Cough

Vincent Esguerra, MD
Assistant Professor-Clinical Medicine
Division of Pulmonary, Critical Care, and Sleep Medicine
The Ohio State University Wexner Medical Center

Cough; A Common Sign

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“My dear doctor, I am surprised to hear you say that I am coughing very badly, as I have been practicing all night.”

- John Philpot Curran
Cough as a Societal Burden

- Most common cause to seek medical attention
- ~12% of US population suffering from chronic cough
- Cost is approximately 3-10 billion dollars every year

Why Do We cough?

- Protective reflex
- Vector for disease spread

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Cough Reflex Arch

- Sensory Component (Vagus Nerve)
  - Ear Canals
  - Pharynx
  - Trachea
  - Carinas
  - Pleura
  - Pericardium
  - Esophagus and Stomach
Cough Reflex Arch

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Cough Reflex Arch

- Motor Component
  - Diaphragm
  - Intercostal Muscles
  - Epiglottis
  - Pelvic Sphincter Muscles

Cough Reflex Arch

- End result is foreign material, mucus, saliva droplets being expelled at 100-500 mph
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Excessive coughing

- Headache
- Rib fractures
- Emesis
- Pneumothorax
- Arrhythmias

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Logical Approach to Cough

- Duration
  - Acute: 0-3 weeks symptoms duration
  - Subacute: 3-8 weeks symptom duration
  - Chronic: > 8 weeks duration of symptoms without intervening resolution

- Associated Signs and Symptoms (Red Flags)
  - Hemoptysis
  - Lack of resolution with antibiotics
  - Pleuritic chest pain
  - Adventitious breath sounds
  - “B” symptoms

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Cough Questionnaires

- Used mainly for research purposes
- Can be useful in specially designated “cough clinics”
- Helpful in judging the severity of cough but not causation
Helpful Physical Exam Findings

- Pulmonary Exam
  - Egophony (highest +LR ratio for pneumonia)
  - Wheezes
  - Crackles (wet or dry)
  - Rhonchi
  - Dullness to percussion
  - Chest wall tenderness

- Extra-Pulmonary Exam
  - Edema and jugular venous distension
  - Clubbing
  - Dental carries
  - Posterior oropharyngeal erythema and nodularity
  - Lymphadenopathy
  - Otoscope exam of the ear and nasal passages

Acute Cough

- Upper respiratory tract infection
- Bronchitis, bronchiolitis, and pneumonia
- Heart failure
- Aspiration
- Inhalational injury or exposure

Acute Cough Treatment
Approach to Cough

Carleen Risaliti, MD
Assistant Professor-Clinical Medicine
Division of Pulmonary, Critical Care, and Sleep Medicine
The Ohio State University Wexner Medical Center

Case

• 74 yo man presents as a new patient for evaluation of chronic cough
  • Cough x 5 years – progressively worse
  • Productive of clear sputum
  • No hemoptysis
  • No fevers/chills, no night sweats
Case

- PMH:
  - DM
  - HTN
  - HLD
  - GERD
  - OSA
  - Chronic sinus disease
- PSH:
  - Tonsillectomy
- FH: CAD/MI, DM
- SH: +Former smoker with a 10 pack-year smoking history; quit 33 years ago

Common Causes of Chronic Cough

- Upper airways cough syndrome (post-nasal drip)
- Asthma
- GERD
- Medication side effects (ACE-i)
- Eosinophilic bronchitis

Upper Airways Cough Syndrome

- Most common cause of chronic cough
- Signs/symptoms:
  - Nasal congestion/drainage
  - Voice changes
  - Throat-clearing
  - Cobble-stoning of pharynx
- Testing
  - Usually not necessary – treat empirically first if high suspicion
  - CT sinuses – mucosal thickening, opacification
  - Allergen testing

Upper Airways Cough Syndrome - Treatment

- Topical/nasal corticosteroids
- Oral antihistamines
- Topical/nasal anticholinergic (i.e. ipratropium bromide)
- Nasal decongestant vasoconstrictor sprays (i.e. afrin/oxymetazoline)
- Oral leukotriene modifiers (especially if patient also has asthma)
Asthma

- Signs/symptoms:
  - History of atopic disease
  - Family history of asthma
  - Nighttime cough
  - Concurrent wheezing/dyspnea
- Testing
  - Spirometry

Gastroesophageal Reflux Disease

- Aspiration
- Activation of esophageal-bronchial cough reflex
- Irritation of cough receptors in the larynx/vocal cords and trachea

Asthma - Treatment

- Treatment based on severity

NHLBI 2007
Gastroesophageal Reflux Disease - Treatment

- Proton-pump inhibitor (PPI)
- Lifestyle modifications
  - Weight loss
  - Avoidance of caffeine, smoking
  - Elevation of the head-of-bed

Case

- PMH:
  - DM
  - HTN
  - HLD
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  - OSA
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Case

- Physical Exam:
  - VS: BP 130/82; HR 65; O2 sat 94% on RA
  - HEENT: Nose: +Boggy turbinates, no polyps; Oropharynx: No cobble-stoning
  - CV: RRR
  - Lungs: Clear to auscultation. No wheezes, crackles
  - Abd: Distended. Soft, non-tender
  - Extrem: Trace edema
  - Neuro: Non-focal
  - Skin: No rash
Case

• EGD (2015): Grade A esophagitis

What’s the diagnosis?

<table>
<thead>
<tr>
<th>Upper Airways Cough Syndrome</th>
<th>Asthma, cough variant</th>
<th>GERD</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic sinus disease</td>
<td>Symptoms worse at night</td>
<td>History of esophagitis</td>
<td>History of HTN and DM – double check meds</td>
</tr>
<tr>
<td>+Nasal congestion</td>
<td>+Heartburn</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Symptoms worse at night</td>
<td></td>
</tr>
</tbody>
</table>

Multi-factorial!

• “Chronic cough: Likely multi-factorial secondary to upper airways cough syndrome (post-nasal drip) +/- obstructive lung disease in the setting of underlying GERD”

• Plan
  • Prescribed Flonase
  • Recommended oral antihistamine
  • Educated about lifestyle modifications for GERD
  • Encouraged PPI
  • Ordered spirometry prior to next visit

Non-asthmatic Eosinophilic Bronchitis

• Signs/symptoms:
  • Cough
  • Normal spirometry/no bronchospasm
  • Sputum with eosinophilia
  • Elevated exhaled nitric oxide

• Treatment:
  • Inhaled corticosteroids
  • Oral corticosteroids

Multi-factorial!
Medication Effects

- ACE-I
  - Can present immediately or months later
  - Cough usually resolves 1-4 weeks after stopping medication
- Sitagliptin

Other Causes of Chronic Cough

- Chronic bronchitis/COPD
- Bronchiectasis
- Post-infectious cough (i.e. Bordetella pertussis)
- Malignancy
  - Primary pulmonary malignancy
  - Metastatic disease
- Sarcoidosis
- Chronic aspiration
- Interstitial lung disease
- Habit cough/psychogenic cough
- Unexplained chronic cough ("idiopathic" cough)

Assess for Red Flags!

- Weight loss
- Hemoptysis
- Occupational/environmental exposures

Still no luck?

- Time to refer!
Still no luck?
• Time to refer!
  ENT/Allergy
  Gastroenterology
  Pulmonary

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But while you wait…
• If no evidence of GERD, stop PPI
• Ensure patient is not on an ace-inhibitor
• Consider referral to speech language pathology (SLP)
  • Cough suppression techniques
  • Reduction of laryngeal irritation
  • Education
  • Psychosocial education, counseling

Cough Suppression Therapies
• Should only be considered after therapies directed at etiology of cough have been tried

Gibson et al, CHEST 2016
Smith and Woodcock, NEJM 2016
# Cough Suppression Therapies

<table>
<thead>
<tr>
<th>Class</th>
<th>Examples</th>
<th>Notes/Caveats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opioids</td>
<td>Morphine, codeine</td>
<td>Can cause dependency; respiratory depression</td>
</tr>
<tr>
<td>Non-opioids</td>
<td>Dextromethorphan (synthetic derivative of morphine)</td>
<td>At least as effective as codeine</td>
</tr>
<tr>
<td>Local anesthetics</td>
<td>Lidocaine</td>
<td>Variable results</td>
</tr>
<tr>
<td>Expectorants/</td>
<td>Acetylcysteine, carboxisteine</td>
<td>Alter volume/consistency of secretions</td>
</tr>
<tr>
<td>Mucolytics</td>
<td>Eucalyptus/menthol</td>
<td></td>
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<tr>
<td>Aromatic agents</td>
<td>TCAs; Paroxetine; gabapentin*</td>
<td>Gabapentin is associated with improvement in QoL in RCT</td>
</tr>
<tr>
<td>Antidepressants;</td>
<td></td>
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<td>Antiepileptics;</td>
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<tr>
<td>Antispasmodics</td>
<td>baclofen</td>
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Murray and Nadel 2010

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# References