

## Technologies to Inform Chemical Safety Sciences

***Recent technological advancements offer compelling new approaches for innovating chemical safety sciences. Which of these have potential to advance our understanding of the biological impacts of chemical exposures? What is the current status regarding their development and broader applicability?***

International participants attending the 2012 International Council of Chemical Associations' Long-Range Research Initiative (ICCA-LRI) workshop considered the potential applications and implications of new technologies for chemical safety sciences as well as the challenges for their acceptance into regulatory decision making. This workshop, *Technologies to Inform Chemical Safety Sciences*, was co-organized with the United Kingdom's Health Protection Agency and was held June 12-13 in Budapest, Hungary. Participants from governmental agencies, academia, industry, and public advocacy groups discussed and evaluated recent technological innovations and their potential applicability for chemical safety assessments. Their discussions considered these innovations in light of the current use of high throughput *in vitro* toxicity assays and in new molecular biology approaches for advancing chemical safety assessments.

Speakers presented a number of examples of technological innovations that could advance understanding of biological changes linked to chemical exposures. They included analyses for detecting changes in DNA and RNA using next generation sequencing, very high resolution spectrophotometric methods for metals in environmental samples, identification of epigenetic modifications, mass spectral analysis for metabolomics to identify metabolites in blood samples, and high throughput methods for evaluating alterations in *in vitro* test systems. The advantages that these new technologies offer chemical safety assessment include increased analytical speed, sensitivity, and specificity as well as cost efficiencies. However, building consensus for acceptance of results from the new technologies among regulatory bodies, industry, academia, and the general public will be a process involving education and discussion. Development of case studies using the new technologies was suggested as one approach for demonstrating and communicating their potential advantages to such groups.

How best to manage, store, access, integrate, and share the extensive datasets emerging from both existing and new technologies was a recurring topic at the workshop. Development of standards for these processes that could be agreed upon by diverse stakeholders was proposed as a key next step. Design of innovative software tools and collation of existing databases containing archived toxicological study results were also discussed as two current collaborative initiatives between the pharmaceutical industry and academia that are focused on improving predictive toxicology.

This ICCA-LRI workshop succeeded in stimulating a dialogue and an exchange of ideas regarding technologies that have the potential to inform chemical safety sciences. Future success will require development of trans-disciplinary teams that will work together so that the maximal benefits from these new technologies can be achieved. Success also will require ongoing engagement of the general public and effective communication regarding the value of these new technologies for advancing human health risk assessment.