

Risk assessment of inhaled airborne particles – clinical aspects and experimental designs

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Many studies clearly demonstrate the connection between air pollution and a wide variety of human respiratory and systemic health complications [1] [2]. As internal combustion engines are among the most important sources of air pollution, engine exhaust emission legislations have become progressively more stringent over the past few decades. As a consequence, new strategies have been developed to improve engine combustion, motor efficiency and exhaust after-treatment. It is however not fully clear yet which emission components are of greatest relevance, while the biological mechanisms that link air pollution and adverse health effects also remain poorly understood.

The aims of the presentation are to provide an overview of the current state of research and clinical aspects in the field, as well as about the development of sophisticated *in vitro* approaches mimicking the inhalation of airborne particles / exhaust for the toxicological testing of engine emissions. Data will be presented that show that the combination of an air-liquid exposure system and 3D lung-cell culture model provides an adequate tool for fast and reliable investigations of complete exhaust toxicity as well as the effects of particulate fraction [3] [4]. This approach yields important results for novel and improved emission technologies in the early stages of product development.

[1] Donaldson *et al* 2005. *Part Fibre Toxicol* **2**: 10. [2] Ghio *et al* 2012. *Curr Opin Pulm Med* **18**:144–150. [3] Müller *et al* 2010. *Environ Sci Technol* **44**(7): 2632-2638. [4] Steiner *et al* 2013. *Atmos Environ* **81**: 380-388.