# ATS CLINICAL PRACTICE GUIDELINE: SUMMARY FOR CLINICIANS

Series Editors: Carey Thomson and Kevin Wilson

## Exercise-induced Bronchoconstriction

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Recognizing that a substantial proportion of patients with asthma experience exercise-induced respiratory symptoms and that exercise-induced bronchoconstriction (EIB) occurs in individuals without a known diagnosis of asthma, the American Thoracic Society formed a task force that was charged with identifying and synthesizing evidence related to EIB and then using the evidence as the basis for treatment recommendations. The result was the publication of *An official American Thoracic Society clinical practice guideline: exercise-induced bronchoconstriction* in 2013 (http://www.thoracic.org/statements/resources/allergy-asthma/exercise-induced-bronchoconstriction.pdf) (1). This summary is prepared for practicing clinicians.

### Definition

Exercise-induced bronchoconstriction is acute airway narrowing that occurs as a result of exercise. It typically follows a modest period of high-intensity exercise, with episodes generally lasting between 30 to 90 minutes in the absence of treatment. Typical symptoms of EIB include dyspnea, chest tightness, cough, wheeze, and increased mucous production. However, symptoms alone are insufficient to identify patients with EIB.

### Diagnosis

The diagnosis of EIB is established by measuring the $FEV_1$ at 5, 10, 15, and 30 minutes after exercise (more frequently if a severe response is expected) and then comparing the values to preexercise values. A decrease of 10% or greater in the $FEV_1$ from the preexercise level is diagnostic of EIB.

The severity of EIB is classified according to the percent fall in the $FEV_1$ from the preexercise level. A decrease of greater than or equal to 10% to less than 25% is classified mild, greater than or equal to 25% to less than 50% is moderate, and greater than or equal to 50% is severe. However, these categories were established before the widespread use of inhaled corticosteroids. Today, a decline in the $FEV_1$ of greater than or equal to 30% in a person taking inhaled steroids is considered severe EIB.

Exercise challenge testing induces high levels of ventilation ideally by a rapid increase in exercise intensity over 2 to 4 minutes. Most protocols involve running while breathing dry air (<10 mg $H_2O$/L) with a nose clip in place. A valid test requires that a ventilation of at least 17.5 times the resting $FEV_1$ be achieved, preferably greater than 21 times the resting $FEV_1$. Once the optimum level of ventilation is attained, the subject is instructed to continue exercising at that level of ventilation for 4 to 6 minutes, after which serial measurements of lung function are performed (2). Alternative diagnostic tests include eucapnic voluntary hyperpnea of dry air, inhalation of hyperosmolar saline, and inhalation of dry powder mannitol.

### Treatment

#### Pharmacological Therapy

For all patients with EIB, use of an inhaled short-acting $\beta_2$-agonist (SABA) before exercise is recommended (strong recommendation, high-quality evidence) (3). The SABA is typically administered 15 minutes before exercise. For patients who continue to have symptoms despite using an inhaled SABA before exercise, or who require an inhaled SABA daily or more frequently, daily administration of an inhaled corticosteroid (ICS) (strong recommendation, moderate-quality evidence) or a leukotriene receptor antagonist (strong recommendation,

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moderate-quality evidence) is recommended. The choice between an ICS and a leukotriene receptor antagonist depends on the patient's baseline lung function and preference. In cases where the baseline lung function is below normal, an ICS is appropriate, as ICS therapy is recommended by consensus guidelines as first-line therapy when baseline lung function is below normal. It may take 2 to 4 weeks after the initiation of therapy to see maximal improvement.

Additional therapies are appropriate for patients who continue to have symptoms despite using an inhaled SABA before exercise or who require an inhaled SABA daily or more frequently. Administration of a mast cell stabilizing agent before exercise is recommended (strong recommendation, high-quality evidence), and administration of a short-acting anticholinergic agent before exercise is suggested (weak recommendation, low-quality evidence). Mast cell stabilizing agents are only available in nebulized form in the United States and are therefore not practical for use in the treatment of EIB.

For patients with EIB who have allergies and continue to have symptoms despite using an inhaled SABA before exercise, or who require an inhaled SABA daily or more frequently, use of an antihistamine is suggested (weak recommendation, moderate-quality evidence). However, it is recommended that antihistamines *not* be used to treat patients with EIB who do not have allergies (strong recommendation, moderate-quality evidence).

Finally, it is recommended that the following *not* be used to treat EIB: an inhaled long-acting $\beta_2$-agonist as single-agent therapy (strong recommendation, moderate-quality evidence) or an inhaled ICS administered solely before exercise (strong recommendation, moderate-quality evidence).

### Nonpharmacological Therapy

For all patients with EIB, interval or combination warm-up exercise before exercise is recommended (strong recommendation, moderate-quality evidence). For patients with EIB who exercise in cold weather, use of a device (e.g., face mask or scarf) that warms and humidifies the air during exercise is suggested (weak recommendation, low-quality evidence). Improving general physical conditioning and losing weight if obese may also be beneficial. For patients with EIB who have an interest in dietary modification to control their symptoms, a low-salt diet (weak recommendation, moderate-quality evidence) and supplementation with fish oils (weak recommendation, low-quality evidence) and ascorbic acid (weak recommendation, moderate-quality evidence) are suggested. We suggest *not* supplementing with lycopene (weak recommendation, low-quality evidence). ■

**Author disclosures** are available with the text of this article at www.atsjournals.org.

## References

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