Cold and Coughing

Understanding common respiratory conditions in winter sport athletes

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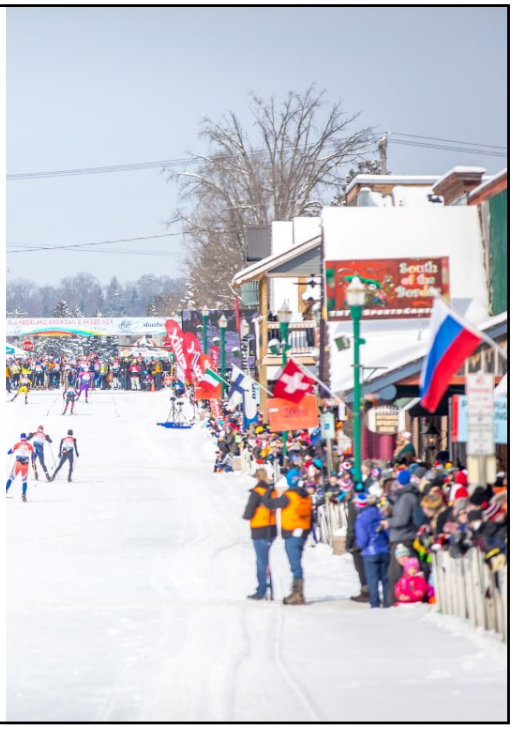
It's February in Northern Wisconsin…

- You are covering the Birkie
- 10 minutes in, a skier starts coughing, wheezing, and laboring to breathe
- They showed up late and did not warm up
- You take them into a warming tent and provide Albuterol inhaler
- 30 minutes later, symptoms resolve



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Objectives

- By the end of this presentation, attendees should be able to:
  - Recognize the signs and symptoms of cold-induced bronchoconstriction (CIB)
  - Explain the physiology of CIB
  - List other respiratory conditions induced by cold exposure
  - Describe strategies for management and prevention of CIB

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Recognizing CIB

- Most prevalent respiratory condition caused by cold weather in sports medicine
- Wheezing, coughing, shortness of breath, chest tightness
- Peak within 8-15 minutes of exposure/exercise
- Resolve within 60 minutes
- Common in athletes with underlying asthma or allergies
- Rates up to 50% in elite cross-country skiers

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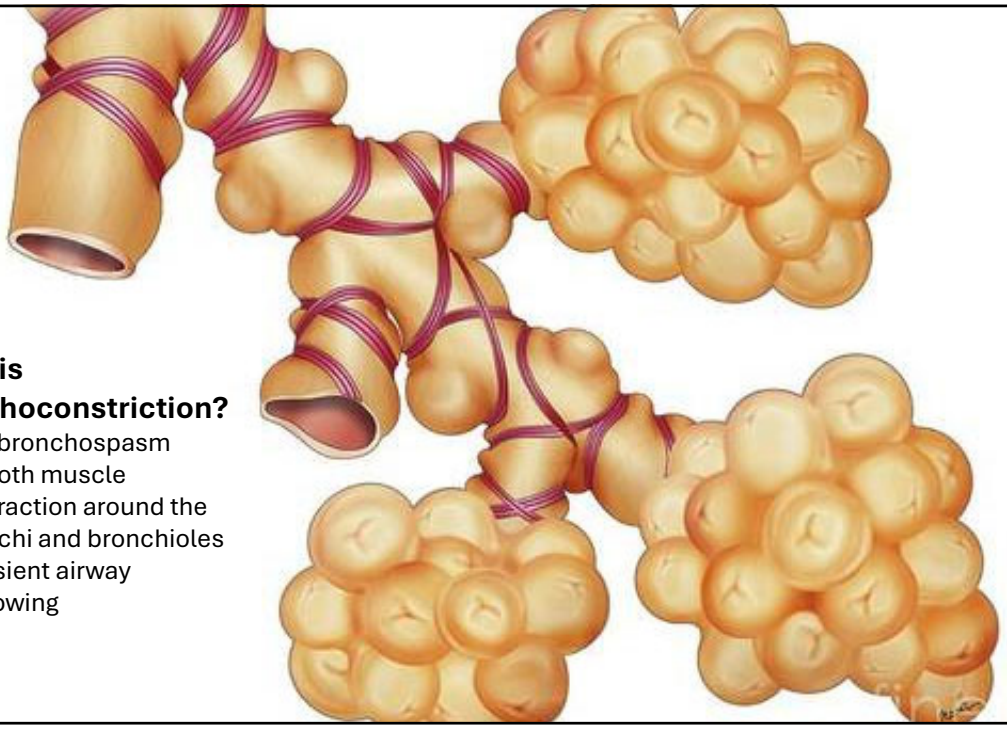

What is bronchoconstriction?

- AKA bronchospasm
- Smooth muscle contraction around the bronchi and bronchioles
- Transient airway narrowing

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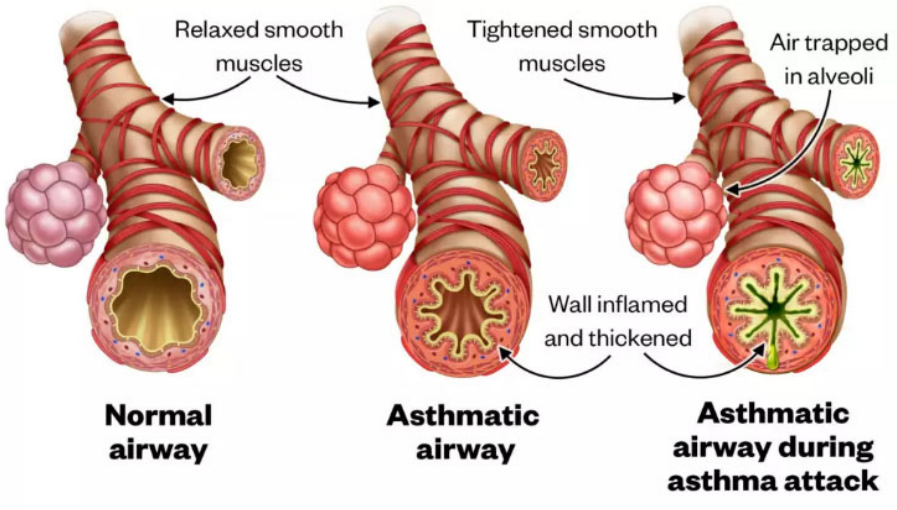
A key feature of asthma attack



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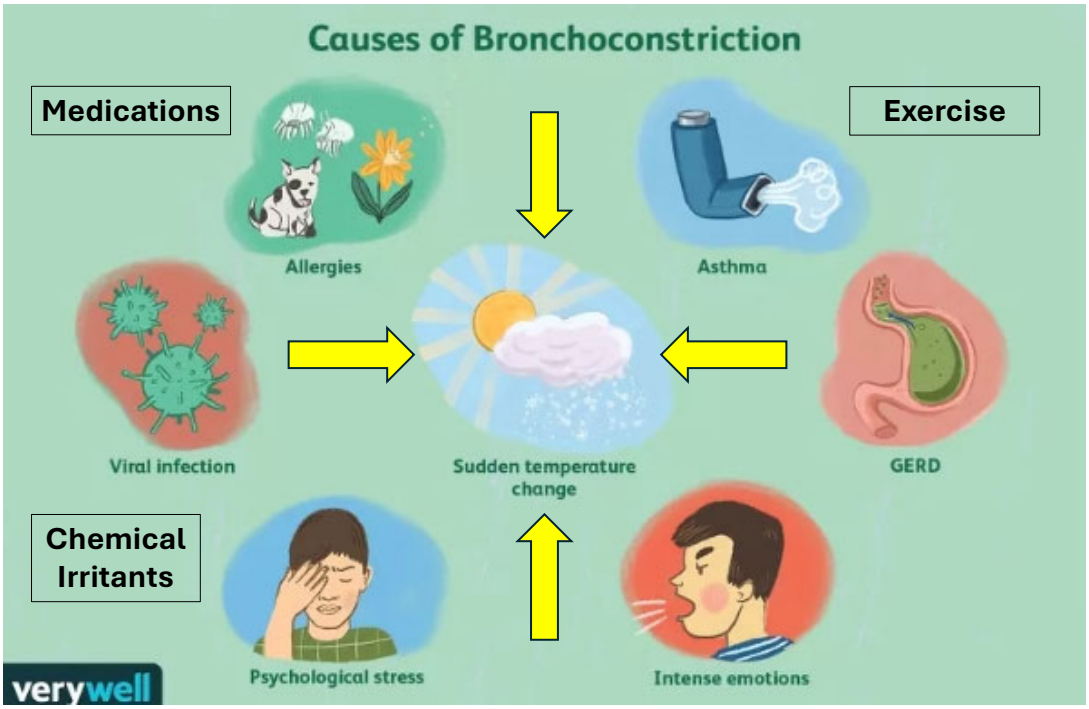

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Physiology of CIB

- Rapid ventilation of cold, dry air
- Airway surface drying and hyperosmolarity -> bronchoconstrictive mediators from airway cells -> bronchospasm
- Neurogenic reflexes from skin cooling (independent of direct airway cooling)
- Disruption of epithelial barrier integrity -> increased inflammatory cytokines and mucus hypersecretion
- Altered ion transport -> smooth muscle contraction

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Other respiratory conditions caused by cold exposure

- Exercise-induced bronchoconstriction (EIB)/asthma exacerbation is most common respiratory condition in winter athletes
- Upper airway cough syndrome (UACS) - AKA post-nasal drip syndrome
- Exercise-induced vocal cord dysfunction (EIVCD) - inspiratory difficulty, stridor
- Non-cardiogenic pulmonary edema – cold water immersion sports, high altitude
- Acute upper respiratory tract infections (URTI) - controversial

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Pharmacologic management of CIB

- Inhaled corticosteroids (ICS) (QVAR, Pulmicort, Flovent, Asmanex)
  - 1st line for regular control
  - Significantly reduce EIB
- Pre-exercise short-acting beta-agonists (SABA) (Albuterol)
  - Effective for acute prevention
  - Also used for rescue therapy
  - Regular use can lead to tolerance
- As-needed low-dose ICS-formoterol (Symbicort, Dulera)
  - Alternative for mild asthma/EIB
  - Non-inferior to regular ICS plus SABA
- Leukotriene modifiers (Montelukast)
  - Recent guidelines caution due to safety concerns
  - FDA black box warning: depression, aggression, suicidal thoughts
  - Liver damage, headache, GI issues, flu-like symptoms

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Prevention of CIB

- Pre-exercise warm-up routines
  - Variable or high intensity intervals
  - Induce refractory period (up to 2 hours)
  - Reduced risk and severity of CIB
- Mechanical barriers to warm/humidify inspired air
  - Heat and moisture exchanger (HME) masks, scarves, face coverings
  - Reduce airway irritation
  - HMEs improve lung function and decrease respiratory symptoms in athletes exposed to cold
- Environmental modifications
  - Train indoors
  - Avoid roads/polluted areas
  - Improve ice rink air quality
- Education: self-management and breathing techniques
  - Nose breathing in cold air
  - Awareness of triggers
  - Manage coexisting conditions
- No evidence supports dietary or supplement interventions

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