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An in vitro approach for genotoxic evaluation of nanomaterials

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Manufactured nanomaterials (MNMs) are extensively produced worldwide and used in many different consumer products due to their unique physico-chemical properties. It is obvious that, as the properties change, unwanted properties (i.e. toxicity) are to be expected as well. While the production of MNMs is growing exponentially, research into the toxicological impact and possible hazard of nanoparticles to human health and the environment is still lagging and the strategy for a thoroughly evaluation of their possible adverse effects is under study. With this aim, in vitro tests are especially relevant in hazard assessment for screening purposes and for identification of potential toxicity endpoints (OECD, ECHA, EFSA). In vitro approaches applied for testing traditional chemicals are suitable also for testing MNMs with some adaptations to take into account their specificities.

As first step, towards definition of reliable strategy for MNMs evaluation, developing preparation and characterization procedures based on standardized protocols are mandatory. Furthermore, in the last years scientific community is dealing with the identification of limits of available in vitro tests and setting new methods to overcome such limits.

Screening of genotoxic properties is part of risk assessment evaluation of MNMs. However, among the genotoxicity assays not all tests can be applied to MNMs (for instance the Ames test) or, alternatively, need some modifications due to the possible interference of NMs with assay procedures (for instance Comet or Micronucleus assays).

Based on the experience in national and international projects (e.g. NANoREG, NanoReg2), specific procedures for MNMs batch dispersion preparation and characterization as well as for the evaluation of their genotoxic potential will be discussed.

Presenter: Dr ANDREOLI, Cristina (ISS - Dipartimento Ambiente e Salute)

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