

[A. Peters: Session 4B: Health Effects \(2\)](#)

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A System to Evaluate the Toxicity of Scooter Emission in Lung Cells *In Vitro*

It is known that diesel exhaust particles (DEP) have the potential to induce adverse health effects associated with pulmonary and cardiovascular diseases (Brunekreef et al, 2002) by inducing oxidative stress (Xiao et al, 2003), inflammatory reactions (Becker et al, 2005), and there is a link between exposure to diesel soot and lung cancer (Donaldson et al, 2005). The toxicity of DEP was studied by using an epithelial airway model (Rothen-Rutishauser et al, 2005). We have shown that DEP in suspension resulted in an increase of both of reactive oxygen species and of the pro-inflammatory chemokine, the tumor-necrosis factor alpha (TNF α , figure 1).

For a realistic exposure of cell cultures, a box was developed in which these cultures can be exposed at an air-liquid interface directly to exhaust emissions of scooters, the small two-wheelers, which are very popular nowadays. The exhaust is discharged and directed to a mass regulator, where it is diluted 1:100 to 1:1000 with absolute clean air. Before passing the cell cultures in an exposure chamber which was developed especially for exhaust exposure (Morin et al, 1999; Papaioannou et al, 2006), the diluted exhaust emission is heated to 37°C, enriched with CO₂ to an end concentration of 5% CO₂ and humidified to a relative humidity of 80%. Directly before the entering to the exposure chamber control measurements (CO and CO₂ concentration, temperature, pressure, humidity) are conducted. On the top of the round exposure chamber, which is located in the isolated and heated box (37°C), the scooter exhaust enters with a flow between 2-10 l/min and is spread evenly over the four exposed 6-well plates. The air is sucked at the bottom of the exposure chamber and again CO₂ concentration, temperature, pressure and humidity are measured. Parallel to the exhaust exposure experiments control experiments are conducted in a reference exposure chamber, where cell cultures are exposed to absolute clean air enriched in CO₂, humidified and heated.

It is planned to expose air-liquid cultures of the epithelial airway barrier model to scooter emissions and to evaluate the toxic reactions by measuring the oxidative stress as well as the inflammatory reactions. Preliminary results of the particle characterisation and the cellular analysis of cellular reactions will be presented.

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