

Assessment of potential cancer risk of nanomaterials and nanoparticles released from products

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Nanomaterials are increasingly used in industrial and consumer products. The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has asked the Federal Institute for Risk Assessment (BfR) and the Federal Environment Agency (UBA) to provide an overview of the present state of scientific knowledge on the carcinogenic potential of various nanomaterials.

BfR and UBA conclude that a number of animal studies indicate that some nanomaterials such as carbon nanotubes (CNTs) and titanium dioxide (TiO₂) may be carcinogenic through respiratory uptake (inhalation). However, the available data is not sufficient to allow these materials to be classified as “potentially carcinogenic to humans” with reasonable certainty. This mainly results from the fact that the extent to which data from animal testing applies to humans and whether these effects are specific to the nanoscale or are rather due to other properties inherent to these substances is uncertain.

Furthermore, at the present time reliable conclusions can be drawn neither in regard to the release of nanomaterials from products nor to exposure. Sufficient data concerning the levels of nanomaterials contained in which products and preparations are not available. In addition, only a few studies have been carried out on the release of these materials from products, and a reliable measurement technology able to detect nanomaterials in different media is not yet available or currently under development. It is therefore not yet possible to assess the health risks of these materials for humans with reasonable certainty.

However, BfR and UBA conclude that despite existing uncertainties, findings on the carcinogenic potential of some nanomaterials should be taken seriously. Assessments should focus on the extent to which humans can be exposed to nanomaterials on a daily basis. At the same time, valid methods on all possible routes of exposure (inhalation, dermal, oral) to determine the toxicological properties of nanostructured materials should be developed. Generally under the present circumstances, carcinogenic hazards can only be characterised for a specific substance in a specific case. The assessment of potential health hazards of nanomaterials should thus be differentiated and material-specific.

The full version of this BfR Opinion is available in German on http://www.bfr.bund.de/cm/252/beurteilung_eines_moeglichen_krebsrisikos_von_nanomaterialien_und_von_aus_produkten_freigesetzten_nanopartikeln.pdf