

Testing for Exercise-Induced Bronchoconstriction



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KEYWORDS

- Exercise-induced bronchoconstriction • Eucapnic voluntary hyperpnea • Mannitol
- Airway hyperresponsiveness

KEY POINTS

- Exercise-induced bronchoconstriction (EIB) is an indicator of active and treatable pathology in persons with asthma, but also can occur in persons who do not have a clinical diagnosis of asthma.
- The objective documentation of the presence and severity of EIB also permits the identification of an individual who may be at risk during a recreational sporting activity or when exercising as occupational duty.
- Laboratory exercise challenge testing can have limitations in the assessment of EIB, as the ambient air conditions cannot often be well controlled, preventing an optimal airway dehydrating stimulus to induce EIB.
- Surrogate challenge tests, such as eucapnic voluntary hyperpnea and the osmotic challenge tests (eg, inhaled mannitol), have considerable practical advantages over laboratory exercise testing.

INTRODUCTION

Exercise-induced bronchoconstriction (EIB) is the term used to describe the transient narrowing of the airways that occurs during, although most commonly following vigorous exercise.¹ EIB is the term used to describe airway narrowing to exercise in both those with clinical symptoms of asthma (in the past termed “exercise-induced asthma”) and those who experience EIB in the absence of clinical asthma.² Although the initial aims of developing protocols for exercise testing were to identify airway hyperresponsiveness (AHR) in those with active

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asthma, testing also is used for the identification of EIB in recreational or competitive athletes.¹ These tests also have found a place in screening subjects susceptible to EIB who may be at risk from vigorous exercise during a recreational activity (eg, SCUBA diving) or an occupational duty (eg, defense, rescue, and police recruits).^{3–5} A variety of protocols for exercise testing have been established, such as treadmill running or cycling on an ergometer in adults.^{1,6} Protocols in children using treadmill or shuttle running, as well as a jumping castle, have been used.^{7–9}

Given that exercise per se was not required to cause EIB and that there are practical difficulties with exercise, the development of surrogate tests have made testing for EIB more clinically accessible and standardizable. The development of the bronchial provocation tests (BPTs), eucapnic voluntary hyperpnea (EVH), and the osmotic challenge tests (eg, hypertonic saline, inhaled dry powder mannitol), have found a place to identify both the presence and severity of EIB^{10,11} (Fig. 1). Documenting EIB identifies an individual who is highly likely to benefit from pharmacologic treatments and strategies (eg, warm-up exercise) to inhibit EIB.¹

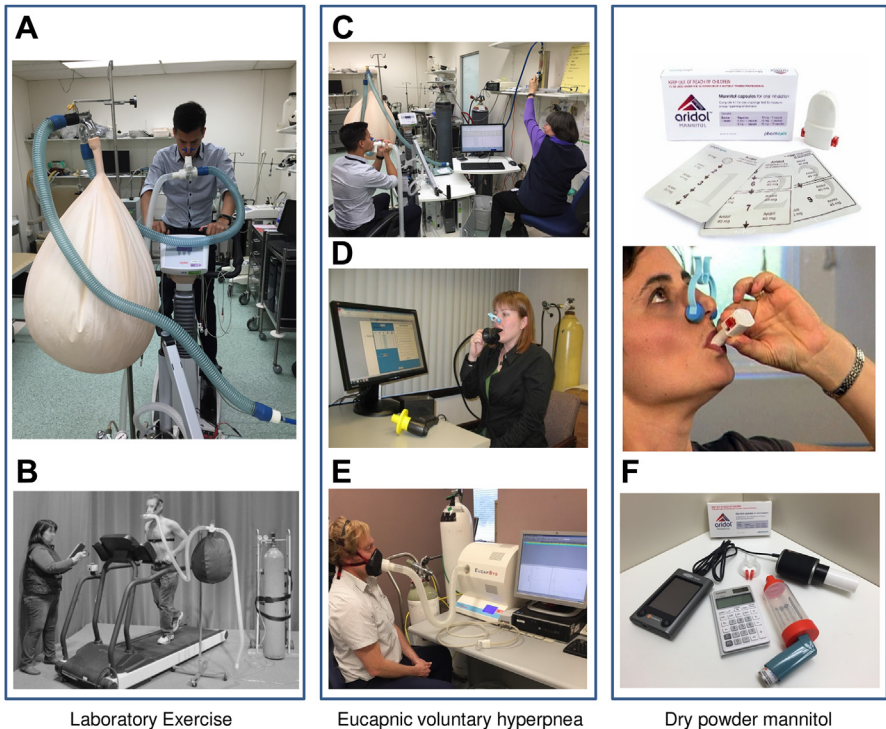


Fig. 1. An example of equipment required to perform laboratory exercise, eucapnic voluntary hyperpnea, or inhaled mannitol challenge testing. Exercise challenge testing: (A) Cycling exercise using a cycle ergometer. (B) Running exercise using a treadmill. Eucapnic voluntary hyperpnea: (C) Noncommercial system using sourced equipment. (D) Commercial device known as the hyperventilometer. (E) Commercial device known as the EucapSys system. (F) Mannitol challenge test kit and supporting equipment. (Courtesy of [A, C] ergoline GmbH, Bitz, Germany; [E] SMTEC SA, Nyon, Switzerland; and [F] Pharmaxis Ltd, Frenchs Forest, New South Wales, Australia.)

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