Diagnosis & Treatment
Of
Cough
a. **Diagnosis:**

- Details History
- Physical Examination
- Investigation

b. **Treatment of cough**
Detail history provides valuables clues for etiology of the cough

- Acute or chronic
- Ass. Symptoms s/o. of Respiratory infection
- Seasonal or ass. with wheezing
- Ass. with symptoms suggestive of post nasal drip or GER
- Ass with fever or sputum? If sputum what’s its character?
- Having any ass. Disease or risk factors
  - like – Cigarette Smoking, Environmental Exp.
- Patient taking an ACE inhibitor?
- Change of voice, weight loss & anorexia
Physical Examination

- Examination of Nose
  - DNS
  - Polyps
  - Nasal Discharge

- Examination of oro-pharynx
  - Erythema of mucosa
  - Post Nasal Drip

- Examination of Chest
  - Inspection
  - Palpation
  - Percussion
  - Auscultation
Investigation

1. Evaluation of Infection
   (a) Microbiological Studies,
   (b) Imaging Studies
   (c) Routine Blood Tests

2. Allergological & Physiological Examination
   (a) Physiological Studies
   (b) Bronchoscopy
   (c) Sputum Examination
   (d) Blood Tests
   (e) Chest CT
   (f) Misc. Studies
1. Evaluation of Inflection

Diagnostic tests to identify pathogens in respiratory tract infections

- Blood cultures
- Sputum smears, e.g. Gram stain
- Sputum cultures
- Culture of throat swabs
- Test performed during bronchoscopy: smears and cultures
  Endobronchial sampling, bronchial washing, BAL, transbronchial biopsy, protected specimen brush
- Transtracheal aspiration: smears and cultures
- Transthoracic needle aspiration: smears and cultures
- Open lung biopsy: smears and cultures
- Immunofluorescence: various samples
- Antigen assays
  Samples include nasal swabs, nasal washings, throat swabs and tonsillar swabs
• Serum antigen detection
  Fungi, cytomegalovirus
• Urine antigen detection
  Legionella, Pneumococcus
• Genetic testing
  DNA probes
  PCR
• Serum antibody detection
  Viruses, Mycoplasma pneumoniae, Chlamidophila,
  Legionella, Coxiella burnetii, Bordetella pertussis and
  fungi

PCR, polymerase chain reaction
# Microbiological Studies

i. **Collection of Sample**: Collect prior to starting Antimicrobial t/t

<table>
<thead>
<tr>
<th>Indirect Sample :-</th>
<th>Sputum</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Urine</td>
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<tr>
<td></td>
<td>Blood</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Direct Sample :-</th>
<th>Tracheal Aspiration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bronchial washing</td>
</tr>
<tr>
<td></td>
<td>Bronchoalveolar lavage</td>
</tr>
<tr>
<td></td>
<td>Transbronchial lung Biopsy</td>
</tr>
</tbody>
</table>
ii. **Rapid Diagnostic Test**: Useful in t/t decisions & Outpatient settings.

- **Sputum Gram Stain**:
  - Useful in Rapid Identification of Bacteria
  - Based on Morphology & staining

- **Special Stains**:
  - Pathogens don’t stain with gram stain
  - T.B. & Non T.B. Mycobacterium – Z.N. stain
  - Fungi – PAS Stain
  - Legionella – Gimenez Stain
Immuno fluorscence :-  Ag - Ab. Complex illuminated under UV light

  Emitted fluorescence examine with a fluorescence microscope e.g. Legionella, Pnemocystitis

Antigen Tests :-
- Detection of Ag in Samples
- Kits are available Commercially for e.g. Pnemoccocal Urinary Antigen, Influenza, RSV

Genetic Tests :-
- DNA probes & PCR
iii. Culture & Identification Test: Sample collect prior to Antimicrobial t/t

- Not suitable for Rapid clinical diagnosis

- Perform to Isolate pathogen and do drugs sensitivity

Bacteria: 
- $10^6 - 10^7$ CFU/ml in Sputum Culture $\rightarrow +$
- $10^3 - 10^4$ CFU/ml in BAL, Bronchial washing $\rightarrow +$

Medium for: 
- Mycobacterium $\rightarrow$ ogawa medium
- Legionella $\rightarrow$ BCYE alfa medium
- Fungus $\rightarrow$ Sabourouds medium
Imaging Studies

- Typical findings on CXR can help confirm a diagnosis of infection.

  a. Lung field Infiltration: - Lobar or Brochopneumonia

  b. Nodules (with or without cavitations) – T.B.
     - Non T.B.
     - Mycobacteriosi
Routine Blood Test

- Peripheral Leukocyte count
- CRP
- ESR

- 3 parameter helps in knowing degree & course of inflammation & t/t effects.
2. Allergological & Physiological Exam.

Table 5.2  Allergy, imaging and physiologic tests in evaluation of cough

- Pulmonary function tests
- Peak flow monitoring
- Airway reversibility
- Airway responsiveness
- Cough receptor sensitivity
- Cough scores, visual analogue scale, QOL questionnaire
- Bronchoscopy
  - Direct visualization, biopsy/brush cytology
- Sputum (Spontaneous, or induced)
  - Cell differential, cytology bacterial smears and culture
- Exhaled nitric oxide
- Exhaled breath condensate
- Blood tests
  - Eosinophil count/percentage
  - Eosinophilic cationic protein (ECP)
  - Total IgE, specific IgE antibody titres
- Allergy skin tests
  - Prick test, scratch test, intradermal test
- Imaging studies
- Upper GI studies
  - Barium swallow, upper GI endoscopy, 24-h pH monitoring

GL, gastrointestinal; QOL, quality of life.
2. Allergological & Physiological Exam.

Physiological Studies

i. PFT:
   - FEV₁
   - FEV₁ / FVC Ratio: Mildly decrease in cough
   - PEF: Variant Asthma
   - MMF: Suggestive Central airways obstruction
   - VC: Often decrease in peripheral airway obstruction
   - FVC: – Interstitial Pneumonia
   - DLCO
   - PAO₂: Hypersensitivity Pneumonitis
ii. **Airway reversibility Test**: FEV$_1$ is measured before and 15-30 minutes after inhalation of B2 agonist.

- **Cough variant asthma**: Pre FEV$_1$ > then Pre FEV$_1$ of classic asthma

- Improvement of coughing after inhalation of B2 agonist is the diagnosis
iii. Airway responsiveness test: Evaluate threshold of bronchial contractility by bronchoconstrictor like {Methacholine, histamine} given by inhalation stating at low dose to higher dose

- Not always specific for diagnosis of cough variant asthma

a. Air sensitivity: Assess by the threshold when constriction first occurs

b. Airway Reactivity: Assess, magnitude of subsequent constriction from the slope of dose–response curve
**Bronchoscopy**

Visual Examination of
- Central Lung tumors
- Endobronchial T.B.
- F.Bodies

If any abnormality found  
- Do Endo bronchial Biopsies
- Brush cytology
- Bronchial wash cytology
- Bacteriology Tests
Blood Test

ECP (Eosinophilic cationic protein) – Marker of airway Inflammation

- Increase in atropic asthma & cough variant asthma

- Blood Eosinophil counts are also used but less specific than ECP
CHEST CT

Central Airway Lesion
- Tumors
- Endobronchial T.B

Parenchymal Lung disorder
- Interstitial pneumonia
- Hyper sensitivity pneumonitis

OTHERS

- Sinus X-Ray

--24 Hours esophageal pH monitoring
TREATMENT

According to – Duration of Cough
  - Type of Cough

  a. Duration of Cough – Acute
     - Sub acute
     - Chronic

  b. Type of Cough – Dry
     - Productive
# Duration of Cough

Guideline for Treating the common causes of Acute Cough

<table>
<thead>
<tr>
<th>Cause</th>
<th>Therapeutic Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common cold</td>
<td>Dexamfetamine, 6 mg, plus pseudophedrine, 120 mg, twice daily for 1 wk, or naproxen, 500-mg loading dose, then 500 mg 3 times daily for 5 days, or ipratropium (0.06%) nasal spray, 2 42-µg sprays per nostril 3 to 4 times daily as needed for 4 days</td>
</tr>
<tr>
<td>Allergic rhinitis</td>
<td>Avoidance of offending allergens</td>
</tr>
<tr>
<td></td>
<td>Loratadine, 10 mg once a day</td>
</tr>
<tr>
<td>Acute bacterial sinusitis</td>
<td>Dexamfetamine, 6 mg, plus pseudophedrine, 120 mg, twice daily for 2 wk</td>
</tr>
<tr>
<td></td>
<td>Oxymetazoline, 2 sprays twice daily for 5 days</td>
</tr>
<tr>
<td></td>
<td>Antibiotic directed against <em>Haemophilus influenzae</em> and <em>Streptococcus pneumoniae</em></td>
</tr>
<tr>
<td>Exacerbation of chronic obstructive pulmonary disease</td>
<td>Antibiotic directed against <em>H. influenzae</em> and <em>S. pneumoniae</em> for 10 days</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Systemic corticosteroids tapered over 2-wk period</td>
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<tr>
<td></td>
<td>Continuous oxygen if PaO$_2$ $\leq$ 55 mm Hg or SaO$_2$ $\leq$ 88%,</td>
</tr>
<tr>
<td></td>
<td>or if PaO$_2$ $\leq$ 59 mm Hg and there is evidence of erythrocythemia or cor pulmonale</td>
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<tr>
<td></td>
<td>Ipratropium, 2 18-μg puffs, plus albuterol, 2 90-μg puffs,</td>
</tr>
<tr>
<td></td>
<td>4 times daily by metered-dose inhaler with spacer</td>
</tr>
<tr>
<td></td>
<td>Cessation of smoking</td>
</tr>
<tr>
<td>Bordetella pertussis infection</td>
<td>Erythromycin, 500 mg 4 times daily for 14 days, or (if allergic)</td>
</tr>
<tr>
<td></td>
<td>trimethoprim–sulfamethoxazole, 160 mg–800 mg twice daily for 14 days</td>
</tr>
</tbody>
</table>
# Guidelines for Treating the most common causes of Subacute Cough

<table>
<thead>
<tr>
<th>Cause</th>
<th>Therapeutic Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postinfection</td>
<td>Dexbrompheniramine plus pseudoephedrine for 1 wk, or ipratropium (0.06%) nasal spray for 1 wk. Ipratropium, 4 18-μg puffs 4 times daily by metered-dose inhaler with spacer for 1–3 wk. Systemic corticosteroids tapered over period of 2–3 wk. Central antitussives</td>
</tr>
<tr>
<td>B. pertussis infection</td>
<td>Erythromycin for 14 days, or (if allergic) trimethoprim–sulfamethoxazole</td>
</tr>
</tbody>
</table>
Subacute bacterial sinusitis

- Dexampheniramine plus pseudoephedrine for 3 wk
- Oxymetazoline for 5 days
- Antibiotic directed against *Haemophilus influenzae* and *Streptococcus pneumoniae*

Asthma

- Beclomethasone, 4 42-μg puffs twice daily by metered-dose inhaler with spacer or other equivalent
- Albuterol, 2 90-μg puffs as needed, up to 4 times daily by metered-dose inhaler with spacer
### Guidelines for Treating the most common causes of Chronic Cough

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>THERAPEUTIC OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postnasal-drip syndromes</td>
<td>Dexbrompheniramine plus pseudoephedrine for 3 wk, or ipratropium (0.06%) nasal spray for 3 wk</td>
</tr>
<tr>
<td>Nonallergic rhinitis</td>
<td></td>
</tr>
<tr>
<td>Allergic rhinitis</td>
<td>Avoidance of offending allergens</td>
</tr>
<tr>
<td></td>
<td>Loratadine, 10 mg once a day</td>
</tr>
<tr>
<td>Vasomotor rhinitis</td>
<td>Ipratropium (0.06%) nasal spray for 3 wk and then as needed</td>
</tr>
<tr>
<td>Chronic bacterial sinusitis</td>
<td>Dexbrompheniramine plus pseudoephedrine for 3 wk</td>
</tr>
<tr>
<td></td>
<td>Oxymetazoline for 5 days</td>
</tr>
<tr>
<td></td>
<td>Antibiotic directed against <em>Haemophilus influenzae</em>, <em>Streptococcus pneumoniae</em>, and anaerobes in the mouth</td>
</tr>
<tr>
<td>Asthma</td>
<td>Beclomethasone by metered-dose inhaler with spacer</td>
</tr>
<tr>
<td></td>
<td>Albuterol by metered-dose inhaler with spacer as needed</td>
</tr>
<tr>
<td>Condition</td>
<td>Treatment</td>
</tr>
<tr>
<td>----------------------------------</td>
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</tbody>
</table>
| Gastroesophageal reflux disease  | Modifications of diet and lifestyle†  
                                | Acid suppression  
                                | Prokinetic therapy |
| Chronic bronchitis               | Elimination of irritant  
                                | Ipratropium, 2 18-μg puffs 4 times daily by metered-dose inhaler with spacer |
| Angiotensin-converting-enzyme inhibitors | Discontinuation of drug |
| Eosinophilic bronchitis          | Inhaled budesonide, 400 μg twice daily for 14 days |
Type of Cough

a. Dry Cough – Antihistamine,
   - Decongestant

b. Productive Cough – Expectorant
   - Mucolytics
   - Decongestant
   - Antihistamine with Low Atropine like activity
<table>
<thead>
<tr>
<th>Cough Suppressants</th>
<th>Expectorants</th>
<th>Mucolytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextromethorphan</td>
<td>Ammonium Salts</td>
<td>Acetyl Cysteine</td>
</tr>
<tr>
<td>Guaiapate</td>
<td>Guacitsal</td>
<td>Ambroxol HCL</td>
</tr>
<tr>
<td>Noscapine</td>
<td>Guaiacol</td>
<td>Bromohexine</td>
</tr>
<tr>
<td>Pholcodine</td>
<td>Guaiphensin</td>
<td>Carbocistines</td>
</tr>
<tr>
<td>Piperidion</td>
<td>Ipecacuanha</td>
<td>Telmesteine</td>
</tr>
<tr>
<td>Sodium Dibunate</td>
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</table>
Complication of Cough

a. Non Specific Complaints – Fatigue
   - Anorexia
   - Nausea & Vomiting

b. Musculoskeletal Complaints – Ribs Fracture
   - Stretching & Pulling of Intercostals muscles
   - Frank rupture of muscles e.g. Rectus Abdominal muscles

c. Severe Coughing
   - Pneumothorax
   - Pneumomediastinum
   - Cough Syncope
All the best.........