Chronic cough

Self study materials for students
6th year, Internal Medicine, Pulmonology circle
Topic 1. Management of patients with chronic cough syndrome

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Definition

Cough (Latin: **tussis**):

1) is a sudden and often repetitively occurring reflex which helps to clear the large breathing passages from secretions, irritants, foreign particles and microbes;

2) is an expelling of air or solid matter from the lungs abruptly and explosively through the partially closed vocal chords.

Cough reflex

- Cough reflex is the basis of cough as a protective mechanism.
- Coughing may be initiated either voluntarily or reflexively.
- It has both sensory (*afferent*) and motor (*efferent*) components.
- Pulmonary irritant receptors (*cough receptors*) in the epithelium of the respiratory tract are sensitive to both mechanical and chemical stimuli.

Physiology

- Stimulation of the cough receptors by foreign particles (dust, mucus, etc.) produces a cough, which is necessary to remove the foreign material from the respiratory tract before it reaches the lungs.
- The anatomical structures that perform ***afferent*** component of cough reflex are *cough center* (in medulla), *vagus nerve*, *irritant receptors* (in trachea and larynx).

Physiology

- The ***efferent*** neural pathway brings relevant signals back from the *cerebral cortex* and *medulla* via the *vagus* and *superior laryngeal nerves* to the *glottis, external intercostals, diaphragm*, and *other major inspiratory and expiratory muscles.*

Physiology

https://www.youtube.com/watch?v=4Tcfp5Kf2WE

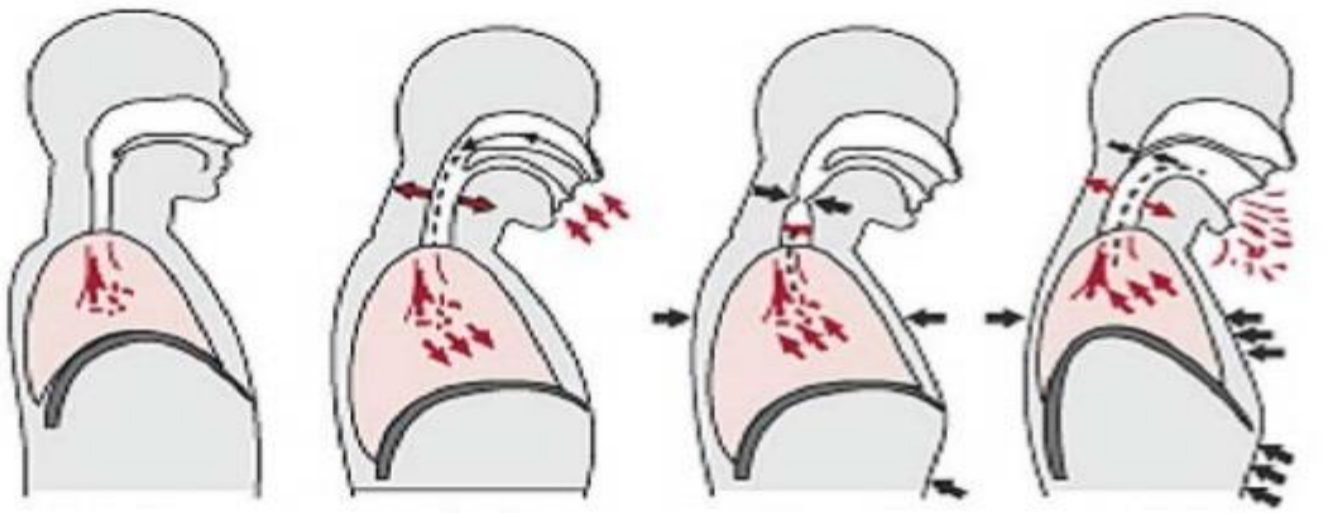
Cough mechanism

- Diaphragm and external intercostal muscles contract, creating a negative pressure around the lung.
- Air rushes into the lungs in order to equalise the pressure.
- The glottis closes and the vocal cords contract to shut the larynx.

Cough mechanism

- The abdominal muscles contract to accentuate the action of the relaxing diaphragm (to increase the pressure of air within the lungs).
- The vocal cords relax and the glottis opens, releasing air at over 100 mph.
- The bronchi and non-cartilaginous portions of the trachea collapse to form slits through which the air is forced, which clears out any irritants attached to the respiratory lining.

Cough phases



Irritation Inspiration Compression Expulsion

http://web.missouri.edu/~danneckere/pt316/case/pulm/cough-4phases.jpg

Summary

The cough starts with a deep inspiration followed by glottic closure, relaxation of the diaphragm, and muscle contraction against a closed glottis.

It is the **most frequent symptom** of respiratory disease.

Classification

- Duration
- Quality
- Characteristic
- Timing

http://img.thesun.co.uk/aidemitlum/archive/00874/cough-280_874576a.jpg

Duration

- Acute (< 3 weeks)
- Subacute (3 – 8 weeks)
- Chronic (> 8 weeks)

http://images.wisegeek.com/man-coughing-in-red-shirt.jpg

Quality

Dry
(non-productive)

- Laryngitis
- Dry pleurisy
- Smoking cough
- Debut of diseases

Wet
(productive)

- Acute viral diseases
- Bronchitis
- Pneumonia
- Tuberculosis
- Bronchiectatic disease

Characteristic

- Barking = Croup
- Whooping = Pertussis
- Staccato
- Hoarse
- Brassy
- Rattling
- Loose
- Moist
- Bovine
- Wheezy

Timing

- Morning cough (“wash up cough”) – smokers cough
- Day cough
- Night cough (“nocturnal cough”)
- All day long cough

- Spring/Autumn – allergological cough
- Winter – asthma, bronchitis, ARD

Threatening symptoms

- Cough with increasing intensity that lasting for week and more
- Cough accompanied by hyperthermia above 38 °C during 3 days or more
- Cough accompanied by dyspnea and thoracic pain on breathing
- Hemoptysis
- Cough with dyspnea
- Cough, weakness and weight loss

Threatening symptoms

- Excessive sweating, shivering
- Sudden attack of severe cough
- Severe cough during an hour without any interval
- Abundant expectoration of sputum

Chronic cough

- **Chronic cough** is defined as lasting eight weeks or longer in adults, four weeks in children.

http://www.productive-cough.com/wp-content/uploads/2014/11/productive-cough-treatment.jpg

Epidemiology

- A cough is the most common reason for visiting a primary care physician in the United States.
- Chronic cough is estimated to occur in up to 40% of the population.
- Risk factors include atopy and smoking. Cough may be work-related and a thorough occupation history is very important in assessment.

Etiology

- An ***exogenous*** source
(smoke, dust, fumes, foreign bodies, patogens)

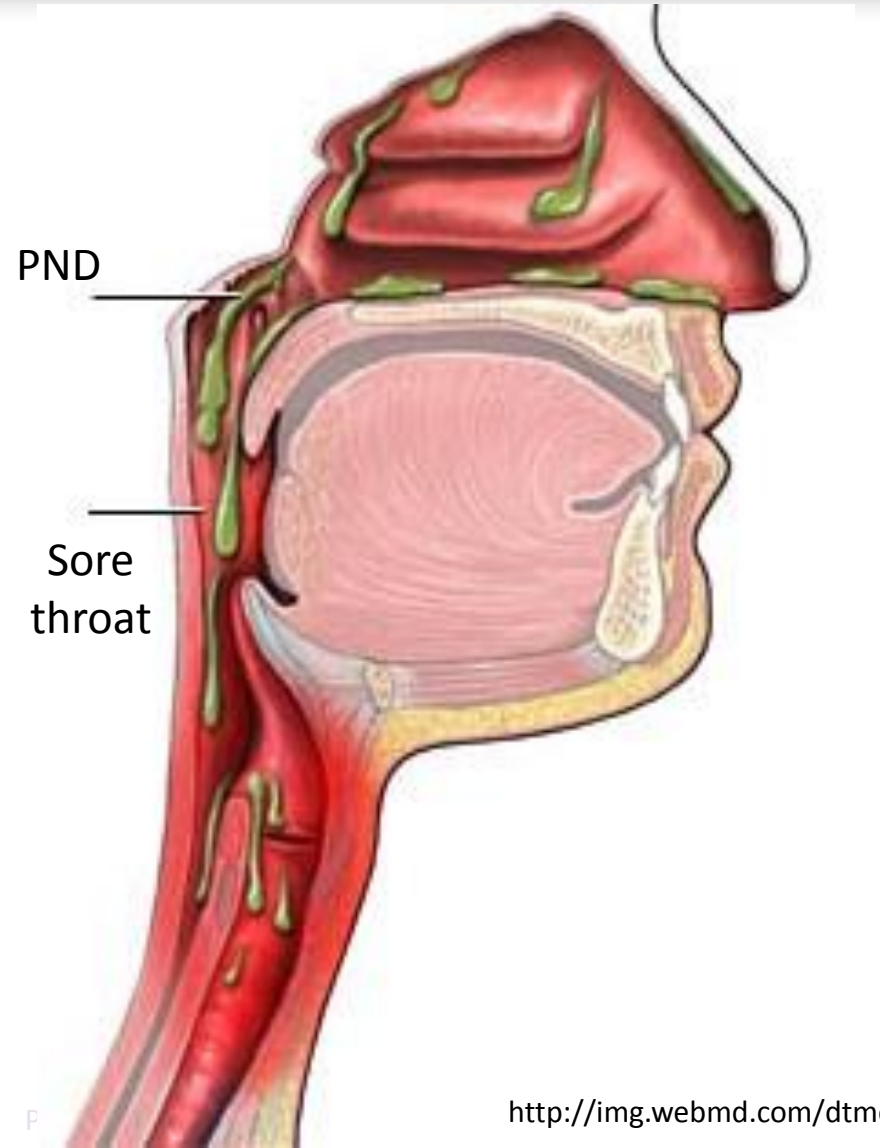
- An ***endogenous*** origin
(upper airway secretions, gastric contents, patogens)

These factors result in ***inflammation, constriction, infiltration***, or ***compression*** of airways and are associated with cough.

Common causes

- Postnasal drip (38-87%)
- Asthma (14-43%)
- GERD (10-40%)
- COPD (0-12%)
- More than one cause (24-72%)

Post-nasal drip



Post-nasal drip (PND) - a drop-by-drop discharge of nasal mucus into the posteriorpharynx caused by *rhinitis,chronic sinusitis*, or *hypersecretion* by the nasopharyngeal mucosa.

http://img.webmd.com/dtmcms/live/webmd/consumer_assets/site_images/media/medical/hw/n1820.jpg

Post-nasal drip

- Caused by allergic and infection otolaryngologic diseases
- Often accompanied by a feeling of obstruction, an unpleasant taste, and fetid breath
- Treatment include the application of drops or sprays of phenylephrine or epHEDrine sulfate to constrict blood vessels and reduce hyperemia, sinusirrigation to improve drainage and use of appropriate antibiotics

Post-nasal drip

- Therapy for allergies may be indicated in some cases, and surgery maybe required if the nasal passages are obstructed by polyps or a deviated septum.

http://i.doctorpiter.ru/photos/2012/11/350x650_Xf78ljyq4BLt89YSeqK2.jpg

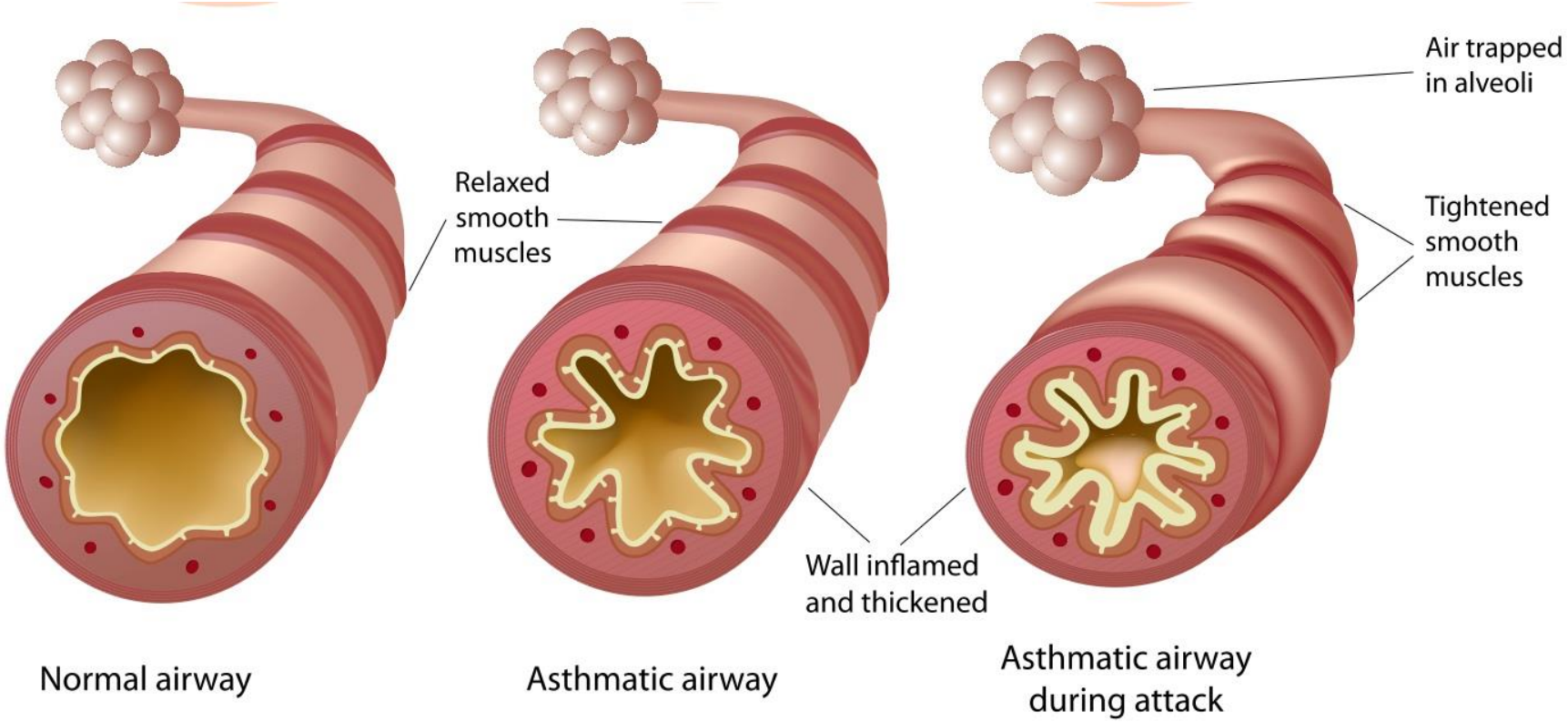
Asthma

Asthma is a common chronic inflammatory disease of the airways characterized by variable and recurring symptoms, reversible airflow obstruction and bronchospasm.

http://www.webwhispering.net/wp-content/uploads/2011/01/AsthmaWoman.jpg

Asthma

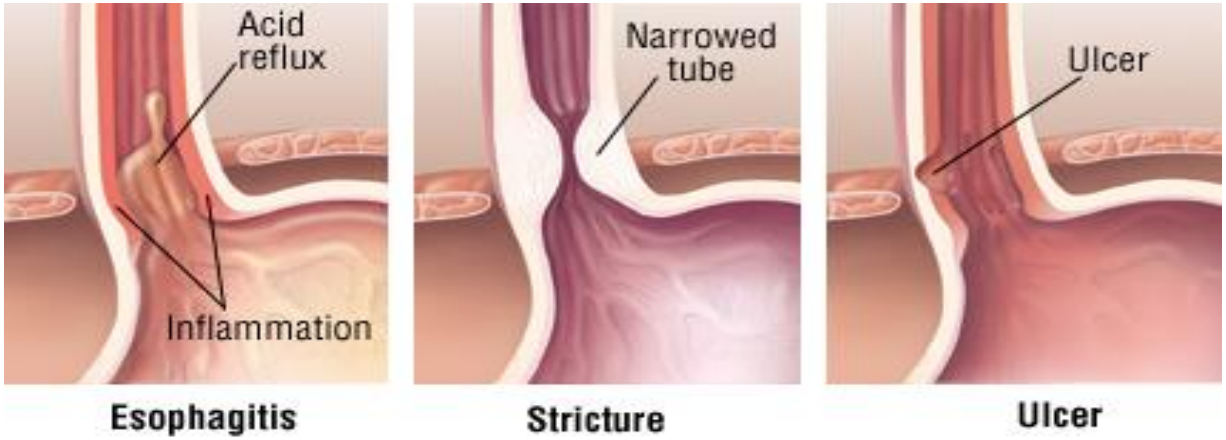
Common symptoms include wheezing, coughing, chest tightness, and shortness of breath.



http://cdn-2.normalbreathing.com/d/asthma-bronchoconstriction-mechanism.jpg

GERD

Gastroesophageal reflux disease (GERD) is a chronic condition in which the lower esophageal sphincter allows gastric acids to reflux into the esophagus, causing heartburn, acidi ndigestion, and possible injury to the esophageal lining.



http://www.drugs.com/health-guide/images/205069.jpg

GERD

There are two main mechanisms of cough in GERD:

- Micro or macro-aspiration of esophageal contents into the tracheo-bronchial tree.
- Acid in the distal esophagus stimulating a vagally mediated esophageal-tracheobronchial cough reflex.

COPD

- **Chronic obstructive pulmonary disease (COPD)** is the set of progressive lung diseases that characterized by irreversible airway obstruction.

http://pngimg.com/upload/cigarette_PNG4763.png

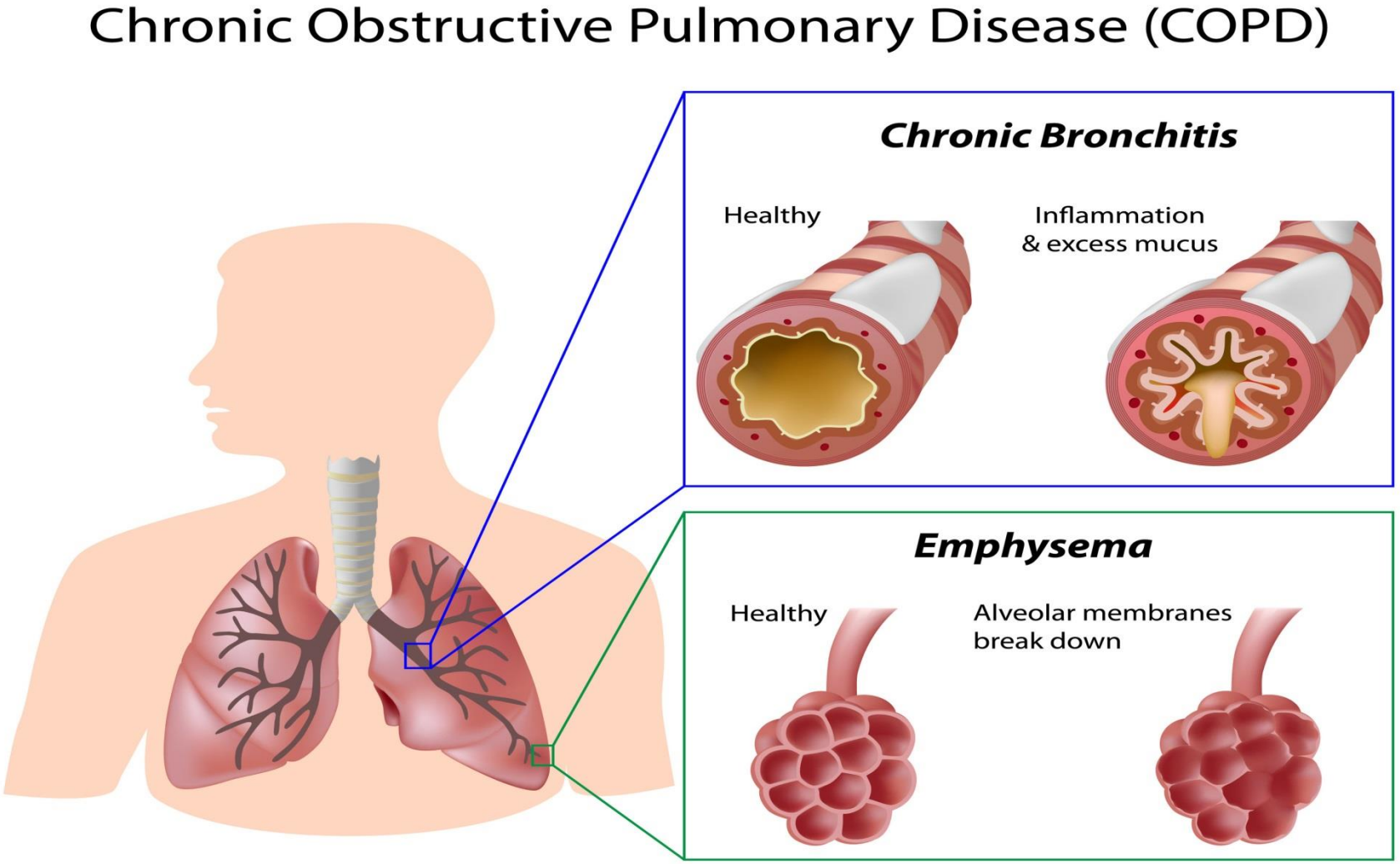
COPD

COPD includes:

- **Chronic Bronchitis** is characterized by
  - Chronic inflammation and excess mucus production
  - Presence of chronic productive cough

- **Emphysema** is characterized by
  - Damage to the small, sac-like units of the lung that deliver oxygen into the lung and remove the carbon dioxide
  - Chronic cough

COPD



http://www.earthtimes.org/newsimage/tai-chi-therapy-copd_29812.jpg

COPD

Causes:

- ***Smoking***
- ***Occupational exposures***
- ***Air pollution***
- ***Genetics***

Less common causes

- Bronchiectasis
- Use of ACE inhibitors
- Post-infectious
- Lung Cancer
- Occult congestive heart failure
- Interstitial Pulmonary Fibrosis
- Occult infection
- Foreign body

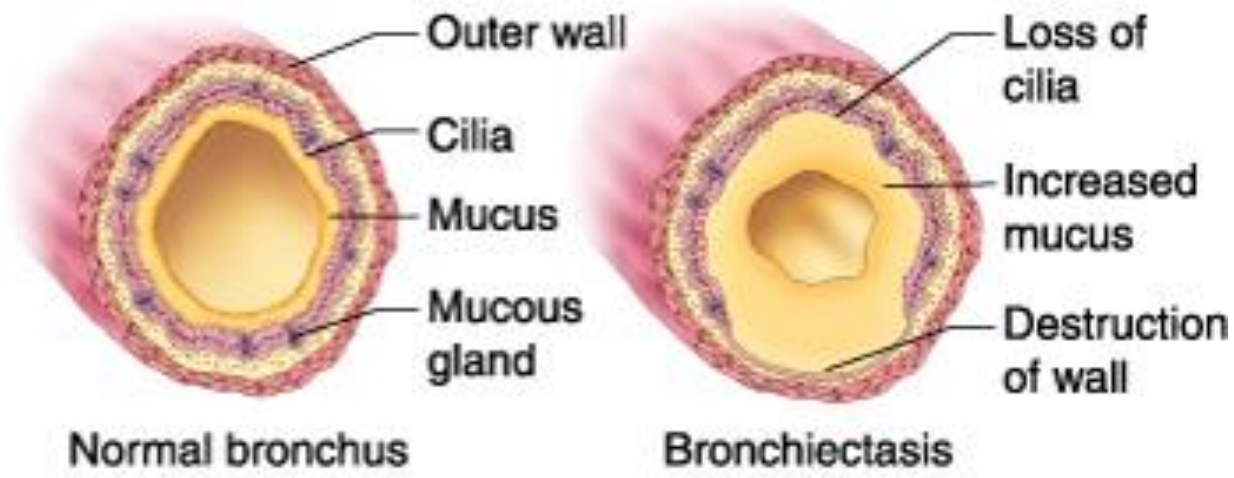
Less common causes

- Problems with:
  - Auditory canal
  - Larynx
  - Diaphragm
  - Pleura
  - Pericardium
  - Esophagus
- Psychogenic (habitual cough)

Bronchiectasis

Bronchiectasis is a disease in which there is permanent enlargement (widening, dilatation) of parts of the airways of the lung. Symptoms typically include a chronic cough with sputum production.

Bronchiectasis



http://www.mdguidelines.com/images/Illustrations/bronchie.jpg

Use of ACE inhibitors

- **Angiotensin-converting-enzyme inhibitors** (**ACE inhibitors**) are a group of medicaments used primarily for the treatment of arterial hypertension and congestive heart failure.
- Frequently prescribed ACE inhibitors include *perindopril, captopril, enalapril, lisinopril*, and *ramipril.*

http://shop.farmvet.com/c.1220551/images/item-pics/enalapril-Maleate-lg.jpg

Use of ACE inhibitors

- ACE inhibitors cause a nonproductive cough in 5 to 20% of patients.
- The cough is usually dry and hacking.
- This effect is not dose related, and the cough may begin 1 week to 6 months after therapy is initiated.

http://www.rxvietnamstore.com/product_images/v/519/CAPTOPRIL_25mg__71878_zoom.jpg

Use of ACE inhibitors

- The cough should spontaneously resolve a few days to several weeks after the ACE inhibitor is discontinued.
- A 4 week trial of withdrawal is usually sufficient to determine whether the medication caused the cough.

http://www.dhgpharma.com.vn/dhg/images/stories/virtuemart/product/perindopril_4_4f4e2e9f2b942.jpg

Psychogenic cough

- **Psychogenic cough ("habit cough" or "tic cough")** is a persistent cough due to a tic or to psychological causes.
- May be the cause in the absence of a physical problem.
- Common in children, women, hypochondriacs.
- Characterized by a small, harsh tinny type sound, and becomes persistent for weeks to months.

Psychogenic cough

- Can reach severe frequency, even a cough every 2–3 seconds.
- These patients do not cough during sleep, are not awakened by cough, and generally do not cough during enjoyable distractions.
- Any other pathologic cough will not totally stop at night.
- A habitual cough is a diagnosis of exclusion.

Psychogenic cough

Google

Creating hypochondriacs since 1998!

http://i.dailymail.co.uk/i/pix/2013/10/02/article-0-1870C3F100000578-315_634x635.jpg

Complications

Acute:

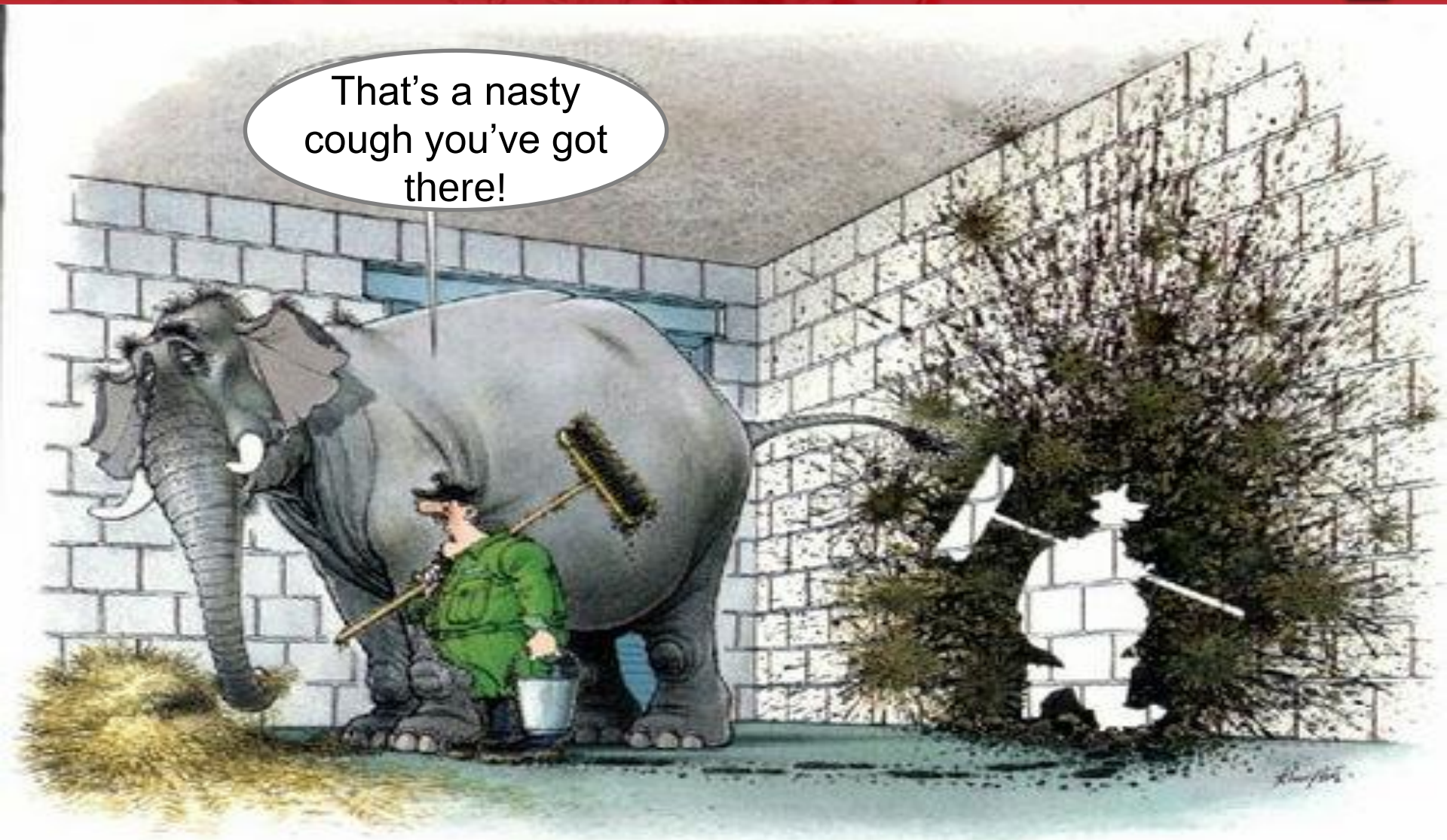
- Cough syncope
- Insomnia
- Womiting
- Pneumothorax, pneumomediastinum, subcutaneous emphysema
- Subconjunctival hemorrhage (red eye)
- Coughing defecation and urination

Complications

Chronic:

- Abdominal or pelvic hernias
- Fatigue fractures of lower ribs
- Costochondritis

Complications



https://c1.staticflickr.com/1/3/4573720_b681299daf.jpg

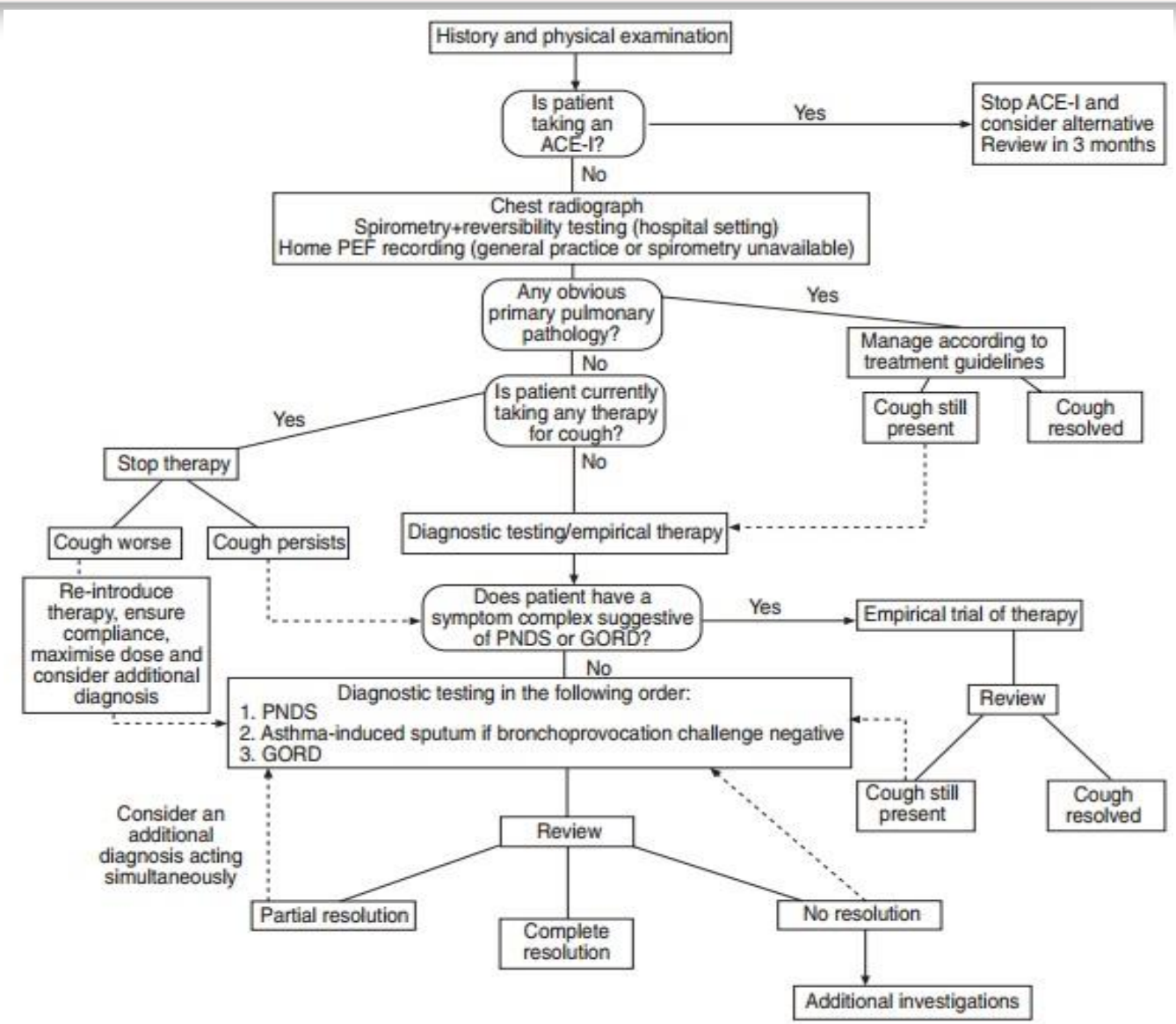
Red Flags

- Massive sputum production (***bronchiectasis***).
- Systemic symptoms - fever, sweats, weight loss (***tuberculosis, lymphoma, bronchial carcinoma***).
- Haemoptysis (***tuberculosis, bronchial carcinoma***).
- Significant dyspnoea (***heart failure, COPD, fibrotic lung disease***).

Diagnostics

- Detailed history
- Physical examination
- Laboratory tests
- Chest radiography
- Pulmonary function testing
- Gross and microscopic examination of sputum
- High-resolution computed tomography (HRCT)
- Fiberoptic bronchoscopy

Algorithm



Treatment

http://www.bonkersinstitute.org/showpics/bayer1901.gif

Medicines

These groups of drugs are used for **symptomatic** cough care:

- Antitussives
- Expectorants
- Mucolytics

Antitussives

- **Antitussives** are agents that suppress cough by depressing the cough center in the medulla oblongata or the cough receptors in the throat, trachea, or lungs.

Antitussives

There are 3 groups of antitussives:

1. **Centrally acting** antitussives:

- ***narcotics*** (Codeine, Hydrocodone)
- ***non-narcotics*** (Dextromethorphan, Sinecod)

2. **Locally acting** agents (throat lozenges, cough drops, syrups) may suppress cough by increasing the flow of saliva and by containing demulcents or local anesthetics to decrease irritation of pharyngeal mucosa (Libexin, Linkus).

3. **Combined** (Tussin DM = Dextromethorphan + Guaifenesin)

Antitussives

The only indication is a dry, hacking, **non-productive cough** that interferes with rest and sleep. It occurs:

- Laryngitis
- Tumors of airways
- Pleuritis
- Debut of ARD
- COPD

http://www.ve.all.biz/img/ve/catalog/7573.jpeg

Antitussives. Precautions.

It is not desirable to suppress a **productive cough** due to a risk of mucus congestion. So you shouldn't use them:

- Acute bronchitis
- Pneumonia
- Cystic fibrosis
- Etc.

https://www.ubuy.com.kw/images/productImages/3659/3659-242012154550.jpg

Expectorants

- **Expectorants** increase the amount or hydration of secretions, resulting in more yet clearer secretions and as a byproduct lubricating the irritated respiratory tract.

http://ingalin.ru/wp-content/uploads/2014/01/grudnoj-sbor-dlya-detej.jpg

Expectorants

- **Guaifenesin** is the most commonly used expectorant. It is available alone and as an ingredient in many combination cough and cold remedies.
- **Other expectorants** (hot beverages, potassium iodide) stimulate production of watery mucus.

https://www.medicinep.com/wp-content/uploads/2011/12/guaifenesin.jpg

Mucolytics

- **Mucolytics** dissolve thick mucus by dissolving various chemical bonds within secretions and is usually used to help relieve respiratory difficulties.
- Ambroxol and **Acetylcysteine (Mucomyst, ACC)** are the only agents recommended for use as mucolytics.

https://cdn-img.aponeo.de/06197481-acc-akut-600-brausetabletten-b1.jpg

Expectorants & Mucolyeics

- Both **expextorants** and **mucolytics** help to liquefy respiratory secretions and allow for their easier removal.
- Sometimes they are united in one group of drugs – **mucokinetics.**

Other drugs

http://cdn.someecards.com/someecards/usercards/1342056317524_5416634.png

Summary

- These drugs may relieve symptoms but do not cure the disorder causing the symptoms.

Summary

- The patient should avoid eating and drinking for approximately 30 minutes after taking cough syrups.
  - Food or fluid removes the medication from the throat.

Summary

- Don’t try to cure the chronic cough. Try to find and cure the **reason** of the cough!!!

Thank you