

Adjuvant Function of Diesel and Toner particles in the Development of Allergies

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Aeroparticles are potential contributing factors to the increasing prevalence of allergies. For example, diesel exhaust particles (DEP) are found to act as adjuvants during allergic sensitization. Oxidative stress is assumed to play a key role in these adjuvant effects (Li et al., 2015), but the exact chemical processes and signaling pathways remain unclear. Our study is aimed to unravel the chemical mechanisms of adjuvant effects of aeroparticles on allergies. In particular, we investigated how particulate matters affected epithelial cells, macrophages and antigen presenting cells in the triggering and modulating immune responses to allergens. We use human monocytes-derived dendritic cells as APC precursors to investigate the influence of diesel and toner particles on the maturation and presentation of APC. By using lung epithelial cells, the role of epithelial cells in allergy development and enhancement is also studied. The effects of these carbonaceous particles and organic aerosol components on THP-1 macrophages are studied with regard to the activation of kinases, the modification of lipids and proteins, and the generation of damage-associated molecular patterns (DAMPs). In ovalbumin stimulated THP-1 macrophage cells, dose-dependent increased expressions of interleukin-6 and TNF-alpha were found during the simultaneous stimulation with DEP. The results obtained can contribute to the understanding of molecular mechanisms of allergy development and deterioration caused by aeroparticles.

Reference:

Li, N., Buglak, N., Convergence of air pollutant-induced redox-sensitive signals in the dendritic cells contributes to asthma pathogenesis, *Toxicology Letters*, 237(1), 2015