

SCIENCE NEWS FLASH:
New ECETOC report addresses poorly soluble particles and lung overload

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Despite being regarded as biologically inert, many poorly soluble substances can still cause toxicity when high concentrations of small particles are inhaled repeatedly over a long time. This phenomenon is known from studies in laboratory animals as 'lung overload'. Normally, it begins with a reduction of lung clearance (less particles are removed due to diminished alveolar macrophage activity), followed by lung inflammation. This happens in all animal species, including hamster, mouse, rat, and primates. Rats appear to be particularly sensitive and eventually some develop lung tumours. The other species are less sensitive to these inflammatory changes and do not develop lung tumours.

The toxic effects are mainly caused by 'oxidative stress' and are independent of particle size (micro, nano, fine). Each species has a different level and pattern of oxidative stress and toxicity, which is probably related to differences in particle retention, distribution, clearance and detoxification in the lung.

So far, using epidemiological studies, lung tumours from particle overload have not been found in humans.

The animal studies indicate a clear toxicological threshold for these inflammatory events related to the dose of inhaled particles (no adverse effect level, NOAEL), and also for the development of tumours in the rat. This enables, for instance, the derivation of a no-effect level (DNEL) in humans or the setting of an occupational exposure limit value (OEL). Direct extrapolation of the effect levels from animals to humans (1 to 1) is warranted.

The findings of the task force are published as ECETOC Technical Report 122: *Poorly Soluble Particles / Lung Overload*. The Summary and free PDF of the report are available at <http://bit.ly/ecetoc-tr122>



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