Lung Disease in Athletes

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What we will cover today

Exercise induced Bronchospasm
Vocal Cord Dysfunction

EIB vs EIA

- Many more athletes have EIB alone
  - Those with asthma usually have EIA
- EIB not associated with a trigger
- Pathology is different
  - Bronchial Biopsies
    - EIB – neutrophils
    - EIA – eosinophils, mast cells

Top 3 Tests for EIB

- Exercise Challenge: $\geq$ 10% fall FEV_1
  - 6- 8 minutes, achievig HR of $\geq$ 85% of max HR - in lab or at site of sport activity
- EVH: $\geq$ 10% fall FEV_1
  - Ventilate at 30*FEV_1 for 6-8 minutes inhaling air with 5% carbon dioxide
- MIC: $PC_{20} \geq 4$ mg/ml
  - Inhale increasing doses of methacholine

EIB in which sports?

Table 2 Examples of sports with a high and a low respiratory minute volume

Sports with high ventilation	Sports with low ventilation
Jogging	Deep sea diving
Football	Baseball
Swimming	Volleyball
Hockey	Weightlifting
Skiing	Bowling

Billen A and Dupont L. Post Grad Med J 2008;84:512-7

EIB/EIA and the Olympics

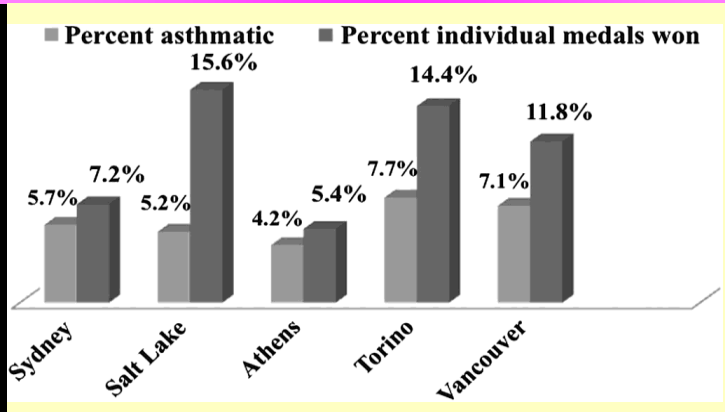


FIGURE. The percent of athletes with documented asthma/airway hyperresponsiveness, and the percent of medals they won at the Olympic Games in individual events.

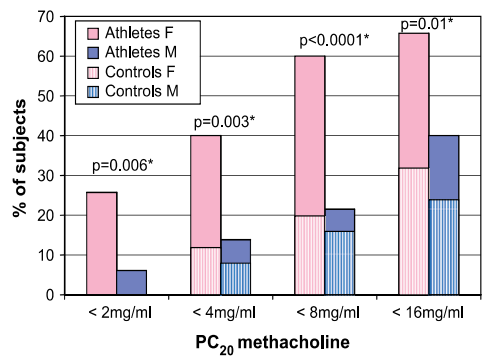
McKenzie DC and Fitch KD. Clin J Sport Med 2011; 21:46-50

AHR in athletes; gender differences

- Group I
  - 100 athletes in 7 sports disciplines
  - 50 sedentary subjects (controls)
    - EIB by Methacholine Inhalation Challenge
    - Questionnaire (symptoms of EI-RS)
- Group II (698: 384F, 314 M)
  - Athletes registered in Quebec Province
    - Questionnaire (symptoms of EI-RS)

Langdea J-B et al. Resp Med 2009;103:401-6

Group I Subjects



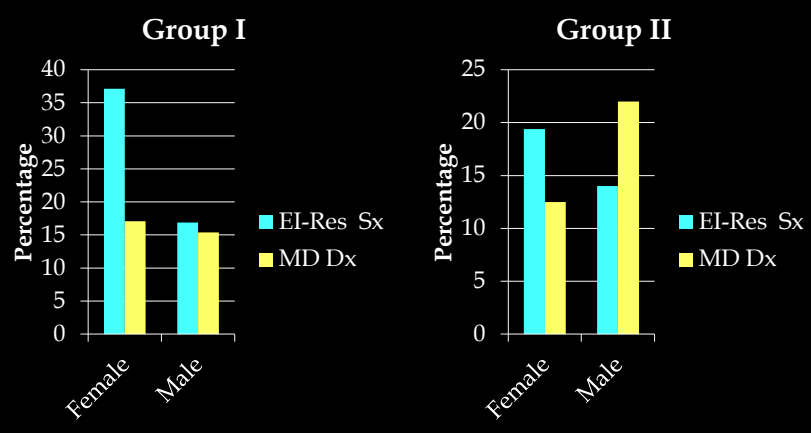
* Significant differences between male (M) and female (F) athletes
No significant differences between male (M) and female (F) controls

Figure 1 Gender differences in prevalence of AHR at various cut-off values of PC_{20}.

Langdea J-B et al. Resp Med 2009;103:401-6

AHR three fold more common in female athletes

EIRS in females fails to translate into MD Dx.



Langdea J-B et al. Resp Med 2009;103:401-6

Management of EIB

Pharmacological

- β_2-agonists
- Ipatropium Bromide
- Inhaled Steroids
- Sodium cromoglycate
- Leukotriene receptor agonists
- Caffeine

Non-pharmacological

- Warming up Exercise
- Face mask (cold environ)
- Breathing thru nose
- Avoidance of allergens
- Nutritional approach

Billen A and Dupont L. Post Grad Med J 2008;84:512-7

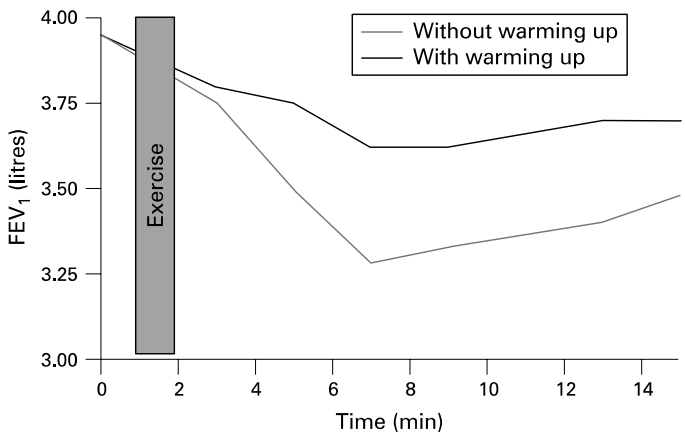


Figure 1 Refractory period after prior exercise. Values refer to the mean results of nine subjects.[28] FEV_1, forced expiratory volume in 1 s.

Billen A and Dupont L. Post Grad Med J 2008;84:512-7

Vocal Cord Dysfunction

- **Imitator of EIB**
  - 5-15% of patients with EI Dyspnea
  - SOB, Increased inspiratory effort, stridor, wheeze, throat tightness
    - Paradoxical adduction of vocal cords during inspiration

Vocal Cord Dysfunction

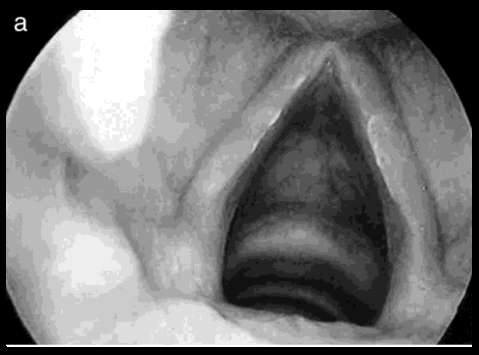
- Predominantly females
- Often have concomitant EIB or asthma
  - VCD is refractory to bronchodilators, but the EIB component responds
- Has been associated with GERD

VCD: Pediatric Study

- Underlying psychological condition?
  - Historically
    - Anxiety a factor
    - Stress and emotions
    - Social stressors in organized sports
  - This study did not elucidate such
- Long term outcome
  - 26/28 had resolution of symptoms

Doshi RD and Weinberger MM. Ann Allergy Asthma Immunol 2006; 96:794-99

Vocal Cord Dysfunction



Newsham KR et al.J Athletic Training 2002; 37:325-8
Chiang WC et al. Singapore Med 2008; 49:e110-112

VCD Treatment

- **Medical**
  - GERD, Allergies, Asthma, PND
- **Behavioral (Speech Pathology)**
  - Relaxation techniques
  - Control of breathing
    - Rate, I:E, Diaphragmatic

VCD Rx Female Athletes

- 20 female adolescents, mean age 14.1
  - 19/20 in competitive sports
  - Intervention
    - Education of patient and family member
    - Training for a coordinated breathing pattern (abdominal and thorax)
    - Home setting: sitting, standing, walking, jogging and fast pace running
  - Phone interview at 6 months

Sullivan MD et al . Laryngoscope 2001; 111:1751-55

VCD Rx Female Athletes

- Frequency of uncontrolled VCD events
  - 65% with none (13/20)
  - 10% with one (2/20)
  - 20% with 2-3 (4/20)
  - 5% with frequent events (1/20)
- Medication use (inhalers)
  - 80% none, 20% occasional

Sullivan MD et al . Laryngoscope 2001; 111:1751-55

VCD: Amitriptyline Study

- 62 pts whom VCD suspected or confirmed
  - Hx and PEx, Anxiety Assessment, MIC, Speech Path and Amitriptyline treatment
    - 10 mg 2-3 hours before bedtime
    - Increased by 10 mg weekly until adequate sleep achieved

Varney VA et al. J Asthma Allergy 2009; 2:105-110

Amitriptyline

Table 2 The response to amitriptyline: responses and doses of amitriptyline required and its benefit, treatment failures and side-effects

	Male	Female
Number of subjects	17	45
% responding to amitriptyline with cessation of VCD	94%	82%
Mean dose required (range)	20 mg (10–40)	20 mg (10–75)
% with improved insomnia	100%	100%
% with improved anxiety	90%	96%
Treatment failures where VCD did not cease	6%	18%
Intolerance due to side effects	Nil	2 (dry mouth)

Abbreviation: VCD, vocal cord dysfunction.

Varney VA et al. J Asthma Allergy 2009; 2:105-110

Ipratropium ?

- 6 patients given inhaled ipratropium as prevention and was effective
  - 4 of 6 had been given albuterol previously without success
  - A different 6 with EIVCD who quit competitive athletic activity did not get ipratropium had
  - Need for a RCT in EIVCD

Doshi RD and Weinberger MM. Ann Allergy Asthma Immunol 2006; 96:794-99

My VCD regimen

- Buspar (buspirone)
  A. 5 mg tid x 2 weeks
  B. 10 mg tid x 2 weeks
  C. 15 mg tid x 2 weeks
- Most only need step A, some step B and rarely step C
- NO published data - just some success

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