Lung diseases: Chronic Obstructive Pulmonary Disease (COPD, including asthma, chronic bronchitis and emphysema) and cystic fibrosis

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An oxidant/antioxidant imbalance in the lower respiratory tract has been proposed as the mechanism of lung injury in inflammatory lung disorders (1-3). An increased oxygen burden arises from the accumulation of inflammatory cells such as activated alveolar macrophages and neutrophils, which show an exaggerated release of reactive oxygen species (ROS). These ROS not only cause direct damage to the alveolar epithelial cells and parenchyma, but also act as signals perpetuating the inflammatory cascade.

The dominant antioxidant molecule in the lungs, both intracellularly and in the epithelial lung fluid (ELF), is glutathione (GSH) (4). It is thought that extracellular GSH protects the cells from oxidants released by inflammatory cells whilst intracellular GSH neutralizes the ROS produced as a result of normal cell metabolism, as well as detoxifying xenobiotics (4). The concentration of GSH in the ELF of the lower respiratory tract is normally more than 50-fold greater than that found in the plasma (5). In subjects with idiopathic pulmonary fibrosis, GSH deficiency in the ELF has been observed (6).

In order to improve or restore the putative oxidant/antioxidant imbalance in the lower respiratory tract in patients with obstructive pulmonary disease, it is obviously desirable to find an effective therapeutic procedure that would raise the antioxidant component (2,4). Since GSH is the major antioxidant in the lungs, GSH or the pro-drug N-acetyl cysteine (NAC) are logical choices that have been used. This has met with limited success according to Gillisen and Nowak (8). Aerosolized GSH has a low half-life and NAC has a bioavailability of about 10% (8). Moreover NAC can have unpleasant side effects including blurred vision, dysphoria, and gastrointestinal discomfort (9).

Immunocal® is a whey protein isolate particularly rich in the amino acid cysteine in bioavailable form. It is clinically proven to raise GSH values (9). In a double blind study using healthy young adults, lymphocyte GSH values rose by 35% in subjects fed Immunocal (20g/day for 3 months) whereas there was no change in casein-fed control subjects. Moreover, Dr Lands' group has published a case report in which a patient with obstructive lung disease was supplemented with Immunocal (20g/day) (7). After one month, whole blood GSH levels and pulmonary function increased dramatically.

References

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