Commentary Paper

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COPD and Asthma: Effects Beyond the Respiratory System

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Asthma and COPD are multidimensional diseases, with several systemic manifestations and associations with a number of comorbid diseases. The most likely link between asthma and COPD and these extrapulmonary conditions is the spillover of inflammatory mediators from the lung, as systemic inflammation is associated with skeletal muscle wasting and cachexia as well as with cardiovascular, metabolic, and bone diseases. Asthma is characterized by chronic airway inflammation, and infiltration of T-lymphocytes, mast cells, eosinophils and monocytes/macrophages. This is associated with the increased expression of several inflammatory proteins, including cytokines, enzymes, receptors and adhesion molecules. Chronic obstructive pulmonary disease (COPD) is currently a leading cause of morbidity and mortality worldwide, with the main cause being long-term cigarette smoking in the Western world. Accumulation of inflammatory mucous exudates in the lumen and infiltration of the wall by innate and adaptive inflammatory immune cells, such as $CD4^+$ cells, $CD8^+$ cells, B cells, macrophages, and neutrophils, and the formation of lymphoid follicles are all features of the observed inflammation that correlate with the severity of COPD. Previous studies have suggested that autoimmune mechanisms may contribute to the pathogenesis of COPD. Serum autoantibodies against elastin and bronchial epithelial cells along with corresponding IgG and complement (C3) deposition have been observed in COPD. In this regard, we have shown the presence of antibodies against carbonyl-modified protein neoepitopes in both COPD and a murine model of chronic exposure to oxidative stress. Thus, it seems that asthma and COPD are not only respiratory system dysfunctions but are also involved in multi-organ disorders.

More research is needed to understand the links between these diseases and to search for common treatable components. It seems likely that treatments, such as statins, that are already used to manage cardiovascular and metabolic diseases might also provide benefit in COPD patients, although it is important that randomized placebo-controlled trials be conducted to confirm this possibility. It is important to consider how the existence of a comorbid disease may affect the management of a patient who also has COPD. Guidelines are needed that recognize the association of these various diseases and provide advice on management, as well as defining questions for future clinical research. In turn, it is important for specialists in nonpulmonary areas to recognize that COPD may commonly occur in association with certain diseases in their specialty and to make the diagnosis using spirometry so that appropriate treatment may be instituted. Treatments already used for COPD might also be beneficial in some comorbid diseases. New therapies should also be considered as potentially beneficial to systemic manifestations and comorbidities. For example, an effective inhaled anti-inflammatory therapy may improve comorbidities by reducing the overspill of inflammatory mediators from the lungs that contribute to systemic inflammation. Alternatively, an oral anti-inflammatory treatment, as well as suppressing inflammation on the respiratory tract, may directly reduce systemic inflammation. It is clear that much more clinical and basic research is needed to understand the complexity of COPD so that more effective management of COPD and its various comorbidities will be possible in the future.