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Abstracts

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Keynotes

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157 Keynote: Understanding Exposure, Hazard Identification, and Human Health Effects: How Ultrafine/Nano Particle Toxicology Influenced Occupational Safety and Health

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Particles and fibers, whether process-derived, engineered, or environmental, have the possibility to cause adverse health effects when inhaled. Historic occupational particulates, such as coal, silica, and asbestos were clearly associated with human disease and induced a human health burden. This necessitated worldwide formation of national institutes to evaluate and mitigate exposures and mechanisms. The scientific evaluation of historic exposures set the stage for conducting air pollution/particulate matter research demonstrating that adverse health outcomes from particulates created potential risk for the general population, not just an occupational workforce. Research soon showed that adverse effects were not confined to the primary target site (e.g., lung) but also included cardiovascular, neurological, and developmental dysfunction. The evaluation of particulate matter, especially the fine and ultrafine fraction, quickly adapted to the rapid expansion of engineered nanomaterials. However, the study of novel engineered nanomaterials required a transition to preventative measures when interpreting controlled toxicity evaluations. Shifting the paradigm of particulate toxicology from explaining a chronic disease to intervening prior to a health burden brought many challenges to toxicologic research, exposure science, and responsible commercialization. Challenges included physicochemical characterization of nanoscale material, toxicologic research proceeding without exposure science guidance, and epidemiological investigations without post-exposure timepoints sufficient for evaluating potential induction of chronic disease. The navigation of these challenges shaped current approaches for evaluating multiple emerging technologies as well as influenced perspective on historic particles, especially those which resurface as part of complex mixtures.