Bronchoconstriction in Figure Skaters

Asthma in Athletes: Exercise-Induced Bronchoconstriction in Figure Skaters

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Exercise-Induced Bronchoconstriction in Figure Skaters

To anyone used to watching national and international figure skating competition on television, a common site seen in the interview booth after the performance is the skater holding flowers in one hand and a metered-dose inhaler in the other. The viewer is at once impressed by the tremendous abilities of these highly trained athletes who have not only overcome the competition, but have also done it battling an illness that promotes decreased exercise capacity. In this issue of CHEST (see page 312), Mannix et al have explained why the above scenario has become commonplace. By performing on-ice spirometry before and after a simulated long program, they found 43 out of 124 skaters (35%) decreased the FEV₁ by ≥10% within 15 min of completing the exercise. The ringside temperature was approximately 8°C and the humidity 60%. In 19 of 124 (15%), FEV₁ decreased by 15% or more. Regardless of which change (10% or 15%) in FEV₁ is used to define exercise-induced bronchospasm, this large number of athletes with exercise-induced bronchospasm is quite impressive.

Exercise-induced bronchospasm, as it occurs in humans, has been used as a model to help explain the pathophysiology of bronchial asthma. Data suggests that bronchoconstriction parallels heat loss and evaporative water loss from the airway mucosa. Drying of the mucosa leads to an increase in the osmolarity of the airway lining fluid which, in turn, may stimulate mediator release. An alternate hypothesis suggests that the bronchial circulation vasodilates excessively during airway rewarming, causing vascular engorgement and reduced airway calibre. Whatever mechanism is involved in producing airflow obstruction, skaters perform in an atmosphere most conducive to triggering exercise-induced bronchoconstriction given the coolness and dryness of the air.

A third factor that may play a role is the air pollution generated by ice grooming equipment. The concentration of "indoor" pollution was not measured in this study. Two recent studies have suggested that exposure to ozone does not enhance exercise-induced bronchoconstriction. Weymer et al¹ challenged subjects with concentrations of ozone from 0.10-0.40 ppm prior to an exercise challenge using warm, dry air (21°C, 40% relative humidity). The ozone exposure did not sensitize airways to produce greater exercise-induced bronchoconstriction, defined in this study by a decrease in the FEV₁ ≥20%. Fernandes et al² using ozone 0.12 ppm did not find any change in exercise-induced bronchoconstriction, defined as a 15% decrease in the FEV₁, after a standard 6-min treadmill test. While these two studies suggest that ozone does not enhance exercise-induced bronchoconstriction, neither study was done in cool, dry air. In addition, other pollutants such as sulfur dioxide and nitrogen dioxide could possibly play an additive role.

While this high percentage of athletes with exercise-induced bronchoconstriction is at first glance impressive, a recent study done by Brudno et al³ studied 397 middle and high school athletes and found 187 (47%) with a decrease of 10% in the FEV₁ after a standardized treadmill test. One hundred and twenty-five (31%) had a ≥15% drop in the FEV₁ and 90 (23%) had a ≥20% drop in the FEV₁. These tests were done in an atmosphere of 22-25°C and a relative humidity of 45-55%. Fourteen percent of these responders were not recognized until 20 min after the exercise had been completed, suggesting that exercise studies should look at changes in the FEV₁ up to 20 min postexercise.

Whatever the cause or reason behind these unexpectedly high incidences of exercise-induced bronchoconstriction, these recent reports raise a number of questions. Is there an increase in exercise-induced asthma in the general population? The findings in a group of untrained school-age athletes as well as an elite group of highly trained athletes suggest that the prevalence has definitely increased, but the reasons for this are not apparent. Further larger epidemiologic studies should be done to examine this observation further.

Do these statistics suggest that exercise-induced bronchoconstriction may be an acquired phenomenon in some individuals? The data reported by Mannix et al underscores the need to do prospective screening on all athletes who perform at higher levels of intensity in order to answer whether or not exercise-induced bronchoconstriction can be acquired. While screening all athletes may be impossible, pre- and post-exercise spirometry in those at higher risk (eg. skaters, soccer players, basketball players, cross-country runners, and skiers to name a few), might help answer this question.

What help would knowledge of the diagnosis of exercise-induced bronchoconstriction provide these athletes? Because the bronchoconstriction occurred after exercise, one could argue that the performance per se might not be enhanced. However, because these individuals spend their careers practicing and developing skills, appropriate diagnosis and treatment of exercise-induced bronchoconstriction might help them achieve even higher levels of success.

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**Are Advance Directives Becoming an Endangered Species?**

Advance directives (ADs) get a lot of attention these days. Federal law, special interest groups, the ill, medical ethics literature, and even the popular media trumpet ADs as a convenient, effective way for competent patients to express their wishes about medical care in case of future incompetence. Yet, while many Americans say they like the idea of ADs, only 8 to 15% have signed one. The question arises, Are unidentified obstacles to signing ADs endangering their survival?

Recent studies, including one by Heffner et al in this issue of CHEST (see page 373), try to address this question. Of 218 pulmonary rehabilitation programs responding to Heffner’s questionnaire, 169 (77%) said education about ADs is appropriate in such programs, but only 73 (33%) give explicit instruction about ADs. The implication is that more education delivered at the proper times—such as during pulmonary rehabilitation—would convince more patients to sign ADs.

I disagree. Despite 5 years of intense publicity about ADs, completion rates remain low. We must identify obstacles other than inadequate education. Below I suggest some.

Obstacles from patients: ADs may create anxieties in patients. Some patients may worry about interrupting their busy physicians to discuss ADs when no immediately life-threatening illness exists. Other patients may suffer more substantial anxieties. Some patients, especially those poorly educated about ADs, may confuse ADs with testamentary wills and fear that ADs may take away their decision-making rights and even their property. Still other patients may not be able to face their own deaths. Attendant, deeply disturbing anxieties may prevent these patients from even considering ADs.

Obstacles from physicians: Certain characteristics of physicians—especially time urgency, concern for patients’ mental health, and the wish for certainty—may also create obstacles for ADs. Overwhelmed by other demands of patient care, many physicians will not bring up ADs during outpatient visits. Furthermore, despite contrary empirical evidence, many physicians believe talk about ADs upsets patients. Finally, some physicians expect too much of ADs: that they be recipes for treatment. ADs do not eliminate all prior uncertainties and may create some of their own. Thus, the uncertainties of using ADs—especially the legal liability—may discourage physicians from promoting ADs.

Obstacles from hospitals: Pressures for hospitals to contain costs and to join ever-larger chains also create obstacles for ADs. Layoffs resulting from such pressures may leave the remaining professional staff overburdened. They may ignore their legal duty to educate patients about ADs. Or the professional staff may reassign that duty to nonprofessional staff who may not grasp the importance of ADs and, thus, perform the duty in a perfunctory way. In addition, the ever-larger hospital chains may have difficulty providing the personal attention ADs require. Institutional priorities may reduce education about ADs to merely a brochure about ADs in the patient’s admission papers.

I believe ADs are a good idea that should not be allowed to die. With ADs, patients can be partners in decision-making about treatment even during their incompetence. But obstacles other than inadequate education may be making ADs an endangered species among clinical innovations. Clinicians and researchers must identify and remove those obstacles. Otherwise, ADs may become as extinct as dinosaurs or woolly mammoths.

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**Pulmonary Rehabilitation**

**Does the Site Matter?**

Strijbos and colleagues, in this issue of CHEST (see page 299), examine the importance of the site of pulmonary rehabilitation, comparing a 3-month rehabilitation program in the home (home pulmonary rehabilitation [HPR]) with standard outpatient pulmonary rehabilitation (OPPR), using a prospective...
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