Abstract

Advances of **nanoscale** science have produced nanomaterials with unique physical and chemical properties at commercial levels which are now incorporated into over 1000 products. **Nanoscale** cerium (di) oxide (CeO(2)) has recently gained a wide range of applications which includes coatings, electronics, biomedical, energy and fuel additives. Many applications of **engineered** CeO(2) nanoparticles are dispersive in nature increasing the risk of exposure and interactions with a variety of environmental media with unknown health, safety and environmental implications. As evident from a risk assessment perspective, the health effects of CeO (2) nanoparticles are not only dependent on their intrinsic toxicity but also on the level of exposure to these novel materials. Although this may seem logical, numerous studies have assessed the health effects of nanoparticles without this simple but critical risk assessment perspective. This review extends previous exposure and toxicological assessments for CeO(2) particles by summarizing the current state of micro and nano-scale cerium exposure and health risks derived from epidemiology, air quality monitoring, fuel combustion and toxicological studies to serve as a contemporary comprehensive and integrated toxicological assessment. Based on the new information presented in this review there is an ongoing exposure to a large population to new diesel emissions generated using fuel additives containing CeO2 nanoparticles for which the environmental (air quality and climate change) and public health impacts of this new technology are not known. Therefore, there is an absolute critical need for integrated exposure and toxicological studies in order to accurately assess the environmental, ecological and health implications of nanotechnology enabled diesel fuel additives with existing as well as new engine designs and fuel formulations.