associated with non-communicable diseases among workers

Aim of the project
Identify and monitor biomarkers among workers or volunteers exposed to a chemical potentially associated with a specific non-communicable disease

A. Identification of exposures suspected to be associated with health problems

1. Selection of chemicals of interest
   Criteria: among the WG 2 products of interest and available epidemiological data from WG 3 (e.g., pesticides and neurotoxicity, formaldehyde and cancer, asthmatogens and COPD, …)

2. Selection of an occupational cohort
   based on occupations of interest (workers from different countries may be included)

B. In vitro testing and biomarkers of effect and exposure

3. Absorption dose estimation
   • In vitro percutaneous permeation assay
     - Permeation rate through human skin
     - Potential metabolism identified
     - ROS measurements
   • In vitro inhalation assay (human cells)
     - Amount of substance delivered
     - Permeation rate through respiratory cells
     - ROS and inflammatory response measurements

4. Identification of potential biomarkers
   • In vitro percutaneous permeation assay
     - Assess toxic effects
     - Dose-response of specific effects
     - ROS measurements
     - Identification of potential biomarkers
   • Volunteers exposed under controlled conditions
     - Elucidate toxicokinetic parameters
     - Measure biomarkers of exposure/effect

Systemic concentration in blood

C. Biomarker validation – human endpoints

5. Monitoring in workers
   Biomonitoring
   • Urine collection: Quantification of chemical and its metabolites (i.e., biomarkers of exposure)
   • Exhaled air collection: Quantification of biomarkers of exposure & effect
   • Blood collection: Quantification of pesticide and its metabolites (i.e., biomarkers of exposure), Detection of potential biomarkers of effect (MN)
   • Other matrices (saliva, hair)
   Air pollution monitoring
   • Occupational hygiene sampling (wipe) associated with job tasks (frequency, compounds, duration, practice,)
     • Development of wearable sensing devices

6. Medical evaluation of workers
   • Occupational non-communicable disease questionnaire (e.g., validated asthma questionnaire)
   • Development and validation of specific diagnostic work-up procedures and clinical scores for occupational non-communicable disease

Involves all WGs
Involves WG 1, 2 and 5
Involves WG 6