A. Duschl / University Salzburg and MAAPHRI

Impact of Diesel exhaust on the immune system

The immune system communicates among its components and with the rest of the body by using proteins as chemical messengers, much like the nervous system uses electrical signals. Diesel exhaust compounds can interfere with immunity by impacting this communication system, resulting in enhanced, suppressed or skewed immune reactions which are all detrimental to the individuum. We have shown that for example pyrene, a polycyclic aromatic hydrocarbon compound of DEP, can induce production of the immunoregulatory proteins IL-4 and IL-8. Both have quite different functions, IL-4 being responsible for development of allergies, and IL-8 for inflammatory responses induced by cellular stress. Molecular investigations show that even the mechanisms by which pyrene is affecting these proteins are clearly different. Effects of Diesel exhaust and its compounds on immunity and health appear to be mediated by multiple and complex mechanisms, which suggests that the analysis of single substances and the application of only one type of bioassay will be insufficient to estimate the impact of pollution. We are developing within the EU 5FP project MAAPHRI systems to analyze several key regulators of immunity in parallel in a robust assay suitable for exposition towards complete gaseous and particulate pollutants under controlled conditions.

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