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What Can We Learn from the Nanotoxicology Publications?

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During the last decade several literature surveys on “Nanotoxicology” have shown that most of the published data on toxicological effects of nanoparticles or nanomaterials is not useful for risk analysis or risk assessment of these materials^{1, 2}. Although the evaluated publications use buzz words such as “toxicological effects”, “risk assessment”, “toxicity” or “genotoxicity” most of them do not respect the rules of toxicological studies. As the term “nano” in the title was nearly a guarantee for project proposals to get money within the last two decades, no one claimed for the adequate quality control which should be applied for toxicological studies.

Most of the published studies contain severe weaknesses such as missing controls, no well characterized materials or they show high-dose-experiments only to observe an effect which is publishable³. Altogether this ends up in the situation that we cannot use all published data without its critical evaluation⁴.

The evaluation of nearly 6000 publications is in some respect disappointing. If one looks carefully into the details of the published studies it becomes more and more apparent that many of these publications contain shortcomings as mentioned above and often the conclusions drawn from these studies are misleading¹. Hence, it would be a great mistake if regulation would be built upon such studies. Obviously, the above described limitations offer difficulties in issuing clear statements on “Safety Aspects of Nanomaterials”. International standards and harmonization of test protocols are urgently needed and should be used in all future projects and experiments.

Nanotoxicology or better nanosafety research may be pushed back on track if the researchers will respect measurement uncertainty and other important rules for biological studies in total and specifically for toxicological studies^{5,6}. One recent example for a possible approach to achieve better quality for nanosafety studies is available online. Here a consortium build up from 6 international institutes in different countries from America, Asia and Europe carried out a study on the harmonization of a cytotoxicity assay for the measurement of nanomaterials in an interlaboratory round robin⁷. This pioneering activity is our showpiece project and may serve as a set point for future nanosafety research quality standards.

References

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Primary author: Prof. KRUG, Harald (International Research Cooperation Manager, Empa - Swiss Federal Laboratories for Materials Science and Technology and Stakeholder - NanoCASE GmbH, Switzerland)

Presenter: Prof. KRUG, Harald (International Research Cooperation Manager, Empa - Swiss Federal Laboratories for Materials Science and Technology and Stakeholder - NanoCASE GmbH, Switzerland)

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