

with the intensity of exercise and the environment. EIB should be diagnosed by means of objective testing, preferably standardized bronchoprovocation challenge, because the prevalence of EIB varies with type of challenge and climatic conditions of relative humidity and temperature. It is important to reiterate that there is no firm consensus for a positive response or the conditions under which exercise should be performed.

Diagnosis (Summary Statements 5-10) of EIB relies on performing a standardized bronchoprovocation challenge in a subject who has been shown to have normal to near-normal PFT results both before and after bronchodilator (Fig E1). Self-reported symptoms and therapeutic trials without a diagnosis are not diagnostic. In a subject who has no history of current clinical asthma, normal PFT results, and no response to bronchodilator, exercise challenge with a treadmill or cycle or in the sport venue or a surrogate challenge, such as EVH, might be indicated. With exercise challenge, the patient should achieve a heart rate at least 85% of maximum (95% in children) for 6 minutes after 2 to 4 minutes of ramping up.

If EIB is to be investigated in a patient with known asthma, a graded challenge with inhaled mannitol, if available, might be preferable for reasons of safety to diagnose EIB. If there is no response to a graded challenge and EIB is still suspected, then consider an ungraded challenge.

Differential diagnosis (Summary Statements 11-16) of EIB requires distinguishing inspiratory stridor alone from inspiratory stridor with or without expiratory wheezing. This is essential to differentiate EIB from exercise-induced laryngeal dysfunction. Diagnosis requires performance of appropriate exercise challenge, direct or indirect surrogate challenge, and flexible laryngoscopy. Providers should determine whether exercise-induced dyspnea and hyperventilation are masquerading as asthma. Furthermore, it is essential to perform spirometry and a focused detailed physical examination if shortness of breath with exercise is associated with underlying conditions, such as chronic obstructive pulmonary disease (COPD) or a restrictive lung condition. Providers should differentiate between exercise-induced anaphylaxis and EIB based on a history of shortness of breath accompanied by pruritus, urticaria, and low blood pressure. Appropriate cardiopulmonary exercise testing and referral to an appropriate specialist might be required when breathlessness with exercise with or without chest pain is caused by these mechanisms in the absence of EIB. A psychological evaluation can also be performed when history is suggestive of psychiatric disorder (Fig E1).

Therapy (Summary Statements 17-28) for EIB requires re-evaluation of patients with frequent EIB, which suggests poor asthma control, and those in whom appropriate management fails. Providers should recognize that there is inpatient and interpatient variability in the effectiveness of pharmacotherapeutic agents on an individual basis. Patients should be scheduled to have regular follow-up of their therapy to determine the effectiveness of the medication. Medications can differ in effectiveness over time because of variability of asthma, environmental conditions, intensity of exercise, and tolerance to β_2 -agonists, as well as patient compliance (Fig E1).

Inhaled β_2 -agonist monotherapy should be used only for short-term prophylaxis against EIB. Providers should only use a single dose of SABA, LABA, or both on an intermittent basis because this can protect against or attenuate EIB. SABAs are effective for 2 to 4 hours and LABAs for up to 12 hours. Caution is

recommended in daily use of β_2 -agonists alone or in combination with ICSs because this can lead to tolerance. Tolerance can be manifested as a reduction in the duration and magnitude of protection against EIB and a prolongation of recovery in response to SABAs after exercise.

Leukotriene modifiers can be used daily or intermittently to prevent EIB and do not lead to tolerance. However, they can provide incomplete protection and cannot reverse existing airway obstruction. Mast cell stabilizers, such as cromolyn and nedocromil, can be administered shortly before exercise to attenuate EIB but have a short duration of action either alone or as added therapy with other drugs for EIB. These agents are not currently available in the United States.

ICSs taken alone or in combination with other therapies can decrease the frequency and severity of EIB. However, ICSs do not eliminate EIB in all subjects, and ICS therapy might not prevent occurrence of tolerance from daily LABA therapy.

Anticholinergic agents provide inconsistent results in attenuating EIB. Methylxanthines and antihistamines should be used cautiously or selectively because they have inconsistent results.

Nonpharmacologic therapy is recommended by using pre-exercise warm-up to prevent EIB and partially reduce the severity of EIB. Dietary supplementation with fish oil (ie, omega-3 fatty acids) and ascorbic acid and measures to reduce sodium intake are inconclusive in reducing the severity of EIB.

Competitive and elite athletes might have EIB alone, which can have different characteristics than are seen in patients with EIB with asthma in relation to pathogenesis, presentation, diagnosis, management, and requirements by governing bodies for permission to use pharmaceutical agents. However, recent studies indicate that both recreational and elite athletes with EIB with asthma can be treated in a similar manner. EIB alone, without underlying asthma, although not extensively studied in athletes, responds to similar treatment as with asthma. The presence of EIB reflects active asthma. Good control of EIB can be attained with the management discussed above, leading to a healthy lifestyle, including regular exercise and pursuit of the chosen sport.

V. SUMMARY STATEMENTS

Summary Statement 1: In asthmatic patients EIB can indicate lack of control of the underlying asthma. Therefore treat the uncontrolled asthma to get control of EIB. [Strength of Recommendation: Strong; Evidence: D]

Summary Statement 2: A diagnosis of EIB should be confirmed by demonstration of airways reversibility or challenge in association with a history consistent with EIB because self-reported symptoms are not adequate. [Strength of Recommendation: Strong; Evidence: B]

Summary Statement 3: Evaluate EIB in elite athletes by using objective testing. [Strength of Recommendation: Strong; Evidence: B]

Summary Statement 4: Perform a standardized bronchoprovocation (exercise or a surrogate) challenge to diagnose EIB because the prevalence of EIB will vary with the type of challenge and the conditions under which the challenge is performed. [Strength of Recommendation: Strong; Evidence: A]

Summary Statement 5: In subjects with no current clinical history of asthma, use an indirect ungraded challenge (eg, exercise challenge or surrogate testing, such as with EVH) for assessing EIB in the recreational or elite athlete who has normal lung function. [Strength of Recommendation: Strong; Evidence: D]