

Management of Asthma in the Athlete

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Management of Asthma in the Athletic Patient

- **Definitions**
- **Epidemiology**
- **Pathogenesis**
- **Clinical features**
- **Diagnosis**
- **Prevention**

Asthma Triggers

- Allergen exposure
- Respiratory infections
- Exercise
- Cold air
- Strong expressions of emotion (laughing, crying)
- Air pollution
- Cigarette smoke
- Household products
- Drugs / medications
- Pets
- Dust / dust mites

Asthma Triggers Important to the Adolescent and Active Patient

- **Tobacco**
- **Allergens**
- **Exercise/sports**
- **Scuba diving**
- **Cave dwelling**
- **High altitude**
- **Travel**

Definitions

- **Asthma**
- **Exercise-induced asthma (EIA)**
- **Exercise-induced bronchospasm (EIB)**

EIA Aggravants

- Continued exercise from 6–8 minutes at 80%–90% maximum heart rate
- Cold and/or dry weather
- Atopy
- Air pollution (e.g., ozone, nitrogen, sulfur dioxides)
- Poorly controlled asthma

Airflow During and After Exercise



- Athletic performance may significantly decline.
- Late-phase bronchospasm may occur 3–6 hours post-exercise.

Epidemiology of EIA / EIB

- **Can occur at any age**
- **Most frequently seen in children and young adults**
- **80%–90% of asthmatics have EIA**
- **7%–10% of the general population have EIB**

EIA Epidemiology

Group	Prevalence
Asthmatics	90%
Allergic rhinitis	40%
General population	3%–13%
Competitive athletes	10%–20%
Cold weather athletes	Up to 50%
Army recruits	7%

EIB Screening in High School Athletes

- 238 varsity football players screened
 - 10% history of asthma
- 214 athletes
 - 13% African Americans (17/126)
 - 2% European Americans (2/82)
- Albuterol reversed bronchospasm
- Risk factors
 - Remote history of wheezing
 - Poverty area residence
 - High humidity

EIB Screening in High School Athletes

- 801 students screened
 - 46 known EIA / EIB
- 755 students
 - 45 identified EIA / EIB
- Overall incidence: 12%
 - 9% males
 - 16% females

EIB Screening in Professional Athletes

- **320 elite athletes screened**
 - **74 identified to have EIB / EIA**
 - **23% incidence**

Factors Modifying Risk and Severity of EIB

- **Ambient temperature/humidity**
- **Intensity/duration of exercise**
- **Air pollutants**
- **Underlying bronchial hyperreactivity**
- **Type of exercise**
- **Interval since last episode of EIB**

Pathophysiology of EIB



Pathophysiology of EIB ?

- **Airway warming and cooling**
- **Increased pulmonary tissue osmolarity**
- **Rewarming of blood in airways**
- **Discharge of bronchospastic mediators secondary to airway irritation**
- **Vagal nerve stimulation**

Typical Symptoms of EIB

- **Wheezing**
- **Coughing**
- **Shortness of breath**
- **Chest tightness**

Subtle Symptoms of EIB

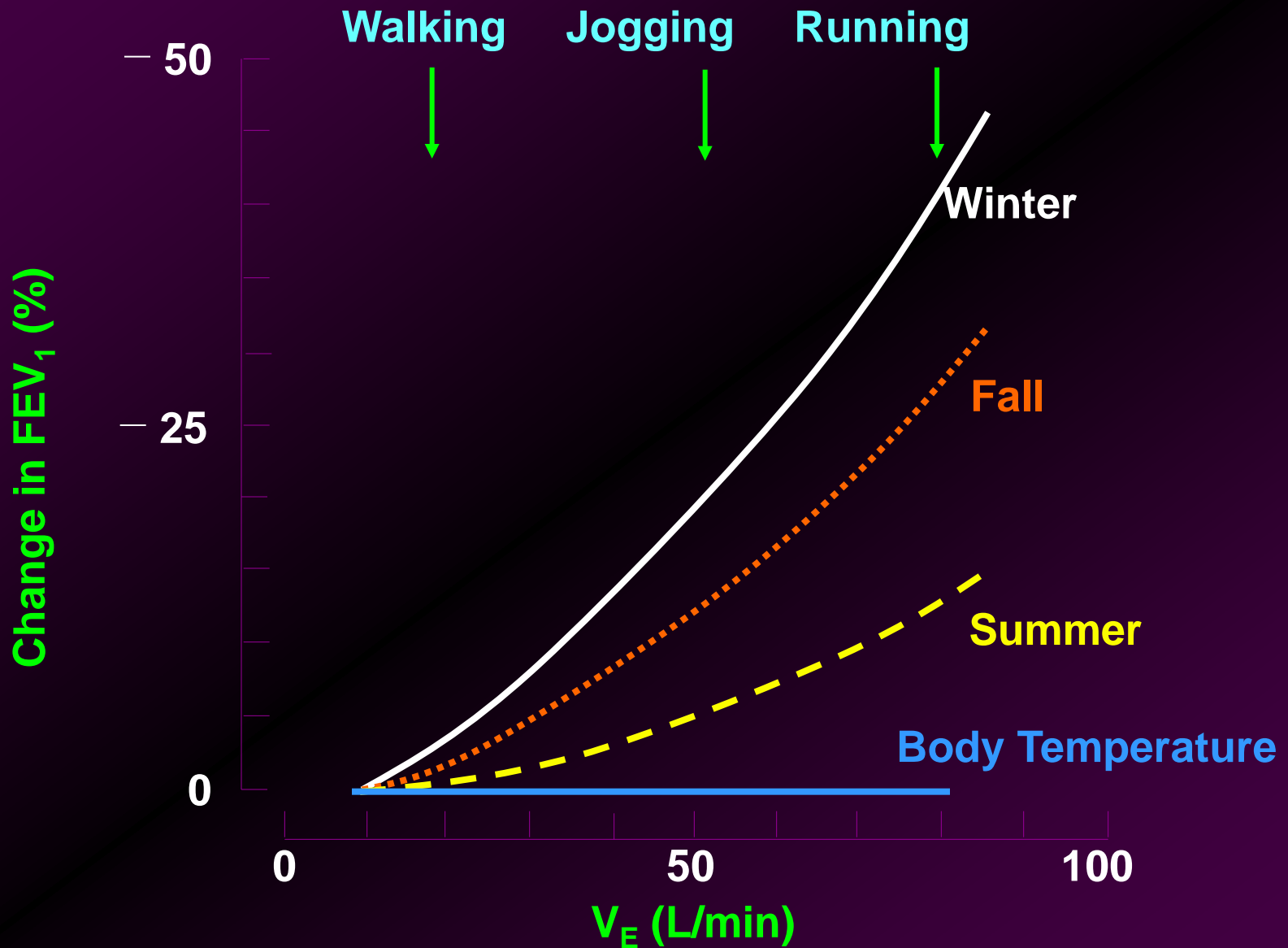
- Uncomfortable breathing
- Feeling out of shape
- Palpitations
- Headache
- Stomach ache
- Inconsistent athletic performance
- Frequent colds
- Chest congestion
- Muscle cramps
- Lack of energy
- Exercise fatigue
- Short exercise periods well tolerated, long exercise periods poorly tolerated

High Asthmogenic Activities

- **High minute ventilation activities**
 - Long distance running
 - Cycling
 - Soccer
 - Basketball
 - Rugby
- **Activities associated with cool, dry climates**
 - Ice hockey
 - Ice skating
 - Speed skating
 - Cross-country skiing

Low Asthmogenic Activities

- Tennis
- Handball
- Racquetball
- Gymnastics
- Golf
- Karate
- Wrestling
- Boxing
- Sprinting
- Swimming
- Diving
- Football
- Baseball
- Downhill skiing
- Isometrics
- Water polo



Differential Diagnosis of EIB

- Poor conditioning
- Upper airway obstruction
- Tracheal syndromes
- Pulmonary embolism
- Anxiety
- Hyperventilation
- Anaphylaxis
- Spontaneous pneumothorax
- Restrictive lung disease
- Cardiac disease
- Disorders of muscle metabolism

Diagnosis of EIB

- **History and physical examination**
 - **Do you have wheezing, coughing, or chest tightness with or following exercise?**
 - **Have you ever missed school or work because of these symptoms?**
 - **Do you have itchy eyes, hayfever, or allergic rhinitis?**
 - **Have you ever been told you have EIA?**

Diagnosis of EIB (cont'd)

- Confirmed by $\geq 10\%$ decline in PEFR or FEV₁ after an exercise challenge or hyperpnea challenge
- Test patients in their usual environments performing activities that produce symptoms
- EIB does not occur with every exercise session; definitive testing can be difficult

Surrogates for Exercise Testing

- Eucapnic voluntary hyperpnea
- Hyperosmolar aerosols (4.5 % saline)
- Dry powder mannitol
- Severity is based on FEV1 fall from baseline-
 - Mild – 10% to 25%
 - Moderate – 26% to 49%
 - Severe – 50% and greater

Factors Leading to a False Negative Diagnosis

- **Insufficient provocation**
 - **Inadequate workload**
 - **Temperature of inspirate too high**
- **Medications that attenuate EIB**
 - **Antihistamines**
 - **Long-acting methylxanthines**
 - **β_2 -agonists**
 - **Decongestants**

Prevention of EIB / EIA

- **Non-pharmacologic**
- **Pharmacologic**

Prophylaxis of EIA

- **Premedication**
 - **Inhaled beta agonists and/or cromolyn or nedocromil**
- **Warm up 10–15 minutes**
- **Interval or combination warmup exercise**
 - **Calisthenics with stretching exercise**
 - **Workout with objective of 50%–60% maximum heart rate for 5–10 minutes**
 - **Use beta-agonist if asthma develops and restart when clear**

Prophylaxis of EIA (cont'd)

- **Select sport knowing asthmogenic potential in terms of climatic conditions needed**
- **Breathe through the nose and provide adequate pharmacotherapy for underlying nasal conditions (i.e., allergy and environmental avoidance precautions); mask in cold weather**
- **Warm down by jogging and stretching for 10–15 minutes and avoid rapid warm to cold transition**
- **Low salt diet, fish oil, ascorbic acid**
- **Appropriate control of chronic asthma with anti-inflammatory medication**

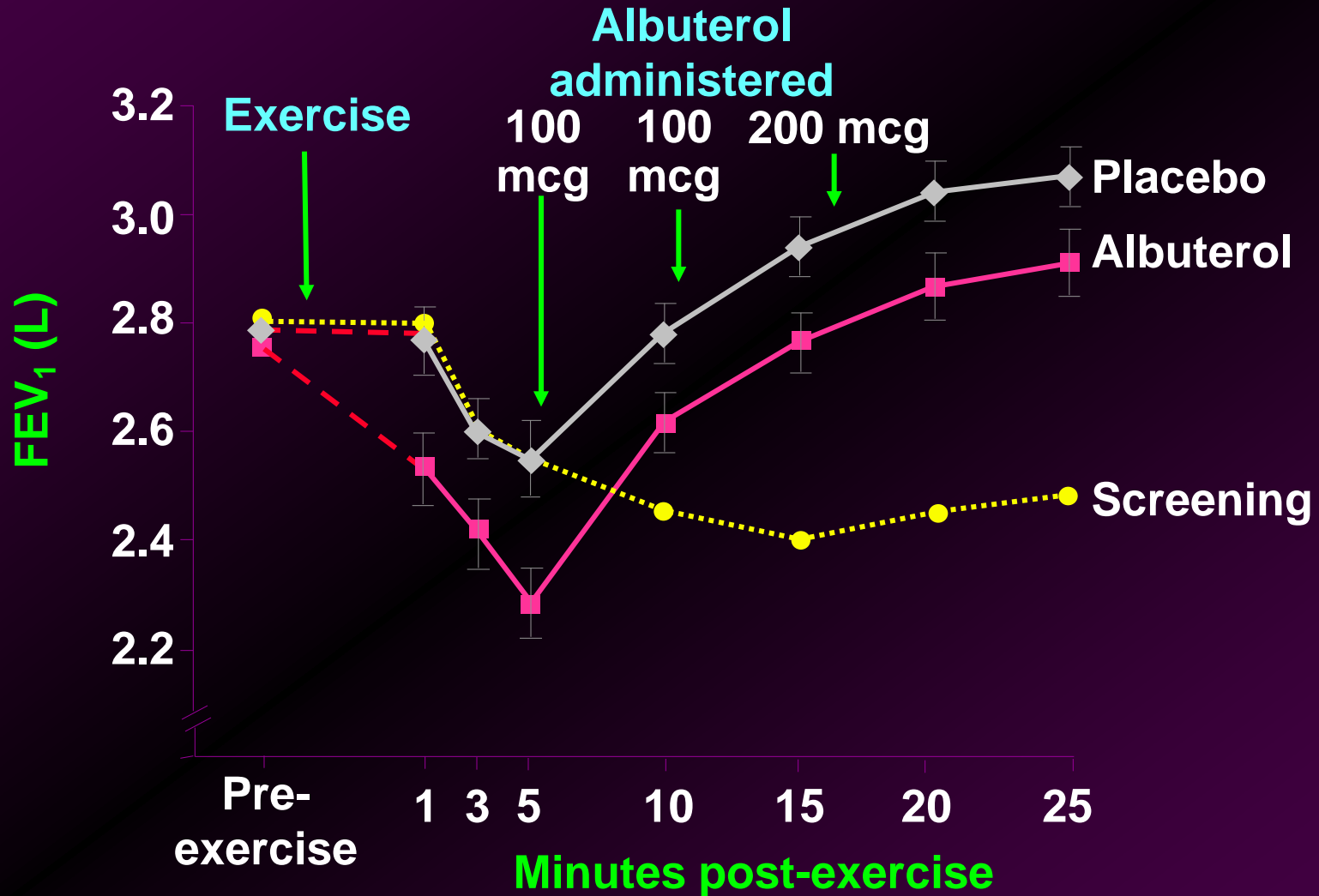
Premedications

Medications	Dose (puffs)	Pre-Exercise (minutes)
Beta₂-agonists		
SABA	2–4	15–30
Salmeterol MDI	2	30–60
Salmeterol DPI	1	30–60
Formoterol DPI	1	15–30
Mast cell stabilizers		
Cromolyn	2–10	10–20
Nedocromil MDI	2–4	10–20

Daily Medications

- Patients with EIA who have chronic asthma
 - First choice – ICS and LABA
 - Alternate choices
 - ◆ ICS and LTM
 - ◆ LTM and LABA
- Sometimes the addition of a mast-cell stabilizer (cromolyn or nedocromil)
- Treat allergic rhinitis and GERD

Regular Albuterol Use Leads to Increased EIB



Availability of Beta-Agonist Inhaler During Sports

- 579 children survey
- 80 reported asthma
 - Prevalence 14%
- 22% had rescue inhaler available

Asthma Deaths During Athletics

- 30 deaths confirmed histologically
- Primary activity running/gym
- Mean age 13.8 ± 5.5 years
- Absence of inhaled corticosteroid therapy
- No available rescue inhaler

US Olympic Committee (USOC) and International Olympic Committee (IOC) Drug Control

- **Allowed**

- Theophylline
- Cromolyn and nedocromil
- Montelukast
- Ipratropium

- **Notification necessary**

- Albuterol, terbutaline
- Salmeterol
- Formoterol
- Inhaled corticosteroids
- Fluticasone + salmeterol

NOTE: Antihistamines and topical nasal corticosteroids and decongestants allowed.

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USOC / IOC Drug Control: Banned Substances

- Bitolterol
- Metaproterenol
- Pirbuterol
- Oral beta agonists
- Injectable beta agonists
- Systemic corticosteroids
- Systemic decongestants

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Conclusions

- **EIA vs. EIB**
- **EIB is fairly common, especially among athletes**
- **Pathophysiology is unknown**
- **Most common symptoms were wheezing, coughing, or chest tightness during or after exercise**
- **Diagnosis is confirmed by >15% decline in PEF_R or FEV₁ after exercise challenge**
- **EIA – control chronic asthma and use prophylaxis**
- **EIB – prophylaxis only**

Conclusions

- **EIA commonly affects**
 - 10%–20% of the general population
 - Up to 50% of cold air elite athletes
 - Up to 90% of unselected asthmatics
- **Easily managed**
 - Warm-up and warm-down
 - Nasal breathing and pre-medication
 - Appropriate control of underlying asthma and inhalant allergy
 - Environmental avoidance and anti-inflammatory medication
- **Good control of EIA allows a healthy lifestyle avoiding the vicious cycle of sedentary life apprehensive of exercise**