Application of omics to immunotoxicology : from mechanisms of action to alternative testing strategies

PROPOSITIONS

1. Although a number of pathways can be commonly affected by direct immunotoxicants, the exact modes of action leading to direct immunotoxicity are chemical-dependent (*This thesis*).
2. Toxicogenomics-based biomarkers can be used to identify direct immunotoxic hazards of chemicals (*This thesis*).
3. To accurately predict direct immunotoxic properties of chemicals *in vivo*, a panel of *in vitro* tests, instead of one single test, is required (*This thesis*).
4. Phosphoproteomics may allow identification of toxicity biomarkers at an earlier stage of exposure than transcriptomics (*This thesis*).
5. Nucleic acid-based assays used singly may not be suitable for hazard characterization when a complex toxicological endpoint, like direct immunotoxicity, is considered.
6. In pathway-based risk assessment, it is challenging to select a toxicity pathway which is not only sensitive in terms of predictive capacity, but also relevant for induction of the adverse effects in human (*Boekelheide and Andersen, 2010*).
7. A validated *in vitro* to *in vivo* extrapolation (IVIVE) should be based on the free concentration, instead of the nominal one, of the chemical in the *in vitro* system (*Blaauboer, 2010*).
8. In order to meet the paradigm shift, a good toxicology team in the 21st century should be a multi-disciplinary one that covers toxicology (human and environment), chemistry, biology, bioinformatics, and mathematical modelling.
9. Time management is all about self-management.
10. There are only ordinary people in the world and it is only ordinary people that do extra-ordinary things.

Propositions belonging to the thesis, entitled

“Application of omics to immunotoxicology: from mechanisms of action to alternative testing strategies”

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