Cough
Etiology, evaluation and treatments
Update 2012

**Cough characteristics according to etiology**

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| Cough caused by medication              | - Generally, it is non-productive and usually resolves within 4 weeks of stopping medication.  
  - Affects 5-20% of patients receiving an angiotensin converting enzyme inhibitor (ACEI). However, it has not been reported with ARBs (angiotensin receptor blockers).  
  - Beta-blockers may be implicated in chronic cough, often by aggravating underlying asthma. |
| Upper airway cough syndrome (UACS)      | - Rhinosinusitis and other upper airways disorders are the most common etiologies of chronic cough.  
  - This syndrome used to be called postnasal drip syndrome.  
  - The symptoms are often subtle (e.g. sensation of secretions in the back of the throat or impression of irritation of the upper airways).  
  - Examination may reveal signs of pharyngitis. Sinus X-rays or CT scans may indicate signs of sinusitis.  
  - The cough will diminish with nasal corticosteroids, a first- or latest-generation antihistamine or nasal anticholinergic, depending on the cause.  
  - Nasal saline rinses may also be helpful. |
| Asthma                                  | - Cough may be its only symptom.  
  - In the presence of suggestive symptoms, diagnosis should be confirmed by the demonstration of variable airway obstruction.  
  - The atopic history and ideally allergy skin tests should be documented.  
  - The cough will respond to asthma treatment, usually inhaled corticosteroids. |
| Gastroesophageal reflux disease (GERD)  | - Reflux can be the cause of the cough or its consequence. It may or may not cause typical symptoms such as heartburn or regurgitation.  
  - It is 1 of the 3 most common causes of chronic cough, and is responsible for approximately 25% of cases.  
  - It is recommended that the first diagnostic test be an evaluation of the response to empiric reflux treatment, such as a proton pump inhibitor. Esophageal pH monitoring can sometimes be useful; however, the pH can be normal if the reflux is nonacidic (alkaline reflux). |
| Chronic bronchitis                      | - Cough secondary to tobacco dependence is often considered normal for smokers. In the absence of significant respiratory function abnormalities, it resolves 2 to 3 weeks after smoking cessation.  
  - In long-term smokers, the possibility of cancer and COPD should be excluded.  
  - Chronic bronchitis is defined as a cough with sputum expectoration for at least 3 consecutive months for at least 2 consecutive years. |
| Non-asthmatic eosinophilic bronchitis (NAEB) | A difficult diagnosis for the primary care physician to make. Patients present with bronchial eosinophilia on sputum analysis, without bronchial hyperresponsiveness. The cough responds to inhaled corticosteroids, just as it does in asthma. |
| Post-infectious cough                   | - A respiratory infection is often the cause of this acute or subacute cough. It accounts for about 15% of chronic cough cases; thus other diagnoses must be excluded.  
  - Generally the cough is non-productive and resolves in several weeks. Chest and sinus X-rays are usually normal. |

---

**Parameter** | **Degree of Change**  
--- | ---  
FEV<sub>1</sub> forced expiratory volume in 1 second | >12% and ≥200 ml improvement 15 min. after administration of a bronchodilator  
>20% after 10 to 14 days of treatment with inhaled or oral corticosteroids  
PEF: peak expiratory flow measured with a flow meter such as the Mini-Wright | ≥20% improvement postbronchodilator or after repeated tests  
Methacholine challenge test: The PC<sub>20</sub> methacholine is the concentration required to cause a 20% drop in FEV<sub>1</sub> | CP<sub>20</sub> <8 mg/ml (Juniper method)  
The American Thoracic Society considers that there is a grey zone between 4 and 16 mg/ml.
Assessment Algorithms

**ACUTE COUGH**
(<3 WEEKS)

- Serious and potentially lethal condition
  - Pneumonia, severe exacerbation of asthma or COPD, pulmonary embolism, heart failure or other serious disease
  - Evaluate and treat

- History, physical exam ± tests
  - Infection
    - Upper respiratory tract infection (URTI)
    - Lower respiratory tract infection (LRTI)

- Condition that is non-life-threatening
  - Exacerbation of a pre-existing condition
    - Asthma
    - Bronchiectasis
  - Environmental or occupational causes
    - Upper airway cough syndrome (UACS)
    - Chronic obstructive pulmonary disease (COPD)

**SUBACUTE COUGH**
(3 TO 8 WEEKS)

- Postinfectious cough
  - Pneumonia and other serious illnesses
  - Assess and treat
  - Pertussis
  - Bronchitis

- History and physical exam
  - New condition or exacerbation of a pre-existing one
    - Upper airway cough syndrome (UACS)
    - Asthma
    - Gastroesophageal reflux disease (GERD)
    - Bronchitis

- Cough of non-infectious origin
  - Same evaluation as for chronic cough
In an arbitrary fashion, cough is classified as:
- Acute (less than 3 weeks in duration)
- Subacute (3 to 8 weeks)
- Chronic or persistent (>8 weeks)

**CHRONIC COUGH**
(>8 WEEKS)

- Investigate and treat
- Possible cause of cough identified
- History, physical exam and chest X-ray
- Smoking, use of ACEIs
- Discontinue

**Inadequate response to optimal treatment**

- **Upper airway cough syndrome (UACS):** empiric treatment
- **Asthma:** evaluate if possible (spirometry, bronchodilator reversibility test, bronchial provocation test) or treat empirically
- **Non-asthmatic eosinophilic bronchitis (NAEB):** look for eosinophils in sputum; if not present, treat empirically
- **Gastroesophageal reflux disease (GERD):** empiric treatment

**No response**

**Inadequate response to optimal treatment**

**COMPLEMENTARY INVESTIGATION OR REFERRAL TO SPECIALIST**
- 24-hour esophageal pH monitoring
- Endoscopic or videofluoroscopic evaluation of swallowing
- Esophageal transit study
- Sinus imaging
- High-resolution chest CT scan
- Bronchoscopy
- Echocardiogram
- Environmental evaluation
- Consider the possibility of other rare causes

**OTHER EXAMINATIONS TO CONSIDER:**

**Important general considerations:**
- Optimize the treatment for each diagnosis
- Verify compliance with therapy
- Because of the possibility of more than 1 cause, continue all partially effective treatments

Consider the possibility of several concomitant causes

## PRINCIPAL TREATMENTS FOR COUGH, ACCORDING TO ETIOLOGY

<table>
<thead>
<tr>
<th>Possible causes</th>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute or subacute cough (0-8 weeks)</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Upper respiratory tract infection (usually viral) | - First-generation antihistamines + oral decongestants  
- If subacute: among the therapeutic options, ipratropium and short-acting corticosteroids are both good choices |
| Acute sinusitis | First-generation antihistamines + oral decongestants + antibiotics as needed |
| Asthma exacerbation | - Introduce or increase inhaled corticosteroids, inhaled β2-agonists  
- Oral corticosteroids if severe |
| COPD exacerbation | Bronchodilators, oral corticosteroids, antibiotics |
| Pertussis | Antibiotic (macrolide) – isolate for 5 days |
| **Chronic cough (>8 weeks)** | |
| Asthma | Environmental control and education, bronchial anti-inflammatories, bronchodilators, regular follow-up, action plan |
| Bronchiectasis | Bronchial toilet, bronchodilators*, treatment of secondary infections, surgery* if localized and infections are frequent |
| Chronic bronchitis | Smoking cessation, avoid respiratory irritants, bronchodilators, corticosteroids* |
| Non-asthmatic eosinophilic bronchitis | Inhaled corticosteroids |
| UACS | First-generation antihistamines + oral decongestants or nasal ipratropium |
| Allergic rhinitis | Topical nasal corticosteroids, latest-generation antihistamines |
| Non-allergic rhinitis | Inhaled nasal corticosteroids, nasal ipratropium |
| Chronic rhinosinusitis/Nasal polyposis | Inhaled nasal (oral*) corticosteroids, ENT assessment (surgery*) |
| Gastroesophageal reflux disease | Diet, refrain from eating or drinking 2 hours before bedtime. Avoid alcohol, caffeine, smoking, theophylline, calcium channel blockers, anticholinergics and NSAIDs. Elevate the head of the bed by 10 to 15 cm. Lose weight if obese. Possible medications: proton pump inhibitors, antacids, H2-receptor antagonists, sucralfate, prokinetic agents |
| Cough and pulmonary neoplasia | Treatment of the cause – smoking cessation – non-specific antitussives if too difficult |
| Cough caused by medication | Stop the medication that is responsible |
| Postinfectious cough | - May resolve on its own  
- First-generation antihistamines + oral decongestants, inhaled corticosteroids or nasal ipratropium may help |
| Psychogenic or habit cough | Psychotherapy, non-specific antitussive treatment for a short period* |

* Indicates a therapeutic option that may be useful in certain patients  
Note: Non-specific antitussives may sometimes be used for a very short period if the cough is very debilitating and disrupts sleep.

Authors: Louis-Phillipe Boulet, MD, Respirologist, Department of Respirology, University Institute for Cardiology and Respirology of Quebec, and Chair of Knowledge Transfer, Education and Prevention in Respiratory and Cardiovascular Health, Laval University  
Gilles Côté, MD, Physician-Consultant, Primary Health Care and Public Health Directorate, Health and Social Services Agency of Bas-Saint-Laurent