

## Exercise-induced asthma

### Definition

- Transient reduction in lung function that occurs after vigorous exercise, now sometimes referred to as 'exercise-induced bronchospasm'

### Key diagnostic question

- "Do you feel more breathless or wheezy or symptomatic five to ten minutes after you stop exercise than during exercise" (Classical wheezing is uncommon)



## Prevalence

- 11% of 1984 US Olympic Team
- 12% - 15% of general population
- 35% - 40% with allergic rhinitis
- 90% of those with asthma
- 11% of 1984 US Olympic Team

Note the increasing prevalence with other allergic problems. This supports the theory of inflammatory burden as part of the etiology of all forms of asthma. This notion has become less certain, recently, and some prefer the term exercise-induced bronchospasm, to avoid suggesting a link that may not be proven.

Incidence - 1998 Winter Olympics

- All sports and gender - 23%
- Cross-country skiers - 50%
- Males 18% Females 26%

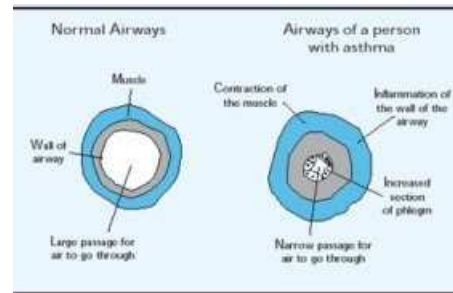
Performance of athletes with exercise induced asthma:

- One team gold
- One individual silver
- One individual bronze



## Pathophysiology

- Airway inflammation and hyper-reactivity
- Airway thermodynamic events
- Inability to warm and humidify during hyperventilation



## Clinical Consequences

- Bronchoconstriction after 6 to 8 minutes of exercise
- FEV1 and PEFV decrease significantly

## Suggestive History

- Coughing, wheezing, dyspnea, and chest discomfort with exercise in children and adolescents
- Decreased or limited endurance
- "Out-of-Shape" label
- Symptoms vary by season and temperature
- Minimal problems with swimming or warm, humid environments

## Exercise Relationships

- More vigorous the exercise, more rapid and severe bronchospasm
- Maximal levels of aerobic capacity are most likely to provoke EIA

## Refractory Period

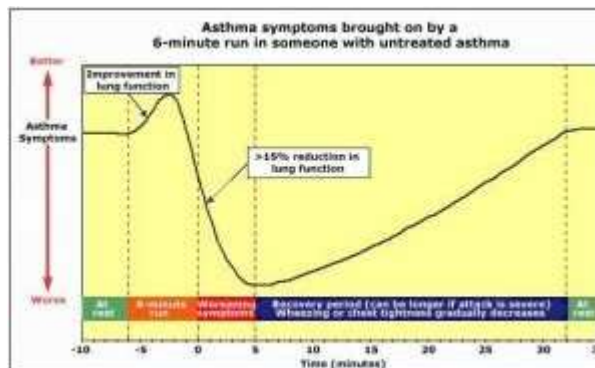
- 50% refractory within one hour
- With second challenge, less than half or original obstruction occurs
- Effect wears off after 2-3 hrs
- May be intermittent
- Possible use as non-pharmacologic management

## Aggravating Factors

- Duration, type, and exercise intensity
- \*\*Overall control of asthma
- Exposure to allergens
- Ambient air conditions
- Poor physical conditioning
- Respiratory infection

## \*\* Important

It is a practical impossibility to control exercise-induced asthma if control of an underlying asthma has not been optimized

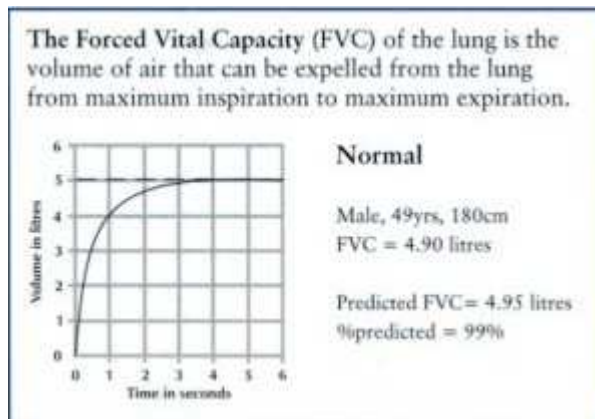


## Diagnosis

- Accurate history
- Physical examination
- Lung function testing (expiratory spirometry)
  - Resting
  - Post exercise
  - Pharmacologic challenge
  - Eucapnic, voluntary, hyperventilation

## Differential Diagnosis

- Asthma with exercise exacerbation
- General deconditioned state
- Gastro-esophageal reflux
- Vocal cord dysfunction
- Cardiac conditions



# Diagnostic Testing

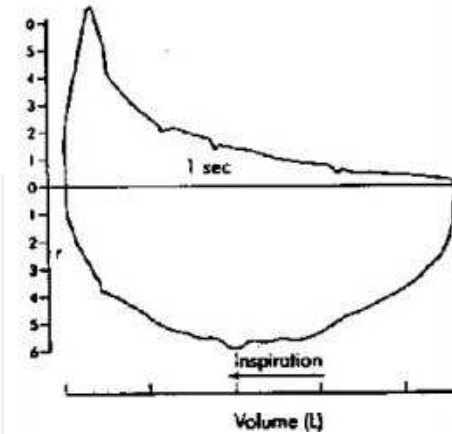
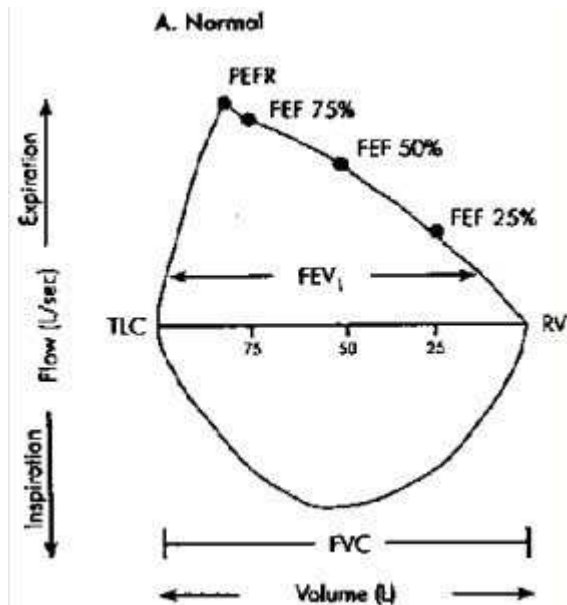
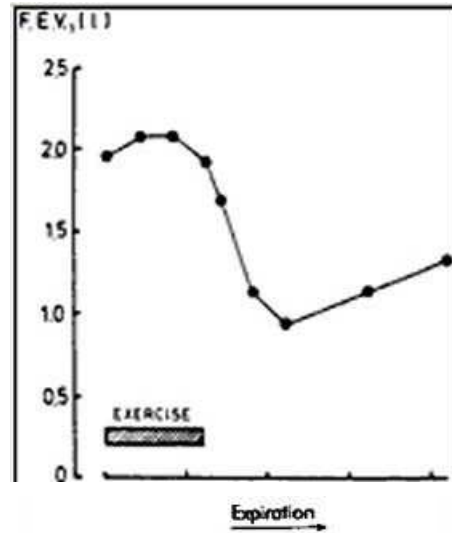
## Spirometry

Key points

- Effort dependent
- Ability to view "curve" is helpful
- FEV1, FEV/FVC and PEFR
- Normal in exercise induced asthma
- Abnormal in active asthma

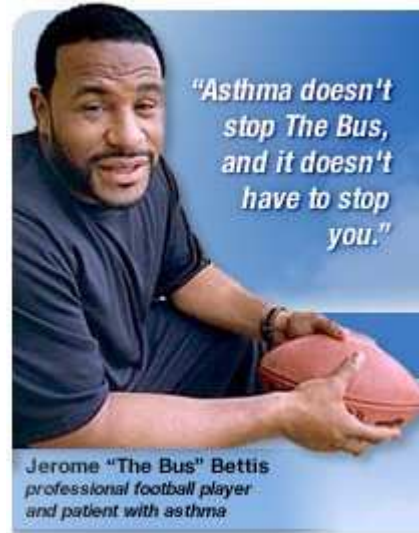
## Diagnosis

- Post-exercise decline of greater than 10% in FEV1
- Post-exercise decline of greater than 15% in PEFR



## Non-pharmacologic intervention

- Improve physical conditioning
- Short bursts of activity
- Warm up activities to take advantage of refractory period
- Warm, humid environments
- Breathing through the nose
- Face masks



## Pharmacologic intervention

Short acting beta-agonists (SABA)

- Effective in 85-90% given 15 minutes prior

Long acting beta-agonists (LABA)

- Effective in 55% given Q12H

Cromolyn and Nedocromil

- Effective in 75-85% given 45 minutes prior

Corticosteroids

Ipratropium

- Effective in 35-40%

adjunctive

## Advances in Treatment

- Beta agonists - short and long - show pronounced tachyphylaxis

- Montelukast shown to be effective

Combinations popular

- Long acting beta agonist with short acting as rescue
- Short acting beta agonist with Ipratropium
- Montelukast and short acting beta agonist





## Olympic requirements

- Notification of use of beta agonist seven days before event accompanied by objective evidence of need
- Eucapnic voluntary hyperventilation is optimal laboratory confirmation

## Eucapnic Voluntary Hyperventilation

- Hyperventilate dry air containing 5% CO<sub>2</sub> at room temperature for six minutes
- Target ventilation  
= 30 times subject's FEV<sub>1</sub>

