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Editorial

Salt: Good for What Ails the Airways?

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The study "Halotherapy for treatment of respiratory diseases" reported by Chervinskaya and Zilber (1995) in this issue of JAM suggests that daily, hourly exposures to salt (NaCl) particles in a Halo(salt)chamber may be therapeutic in COPD or asthma. Despite significant problems in their study design, their paper is presented in this issue as a "special article" to stimulate further interest in this therapy. Their results indicate that the patients with the worst baseline PFTs had very significant improvement (table 7 of the manuscript) following therapy. However, they also indicate that "base medication and other methods of treatment" were included with the halotherapy without providing many specifics on the frequency and dosages of these other medications/treatment. Furthermore, while they include a control sham group who had little or no change in PFTs over time, this group is not well characterized, i.e., the authors do not provide baseline PFTs for these patients. If the control group is similar to Group 1 of the treated patients (the patients with the best lung function, table 7), then they shouldn't have expected to see any changes in lung function over time, even with halotherapy. But, if the control group had similar baseline lung function to group 3 or 4 and received similar "other medication" without halotherapy, then the results would suggest that halotherapy is indeed beneficial.

What evidence is there that such therapy may be of benefit to patients with obstructive airways disease? The study by Pavia et al (1978) in COPD and a recent study by Robinson et al (1993) in CF suggest that hypertonic saline is effective at enhancing mucus clearance in these patients. Because Pavia et al (1978) showed increased sputum production, despite similar cough frequency, for saline vs. no treatment, they concluded that the saline-induced speeding of clearance was likely due to enhanced cough clearance. Spontaneous cough was also present during treatment in CF patients studied by Robinson et al (1993), suggesting that increased cough productivity may also play a role in their saline-induced acceleration of CF clearance. Likewise in the present study (Chervinskaya and Zilber, 1995), the authors report that their patients' cough became more productive following halotherapy. Pavia et al (1978) suggest that the increased salt concentration in airway surface fluid promotes transfer of water into bronchial secretions, altering the thickness of the periciliary layer and decreasing the viscosity of airway secretions to augment both mucociliary and cough clearance. More recently, Wills and Cole (1995) suggest that sodium chloride may improve mucus rheology and ciliary transportability independent of enhanced water transport.

New therapeutic strategies for improving clearance of secretions in CF have, in fact, concentrated on enhancing water transport onto the airway surface (Knowles et al, 1995) by increasing Na^+ and Cl^- ion concentrations in airway surface fluid. Treatment with the Na^+ channel blocker, amiloride, and triphosphate nucleotides (ATP or UTP) may improve the biorheology of airway secretions by blocking Na^+ absorption and stimulating Cl^- secretion through the luminal surface of CF airway epithelia. A pilot study of 6 month aerosolized amiloride treatment in CF has shown improved lung function in patients compared to placebo control (Knowles et al, 1990). Acute amiloride, alone, has also been shown to speed mucociliary and cough clearance in young CF patients (App et al, 1990) and, in combination with UTP, enhances clearance from the peripheral, small airways of adult CF patients (Bennett et al, 1994).

Similar effects of hypertonic saline on mucociliary clearance have recently been observed in asthmatics (Daviskas et al, 1995). But such treatment, especially with high concentrations of saline (14.4%), also induces bronchoconstriction in these patients (Daviskas et al, 1995). In fact, nebulized saline (4.5%) is commonly used as an inhalation provocation test for measuring bronchial hyperresponsiveness (Smith and Anderson, 1989). Thus, it is not clear that inhalation of salt particles would necessarily be beneficial in asthma. It may be, as the authors of the present article (Chervinskaya and Zilber, 1995) suggest, that the beneficial nature of halotherapy requires low airborne concentrations of salt administered over a long period. Indeed, they varied salt concentrations for different patient populations, table 3, with allergic asthmatics being treated with the lowest concentrations ($0.5\text{-}1 mg/m^3$). Inhalation of low salt concentrations may be sufficient to enhance mucus clearance in asthmatics while not provoking bronchoconstriction.

While the results of the present study (Chervinskaya and Zilber, 1995) must be taken "with a grain of salt", the notion that salt therapy may be beneficial in patients with chronic airway obstruction characterized by mucus hypersecretion is supported hypothetically and experimentally by these as well as other studies. In publishing this article, JAM hopes to stimulate further discussion and interest in this area of research, so that well controlled clinical studies may provide answers to questions raised here and place such drug-free therapies in proper context with pharmacological attempts to improve lung function in these patients.

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