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Particulate allergens aggravate allergic asthma in mice

Ambient inhalable particulate matter acts as an efficient carrier of allergens allowing penetration deep into the distal airways. Epidemiological studies have shown an association between the increased incidence of asthma and levels of ambient particulate matter from air pollutants. Most experimental models investigating the pathogenesis of allergic asthma have used soluble allergens (sAgs) whereas knowledge is limited regarding the responses evoked by particulate allergens (pAgs). In this study, pathological responses to sAgs were compared with the same amount of allergens adsorbed on to the surface of polystyrene particles, in sensitised mice.

Regardless of allergen type, airways hyper-responsiveness and eosinophil infiltration were significantly greater with pAgs compared with sAgs. The response was blunted in mast cell (MC)-deficient mice suggesting that MCs are crucial in this response. MCs were able to distinguish between pAgs and sAgs. A fivefold greater MC IgE receptor-mediated response was seen with pAgs compared with sAgs. The mechanism for this was delayed endocytosis of pAg/IgE/FcεRI complexes. These complexes were retained in CD63⁺ endocytic compartments, which contain lipid rafts, thus enabling sustained signalling and increased production of proinflammatory mediators to occur. This was in contrast to sAgs where there was rapid movement of the allergen receptor complex out of the CD63⁺ compartments via a degradative endocytic pathway resulting in shorter signal transduction.

This study increases our understanding of the pathological responses evoked by allergens in particulate form and describes a cellular mechanism by which pAgs may evoke heightened inflammatory responses in allergic asthma.

► **Jin C**, Shelburne CP, Li G, *et al.* Particulate allergens potentiate allergic asthma in mice through sustained IgE-mediated mast cell activation. *J Clin Invest* 2011;**121**:941–55.

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