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Abstract book

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1.2.5 Integration and Analysis of Available Information for Building Exposure Scenarios for Nanomaterials

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The goal of the EU FP7 NANEX project was to develop a catalog of generic and specific exposure scenarios (ES) covering the life cycle of certain uses of nano-TiO_2, nano-Ag, and carbon nanotubes. Leading scientists from twelve partner institutions in Europe compiled exposure information from a variety of sources that was relevant to occupational exposure, consumer exposure, and environmental release, including literature, industry case studies and exposure estimation models. This information was then used to develop ES in a format similar to that outlined by the European Chemicals Agency for compliance with the REACH regulation. Both the information used to build the ES and the ES themselves were evaluated for quality and completeness, and research needs were identified. The ES developed in NANEX should not be considered 'final' exposure scenarios due to the limited information available in the public domain and as the ES have not been 'validated' vs. no-effect levels (outside the scope of Nanex).

Although several studies describe uses of manufactured nanomaterials (MNM) in consumer products, very few studies contained specific or quantitative information on amount in and release from such products, making it difficult to build reasonable ES. Over 75% of the occupational studies reviewed that contained quantitative exposure information were associated with primary manufacture of MNM (largely lab/pilot scale information), and very little exposure information was found on exposure to downstream users. Lack of information on context or sampling strategy made it difficult to compare the results of these studies. It was demonstrated that current models to estimate worker or consumer exposure are not accurate since they are neither calibrated nor validated for specific nano exposure features. Due to lack of detection methods and knowledge of use volumes for MNMs, modeling is currently the best method available to estimate MNM release to the environment. Overall, the ES that were developed were often missing information or could only be completed using highly uncertain information.

The development of ES is challenged by both limited availability of exposure information and lack of standardization for interpreting and reporting information relevant to exposure conditions and exposure levels. The aim of future research should be to determine which factors (e.g., activity, material characteristics, operational conditions and risk management measures) are the greatest determinants of exposure and which types of information are most useful for describing exposure level. In the short term, while waiting for more precise exposure and hazard information on MNM, attention should be on risk management strategies.