

W.G. Kreyling / GSF München

Translocation of ultrafine solid combustion particles into the vascular and the central nervous system

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While epidemiological studies indicate associations between adverse health effects and exposure of susceptible individuals to ambient ultrafine particles predominantly originating from combustion processes in automotive vehicles and domestic heating, their dosimetry in the respiratory tract including deposition patterns and the biokinetic fate of ultrafine particles is not fully understood. Toxicological studies aim to identify mechanisms which are causal for the gradual transition from the pre-disposed physiological status towards patho-physiological disease. Cardio-vascular effects observed in epidemiological studies fuelled the discussion on enhanced translocation of ultrafine particles from the respiratory epithelium towards circulation and subsequent target organs like heart and liver eventually causing impairment of cardiac function and blood coagulability. Additionally, first studies indicate translocation of ultrafine particles to regions of the brain, hypothesizing that UFP deposited on the olfactory mucosa of the nasal region will be translocated along the olfactory nerve into the olfactory bulb. Therefore, the CNS can be targeted by inhaled ultrafine particles via such a neuronal route of translocation which opens the question whether inhaled UFP can cause CNS effects which needs to be determined in future studies.

This presentation aims to summarize the current knowledge and limitations of translocation of ultrafine particles towards secondary target organs as a potential source for adverse health effects.

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