

A Multi-Stakeholder Perspective on the Use of Alternative Test Strategies for Nanomaterial Safety Assessment

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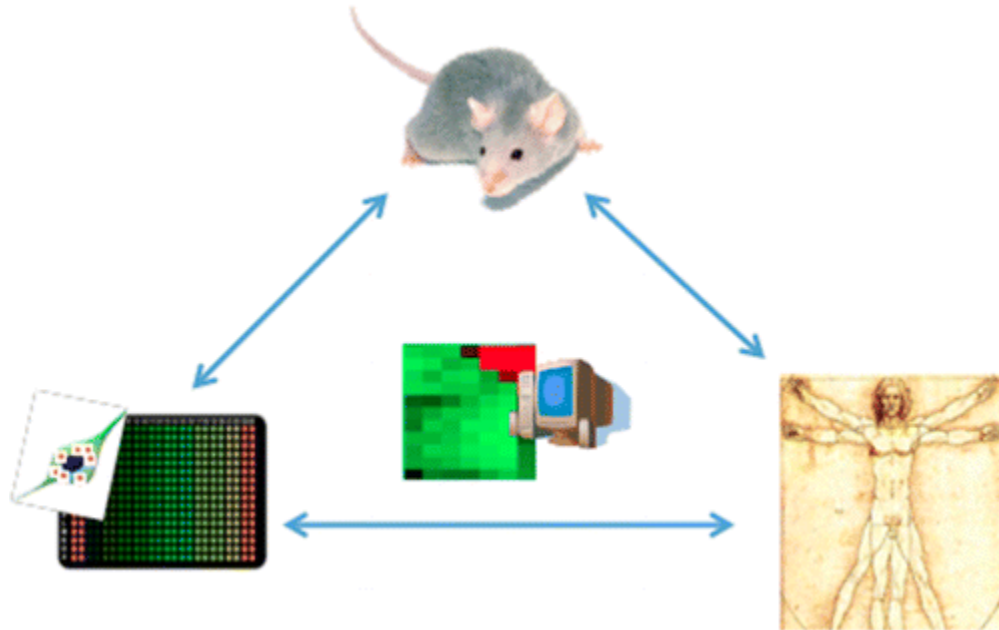
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Abstract



There has been a conceptual shift in toxicological studies from describing *what* happens to explaining *how* the adverse outcome occurs, thereby enabling a deeper and improved understanding of how biomolecular and mechanistic profiling can inform hazard identification and improve risk assessment. Compared to traditional toxicology methods, which have a heavy reliance on animals, new approaches to generate toxicological data are becoming available for the safety assessment of chemicals, including high-throughput and high-content screening (HTS, HCS). With the emergence of nanotechnology, the exponential increase in the total number of engineered nanomaterials (ENMs) in research, development, and commercialization requires a robust scientific approach to screen ENM safety in humans and the environment rapidly and efficiently. Spurred by the developments in chemical testing, a promising new toxicological paradigm for ENMs is to use alternative test strategies (ATS), which reduce reliance on animal testing through the use of *in vitro* and *in silico* methods such as HTS, HCS, and computational modeling. Furthermore, this allows for the comparative analysis of large numbers of ENMs simultaneously and for hazard assessment at various stages of the product development process and overall life cycle. Using carbon nanotubes as a case study, a workshop bringing together national and international leaders from government, industry, and academia was convened at the University of California, Los Angeles, to discuss the utility of ATS for decision-making analyses of ENMs. After lively discussions, a short list of generally shared viewpoints on this topic was generated, including a general view that ATS approaches for ENMs can significantly benefit chemical safety analysis.