Use of Exhaled Breath Condensate in the Study of Airway Inflammation After Hypertonic Saline Solution Challenge

To the Editor:

The recent study by Carpagnano et al (November 2005) found that the inhalation of hypertonic saline solution increased exhaled breath condensate (EBC) concentrations of interleukin-6 and tumor necrosis factor-α in healthy subjects and patients with asthma or COPD. Hypertonic aerosols also reduced the pH of BAL fluid samples. No significant changes in these parameters were observed after the inhalation of isotonic saline solution. The authors have concluded that hypertonic aerosols can induce airway inflammation.

Although the conclusions of the authors appear to be plausible, an alternative explanation is possible for their observations regarding EBC cytokine concentrations. The inhalation of hypertonic saline solution may have stimulated the release of airway secretions and/or caused an osmotic shift of water into the airways. Increases in the volume of airway secretions could in turn augment the contribution of respiratory droplets to the EBC, most (approximately 99.99%) of which is condensed water vapor. Increased EBC concentrations of cytokines could reflect the production of more or larger respiratory droplets rather than an increase in cytokine concentrations in the airway fluid. This possibility could have been addressed by measuring the dilution of respiratory droplets by water vapor, which can be readily determined by measuring the conductivity of EBC samples after lyophilization. Such measurements could also indicate whether the concentrations of cytokines in EBC are consistent with those reported from sputum samples and BAL fluid samples. The interpretation of EBC studies will always be difficult if no effort is made to measure the dilution. The effect of hypertonic aerosols on the pH of EBC is also problematic since it may be related to the effect of these solutions on the pH of the saliva and the release of volatile acids and bases (eg, NH₃ and acetic acid) from the mouth rather than to any effect on airway pH.

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