Air pollution and climate change effects on current day allergies

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Air pollution and climate change are potential drivers for the increasing burden of allergic diseases. Allergies are hypersensitivities initiated by specific immunologic mechanisms (abnormal adaptive immune responses). They constitute a major health issue in most modern societies, and related diseases such as allergic rhinitis, atopic asthma, eczema, and food allergies have strongly increased during the past decades [1]. The molecular mechanisms by which air pollutants and climate parameters may influence allergic diseases, however, are complex and elusive. The environmental factors such as increasing carbon dioxide, ozone, nitrogen oxides, and combustion- or traffic-related particulate matter can enhance the abundance and induce chemical modifications of allergens, increase oxidative stress in the human body, and skew the immune system towards allergic reactions [2]. During recent years, great progress has been made in the development and application of efficient sampling and measurement methods for bioaerosol particles and components, including microscopic, spectroscopic, mass spectrometric, genomic, and proteomic analyses [3]. Analyses reported that chemical modification by air pollutants can lead to changes in the structure of protein macromolecules (amino acid oxidation, peptide backbone cleavage, conformational changes cross-linking and oligomerization), and affect protein stability and other properties such as hydrophobicity and acidity of binding sites [4]. These and other post-translational protein modifications may induce multiple effects in the molecular interaction of allergens with the immune system [2].

References:


