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**Health Effects of Biofuels and Diesel Particulate Filter with a EURO-III Truck Engine**

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**BACKGROUND:** Biofuels increasingly receive interest as a replacement for fossil fuels due to economic and environmental benefits. The health effects of combustion-derived emissions, however, are still unclear. Here, we report a study in which standard low sulphur diesel (EN590) is compared to pure vegetable-derived fuel (PPO) and biodiesel (FAME). The latter in a series of blends: B5, B10, B20 and B100 (standard diesel with 5%, 10% and 20% biodiesel). European Transient Cycles (ETC) were conducted with these fuels using a Euro III truck engine. Also a continuously regenerating wall flow diesel particulate filter was mounted, tested with standard diesel fuel.

**RESULTS:** The pure biofuels PPO and B100 showed a fairly strong effect on NO<sub>x</sub> and PM. Both fuels showed a NO<sub>x</sub> rise of about 25% and a PM reduction in the range of 60% to 80%. The PM numbers (measured with the ELPI) showed a comparable reduction. This was across the entire size range. The results with wall flow diesel particulate filter showed a PM reduction both in weight and number of more than 95%. There was however a strong rise in NO<sub>2</sub> emission.

The analysis of non-regulated components included (oxy-, nitro-) PAH, aldehydes, hopanes and steranes. The biological tests included in vitro tests for mutagenic activity, DNA and chromosome damage, cytotoxicity and oxidative stress.

Interestingly, using the Ames assay a significant increase was displayed in mutagenic potential for both PPO and B100, in the absence of metabolic activation. B100 biodiesel caused significantly elevated levels of cytotoxicity. None of the samples showed a significant increase in DNA damage, irreversible chromosome damage or oxidative stress at the evaluated concentrations. Although absolute (oxy-, nitro-) PAH decrease, relative increase is suggested for some individual (oxy-, nitro-) PAH.

**CONCLUSIONS:** Taken together, exposure to emissions of biofuels results in adverse health effects in vitro. These observations cause concern about future usage of biofuels and warrant further investigation in the chemical compounds that mediate the toxic effects of biofuels. Furthermore, the results indicate that current legislation which is based on mass of PM emission might not adequately reflect health effects of environmental particulates.