WP6: Overall Data evaluation & Grouping/Classification

Omics technologies have found their way into toxicology and have been summarized under the term systems toxicology (derived from systems biology). The initial interest in uncovering the mechanism of action of substances of concern has evolved into the idea of identifying so-called adverse outcome pathways (AOPs). Correlations in AOPs and patterns in signalling and metabolic pathways should allow drawing conclusions about the hazards of new substances from established substances. In addition, such information can be used to compare results from different species and between in vivo and in vitro test results. Thereby, confidence in test results can be increased and ultimately in vitro test systems could become the main source of toxicological data. The analysis of signalling pathways requires bioinformatic data analysis using different algorithms to evaluate the data with different perspectives. This type of statistical analysis is highly dependent on the quality of the underlying data and still presents challenges in increasing the reliability of its conclusions.
For NMs, a comprehensive analysis of different correlated omics data has yet to be performed. The NanoToxClass project will address the challenge of integrating the heterogeneous data from literature, previous projects, and the systematic high-quality omics data generated within the project in work package 6. Physico-chemical parameters, classical toxicity data, and omics data whose structure varies widely must be combined in one data matrix. Statistical analyses will be performed on this matrix to reveal cellular signalling pathways that are activated or inhibited by exposure to NMs. Such so-called toxicity pathways are compared for different NMs. Grouping strategies devised in WP1 will be revised with the results of this work package and newly revealed biomarkers or pathways are added. Furthermore, both data and SOPs will be made accessible to various stakeholders, including regulatory and standardization authorities and researchers in other national and international projects.

This WP is structured into 3 tasks:

- Task 1 - Overall data analysis
- Task 2 - Grouping
- Task 3 - Validation of Grouping