THE EFFECT OF CHANGES IN DIESEL EXHAUST COMPOSITION AND AFTERTREATMENT TECHNOLOGY ON LUNG INFLAMMATION AND RESISTANCE TO VIRAL INFECTION

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ABSTRACT

Diesel engine exhaust changes in composition with modification of engine operation/configuration, including the addition of emission reduction technologies, such as low-sulfur fuel and catalyzed ceramic traps. While previous studies have shown that diesel exhaust can cause inflammation in rodents and humans and decreased resistance to respiratory infection in mice (Harrod et al., *Am. J. Resp. Cell Mol. Biol*., vol. 28, pp. 451-463), there is little information on the impact of changes in exhaust composition (resulting from change in engine operation) and aftertreatment technology on these effects.

To address this, identical inflammation and respiratory infection assessments were conducted after exposure of mice to diesel exhaust generated from a single-cylinder diesel engine generator under three steady-state operating conditions: 1) high-load operation, #2 certified fuel, diluted to 200 $\mu g/m^3$ particulate matter (PM), 2) low-load operation, #2 certified fuel, diluted to 200 $\mu g/m^3$ PM, and 3) high-load operation with ultra-low sulfur fuel and catalyzed ceramic trap, with same dilution rate as condition 1.

Changing the operation (load) of the engine resulted in a twofold change in particle organic content and a fourfold difference in particle size. Comparative results of the compositions of these three exposure atmospheres and the biological effects will be discussed.